Environmental and Social Impact Assessment - Vol II

Huadian Dak Lak Wind Power Project

China Huadian Engineering Co.,Ltd

28 March 2022

Project No.: 0599549

The business of sustainability

ERM

Document details	
Document title	Environmental and Social Impact Assessment - Vol II
Document subtitle	Huadian Dak Lak Wind Power Project
Project No.	0599549
Date	28 March 2022
Version	Final
Author	ERM Vietnam
Client Name	China Huadian Engineering Co.,Ltd

Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
Draft	0.0	ERM Vietnam	Tram Le, Claire Weller, Hanh Nguyen	Paola Romero	31.08.2021	Issued to Client
Draft	1.0	ERM Vietnam	Tram Le, Hanh Nguyen	Paola Romero	28.10.2021	Addressed comments
Draft	2.0	ERM Vietnam	Tram Le, Hanh Nguyen	Paola Romero	10.12.2021	Addressed comments
Final	3.0	ERM Vietnam	Tram Le, Hanh Nguyen	Paola Romero	28.03.2022	Final issuance

Signature Page

28 March 2022

Environmental and Social Impact Assessment - Vol II

Huadian Dak Lak Wind Power Project

Paola Romero
Partner in Charge

ERM Vietnam
3rd Floor, Saigon Finance Centre
09 Dinh Tien Hoang, Dakao Ward
District 1, Ho Chi Minh City
Vietnam

CONTENTS

7. ENVIRONMENTAL BASELINE 1
7.1 Introduction 1
7.2 Climate and Meteorology 1
7.2.1 Temperature 2
7.2.2 Relative Humidity 3
7.2.3 Rainfall 4
7.2.4 Evaporation 5
7.2.5 Sun Hours 6
7.2.6 Wind Regime 6
7.2.7 Natural Hazards 12
7.3 Topography and Terrain 16
7.4 Geology Conditions 17
7.4.1 Geological Conditions in KB1 and KB 2 Project's Areas 17
7.4.2 Geological Conditions in Cu Ne 1 and Cu Ne 2 Project's Areas 18
7.4.3 Geological Conditions in Substation and 220 kV Transmission Line's Area 18
7.5 Hydrology 19
7.5.1 Hydrological Conditions in Dak Lak Province 19
7.5.2 Hydrological Conditions in the Project Area 19
7.6 Noise Baseline 21
7.6.1 Noise Monitoring Locations 22
7.6.2 Noise Monitoring Procedure 24
7.6.3 Noise Monitoring Results 24
8. BIODIVERSITY BASELINE 30
8.1 Methodology 30
8.1.1 Desktop Review 30
8.1.2 EAAA Identification 33
8.1.3 Flora and Fauna Field Survey 33
8.1.4 Critical Habitat Assessment 33
8.2 Baseline Results 35
8.2.1 Desktop Review Results 35
8.2.2 Flora and Fauna Surveys 42
8.2.3 Identification of the EAAA 63
8.2.4 Critical Habitat Assessment 68
9. SOCIAL BASELINE 79
9.1 Introduction 79
9.1.1 Introduction to the Chapter 79
9.2 Methodology 79
9.2.1 Research Area 79
9.2.2 Data Collection 80
9.2.3 Data Analysis 84
9.2.4 Limitations 85
9.3 National Socio-Economic Context 85
9.3.1 Demographic Profile 85
9.3.2 Institutional Context 86
9.3.3 Economy and Industry 88
9.3.4 Renewable Energy Planning and Development 90
9.4 Regional Socio-Economic Context 91
9.4.1 Overview of the Central Highlands 91
9.4.2 Demographic Profile 92

9.4.3 Economic Development 93
9.4.4 Renewable Energy Planning and Development 93
9.5 Local Socio-Economic Context 94
9.5.1 Provincial Level: Dak Lak 94
9.5.2 District Level: Krong Buk 110
9.5.3 Commune Level 121
9.5.4 Village Level 139
9.6 Household-Levelled Socio-Economic Analysis 151
9.6.1 Demographic Profile 151
9.6.2 Livelihood Engagement 158
9.6.3 Income and Expenditure 171
9.6.4 Housing Conditions 179
9.6.5 Land Holdings 186
9.6.6 Health Care 189
9.6.7 Access to Public Infrastructure 192
9.6.8 Local Electricity Supply 192
9.6.9 Community and Social Relations 199
9.7 Vulnerability Analysis 202
9.7.1 Definition of Vulnerable Households 202
9.7.2 Vulnerability Analysis of Project Affected Areas 204
9.7.3 Vulnerability Analysis Based on the Household Survey 208
9.7.4 Support Schemes for Different Vulnerability Categories 216
9.8 Ethnic Minorities Issues 218
9.8.1 Ethnic Minorities in Vietnam 218
9.8.2 Ethnic Minorities in Dak Lak Province 222
9.8.3 Ethnic Minorities in Krong Buk District 224
9.8.4 Characteristics of Ede Ethnic Minority Group 226
9.9 Gender Analysis 233
9.9.1 Women's Rights and Gender Equality 233
9.9.2 Gender and Sustainable Development Goals 233
9.9.3 Gender and Renewable Energy Sector 235
9.9.4 Gender Equality Implementation 236
9.9.5 Gender Policy Implementation Mechanisms 240
9.9.6 Gender Equality Implementation in Dak Lak Province 242
9.9.7 Gender Equality Implementation in Krong Buk District 244
9.9.8 Gender Equality Implementation in Commune Level 245
9.9.9 Gender Analysis Based on the Household Survey 247
9.10 Human Rights Considerations 262
9.10.1 Human Rights in International Context 262
9.10.2 Human Rights in National Context 272
9.10.3 Human Rights in Local Context 281

REFERENCES 284

APPENDIX C DETAILS NOISE MONITORING REPORT

APPENDIX D LIST OF SPECIES RECORDED IN PROTECTED AREAS AND KEY BIODIVERSITY AREAS WITHIN 50 KM RAIDUS FROM THE PROJECT

APPENDIX E LIST OF INVASIVE SPECIES IN VIETNAM.

APPENDIX F BIRD AND BAT SURVEY – MAY 2021

APPENDIX G FLORA AND FAUNA SURVEY – JULY 2021

APPENDIX H BIRD SURVEY – DECEMBER 2021

APPENDIX I COMPILED LIST OF IDENTIFIED SPECIES FROM FIELD SURVEYS
APPENDIX J CRITICAL HABITAT ASSESSMENT
APPENDIX K LIST OF INTERVIEWS AND QUESTIONAIRE FOR NON-VOLANT MAMMALS

List of Tables

Table 7.1 Average/Minimum/Maximum Monthly Temperature at Buon Ma Thuot Station over the Period of 1987 – 2018 [Celsius Degree] 2
Table 7.2 Relative Humidity Recorded in Buon Ma Thuot Station [%] 3
Table 7.3 The Average Rainfall during the Period of 1987 – 2018 [mm] 4
Table 7.4 The Monthly Average Evaporation [mm] 5
Table 7.5 The Monthly Average Sun Hours [hours] 6
Table 7.6 Summary of Wind Met Masts Located at the Project's Sites 7
Table 7.7 Wind Frequency at Two Different Height of 118 m and 98 m 8
Table 7.8 The Average Wind Speed Recorded in Buon Ma Thuot Station [m/s] 9
Table 7.9 The Maximum Wind Speed at Buon Ma Thuot Station [m/s] 10
Table 7.10 The Appearance Frequency of Wind Speed at Different Height 11
Table 7.11 Standardised Wind Pressure in 10 Years and 20 Years 12
Table 7.12 The Average Thunderstorm Days in Buon Ma Thuot Station 14
Table 7.13 IFC General EHS Guidelines on Noise Level 22
Table 7.14 Summary of Noise Measurement Locations 22
Table 8.1 Critical Habitat Criteria 34
Table 8.2 Critically Endangered and Endangered Species within the Ecoregion 35
Table 8.3 Presence of Important Conservation Areas within 50 km Radius of the Project 35
Table 8.4 Protected Areas within 50km Radius of the Project Area 37
Table 8.5 KBA within 50 km Radius of the Project 40
Table 8.6 Invasive Species in Dak Lak Province 42
Table 8.7 Weather Description during the First and Second Surveys 43
Table 8.8 Summary of Survey Methodologies 45
Table 8.9 Habitat Descriptions at Each Transect/Sampling Plot 50
Table 8.10 Flora Species of Conservation Concern Recorded during Site Surveys 51
Table 8.11 Species that are Likely to be Impacted by the Project Recorded from Field Surveys 55
Table 8.12 Land Classification within Project EAAA 64
Table 8.13 Land Classification within Project Boundary 64
Table 8.14 Summary of Numbers of Candidate Critical Habitat Identifed from PAs and KBAs 68
Table 8.15 Summary of Numbers of Candidate Species from IBAT 68
Table 8.16 Summary of Numbers of Candidate Species from ebird 69
Table 8.17 Modification-tolerant Candidate Species Identified from Desktop Review that Potentially Occur in the EAAA 69
Table 8.18 Candidate Critical Habitat Species Identified from Field Surveys 70
Table 8.19 Critical Habitat Assessment Results (for candidate species) 72
Table 9.1 Surveyed Communes Affected by Project Components 80
Table 9.2 Research Sample by Geographical Location and Research Method 81
Table 9.3 Targets Set in PDP VII for Renewable Energy by 2020, 2025, and 2030 91
Table 9.4 Population of Provinces in the Central Highlands 92
Table 9.5 Wind Power Projects Proposed to be Supplemented in Vietnam 94
Table 9.6 Wind Power Projects Proposed to be Supplemented in the Central Highlands 94
Table 9.7 Population Distribution by Gender and Residential Area in Dak Lak 2017-2020 97
Table 9.8 Workforce Distribution by Gender and Residential Area in Dak Lak 2017-2019 98
Table 9.9 Planted Area of Rice and Other Crops in Dak Lak 2020 102
Table 9.10 Planted Area and Production of Some Perennial Crops in Dak Lak 2020 103
Table 9.11 Wind Power Development to 2020 with a Vision to 2030 of Dak Lak Province 105
Table 9.12 Main Agricultural Export Items in Dak Lak 2019 106

Table 9.13 Education System of Dak Lak Province in the School Year 2019-2020 107
Table 9.14 Number of Communes and Villages in Krong Buk District 111
Table 9.15 Planted Area, Average Yield, and Productivity of Winter-Spring Crops in Krong Buk District 2020 117
Table 9.16 Education System in Krong Buk District 2020-2021 119
Table 9.17 Overview of the Surveyed Communes 122
Table 9.18 Education System in Cu Pong Commune 2019-2020 129
Table 9.19 Characteristics of *Buôn* and *Thôn* 139
Table 9.20 Demographic Features of the Surveyed Villages 142
Table 9.21 Local Schools in the Surveyed Villages 145
Table 9.22 Livelihoods Structure of Surveyed Villages 149
Table 9.23 Surveyed Households and Population by Commune 151
Table 9.24 Length of Residency of the Surveyed Population 153
Table 9.25 Average Household Size of the Surveyed Households 153
Table 9.26 Surveyed Population by Age Group 154
Table 9.27 Surveyed Population by Religion 154
Table 9.28 Surveyed Population by Marital Status 155
Table 9.29 Surveyed Population by Literacy 156
Table 9.30 Surveyed Population by Educational Attainment 156
Table 9.31 Main Livelihoods of the Surveyed Working Population 158
Table 9.32 Surveyed Working People with Land-based Livelihoods 159
Table 9.33 Main Crops in the Surveyed Communes 166
Table 9.34 Challenges in Agricultural Production 169
Table 9.35 Surveyed Working People with Wage-based Livelihoods 169
Table 9.36 Surveyed Working Population with Supplementary Livelihoods 171
Table 9.37 Average Monthly Incomes per Household and per Capita 172
Table 9.38 Average Monthly Household Income Structure 173
Table 9.39 Average Monthly Expenditures per Household and per Capita 174
Table 9.40 Irregular Expenditures of the Surveyed Households 175
Table 9.41 Average Monthly Household Expenditure Structure 176
Table 9.42 House Ownership by the Surveyed Household 179
Table 9.43 Length of Residence in the House by the Surveyed Population 179
Table 9.44 House Materials in the Surveyed Communes 182
Table 9.45 Household Vehicles Owned by the Surveyed Household 182
Table 9.46 Ownership of Household Assets 183
Table 9.47 Local Water Sources of Surveyed Households 184
Table 9.48 Cooking Energy Sources of the Surveyed Households 185
Table 9.49 Different Types of Land Holdings of the Surveyed Households 186
Table 9.50 Annual Crops Land Ownership of the Surveyed Households 187
Table 9.51 Perennial Crops Land Ownership of the Surveyed Households 188
Table 9.52 Farming Forestry Land Ownership of the Surveyed Households 188
Table 9.53 Residential and Gardening Land Ownership of the Surveyed Households 189
Table 9.54 Surveyed Population with Health Issues 189
Table 9.55 Visit to Health Establishments by the Surveyed Household 191
Table 9.56 Evaluation of Electricity Supply by the Surveyed Household 192
Table 9.57 Evaluation of Local Roads by the Surveyed Household 193
Table 9.58 Evaluation of Local Schools by the Surveyed Household 194
Table 9.59 Evaluation of Local Health Stations by the Surveyed Household 194
Table 9.60 Evaluation of Local Water Supply by the Surveyed Household 195
Table 9.61 Evaluation of Local Waste Collection Services by the Surveyed Household 196
Table 9.62 Evaluation of Internet and Telecommunication Services by the Surveyed Household 197
Table 9.63 Evaluation of Local Markets by the Surveyed Household 198
Table 9.64 Local Perception of Community Cohesion and Well-being 201

Table 9.65 Support Sources 202
Table 9.66 Poor Households and Poor Ethnic Minority Households by District in Dak Lak 2020 205
Table 9.67 Number of Extremely Difficult Villages in Krong Buk District 2021-2025 207
Table 9.68 Demographic Features of the Surveyed Villages 208
Table 9.69 Proportion of Households with Vulnerabilities in the Surveyed Villages 209
Table 9.70 Proportion of Household Vulnerability by Category 209
Table 9.71 Household and per Capita Incomes of Vulnerable Households 211
Table 9.72 Monthly Income Structure of Vulnerable Households 212
Table 9.73 Evaluation on Local Infrastructure 213
Table 9.74 Evaluation on Specific Aspects of Personal Life 215
Table 9.75 Development Challenges Identified by Vulnerable Groups in the Surveyed Villages 215
Table 9.76 Some Main Support Programs for Vulnerable Households in Vietnam 217
Table 9.77 Ethnic Minority Population in Different Regions of Vietnam 219
Table 9.78 Poor Ethnic Minority Households by Region 2020 220
Table 9.79 Ethnic Minority Groups with Population Size of More Than 20 Thousand People 2019 222
Table 9.80 Poor Households and Poor Ethnic Minority Households by District in Dak Lak 2020 223
Table 9.81 Number of Extremely Difficult Villages in Krong Buk District 2021-2025 224
Table 9.82 Goal 5 of Sustainable Development Goals 234
Table 9.83 Year of Accession/Ratification of CEDAW and CRC of ASEAN Members 236
Table 9.84 Brief Summary of Key Legislation on Gender Equality in Vietnam 237
Table 9.85 Events Relating to Gender Equality and Women in Vietnam 238
Table 9.86 Surveyed Population by Gender and Ethnicity 248
Table 9.87 Surveyed Population with Health Issues 251
Table 9.88 Women's Participation in Social Organisations 252
Table 9.89 Evaluation on Local Infrastructure by FGD Participants 253
Table 9.90 Livelihood Engagement by Gender 255
Table 9.91 Supplementary Occupations of Surveyed Female Population 255
Table 9.92 Labour Division in Reproduction Activities among the Surveyed Households 256
Table 9.93 Labour Division in Production Activities among the Surveyed Households 256
Table 9.94 Labour Division in Community Activities among the Surveyed Households 257
Table 9.95 Access to Resources by Gender 258
Table 9.96 Control over Resources among the Surveyed Households 259
Table 9.97 Decision Making on Financial Issues in the Surveyed Households 260
Table 9.98 Changes in Women's Engagement in Community and Social Activities 262
Table 9.99 Examples of Human Rights 262
Table 9.100 Core Human Rights Treaties 264
Table 9.101 Treaty Bodies, Membership, and Functioning 265
Table 9.102 Human Rights Related Risks to Communities 269
Table 9.103 Potential Human Rights Related Risks to Wind Energy Industry 270
Table 9.104 Human Rights Treaties Ratified by Vietnam 273
Table 9.105 Human Rights Practice in Certain Areas in Vietnam 278

List of Figures

Figure 7.1 Meteorological Stations in Dak Lak Province 2
Figure 7.2 Demonstration of Average/Maximum/Minimum Monthly Temperature at Buon Ma Thuot Station over the Period of 1987 – 2018 [Celsius Deg.] 3
Figure 7.3 Demonstration of Average/Minimum Monthly Relative Humidity in Buon Ma Thuot Station [%] 4
Figure 7.4 Demonstration of Average Rainfall during the Period of 1987 – 2018 [mm] 5
Figure 7.5 The Monthly Average Evaporation [mm] 5
Figure 7.6 Demonstration of Average Sun Hours [Hours] 6
Figure 7.7 Wind Met Mast Locations in the Project's Sites 8
Figure 7.8 Demonstration of Wind Frequency at Two Different Height of 118 m and 98 m 9

Figure 7.9 Demonstration of Annual Average Wind Speed (m/s) 10
Figure 7.10 Demonstration of the Maximum Wind Speed 10
Figure 7.11 Demonstration of the Appearance Frequency of Wind Speed at Different Height 12
Figure 7.12 Destruction of Storm Level 12 Hitting Dak Lak Province 13
Figure 7.13 Flooding and Landslide to Happen in Many Districts in Dak Lak Province 13
Figure 7.14 Heavy Fog in National Highways 14
Figure 7.15 The Demonstration of Average Thunderstorm Days in Buon Ma Thuot Station 15
Figure 7.16 Severe Drought striking Dak Lak Province 15
Figure 7.17 Topography and Drainage System 16
Figure 7.18 Typical Topographies of the Project's Area 17
Figure 7.19 The Locations of Three Lakes near the Project's Site 20
Figure 7.20 The Status of Three Lakes near the Project's Site 20
Figure 7.21 Noise Monitoring Locations 23
Figure 7.22 The location of WTGs and NMLs 23
Figure 7.23 $L_{eq\ ,10min}$ (dBA) at Location NML1 24
Figure 7.24 $L_{eq,\ 10min}$ (dBA) at Location NML2 25
Figure 7.25 $L_{eq,10min}$ (dBA) at Location NML3 26
Figure 7.26 $L_{eq,\ 10min}$ (dBA) at Location NML4 27
Figure 7.27 Diagram of $L_{eq,10min}$ (dBA) at Location NML5 28
Figure 7.28 Diagram of $L_{eq,10min}$ (dBA) at Location NML6 29
Figure 8.1 Steps of the Critical Habitat Assessment 30
Figure 8.2 AoI for Noise 31
Figure 8.3 Project Area (Project boundary) and Project Footprint (Project Components) 32
Figure 8.4 Protected Areas and Key Biodiversity Areas within 50 km Radius of the Project 41
Figure 8.5 Flora Transects and Sampling Plots Locations 49
Figure 8.6 Locations of Conservation Significat Flora Species within the Project Area 52
Figure 8.7 2km arc Observation Coverage at Each Vantage Point 54
Figure 8.8 Locations of Bird Transects 54
Figure 8.9 Location of Bat Transects 57
Figure 8.10 Location of Bat Harp-traps 58
Figure 8.11 Location of Bat Mist-nets 58
Figure 8.12 Non-volant Mammal Survey Transects 59
Figure 8.13 Non-volant Mammal Camera Trap Locations 60
Figure 8.14 Non-volant Mammal Live Trap Locations 60
Figure 8.15 Location of the Otter Group According to Interviewee 61
Figure 8.16 Squirrels, Rats and Birds Hunted by Local People for Food 61
Figure 8.17 Herpetofauna Survey Transects 62
Figure 8.18 Locations of Endangered Reptiles Found 63
Figure 8.19 Land Classification within the EAAA 65
Figure 8.20 Land Classifications within Project Boundary – Krong Buk 66
Figure 8.21 Land Classification within Project Boundary – Cu Ne 67
Figure 9.1 Vietnam at a Glance 86
Figure 9.2 The State System of Vietnam 87
Figure 9.3 Vietnam's Multi-Dimensional Poverty Rate by Region 2016-2019 90
Figure 9.4 Map of the Central Highlands 92
Figure 9.5 Dak Lak Province at a Glance 95
Figure 9.6 Land Use Structure of Dak Lak Province 2018 101
Figure 9.7 Economic Structure of Dak Lak Province 2020 102
Figure 9.8 Cultural and Historical Relics in Dak Lak Province 110
Figure 9.9 Krong Buk District at a Glance 111
Figure 9.10 Religion Groups Composition of Krong Buk District 2019 113
Figure 9.11 Land Use Structure of Krong Buk District 2019 115
Figure 9.12 Photo of Krong Buk District Multi-Functional Medical Center 120

Figure 9.13 Dray Drak Waterfall in Cu Pong Commune 121
Figure 9.14 Cu Ne Commune at a Glance 123
Figure 9.15 Land Use Plan of Cu Ne Commune 2021 124
Figure 9.16 Schools in Ea Kung Village, Cu Ne Commune 125
Figure 9.17 Photo of Cu Ne Communal Health Station 126
Figure 9.18 Cu Pong Commune at a Glance 126
Figure 9.19 Land Use Plan of Cu Pong Commune 2021 128
Figure 9.20 Photo of Primary School in Cu Hriet village, Cu Pong Commune 130
Figure 9.21 Photo of Cu Pong Communal Health Station 130
Figure 9.22 Ea Sin Commune at a Glance 131
Figure 9.23 Land Use Plan of Ea Sin Commune 2021 133
Figure 9.24 Photo of Ethnic Minority Semi-Boarding Primary School and Lower Secondary School in Ea Sin Commune 134
Figure 9.25 Photo of Ea Sin Communal Health Station 135
Figure 9.26 Chu Kbo Commune at a Glance 136
Figure 9.27 Land Use Plan of Chu Kbo Commune 2021 137
Figure 9.28 Photo of Primary School in Chu Kbo Commune 138
Figure 9.29 Photo of Chu Kbo Communal Health Station 139
Figure 9.30 Difference in Cultural House Styles between Ede and Kinh Villages 141
Figure 9.31 Dirt Roads in Drah 1 (left) and Ea My (right) Villages 143
Figure 9.32 Ea Mak Area of Ea My Village 144
Figure 9.33 Water Source from Dug Wells in the Surveyed Villages 145
Figure 9.34 Temporary Markets in Ea Kung Village 147
Figure 9.35 Intercropped Production Area in Ea Sin Commune 147
Figure 9.36 Surveyed Population by Ethnicity 152
Figure 9.37 Surveyed Households by Size 153
Figure 9.38 Surveyed Population by Working Age Group 157
Figure 9.39 Active Labour Force of the Surveyed Working Age Population 158
Figure 9.40 Cultivation and Husbandry in the Surveyed Communes 160
Figure 9.41 Cultivation Area of Kty 5 Village, Chu Kbo Commune 161
Figure 9.42 Cultivation Area of Kdro 1 Village, Cu Ne Commune 162
Figure 9.43 Cultivation Area in Kdro 2 Village, Cu Ne Commune 163
Figure 9.44 Tractor as Common Agricultural Equipment in the Surveyed Communes 164
Figure 9.45 Intercropping Practice in Cu Hriet Village, Cu Pong Commune 165
Figure 9.46 Small Businesses in Cu Pong Commune 170
Figure 9.47 Household Income and Expenditure Balance 176
Figure 9.48 Sources of Household Finance Support 177
Figure 9.49 Sources of Debts among the Surveyed Households 178
Figure 9.50 Loan Affordability Pressures of the Surveyed Households 178
Figure 9.51 Different Housing Types Owned by the Surveyed Household 180
Figure 9.52 Housing Types in the Surveyed Communes 181
Figure 9.53 Household Utilities Owned by the Surveyed Household 183
Figure 9.54 Groundwater from Borehole Wells in Drah 1 Village, Cu Ne Commune 184
Figure 9.55 Firewood for Domestic Use 185
Figure 9.56 Toilet Conditions among the Surveyed Households 186
Figure 9.57 Types of Common Diseases among the Surveyed Population 190
Figure 9.58 Birthplaces of the Youngest Family Members Born within the Last Five Years (2017-2021) 191
Figure 9.59 Local Roads in the Surveyed Communes 193
Figure 9.60 Water Supply in the Surveyed Communes 196
Figure 9.61 Waste Treatment in the Surveyed Communes 197
Figure 9.62 A Local Grocery in Cu Hriet village, Cu Pong Commune 199
Figure 9.63 Civic Organisation Membership of the Surveyed Population 200

Figure 9.64 Communes with Mountainous and Ethnic Minority Villages “with Special Difficulties” in Dak Lak Province 2021-2025 205
Figure 9.65 Circle of Social Support Defined by Vulnerable Groups 216
Figure 9.66 Majors Actors for Ethnic Minority Related Works 221
Figure 9.67 Communes with Mountainous and Ethnic Minority Villages “with Special Difficulties” in Dak Lak Province 2021-2025 222
Figure 9.68 Bridge and Groom in Ede Culture 229
Figure 9.69 The Gong Festival in Central Highland Areas with Ede People Participation 230
Figure 9.70 Ede Woman in Traditional Costumes 231
Figure 9.71 Long Stilt House of the Ede People 232
Figure 9.72 New Housing Style of the Ede People 232
Figure 9.73 Sustainable Development Goals 234
Figure 9.74 Surveyed Population by Gender and Commune 248
Figure 9.75 Population Pyramid by Age and Gender 249
Figure 9.76 Surveyed Population by Working Age Group and Gender 249
Figure 9.77 Surveyed Female Population by Marital Status 250
Figure 9.78 Surveyed Population by Educational Attainment and Gender 250
Figure 9.79 Types of Common Diseases among the Surveyed Female Population 252
Figure 9.80 Surveyed Labour Force by Gender and the Surveyed Commune 254
Figure 9.81 Women in Agricultural Production 257
Figure 9.82 Circle of Support by Ede and Kinh Women Groups 261
Figure 9.83 Circle of Support by the Ethnicity-Mixed Women Group 261
Figure 9.84 Facts and Figures of UN Human Rights in 2020 268

Acronyms and Abbreviations

ACTIP	ASEAN Convention Against Trafficking in Persons, Especially Women and Children
ACWC	ASEAN Commission on the Promotion and Protection of the Rights of Women and Children
AHP	ASEAN Heritage Park
AHRD	ASEAN Human Rights Declaration
AICHR	Intergovernmental Commission on Human Rights
AMS	ASEAN member states
AoI	Area of Influence
APF	Asia Pacific Forum of National Human Rights Institutions
ASEAN	Association of Southeast Asian Nations
AZE	Alliance for Zero Extinction
CAT	Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment
CAT-Committee	Committee against Torture
CED, Art.32	Interstate communication procedure under the International Convention for the Protection of All Persons from Enforced Disappearance
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CED-Committee	Committee on Enforced Disappearances
CEMA	Committee for Ethnic Minority Affairs
CERD-Committee	Committee on the Elimination of Racial Discrimination
CESCR-Committee	Committee on Economic, Social and Cultural Rights
CMW-Committee	Committee on the Protection of the Rights of All Migrant Workers and Members of Their Families
COMMIT	Coordinated Mekong Ministerial Initiative Against Trafficking
COVID-19	Coronavirus Disease of 2019
CPC	Commune People’s Committee
CPED	International Convention for the Protection of All Persons from Enforced Disappearance
CR	Critically Endangered
CRC	Convention on the Rights of the Child
CRC-Committee	Committee on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
CRPD-Committee	Committee on the Rights of Persons with Disabilities
CWU	Communal Women's Union
DD	Data Deficient
DEDAW	Declaration on the Elimination of Discrimination against Women

DOLISA	Department of Labour, Invalid, and Social Affairs
DONRE	Department of Natural Resources and Environment
DPC	District People's Committee
DSRE	The Development Strategy for Renewable Energy of Vietnam
EAAA	Ecologically Appropriate Area of Analysis
EBA	Endemic Bird Area
EIA	Environmental Impact Assessment
EN	Endangered
EOO	Extent of Occurrence
ESIA	Environmental and Social Impact Assessment
FGDs	Focus Group Discussions
FiTs	Feed-in-tarrifs
FOA	Freedom of Association
FPIC	Free, Pior and Free Consent
GBIF	Global Biodiversity Information Facility
GDP	Gross Domestic Product
GISD	Global Invasive Species Database
GN	Guidance Note
GRDP	Gross Regional Domestic Product
HDI	The Human Development Index
IBA	Important Bird and Biodiversity Area
IBAT	Integrated Biodiversity Assessment Tool
ICCPR	International Covenant on Civil and Political Rights
ICCPR-OP1	Optional Protocol to the International Covenant on Civil and Political Rights
ICCPR-OP2	Second Optional Protocol to the International Covenant on Civil and Political Rights, aiming at the abolition of the death penalty
ICERD	International Convention on the Elimination of All Forms of Racial Discrimination
ICESCR	International Covenant on Economic, Social and Cultural Rights
ICESCR - OP	Optional Protocol to the Covenant on Economic, Social and Cultural Rights
ICMW	International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (known as the Migrant Workers Convention)
ICPD	International Conference on Population and Development
ICRMW	International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families
IFC	International Finance Corporation

ILO	International Labour Organization
IPA	Important Plant Area
IPIECA	International Petroleum Industry Environmental Conservation Association
IUCN	International Union for the Conservation of Nature
KBA	Key Biodiversity Area
KIIs	Key Informant Interviews
LFDC	District Land Fund Development Center
LURC	Land use right certificate
MARD	Ministry of Agriculture and Rural Development
MDGs	Millennium Development Goals
MIP	Ministry of Investment and Planning
MOCST	Ministry of Culture, Sports and Tourism
MOET	Ministry of Education and Training
MOIT	Ministry of Industry and Trade
MOLISA	Ministry of Labour, War Invalids and Social Affairs
MW	Megawatt
n.d.	No date
NCFAW	Committee for Advancement of Women
NDVI	Normalised Differential Vegetation Index
NE	Not Evaluated
NGOs	Non-governmental Organisations
NHRIs	National Human Rights Institutions
NL	Not Listed
NT	Near Threatened
NTFPs	non-timber forest products
ODA	Official Development Assistance
OHCHR	Office of the United Nations High Commissioner for Human Rights
OP-CAT	Optional Protocol to the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment
OP-CEDAW	Optional Protocol to the Convention on the Elimination of Discrimination against Women
OP-CRC-AC	Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict
OP-CRC-IC	Optional Protocol to the Convention on the Rights of the Child on a communications procedure
OP-CRC-SC	Optional Protocols to CRC on the involvement of children in armed conflict and on the sale of children, child prostitution and child pornography

OP-CRPD	Optional Protocol to the Convention on the Rights of Persons with Disabilities
PDP VII	National Power Development Master Plan
PPC	Provincial People's Committee
RSZ	Rotor Swept Zone
SAARC	South Asian Association for Regional Cooperation
SDGs	Sustainable Development Goals
SEDP	Social and Economic Development Plan
SEDS	Social and Economic Development Strategy
SPT	Subcommittee on the Prevention of Torture and other Cruel, Inhuman or Degrading Treatment or Punishment
UN	United Nations
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNWOMEN	United Nations Entity for Gender Equality and the Empowerment of Women
USAID	United States Agency for International Development
VRDB	Vietnam Red Data Book
VSSID	Vietnam Social Security Identification
VU	Vulnerable
VWU	Vietnam Women’s Union
WHO	World Health Organisation
WRO	Independent Worker Representative Organization
WWF	World Wildlife Fund

Definition of Terms

Term	Definition
Alliance for Zero Extinction	The Alliance for Zero Extinction (AZE) work to safeguard the last remaining areas where certain critically endangered and endangered species exist at only a single site in the world. This involves eliminating human threats such as commercial exploitation, disease, and introduction of invasive species.
ASEAN Heritage Parks	ASEAN Heritage Parks (AHPs) are selected protected areas in the ASEAN region recognized for their unique flora and fauna and ecosystems, wilderness and excellent values. There are 10 AHPs located within Vietnam.
Ecologically Appropriate Area of Analysis (EAAA)	Areas used to determine the presence of critical habitat for each species or ecosystem with occurrence in the Project area of influence.
Ecoregion	World Wildlife Fund (WWF) defines an ecoregion as a “large unit of land or water containing a geographically distinct assemblage of species, natural communities, and environmental conditions”. The boundaries of an ecoregion are not fixed, but rather encompass an area within which important ecological and evolutionary processes most strongly interact.
Endemic Bird Area	An Endemic Bird Area (EBA) is defined as an area which encompasses the overlapping breeding ranges of restricted-range species, such that the complete ranges of two or more restricted-range species are entirely included within the boundary of the EBA.
Important Bird and Biodiversity Area (IBA)	Important Bird and Biodiversity Areas (IBA) are defined as places of international significance for the conservation of birds and other biodiversity. An IBA includes sites that together form part of a wider integrated approach to the conservation and sustainable use of the natural environment.
Important Conservation Areas	Include Biosphere Reserves, World Heritage Sites, Ramsar sites, ASEAN Heritage Parks, Protected Areas and Key Biodiversity Areas.
Integrated Biodiversity Assessment Tool	A multi-institutional tool that draws together information from a number of IUCN’s Knowledge Products: IUCN Red List of Threatened Species, Key Biodiversity Areas and Protected Planet/The World Database on Protected Areas. Through an interactive mapping tool, decision-makers are able to identify biodiversity risks and opportunities within or close to a project boundary.
Invasive species	Invasive species are non-native species to a particular ecosystem and whose introduction and spread causes, or are likely to cause, socio-cultural, economic, environmental harm or harm to human health. These species become naturalized in their introduced range, and often reproduce in large numbers and spread over a large area. This can result in competition and threaten native species and ecosystems.
Key Biodiversity Areas	Key Biodiversity Areas (KBAs) are defined by the Key Biodiversity Areas Partnership as sites that contribute significantly to the global persistence of biodiversity, applicable to terrestrial, freshwater, and marine ecosystems. Sites qualify as KBAs if they meet one or more of 11 criteria as defined by the Partnership, grouped into the following five categories: threatened biodiversity, geographically restricted biodiversity, ecological integrity, biological processes and irreplaceability. KBAs include Important Bird and Biodiversity Areas (IBA) and Alliance for Zero Extinction (AZE) sites.

Migratory and/or Congregatory Species	Migratory species are defined as any species of which a significant proportion of its members cyclically and predictably move from one geographical area to another (including within the same ecosystem). Congregatory species are defined as species whose individuals gather in large groups on a cyclical or otherwise regular and/or predictable basis.
Modified	Area that may contain a large proportion of plant and/or animal species of non-native origin, and/or where human activity has substantially modified an area's primary ecological functions and species composition
Natural	Areas composed of viable assemblages of plant and/or animal species of largely native origin, and/or where human activity has not essentially modified an area's primary ecological functions and species composition.
Production forest	Production forests are used mainly for production and trading of timber and non-timber forest products. Production forests include natural and planted forests.
Project area	Area within the Project boundary where Project activities take place.
Project Area of Influence	The Project Area of Influence (AoI) includes the area likely to be affected by the Project including all its ancillary aspects, such the Project components and unplanned developments induced by the Project.
Project footprint	Areas cleared for infrastructure development.
Protected Area	A Protected Area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve long-term conservation of nature with associated ecosystem services and cultural values. Under the provisions of IFC PS6, a Protected Area require specific management actions if development proceeds within the boundary
Protection forest	Protection forests are used mainly to protect water sources and land, prevent erosion and desertification, restrict natural calamities and regulate climate, thus contributing to environmental protection. Protection forest may include (1) headwater protection forests; (2) wind- and sand-shielding protection forests; (3) protection forests for tide shielding and sea encroachment prevention; and (4) protection forests for environmental protection.
Ramsar Sites	The Convention of Wetlands, also known as the Ramsar Convention, is an intergovernmental treaty that provides the framework for the conservation and use of wetlands and their resources. Wetlands designated under the Convention are known as Ramsar Sites. The Ramsar Convention for Vietnam has been effective from 20 January 1989; currently Vietnam has nine sites designated as Wetlands of International Importance.
Restricted range species	According to IFC PS6, restricted range species is defined as species with an estimated extent of occurrence (EOO) of $\leqslant$ 50,000 km^2 for terrestrial vertebrates and $\leqslant$ 100,000 km^2 for marine species. For coastal, riverine, and other aquatic species in habitats that do not exceed 200 km width at any point (for example, rivers), restricted range is defined as having a global range of less than or equal to 500 km linear geographic span (i.e., the distance between occupied locations furthest apart).
Special-use forest	Special-use forests are used mainly for conservation of nature, specimens of the national forest ecosystems and forest biological gene sources; for scientific research; protection of historical and cultural relics as well as landscapes; in service of recreation and tourism in combination with protection, contributing to environmental protection. Special-use forest may include (1) national parks; (2) nature conservation zones; (3) landscape protection areas; and (4) scientific research and experiment forests.

Threatened species	Threatened species are identified as those classified on the IUCN Red List of Threatened Species. The Red List provides the conservation status of these listed species as being critically endangered (CR) and endangered (EN). CR and EN species are considered to be at a heightened risk of extinction and are treated with an elevated level of consideration under IFC PS6.
World Heritage Sites	World Heritage Sites (WHS) are sites selected by UNESCO as having cultural, historic, scientific or other form of significance that have outstanding universal value to humanity. Countries which are signatories to the World Heritage Convention (which includes Vietnam) are required to legally protect and manage the outstanding values of such Sites. This allows for practical conservation of areas, which would otherwise be subjected to threats such as uncontrolled and unrestricted access, and associated activities such as poaching and illegal logging.

7. ENVIRONMENTAL BASELINE

7.1 Introduction

This Section provides an overview of environmental baseline conditions within the Project area and its surrounding, including topography and geology conditions, climate and meteorology, noise quality, and terrestrial biodiversity.

The description of environmental baseline conditions is primarily based on a wide range of information gathered from various sources, consisting of:

- Desk research and literature review;
- Primary data collected by ERM from field surveys and site investigations including noise, two seasonal surveys of bird and bat, terrestrial fauna and flora baseline studies were undertaken in May 2021 by ERM's subcontractor during the ESIA preparation process, and
- Secondary data provided by statutory and non-statutory stakeholders including the Feasibility Study Report (FS Report, 2020).

The objective of this section is to outline the existing environmental conditions in the Project area. This information is used to assess potential impacts caused by the Project in both construction and operation phases and provide mitigation measures and/or monitoring programs monitor the changes of the environment and minimise the followed adverse impacts.

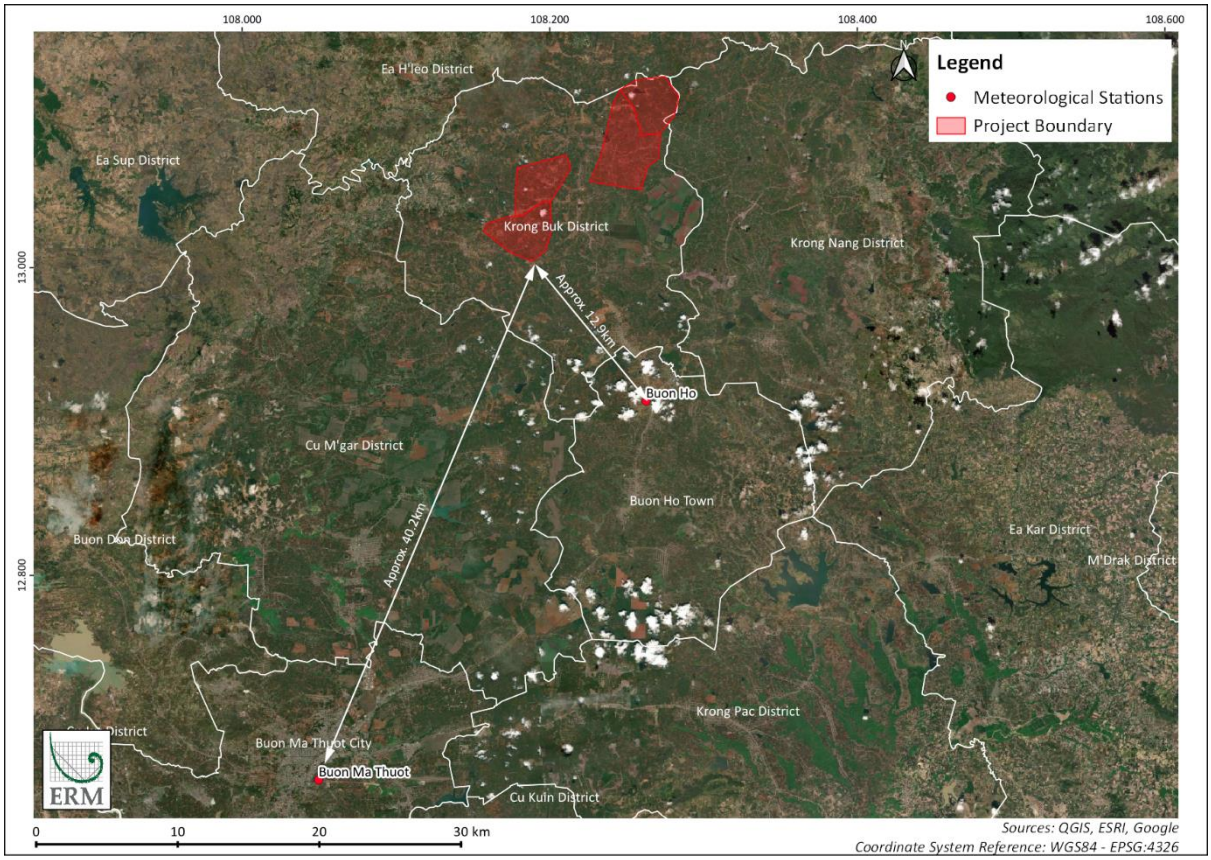
7.2 Climate and Meteorology

This section provides an overview of climate and meteorology conditions including temperature, relative humidity, rainfall, evaporation, sun hours, wind regime, and natural hazards in Dak Lak Province where the Project is prospectively launched.

The climate in Dak Lak Province splits into two sub-regions in which Northwest region is hot and dry while Southeast is cool and pleasant. The weather in the region is also divided into rainy and sunny seasons. Rainy season lasts for six months from May to October with the Southwest prevailing wind leaving the remaining six months for dry season from November to April next year.

Regarding the FS Report, there are five meteorological stations and nearly ten rain measuring stations along the Serepok river basin in Dak Lak Province doing the monitoring on rainfall, evaporation, temperature, humidity, atmospheric pressure and other parameters. However, data obtained from Buon Ma Thuot and Buon Ho meteorological stations which locate near the Project's area will be used to represent the weather and climate features of the Project's area. The specific coordinates and locations of Buon Ma Thuot and Buon Ho stations are presented in Figure 7.1.

- Climate, precipitation, and meteorology data are derived mainly from Buon Ma Thuot meteorological station in 38 Nguyen Chi Thanh, Tan An Ward, Buon Ma Thuot City, Dak Lak Province which is 40.2 km from the Project's Site
- Wind data is collected from Buon Ho meteorological station in An Binh Ward, Buon Ho District, Dak Lak Province which is 12.9 km from the Project's Site.



Source: QGIS, ESRI, Google, August 2021

Figure 7.1 Meteorological Stations in Dak Lak Province

7.2.1 Temperature

Dak Lak Province in general and the Project's location in particular are in monsoon tropical climate area. The monthly average temperature variation between the hottest and coldest month is minor about 5^{o}C, while the variation between the day and night is significant about 10 – 11^{o}C, especially in dry season. The monthly average temperature varies from 21.2 – 26^{o}C. In addition, the coldest month during the monitoring time in Buon Ma Thuot Station falls in December with temperature of 13.2^{o}C and hottest month monitored is in March or April with temperature of 37^{o}C. Table 7.1 and Figure 7.2 presents the average, minimum, and maximum monthly temperature at Buon Ma Thuot Station over the period of 1987 – 2018.

Table 7.1 Average/Minimum/Maximum Monthly Temperature at Buon Ma Thuot Station over the Period of 1987 – 2018 [Celsius Degree]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	21.3	22.7	24.8	26.3	25.9	25.0	24.5	24.3	24.1	23.7	22.7	21.4	23.9
Max	34.3	36.4	37.6	38.7	37.0	35.1	32.9	32.8	32.8	33.1	32.6	32.4	38.7
Min	11.3	12.3	12.9	18.0	18.6	19.2	13.7	19.5	18.2	15.0	11.4	10.0	10.0

Source: National Centre for Hydro-Meteorological Forecasting

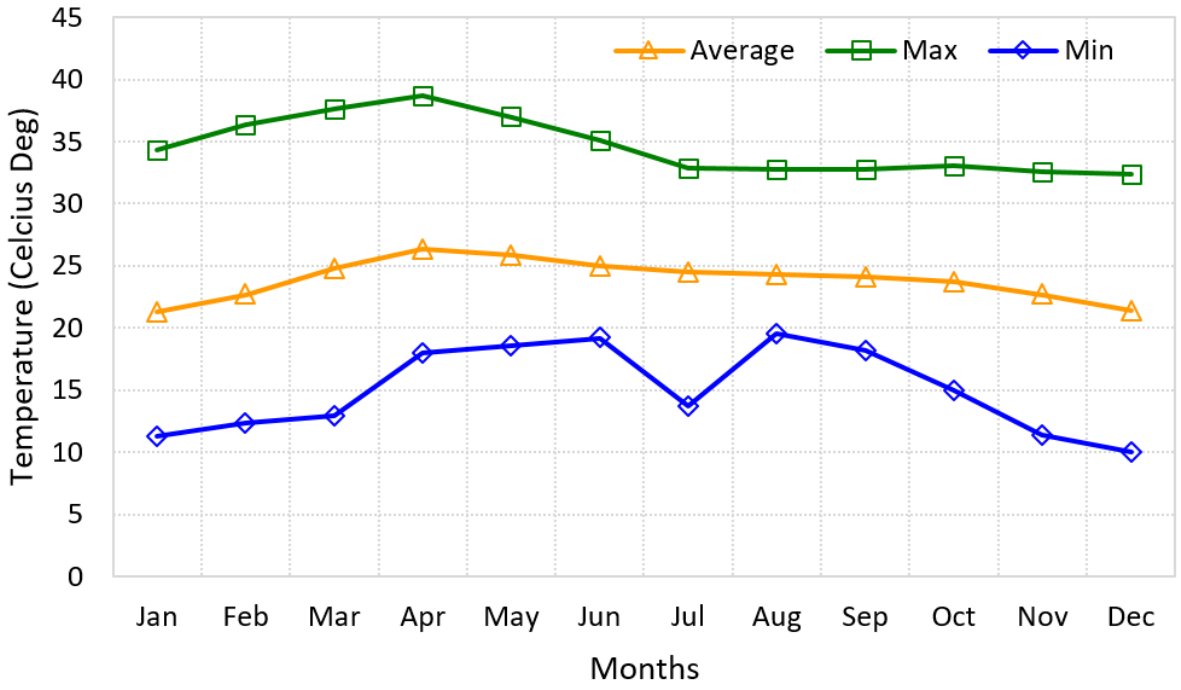


Figure 7.2 Demonstration of Average/Maximum/Minimum Monthly Temperature at Buon Ma Thuot Station over the Period of 1987 – 2018 [Celsius Deg.]

7.2.2 Relative Humidity

The yearly and monthly average humidity is rather stable. The relative humidity in rainy season varies from 80 – 90% while in dry season is 70 – 80%. The highest relative humidity recorded at the value of 100% falls in rainy season. The minimum relative humidity observed in dry season during the monitoring time is 9% which is the lowest value (Buon Ma Thuot Station). The average monthly humidity recorded in Buon Ma Thuot Station in Dak Lak Province during the period of 1987 – 2018 is shown in Table 7.2 and Figure 7.3.

Table 7.2 Relative Humidity Recorded in Buon Ma Thuot Station [%]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average (%)	77.4	73.9	71.7	72.9	80.5	85.3	86.8	87.8	88.6	86.5	84.2	81.9	81.4
Min (%)	27	13	15	20	25	41	49	53	44	42	38	33	13

Source: National Centre for Hydro-Meteorological Forecasting

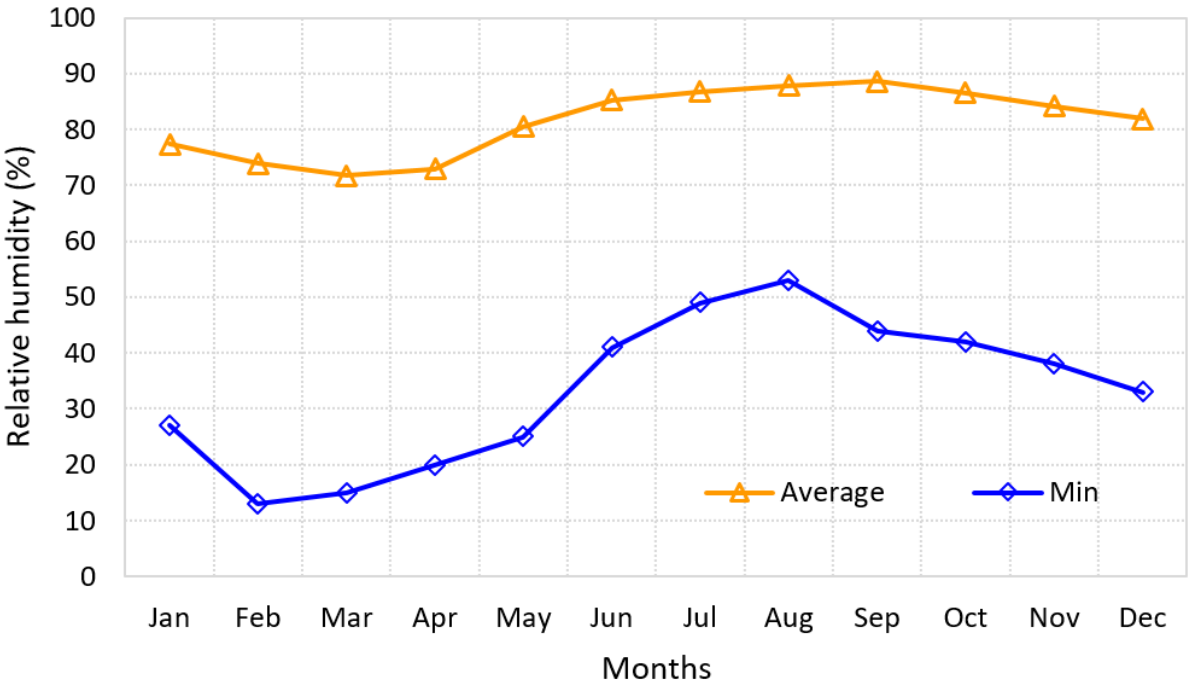


Figure 7.3 Demonstration of Average/Minimum Monthly Relative Humidity in Buon Ma Thuot Station [%]

7.2.3 Rainfall

The precipitation recorded in Dak Lak Province and Project's area varies depending on the relatively complicated topography. The annual average rainfall is ranged from 2,600 – 3,000 mm in the North Mountain, while the rainfall in the Southwest ranges from 1,700 – 2,000 mm.

The rainy season in the West and Southwest affected by summer monsoon starts from May to October and dry season is from November to April next year. On the contrary, in the North and Northeast, the main rainy season commences from September to December and occurs in May next year, the rainfall after May decreases until August. The diverse rainfall happens due to the effect caused by the combination of winter and summer monsoon.

The average rainfall in rainy season takes 80 – 90% the rainfall of the whole year. The total rainy days per year reach 200 days in high precipitation area and 170 days in low precipitation area, respectively. 90% of rainy days per month falls due to the effect of West and Southwest monsoon. During rainy months, the highest rainfall within 24-hours is approximately 50 – 70 mm. Otherwise, the highest rainfall in the dry season within 24 hours is less than 10 mm. The highest rainfall recorded per day and night in Buon Ma Thuot meteorological station is 244.5 mm in 1993. The average rainfall is presented in Table 7.3 and Figure 7.4.

Table 7.3 The Average Rainfall during the Period of 1987 – 2018 [mm]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average (mm)	5.0	3.9	28.5	92.8	245.6	261.9	253.3	314.6	335.3	217.7	94.1	21.4	1873.0

Source: National Centre for Hydro-Meteorological Forecasting

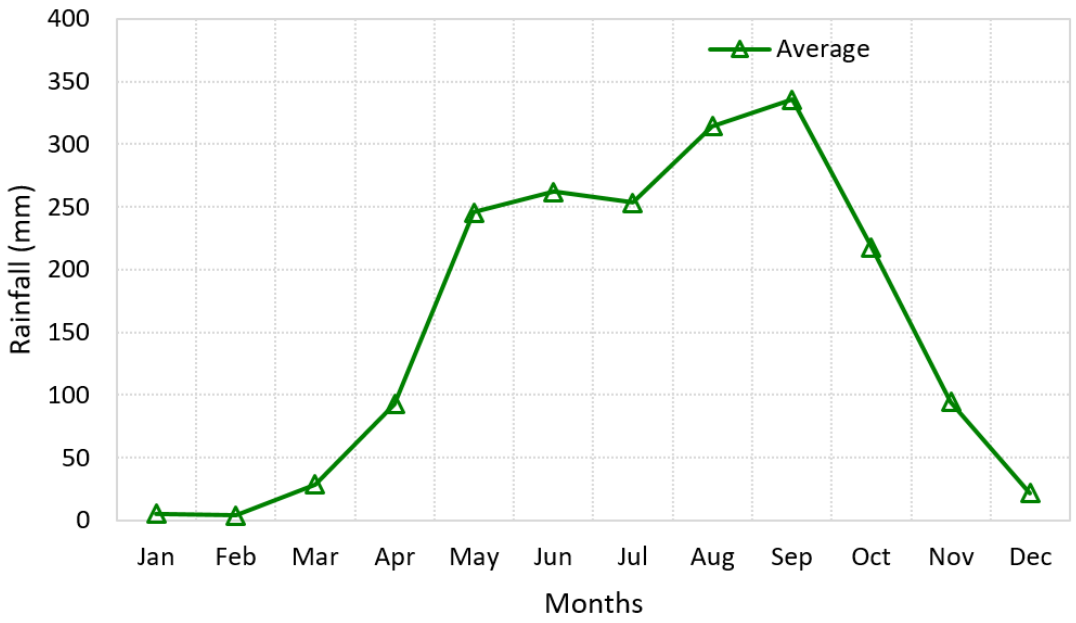


Figure 7.4 Demonstration of Average Rainfall during the Period of 1987 – 2018 [mm]

7.2.4 Evaporation

Regarding the data collected in Buon Ma Thuot Station, the monthly average evaporation is presented in Table 7.4 and Figure 7.5.

Table 7.4 The Monthly Average Evaporation [mm]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Evaporation [mm]	242	269	266	254	236	193	173	171	150	175	181	183	2,493

Source: Feasibility Study Report

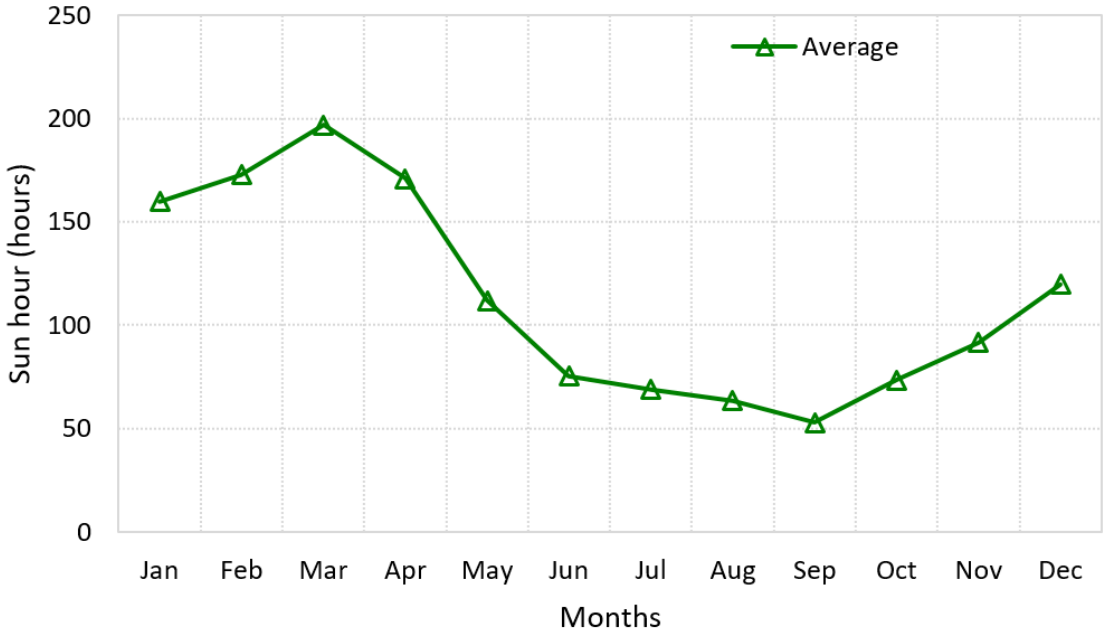


Figure 7.5 The Monthly Average Evaporation [mm]

7.2.5 Sun Hours

The total sun hours in Dak Lak is relatively high ranging from 2,400 – 2,700 hours. The monthly average sub hours is approximately 151 – 280 hours. As recorded, March attains the highest sub hours of 200 – 320 hours. The average sun hours is presented in Table 7.5 and Figure 7.6.

Table 7.5 The Monthly Average Sun Hours [hours]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	160	173	197	171	112	75.6	69.0	63.7	53.0	73.6	91.7	120	1,360

Source: Feasibility Study Report

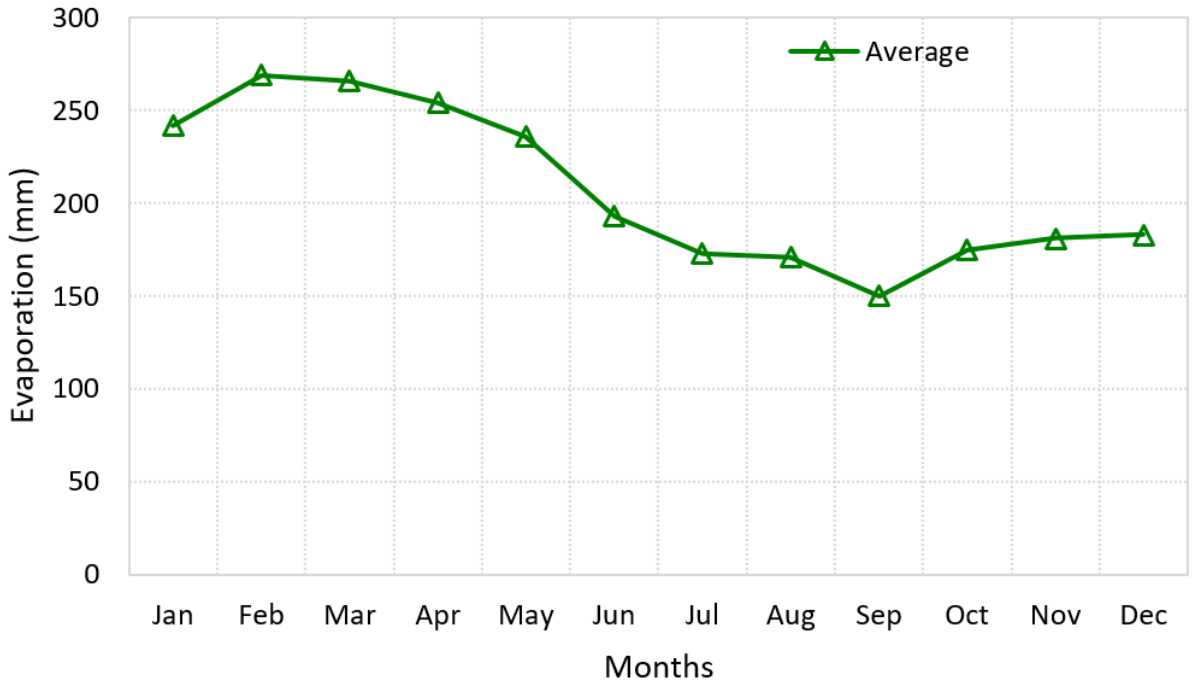


Figure 7.6 Demonstration of Average Sun Hours [Hours]

7.2.6 Wind Regime

7.2.6.1 Wind Regime in Dak Lak Province

According to the monitoring data, there are summer monsoon and winter monsoon in Dak Lak Province. During summer season, the South and Southwest monsoon is dominant and last from the end of May to the September and concentrate mainly on August with the frequency of 23.7%. Otherwise, during winter time, the East and Northeast monsoon are prevailing which occur from October to April next year accounting for 50 – 90%.

7.2.6.2 Wind Regime in the Project's Area

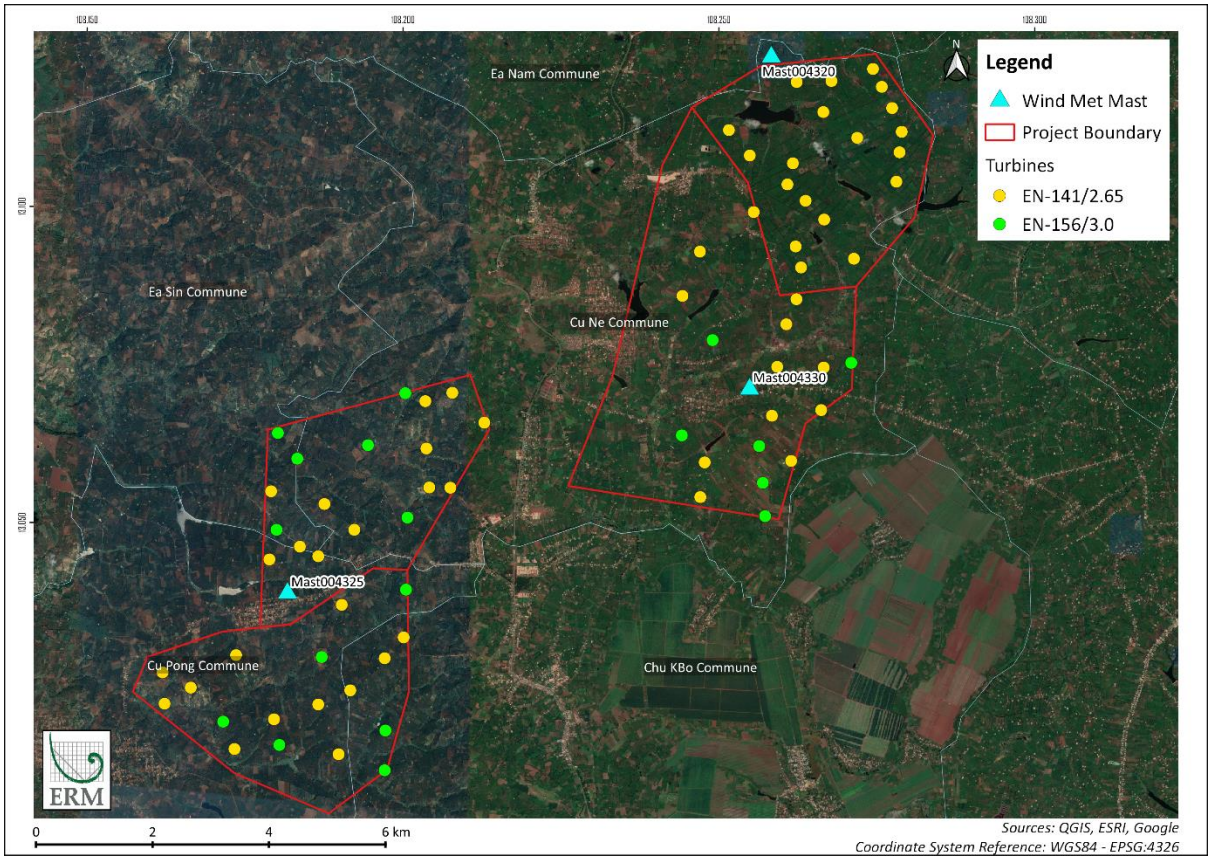
7.2.6.2.1 Wind Met Mast

There are three wind met masts located in the Project's area namely Mast004325, Mast004330 and Mast004320 to monitor and record the wind characteristics at four wind farms. The representativeness of wind met masts depend on the distance and difference of elevation between masts and wind turbine locations, and height difference between the sensor height and wind turbine hub height. Details of three wind met masts are presented and demonstrated in Table 7.6 and Figure 7.7.

Table 7.6 Summary of Wind Met Masts Located at the Project's Sites

Mast name	Mast004325	Mast004330	Mast004320
Longitude	108.181715	108.254870	108.258308
Latitude	13.03880	13.071098	13.123637
Elevation (m)	671.0	766.0	759.0
Wind Speed Sensor (m)	120mA/120mB/100mA/ 100mB/80m/60m	120mA/120mB/100mA/ 100mB/80m/60m	120mA/120mB/100mA/ 100mB/100mC/80m/60m
Direction Sensor (m)	118m/98m/58m	118m/98m/58m	118m/98m/58m
Temperature Sensor (m)	10m	10m	10m
Air pressure Sensor (m)	10m	10m	10m
Commencement Period (YYYY/MM/DD – HH:MM:SS)	2019/01/02 – 15:10:00	2018/12/30 – 12:50:00	2019/01/05 – 00:00:00
Complete year Period (YYYY/MM/DD – HH:MM:SS)	2020/11/17 – 23:50:00	2020/11/17 – 23:50:00	2020/11/17 – 23:50:00
Integrity of original data (%)	98.83	99.08	99.49
Validity of complete year data (%)	65.94	98.64	99.05
Validity of data after amending (%)	99.37	98.64	99.05
Main direction of wind power	E	E	ENE
Main direction of wind frequency	E	E	ENE
Turbulence class	IEC-B	IEC-A	IEC-A+
Wind shear	0.290	0.240	0.255
Complete year wind speed (m/s)	130m 6.47	130m 6.14	130m 6.18
Extreme wind speed (50-year period 10min) (m/s)	120mA 27.02	120mB 29.28	120mB 30.29

Source: Envision Group, 2021



Source: QGIS, ESRI, Google, August 2021

Figure 7.7 Wind Met Mast Locations in the Project's Sites

7.2.6.2.2 Wind Direction

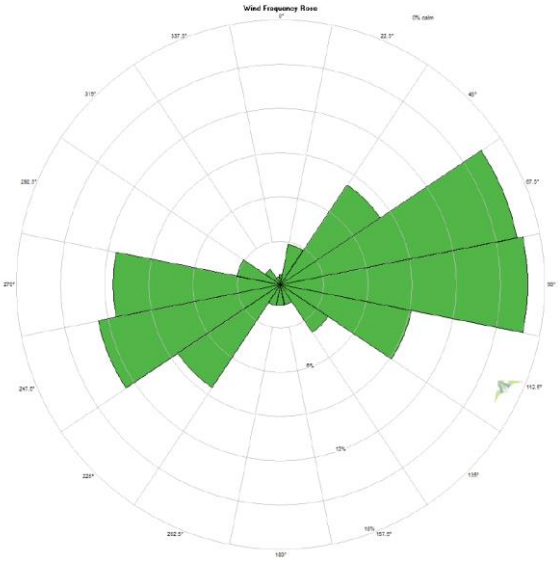
Based on the monitoring data collected from the Buon Ma Thuot Meteorological Station, the prevailing wind direction is the East, Northeast, and the West accounting for 36.0%, 14.1%, and 8.4%, respectively. The windless frequency is about 24.5%. The annual wind frequency at two different height of 118 m and 98 m is presented in Table 7.7 and Figure 7.8.

Table 7.7 Wind Frequency at Two Different Height of 118 m and 98 m

Direction Sector (°)	Ch13_118.00 m (%)	Ch14_98.00 m (%)
0	2.0904	0.6845
22.5	9.5245	2.8154
45	14.9474	8.2143
67.5	10.9709	16.4747
90	9.7803	16.8464
112.5	6.4533	9.1142
135	3.0049	3.9379
157.5	1.4427	1.4132
180	1.1924	1.4776
202.5	3.2055	1.5126

Direction Sector (º)	Ch13_118.00 m (%)	Ch14_98.00 m (%)
225	10.4538	8.426
247.5	16.206	12.6877
270	6.3852	11.4622
292.5	2.1327	3.0565
315	1.2126	1.2881
337.5	0.9974	0.5888

Wind frequency at 118 m



Wind frequency at 98 m

Source: Feasibility Study Report, 2021

Figure 7.8 Demonstration of Wind Frequency at Two Different Height of 118 m and 98 m

7.2.6.2.3 The Average Wind Speed

The Project's area belongs to Southeast region in Dak Lak Province where the average wind speed ranges from 1.6 m/s – 4.5 m/s. The yearly average wind speed recorded in Buon Ma Thuot Meteorological Station is presented in Table 7.8 and Figure 7.9.

Table 7.8 The Average Wind Speed Recorded in Buon Ma Thuot Station [m/s]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	4.53	4.09	3.37	2.47	1.62	1.60	1.53	1.56	1.41	2.15	3.27	4.17	2.65

Source: Feasibility Study Report

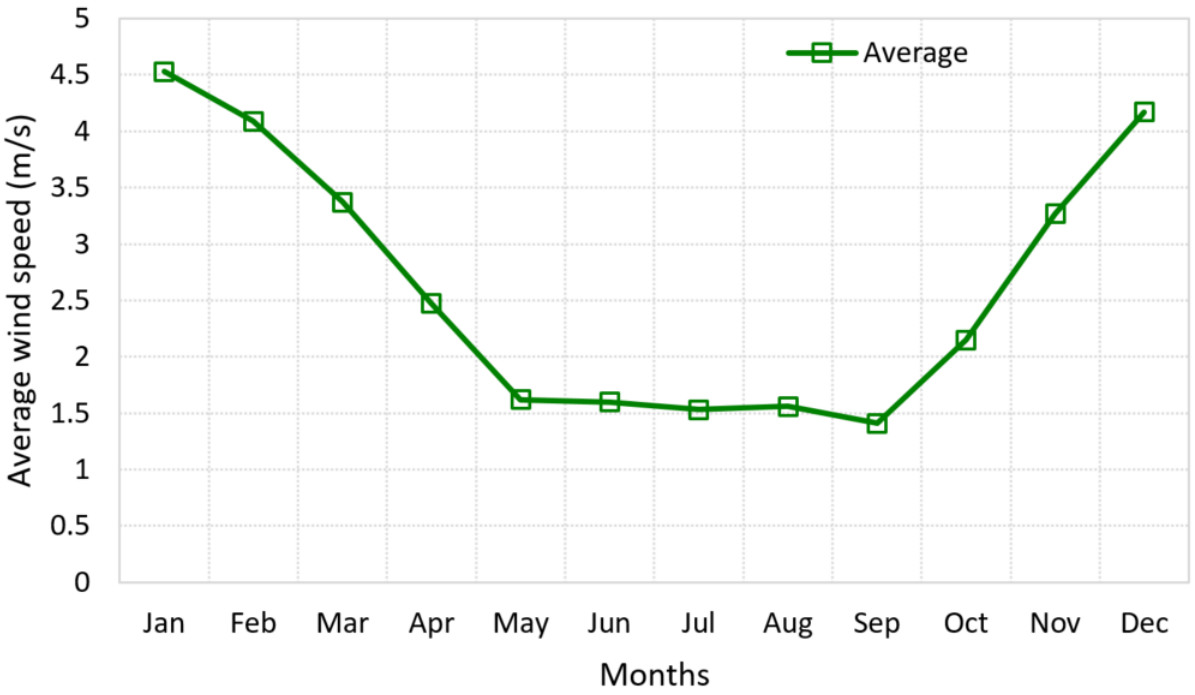


Figure 7.9 Demonstration of Annual Average Wind Speed (m/s)

The maximum wind speed recorded in Buon Ma Thuot Meteorological Station is presented in Table 7.9 and Figure 7.10:

Table 7.9 The Maximum Wind Speed at Buon Ma Thuot Station [m/s]

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
V_{max}	20	20	34	24	20	24	20	22	18	18	18	18	34

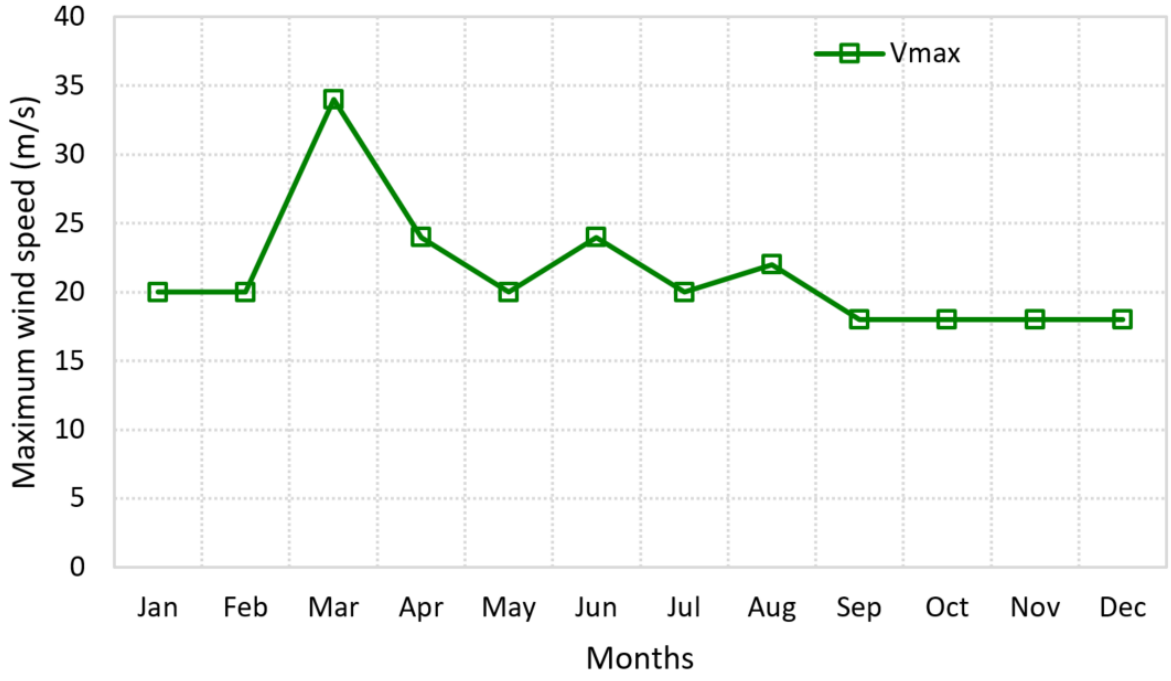


Figure 7.10 Demonstration of the Maximum Wind Speed

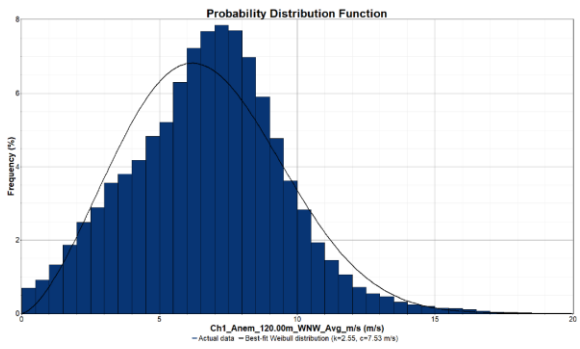
The appearance frequency of wind speed at different heights of 120_A/120_B/100_A/100_B[1] is presented in Table 7.10 and Figure 7.11.

Table 7.10 The Appearance Frequency of Wind Speed at Different Height

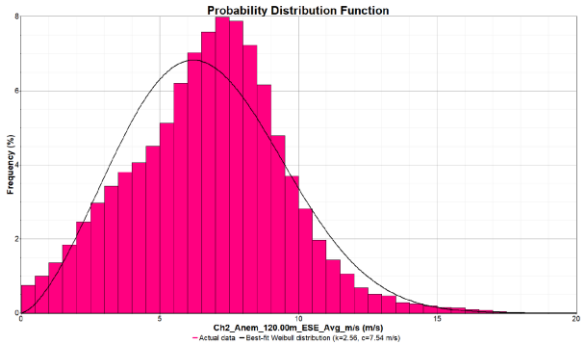
Level of wind speed (m/s)	The frequency of appearance			
	120m_A	120m_B	100m_A	100m_B
0<v<1	1.608	1.75	1.851	1.851
1≤v<2	3.185	3.207	3.467	3.467
2≤v<3	5.36	5.425	5.647	5.647
3≤v<4	7.338	7.23	8.078	8.078
4≤v<5	9.011	8.562	10.375	10.375
5≤v<6	11.504	11.317	13.135	13.135
6≤v<7	14.9	14.6	15.658	15.658
7≤v<8	15.54	15.847	15.371	15.731
8≤v<9	12.864	13.383	11.267	11.267
9≤v<10	8.317	8.485	7.121	7.121
10≤v<11	4.748	4.777	3.735	3.735
11≤v<12	2.508	2.486	1.919	1.919
12≤v<13	1.262	1.2	1.049	1.049
13≤v<14	0.775	0.738	0.6	0.6
14≤v<15	0.447	0.44	0.368	0.368
15≤v<16	0.289	0.285	0.208	0.208
16≤v<17	0.184	0.175	0.101	0.101
17≤v<18	0.068	0.061	0.035	0.035
18≤v<19	0.028	0.026	0.015	0.015
19≤v<20	0.009	0.007	0	0
Total	100	100	100	100
0<v<1	1.608	1.75	1.851	1.851

Source: Feasibility Study Report

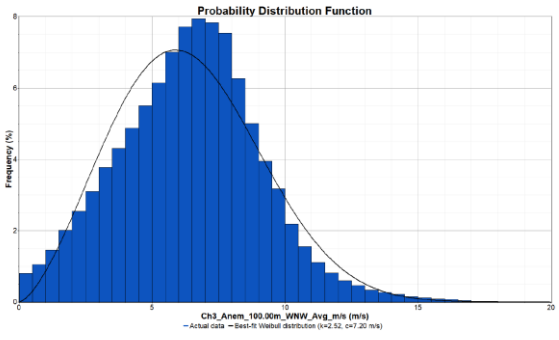
[1] Wind characteristics will be measured by two channels A and B at different height to monitor various wind parameters such as wind direction, wind speed, temperature, etc.



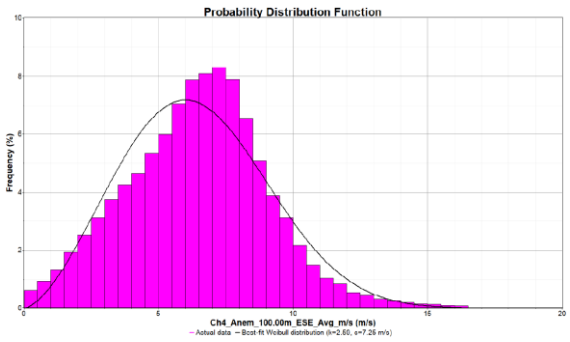
120m_A



120m_B



100m_A



100m_B

Source: Feasibility Study Report, 2021

Figure 7.11 Demonstration of the Appearance Frequency of Wind Speed at Different Height

7.2.6.2.4 Wind Pressure

Regarding the wind distribution map regulated in QCVN 02:2009/BXD on Natural Physical & Climatic Data for construction, the regional wind speed are identified and presented in Table 7.11.

Table 7.11 Standardised Wind Pressure in 10 Years and 20 Years

Location	Regional pressure	W_o (kN/m^2) 3 seconds, 10 years	W_o (kN/m^2) 3 seconds, 20 years
Dak Lak Province	IA	4.09	3.37

Source: National Technical Regulation QCVN 02:2009/BXD, and 11TCN-19-2006 on Electrical Equipment Regulations

7.2.7 Natural Hazards

7.2.7.1 Storm and Tropical Depression

Storms and tropical depressions are considered as dangerous weather phenomenon accompanied by torrential rain and strong wind. Basically, storm and tropical depression are in similar nature, the only difference is the wind velocity. In Vietnam, storms and tropical depressions occur frequently in rainy season which induce wreak havoc to local people's lives and productions. Once happening, storms and tropical depressions can cause severe inundation, and significant damage to local infrastructures.

Given that Dak Lak Province locates in mainland area and be protected by the Truong Son Mountain ranging from Northeast to Southwest, this territory is less relatively affected by the storms. However, the total precipitation in Dak Lak Province takes nearly 10 – 15% of total rainfall of the year. Stormy

season in 1977, 1978, 1979, 1980, and 1981 can generate the significant destruction to a thousand of victuals, ruin many harvest seasons, and strongly affect to people's livelihood and their lives living nearshore of Krông Ana, Krông nô rivers in Dak Lak Province.

According to the Dak Lak Province's Department of Agriculture and Rural Development[2], the severe Storm No. 12, 2020[3] (International name: ETAU) and No.13, 2020 (International name: VAMCO) in Dak Lak Province blew many houses roof off, disrupted the local electricity network, uprooted many trees, and induced inundation and major landslide in the affected area. The destruction recorded in the region is demonstrated in Figure 7.12.

Source: Dak Lak Province's Department of Agriculture and Rural Development, 2020

Figure 7.12 Destruction of Storm Level 12 Hitting Dak Lak Province

7.2.7.2 Flooding and Landslide

Flooding and landslide resulted by the storm, tropical depressions and prolonged downpour had happened in many districts namely M'Drak, Ea Kar, Krong Nang, Ea H'leo, Krong Buk, Krong Pac, Krong Bong, Ea Sip and Cu M'gar in Dak Lak Province. Severe flooding and landslide in Dak Lak Province emerged and caused damage to many houses and plants, inundated rural roads in Cu Dram, Cu Pui and Ea Khiem Communes, destroyed many provincial facilities such as bridges and aquaculture ponds, and hindered the local transportation for many days (See Figure 7.13[4]).

Source: Dak Lak Magazine, 2020

Figure 7.13 Flooding and Landslide to Happen in Many Districts in Dak Lak Province

[2] http://nnptnt.daklak.gov.vn/tin-tuc-su-kien/tay-nguyen-ngap-lut-do-anh-huong-cua-bao-so-12.html

[3] https://vi.wikipedia.org/wiki/Thang_s%E1%BB%A9c_gi%C3%B3_Beaufort

[4] http://www.baodaklak.vn/channel/3483/202012/ngap-lut-sat-lo-dat-do-mua-lon-keo-dai-5712335/

7.2.7.3 Fog

Fog is a phenomenon formed by the condensation of water into aerosols suspended in the atmosphere which limits the vision under 1 km, even below 100 m. Due to the ground radiation and convection, fog usually be found in the mountainous and highland area. Thick fog can bring danger to the transportation and travelling due to vision limitation, particularly in National Highways No. 14 and 27 (See Figure 7.14 [5] [6]). Moist caused by fog can also lead to air-borne diseases by the development and growth of bacteria and viruses. In Dak Lak Province, there are 20 – 40 days experiencing heavy fog. However, during summer time, wind can minimise the formation of fog leading to the decreasing of foggy days in the region in comparison with other provinces. As recorded in Buon Ma Thuot Meteorological Station, there is an average of 5.2-day per year having the fog.

Source: Dak Lak and Tien Phong Magazines, 2020

Figure 7.14 Heavy Fog in National Highways

7.2.7.4 Thunderstorm

Thunderstorm is considered as a complicated atmospheric phenomena including the electric discharge from either clouds (lightning) or clouds and the ground (thunderbolt). Accompanied by the thunderstorm is downpour, downburst wind, and explosive echo which dampens the residential and properties. Thunderstorm can develop in any geographical locations but most frequently within the mid-latitude where warm, moist air from tropical latitudes collides with cooler air from polar latitudes. Regarding the Conversations on Vietnam Development Magazine [7], Vietnam locates in the centre of the Asia thunderstorm region which is among three thunderstorm centres in the world. In Dak Lak Province, thunderstorm usually occurs during summer time from April to October. There is an estimation of total 60 – 100 thunderstorm days per year in Dak Lak Province. Table 7.12 and Figure 7.15 demonstrate the average days experiencing thunderstorm per year recorded in Buon Ma Thuot Meteorological Station. Regarding the FS, thunderstorm usually appears from 13:00 – 19:00 in the highland region due to the complex geography of mountains, valleys, rivers and streams together with the strong development of convection. As recorded, May and September are two months possessing the most thunderstorm days through a year which are more than 20 days due to the strong activity of dry and moist Southwest monsoon at the early summer.

Table 7.12 The Average Thunderstorm Days in Buon Ma Thuot Station

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Average	0.1	0.7	2.9	8.0	14.4	10.3	10.2	8.7	11.0	5.8	0.7	0.1	72.8

Source: FS Report, Buon Ma Thuot Meteorological Station.

[5] https://daklak24h.com.vn/xa-hoi/62320/suong-mu-day-dac-gay-nguy-co-mat-an-toan-giao-thong-tren-quoc-lo-14.html
[6] https://tienphong.vn/suong-mu-day-dac-nguoi-dan-dak-lak-bat-den-do-dam-giua-ban-ngay-post1306035.tpo
[7] https://cvdvn.net/2018/08/11/thunderstorm-activity-and-research-on-lightning-position-in-vietnam/

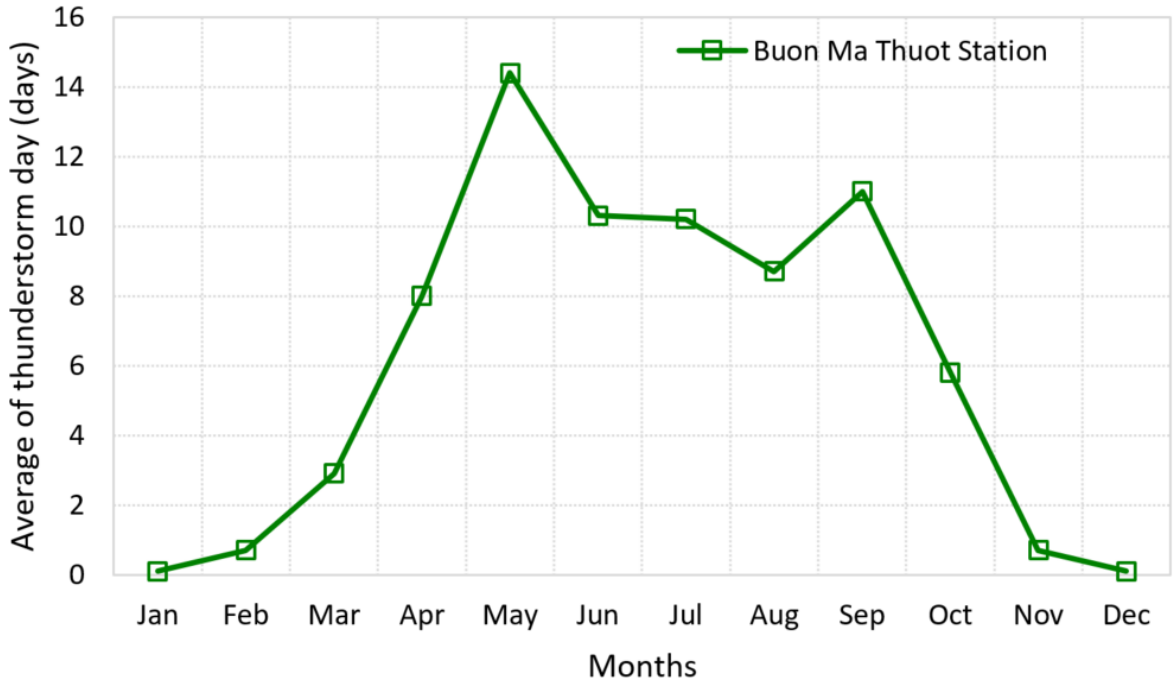


Figure 7.15 The Demonstration of Average Thunderstorm Days in Buon Ma Thuot Station

7.2.7.5 Drought

In Dak Lak Province, drought becomes a persistent issue burdening the residential and livestock in the local region. According to the Dak Lak Province's Department of Agriculture and Rural Development, the river and stream levels plummet leading to the lack of flowing downing to 50 – 70%[8]. Many small provincial steams run out of water. Many reservoirs and irrigation dams are also in the depletion of water resources which is no longer able to supply water for irrigation in the region[9]. There is a worry about the severe water shortage situation in the area which can cause the vulnerability of plants including 4,000 hectares of paddy field, 1,000 hectares of fruits, and 25,000 hectares of perennial plants together with 2,000 households lacking of supply water for their daily use (See Figure 7.16[10] [11]). The water shortage is recorded mainly in Ea Kar, Cu M'gar, Buon Don, Ea H'leo, Krong Buk (where the Project locates), Krong Bong and Ea Sup Districts.

Source: Dan Viet and Dang Cong San online Magazines, 2020

Figure 7.16 Severe Drought striking Dak Lak Province

[8] https://nhandan.vn/goc-nhin/dak-lak-song-can-ho-kho-453144/

[9] https://dangcongsan.vn/kinh-te/dak-lak-han-han-gay-nhieu-kho-khan-cho-san-xuat-nong-nghiep-551540.html

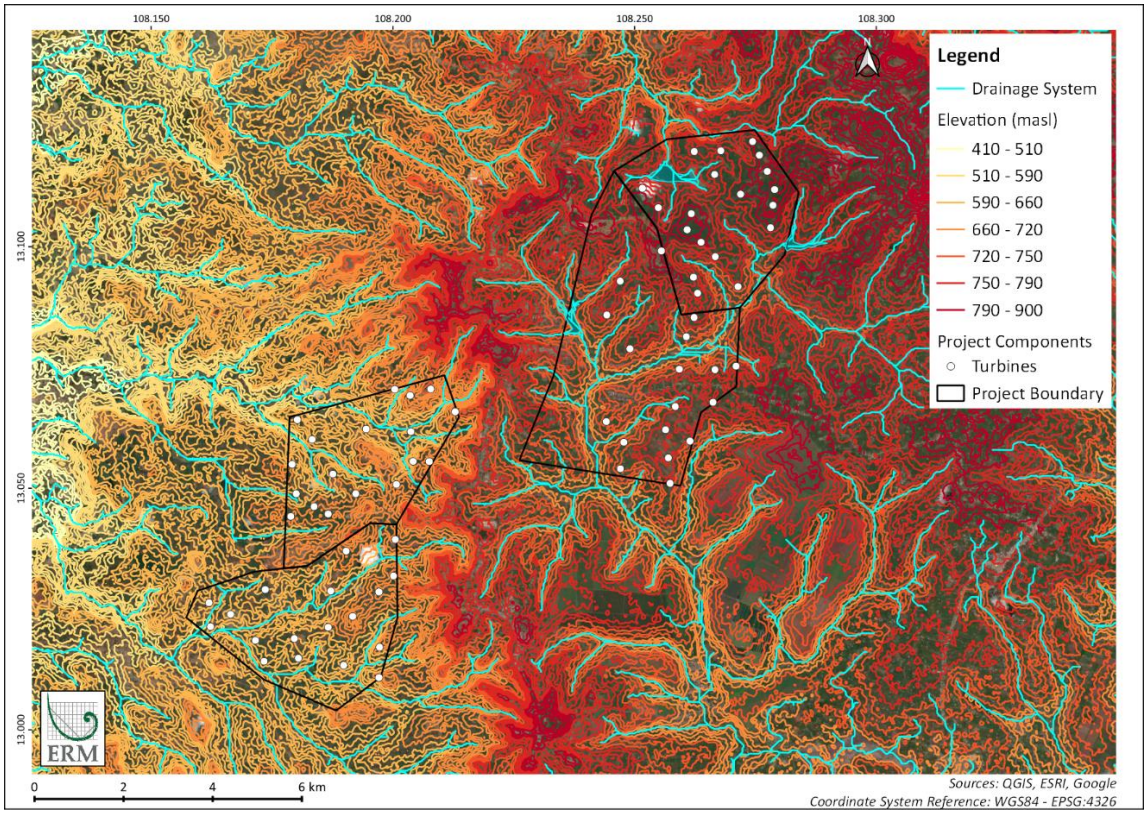
[10] https://danviet.vn/dak-lak-nang-nong-han-han-hoanh-hanh-hang-ngan-ho-chay-uong-tung-bua-20200518140720774.htm

[11] https://moitruong.net.vn/han-han-keo-dai-nguoi-dan-dak-lak-chat-chiu-tung-giot-nuoc/

7.3 Topography and Terrain

The terrain of Dak Lak Province gently slops in Southwest to Northeast direction which situates in the West and in the end of the Truong Son Mountain. The average height of Dak Lak Province is about 400 – 800 m above the sea level. Highland terrain is dominant in Dak Lak Province consisting of two main highland namely Buon Ma Thuot and M'Dak (or also called as "Khanh Duong").

The wind farm area is distributed on both sides of National Highway No.14, mostly in the form of wide and gentle low mountains and hills. The Project's topography can be divided into three types including highland, lowland, and plains (See Figure 7.17 and Figure 7.18 [12]). The mountainous side of the Project consists of Northeast mountain ranges initiating from the Krông Buk River with the height of 100 – 1,000 m above the sea level.



Source: QGIS, ESRI, Google, August 2021

Figure 7.17 Topography and Drainage System

[12] Provided by the China Huadian Engineering Co.,Ltd

Source: Feasibility Study Report, 2021

Figure 7.18 Typical Topographies of the Project's Area

7.4 Geology Conditions

The Geology condition of the Project's area is fairly uncomplicated consisting of around six geological layers, in which four layers are soil and two layers are rock, in particular:

7.4.1 Geological Conditions in KB1 and KB 2 Project's Areas

Regarding the survey and laboratory results, the geological sections of the KB1 and KB2 Project's areas include:

Layer 1: The composition of this layer includes clay and clay loam mixed with crushed gravel and roots in brown and dark brown (from 0 – 0.8 m). This layer is covered with moist and flexible hard soil with depth of 3 – 6.5 m and sited on the surface of the ground. The SPT N_{30} value was estimated at 16 – 33.

Layer 2: The composition of this layer is clay and clay loam mixed with tender gravel with the depth of 0.2 – 0.4 cm in the colour of ash grey, and blue grey. The characteristics of soil in this layer is moist and heterogeneous which is flexible hard and tender in some sections. The second layer exists beneath the first layer with the depth of 6.0 m. The SPT N_{30} value of this layer was estimated at 8 – 15.

Layer 3: This layer is formed by the clay, clay loam together with tender gravel at the depth of 0.2 cm in dark grey and fawn. Soil in this layer is moist, pliable to soft which is situated under the second layer with the depth of 3.0 m. The SPT N_{30} value of this layer was estimated at 4.

Layer 4: This layer consisting of clay, clay loam with the depth of 0.2 cm in white grey and fawn. Soil in this layer is moist, and in semi-hard to hard state which is situated under the third layer with the depth of 2.4 m The SPT N_{30} value of this layer was estimated at 15.

Layer 5: The composition of this layer is moderately weathered basalt rock in the colour of blue grey, and dark blue. The soil in this layer is strong and slightly and moderately cracked with the depth of 1.4 m.

Layer 6: The composition of this layer is slightly weathered basalt rock in the colour of blue grey, and dark blue. The soil in this layer is strong and slightly and moderately cracked with the depth of 25 m.

Regarding the survey data at the drilling holes and other local drilling wells, the layer 5 and 6 were found at the area of WTG1 – WTG19 in KB2, WTG1 – WTG6 in KB1 at the depth of 18 – 20 m and 6 – 15 m at the area of WTG7 – WTG 19 in KB1, respectively.

7.4.2 Geological Conditions in Cu Ne 1 and Cu Ne 2 Project's Areas

At the bore hole KB-BH1, the geological sections of the CN1 and CN2 Project's areas include:

Layer 1: The composition of this layer includes clay and clay loam mixed with crushed gravel and roots in brown and dark brown (from 0 – 0.8 m). This layer is covered with moist and flexible hard soil with depth of 3 – 6.5 m and sited on the surface of the ground. The SPT N_{30} value was estimated at 10 – 15.

Layer 2: The composition of this layer is clay and clay loam mixed with tender gravel with the depth of 0.2 – 0.4 cm in the colour of ash grey, blue grey, white grey, sepia, and fawn. The characteristics of soil in this layer is moist and heterogeneous which is flexible hard and tender in some sections. The second layer exists beneath the first layer with the depth of 14.0 m. The SPT N_{30} value of this layer was estimated at 7 – 15.

Layer 3: This layer is formed by the clay, clay loam together with tender gravel at the depth of 0.2 cm in dark grey and fawn. Soil in this layer is moist, pliable to soft which is situated under the second layer with the depth of 7.0 m. The SPT N_{30} value of this layer was estimated at 19 – 20.

Layer 4: This layer consisting of basalt rock is strongly weathered to clay loam mixed with gravel in white grey and dark blue. The percentage of gravel accounts for 50 – 90%. This kind of layer contains tender to medium hard rocks and tends to be strongly cracked. The fourth layer lies under third one with the depth of 4.8 m. The SPT N_{30} value of this layer was more than 50.

Layer 5: The composition of this layer includes light weathered basalt in blue grey, dark blue which is cracked lightly to moderately. The drilling depth of this layer is 35 m.

7.4.3 Geological Conditions in Substation and 220 kV Transmission Line's Area

Regarding the survey and laboratory results at four bore holes S-BH1, S-BH2, S-BH3, and TL-BH1, the geological sections at the Substation and 220 kV Transmission Line of the Project's areas include:

Layer 1a: The composition of this layer includes clay and clay loam mixed with crushed gravel and roots in brown and dark brown (from 0 – 0.8 m). This layer situates on the surface of the ground with the total depth of 8.1 – 9.1 m and distributes from the S-BH1 to the middle of S-BH1 and S-BH2 and at the beginning of 220 kV Transmission Line. The SPT N_{30} value of this layer was estimated at 20 – 29.

Layer 1: The composition of this layer includes clay and clay loam mixed with crushed gravel and roots in brown and dark brown (from 0 – 0.8 m). This layer is covered with moist and flexible hard soil with depth of 8.5 – 8.7 m and sited on the surface of the ground and distributes from the S-BH3 to the middle of S-BH3 and S-BH2 and at the end of 220 kV Transmission Line. The SPT N_{30} value of this layer was estimated at 9 – 10.

Layer 2: This layer composes clay and clay loam mixed with crushed gravel in ash grey and blue grey with the depth of 0.2 – 0.4 cm. This layer is covered with moist and flexible hard soil, sited under the layer 1 and 1a to the drilling depth of 12 m and distributed to the entire studied area. The SPT N_{30} value of this layer was estimated at 8 – 13.

7.5 Hydrology

7.5.1 Hydrological Conditions in Dak Lak Province

The river network in Dak Lak Province is diverse and evenly distributed. There are two main rivers traversing the Province which are Serepok River with the total length of 315 km and Ba River of 338 km, in particular:

- Serepok River is formed by the combination of two river branches namely Krong Ana and Krong Kno which locates beneath the Buôn Dray waterfall in Krông Ana District. The river basin area of Serepok River is 30,100 km^2 with the average slope of 2%, the density of river network is 0.55 km/km^2 and the meandering index of the river is 1.89:
  - Krong Kno River originates from the mountain with height of 200 m with the basin area of 3,920 km^2 and the length of 156 km. The formation of Krong Kno River are formed by two small streams namely Krong Kmar and Dak Mang.
  - Krong Ana River is the confluence of three main streams namely Krong Buk, Krong Pak and Krong Pong with the basin area of 3,960 km^2 and the length of 215 km.
  - Another sub-basin of Serepok River is Ea H'Leo River originating from Ea Ban Mountain at the height of 700 m in Ea H'Leo District, Dak lak Province. The basin area of Ea H'Leo River is 3,080 km^2 and the total length is 143 km formed by two small branches namely Ea H'Leo and Ea Soup.
- Ba River with basin area of 13,900 km^2 does not directly traverse the Dak Lak Province territory; however, there are some sub river branches of Ba River originating from the mountainous area of the Province namely Krong H'Nang and Hinh rivers. The two sub-rivers are capable of high potential in hydroelectricity but low capability in water supply for production activities due to the steep terrain and the lack of agricultural land.

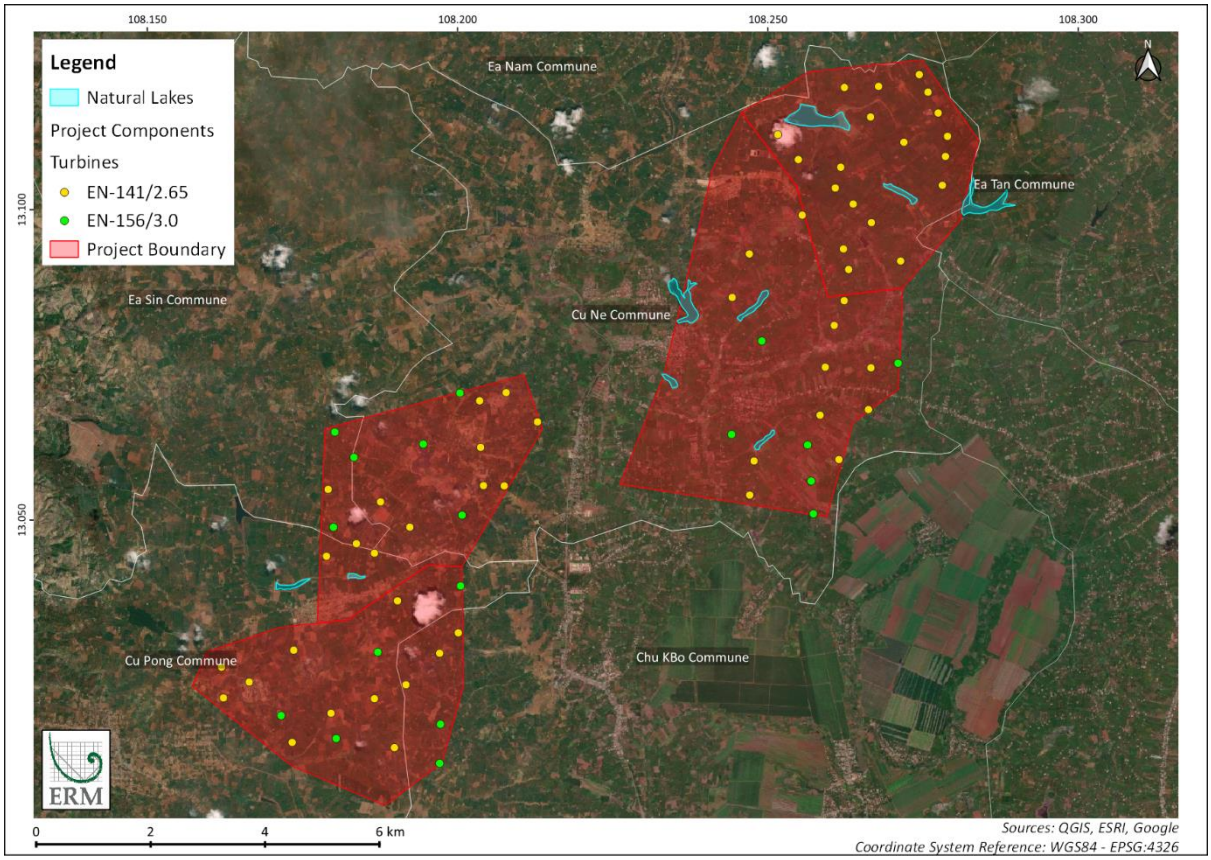
The locations of two main rivers are situated approximately 80 – 125 km away from the Project's area and there are no river's branches traversing the Project site.

In addition, there are approximately 833 streams with the length more than 10 km forming a dense network of rivers and streams in Dak Lak Province. Additionally, there are a huge number of natural and manmade lakes existing in the region namely Lak, Ea Kao, and Buon Triet in Dak Lak Province.

7.5.2 Hydrological Conditions in the Project Area

7.5.2.1 Surface Water

There is no main rivers and streams traversing the Project's area. During the site visit conducted by the ERM Team, there are some small lakes were found near the Project's area where local people takes surface water for their activities (washing or cleaning) and irrigation. However, the Project's activities will not take water from these lakes nor the construction and operation. The locations and demonstration of some lakes are presented in Figure 7.19 and Figure 7.20.



Source: QGIS, ESRI, Google, August 2021

Figure 7.19 The Locations of Three Lakes near the Project's Site

Source: ERM, May 2021

Figure 7.20 The Status of Three Lakes near the Project's Site

7.5.2.2 Groundwater

During the survey of the drilling wells conducted by local people in summer season, the groundwater was found at:

- The depth of 9 – 15 m in the locations of WTG A7 to WTG A19 in Krong Buk 1
- The depth of 17 – 25 m in the locations of WTG1 to WTG A6 in Krong Buk 1 and WTG B1 to WTG B19 in Krong Buk 2
- The depth of 18 – 25 m in the locations of WTG D5 to WTG D9 in Cu Ne 2, and
- The depth of 8 – 20 m in the locations of WTG D1 to WTG D4 and WTG D10 to WTG D19 in Cu Ne 2.

In the Project's areas, another groundwater source was found at the depth of 18 m in the bore hole CN-BH1 where a groundwater sample was also taken to analyse by the cooperation of consultancy firms. The details are demonstrated in the survey report under the Feasibility Study report. The laboratory result elucidated that the groundwater quality in the Project's area was good and identified as freely of potential corrosion or destruction risk.

As stated by the Project owner, water requirement during the construction phase has been sourced from the local areas or any organizations who hold wells with groundwater extraction permit[13], whereas the extraction permit of groundwater shall be obtained by the Project owner during the operation phase as they will exploit their own wells for domestic purposes.

7.6 Noise Baseline

As wind speed increases, background noise levels generally also increase as natural sources such as wind in trees begin to dominate. Noise levels can also change as propagation from other noise sources changes. The variation of background noise with wind speed is usually quite site-specific and related to various physical characteristics such as topographic shielding and the extent and height of exposed vegetation. In order to establish wind farm noise assessment criteria it is therefore usual to carry out background noise monitoring of the pre-existing environment as a function of wind speed.

The relative proximity of some receiver locations to one another and their similar wind exposure and surrounding environment meant that background noise monitoring could be conducted at six representative Noise Monitoring Locations (hereinafter referred to as "NMLs") scattering evenly through the Project's area which are representative of all of the locations at which noise prediction were carried out.

Background noise measurements had been carried out through six representative monitoring locations in the vicinity of the Project site (See Table 7.14 and Figure 7.21). Details of the noise monitoring points, noise measurement methodology, and equipment can be referred to the Appendix C. Background noise survey were carried out in a period of 20 – 27 May 2021 in four Communes namely Cu Ne, Cu Pong, Ea Sin, and Chu Kbo in Krong Buk District, Dak Lak Province. As mentioned in the EHS Guidelines for Wind Energy "If the preliminary model suggests that turbine noise at all sensitive receptors is likely to be below an LA90 of 35dB at a wind speed of 10 m/s at 10 m height during day and night times, this preliminary modelling is likely to be sufficient to assess noise impact; otherwise it is recommended that more detailed modelling be carried out, which may include background ambient noise measurements". Hence, the selection of the monitoring locations and monitoring procedure were implemented and the results are assessed against the Criteria in IFC EHS Guidelines (See Table 7.13).

[13] This is regulated in *Circular No. 27/2014/TT-BTNMT* regulating the registration for groundwater extraction and necessary dossier for issue, extension, modification, re-issue of water resource permit by the Ministry of Natural Resources and Environment, dated 30 May 2014.

Table 7.13 IFC General EHS Guidelines on Noise Level

Receptor	On Hour L_{Aeq} (dBA)	
	Day time 7:00 – 22:00	Night time 22:00 – 7:00
Residential, Institutional, and educational	55	45

Source: IFC General EHS Guidelines – Noise Management, 2007

7.6.1 Noise Monitoring Locations

Noise monitoring was conducted at six different locations (NML1 to NML6) in Krong Buk District, Dak Lak Province. These monitoring locations were representative of noise sensitive receptors around the Project's area. The noise sampling points were selected based on some criteria:

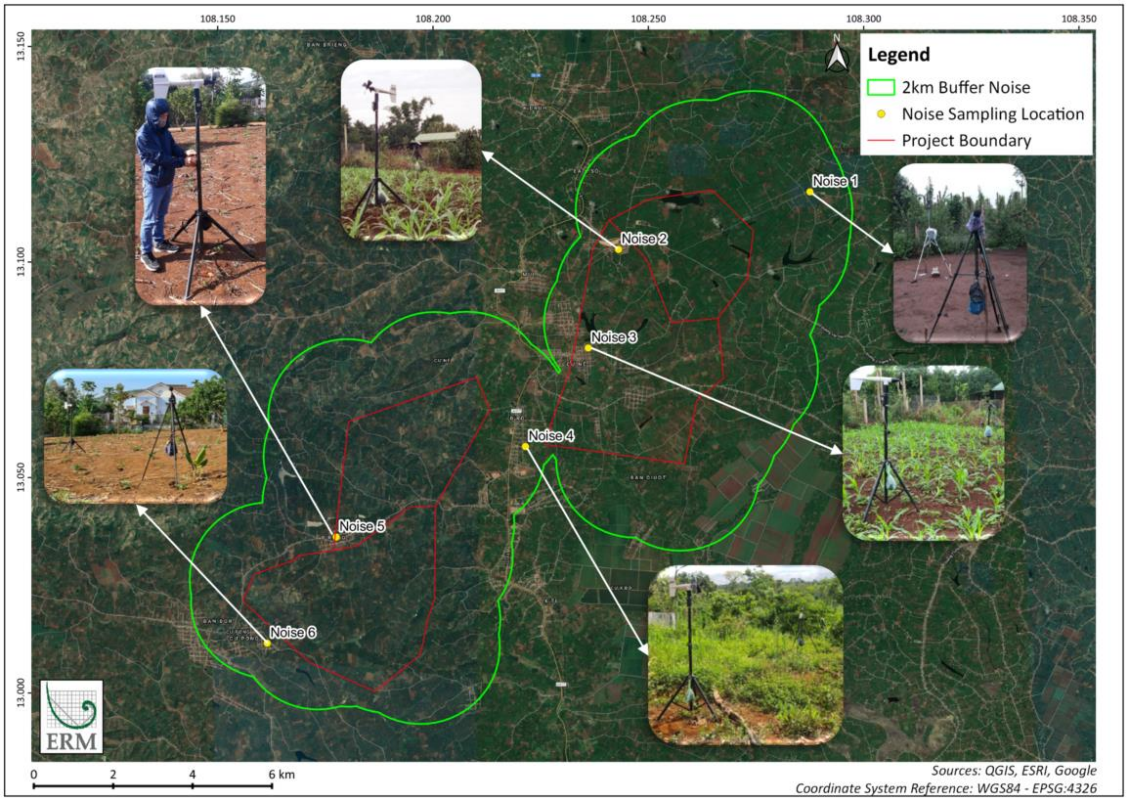
- Densely populated areas (sensitive receptors) which are potentially affected by the noise generated by the Project's operation and are located within the 2 km of the buffer noise area regulated by the IFC EHS Guidelines for Wind Energy[14], and
- Areas locate far away from significant noise sources such as construction sites, schools, and along the main roads.

The location of noise monitoring points (NMLs) and distance correlation between NMLs to wind turbines are presented in Table 7.14, Figure 7.21, and Figure 7.22.

Table 7.14 Summary of Noise Measurement Locations

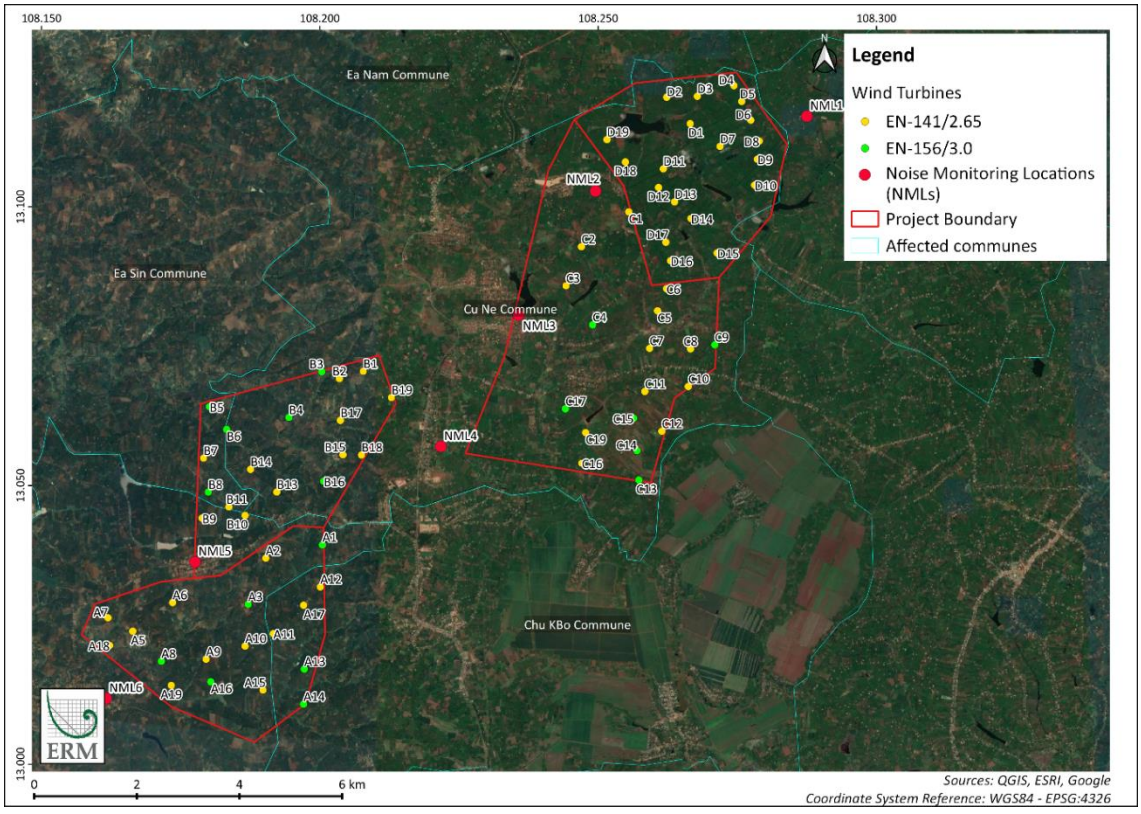
No.	Site	Location	Nearest WTG	Distance from monitoring location to the nearest wind Turbine (m)	Coordinates (WGS84)
1	NML1	67 Quang Trung Hamlet, Ea Tan Commune, Krông Năng District, Dak Lak Province	D8	1050	13º6'58.521"N, 108º6'58.521"E,
2	NML2	Ea Nguoi Hamlet, Cu Ne Commune, Krông Buk District, Dak Lak Province	C1	770	13º6'10.185"N, 108º14'5834.58"E,
3	NML3	Buon Dhia 1 village, Cu Ne Commune, Krông Buk District, Dak Lak Province	C3	1090	13 º6'10.3886"N, 108º14'34.36453"E,
4	NML4	Buon Kdro 2 village, Cu Ne Commune, Krông Buk District, Dak Lak Province	B18	1560	13º3'25.2436"N, 108º13'18.32544"E,
5	NML5	29, Buon Moi villaget, Cư Pơng Commune, Krông Buk District, Dak Lak Province	B9	880	13º0'3.619"N, 108º1'7.775"E,
6	NML6	38 Buon Druong village, Cu Pong commune, Krông Buk District, Dak Lak Province	A18	1060	13º0'42.5"N, 108º09'41.8"E,

[14] https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/publications/publications_policy_ehs-wind_energy



Source: QGIS, ESRI, Google, June 2021

Figure 7.21 Noise Monitoring Locations



Source: QGIS, ESRI, Google, September 2021

Figure 7.22 The location of WTGs and NMLs

7.6.2 Noise Monitoring Procedure

The background noise measurements at the six monitoring locations were conducted based on the IFC EHS Guidelines. LA_{eq}, LA_{90} and LA_{10} noise levels within 48 hours at 10-minute intervals. Weather conditions (e.g. wind speeds), exciting industrial condition and noise contribution from other noise sources at the monitoring locations were recorded and used for noise analysis. The measured background noise data were supplemented with synchronous wind speed data measured from the three wind met masts near the Project's location (See Figure 7.7).

7.6.3 Noise Monitoring Results

7.6.3.1 Noise Monitoring Site NML1

- The noise level (L_{eq}, 10 minutes) measured during the day was in the range of 38.5- 72.4dBA. 30% of the measured values were higher than the limit regulated in the IFC. On 25 May 2021, Noise level (L_{eq}, 10 min) reached 72.4dBA in the period of 6PM-6:10PM due to the noise from cicadas. The sound of cicadas leveraged the noise levels to around 70 dBA between 5:20PM-6:20PM.
- 62% of the noise values measured during the night were higher than IFC's allowable limit (45dBA). The highest noise level reached 57.3 dBA, recorded at 5AM-5:10AM on 26 May 2021 due to rooster crowing. The lowest noise level was recorded at 35.6 dBA in the period of 0:50-1AM on 26 May 2021.
- Noise at location NML1 was caused by agricultural vehicles[15] and motorbikes frequently passing by; however, it was mostly affected by the sound of cicadas (from 1:00PM to 6:30PM). There were other arising noise sources at N1 point caused by the sound of other insects (from 6:30PM to 4:00AM), and occasional birds and roosters.

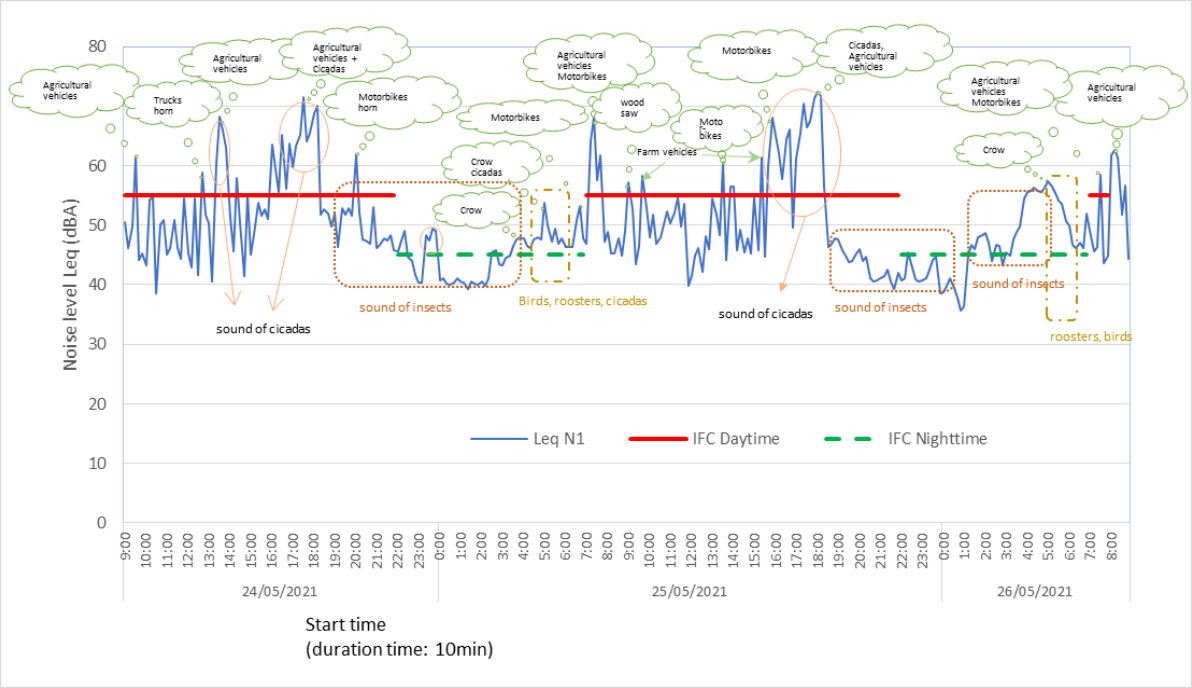


Figure 7.23 $L_{eq\ ,10min}$ (dBA) at Location NML1

[15] Defined as a motor vehicle used to pull heavy loads, especially farm machinery such as a plough or harvester. It usually has two large wheels with deeply treaded tyres which is suitable for muddy and hilly roads. An example of agricultural vehicle is a tractor which can carry people and agricultural products.

7.6.3.2 Noise Monitoring Site NML2

- 94.44% of noise level monitored during daytime was lower than IFC's limitation. The highest noise level measured was 63 dBA in the period of 9:37PM - 9:47PM on 25 May 2021 due to the sound of insects. The lowest noise level was recorded at 40.1 dBA in the period of 2:31PM – 2:41PM on 26 May 2021.
- 49.07% of noise value at night (10:00PM-7:00AM) was higher than IFC's limitation (45dBA). The highest measured noise level was 65.5 dBA in the period of 10:07PM- 10:17PM on 25 May 2021 because of the sounds from motorbikes and insects. The lowest noise level measured was 37.9dBA in the period of 2:53AM – 3:03AM on 25 May 2021.
- The noise at NML2 was mainly affected by agricultural vehicles often traveling and motorbikes occasionally traveling, insects at night (6:00PM to 4:00AM). In addition, there were other noise sources such as cicadas, karaoke 70m away (from 1:30AM to 4:00AM), loudspeakers, dogs barking, and rooster crowing.

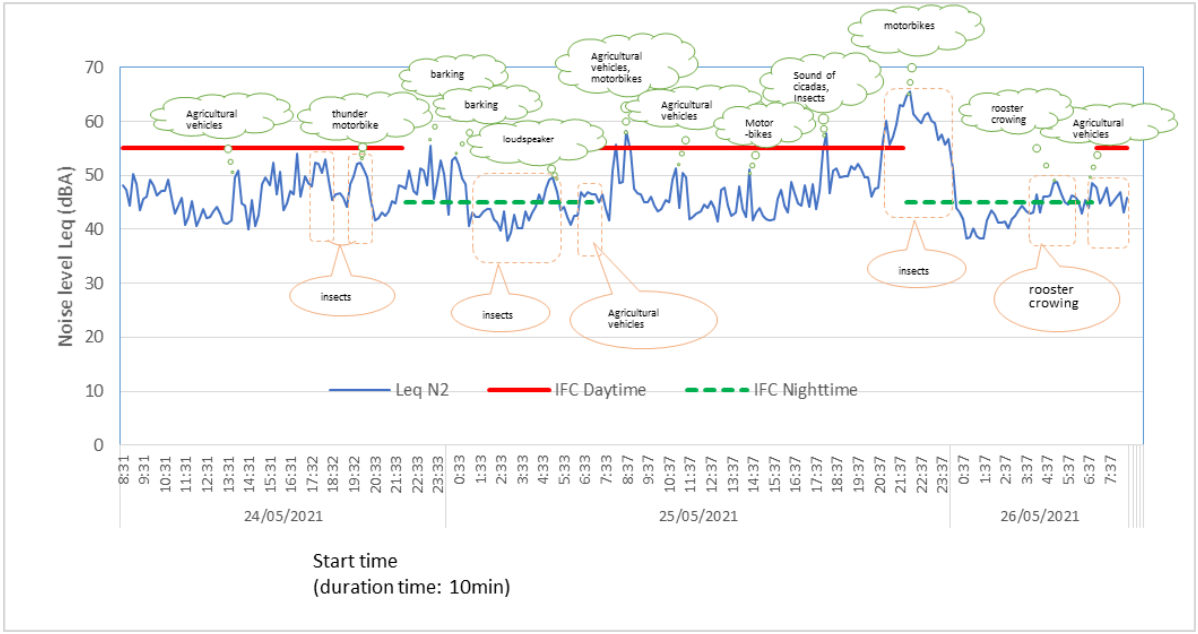


Figure 7.24 $L_{eq,\ 10min}$ (dBA) at Location NML2

7.6.3.3 Noise Monitoring Site NML3

- 25.67% daytime noise levels were above the IFC's limitation. The highest noise level measured was 63.3dBA during the period of 10 minutes from 9:05AM to 9:15AM on 26 May 2021[16] due to barking dogs and insects. The lowest noise level was measured at 42.4 dBA during the period 3:41PM-3:51PM on 23 May 2021.
- Most of night noise value (94.34%) exceeded the IFC's limitation for night-time (45dBA), mainly due to insects, occasional barking dogs, and crowing roosters. The highest measured noise level was 62.3 dBA at 2:15AM and 2:25AM on 27 May 2021 due to insects. The lowest noise level measured was 42.9 dBA in the period of 22:41-22:51 on 22 May 2021.
- In short, NML3 was often affected by the noise sources from agricultural vehicles, loudspeakers from the National Assembly Election 2021, and other insects at night. There were also occasional noise sources such as motorbikes, trucks, dogs and roosters.

[16] A longer period of monitoring time occurred to NML3 and NML4 due to rainy time on 22 May 2021. The compensation of monitoring time was conducted later on 26-27 May 2021 to ensure sufficient data during 48 hours.

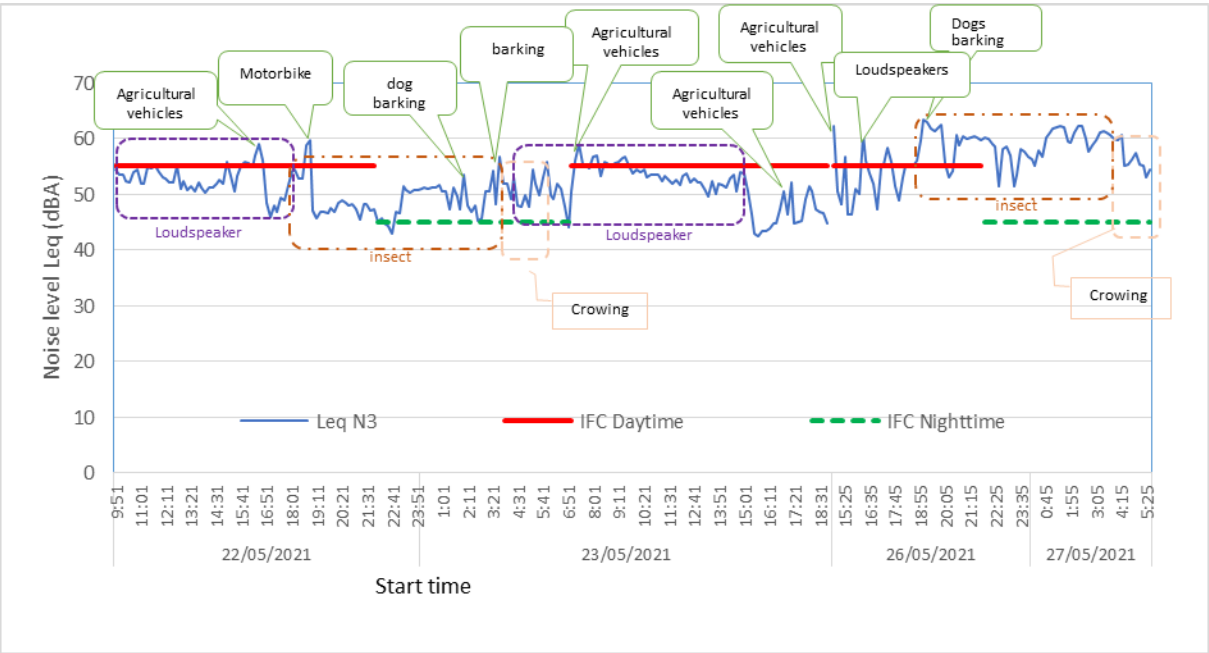


Figure 7.25 $L_{eq,10min}$ (dBA) at Location NML3

7.6.3.4 Noise Monitoring Site NML4[16]

- 4.79% of $L_{eq,10min}$ in daytime was higher than the IFC's limitation. The highest noise level measured was 58.5 dBA in the period of 15:42-15:52 on 23 May 2021 due to karaoke noise which is about 40m away. The lowest noise level measured was 39.9 dBA at 15:54 on 23 May 2021.
- 100% noise level in the night time exceeded the IFC's limitation (45dBA) mainly due to the sound of insects and dog barking. The highest noise level was measured at 57.8 dBA in the period of 5:21AM-5:31AM on 23 May 2021 due to the sound of insects and dog barking. The lowest noise level measured was 49.2 dBA at 10PM -10:10PM of 22 May 2021.
- N4 was not only affected by the noise sources from agricultural vehicles and motorbikes, but also by other noise sources such as insects at night (6:15PM to 3:00AM), cicadas, dogs, roosters and birds. In addition, because NML4 location was about 40m away from the residential areas, it was often affected by residents' activities consisting of talking, children playing, and karaoke singing.

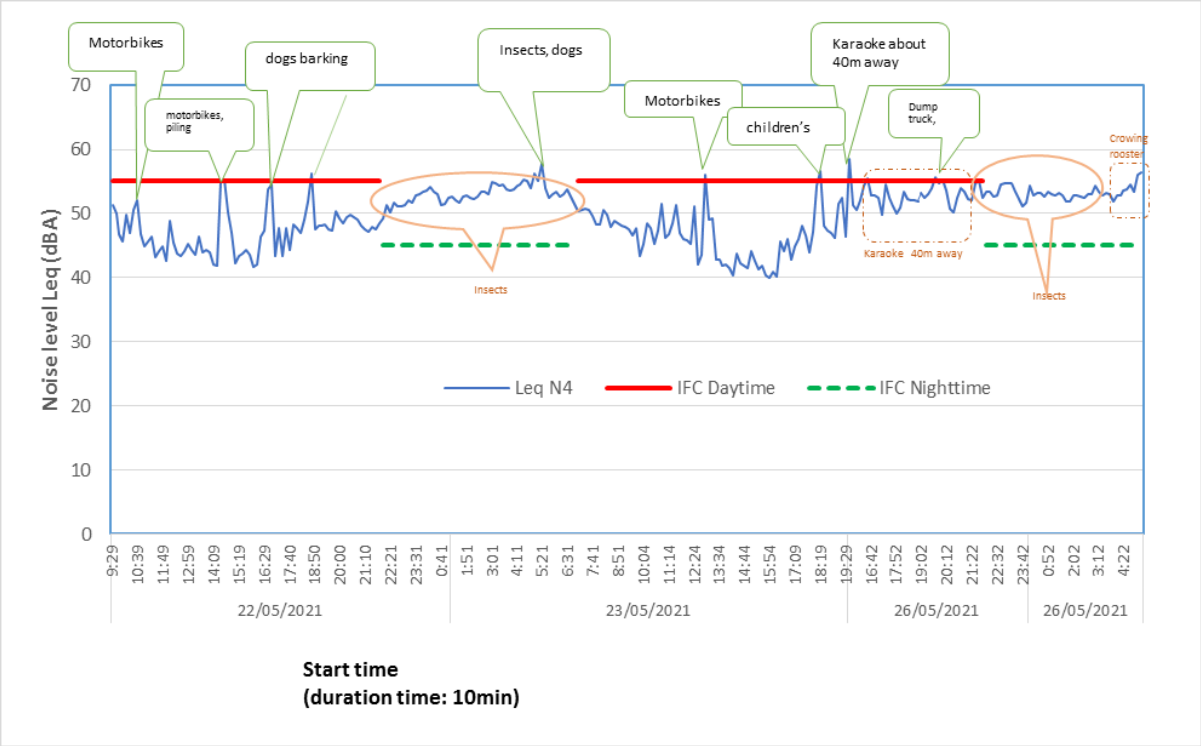


Figure 7.26 **$L_{eq,\ 10min}$ (dBA) at Location NML4**

7.6.3.5 Noise Monitoring Site NML5

- $L_{eq,10min}$ noise level measured at site NML5 fluctuated between 33.3dBA and 70.5 dBA.
- 39.44% of the $L_{eq,10min}$ measured in daytime was higher than IFC EHS Guidelines. The highest noise level in daytime was 70.5dBA during the period 7:52AM-8:02AM on 22 May 2021 due to the traveling of agricultural vehicles and motorbikes. The lowest noise level measured was 34.6 dBA at 9:52PM-10:02PM on 21 May 2021.
- 53.7% of $L_{eq,10min}$ in night time was higher than IFC EHS Guidelines. The highest noise level in night time was recorded at 70 dBA during the period 6:32AM-6:42AM on 21 May 2021 due to agricultural vehicles and motorbikes. The lowest noise level was measured at 33.3 dBA at 11:52PM on 21 May 2021.
- At N5 monitoring point, there were interference noise sources affecting to the noise baseline which could be recorded as agricultural vehicles and motorbikes frequently passing by. During night time, there were other sounds from the insects, dogs barking, roosters crowing, cicadas chirping, children's voices and even karaoke singing.

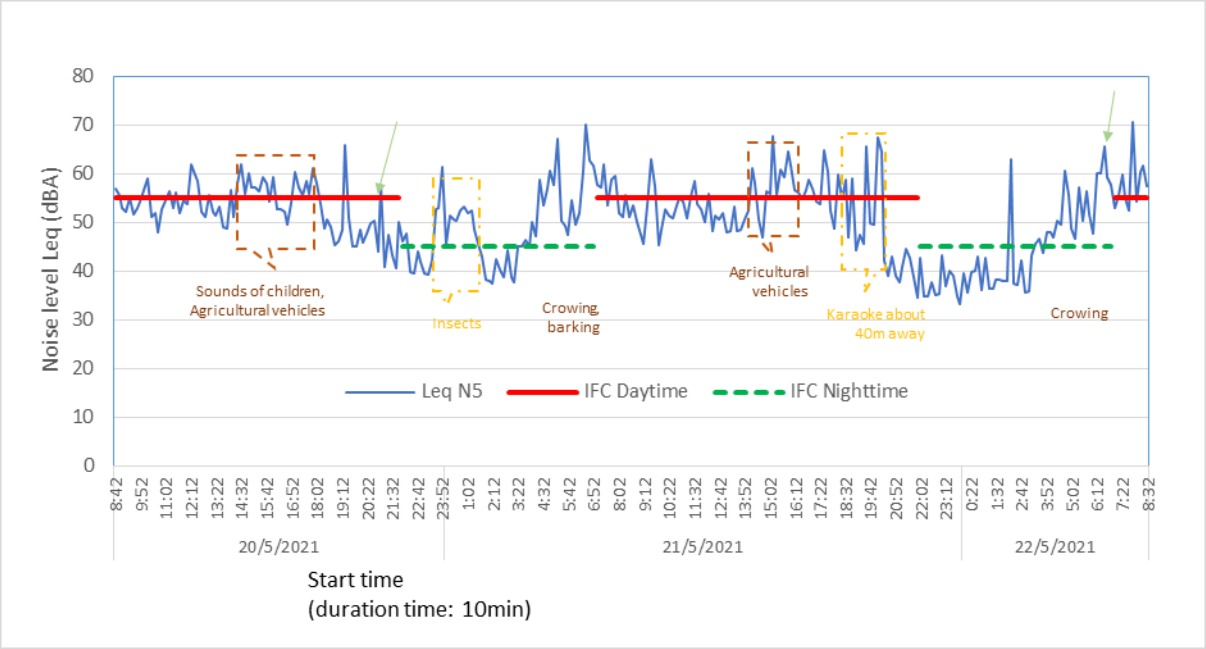


Figure 7.27 Diagram of $L_{eq,10min}$ (dBA) at Location NML5

7.6.3.6 Noise Monitoring Site NML6

- Noise level ($L_{eq,\ 10\ minutes}$) at the NML6 position ranged from 36.5 to 65.5 dBA
- 6.08% of the noise level measured in daytime was higher than the IFC noise standard. The highest noise level in daytime was 65.5 dBA from 6:12PM to 6:22PM on 20 May 2021 due to motorbikes. The lowest noise level measured was 36.5 dBA during the period 8:59PM-9:09PM on 21 May 2021.
- 56.3% of noise level measured during night time was higher than the IFC EHS Guidelines. The highest noise level in night time was recorded at 57.5 dBA in the period of 6:32AM – 6:42AM on 21 May 2021 due to agricultural vehicles. The lowest noise level as measured at 36.7 dBA in period of 10:59PM – 11:09PM on 21 May 2021.
- At NML6 monitoring point, there were interference noise sources affecting to the noise baseline which could be recorded as agricultural vehicles and motorbikes frequently passing by. During night time, there were other sounds from the insects, dogs barking, roosters crowing, cicadas chirping, children's voices, and even karaoke singing.

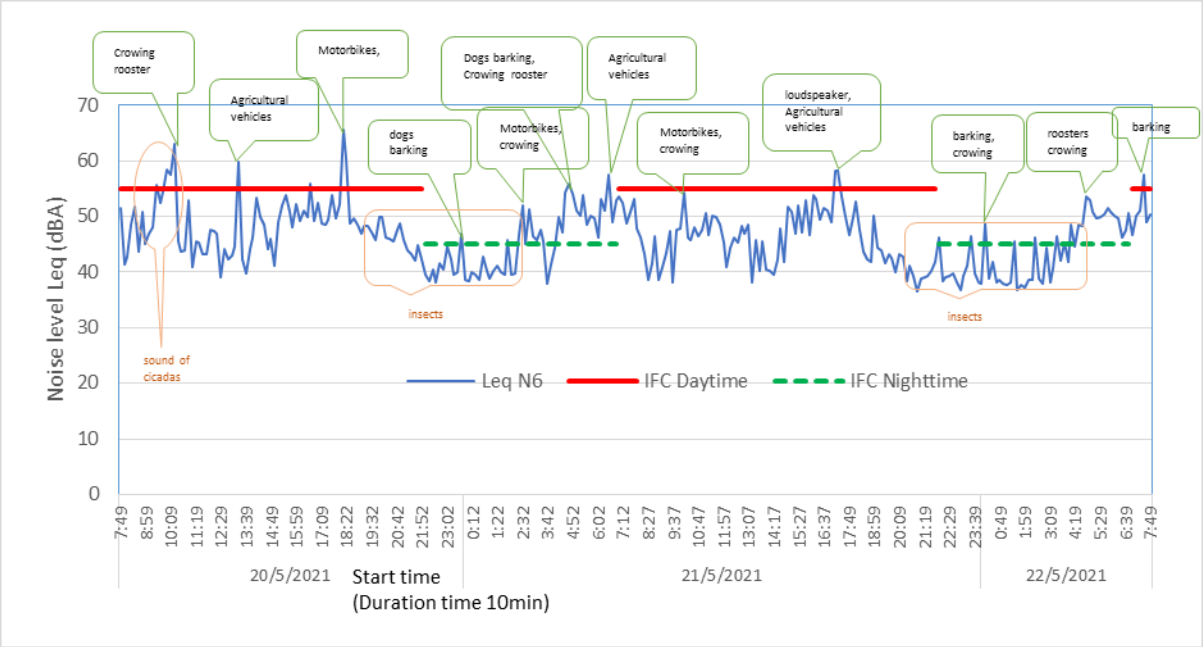


Figure 7.28 Diagram of $L_{eq,10min}$ (dBA) at Location NML6

8. BIODIVERSITY BASELINE

This section presents the existing biodiversity values of the Project area and its vicinity, based on information collated from different methods, as detailed in Section 1.1. The objective of the biodiversity baseline is to identify and characterise the biodiversity receptors that can potentially be affected by the development of the Project. This section also provides an assessment on whether the Project are overlaps Critical Habitat. Critical Habitat is defined as an area having high biodiversity value according to the criteria set out within the International Financial Corporation's Performance Standard 6 (IFC PS6) and the associated Guidance Note 6 (GN6). Where a Project area overlaps with Critical Habitat, particular requirements are triggered in order for that project to comply with IFC PS6.

8.1 Methodology

The biodiversity baseline and critical habitat assessment (CHA) methodology involves a four-step process including: desktop review, identification of the Ecologically Appropriate Area of Analysis (EAAA), field surveys, and then a CHA (Figure 8.1). Steps 1 to 3 can be regarded as the baseline data collection process used to inform the CHA.

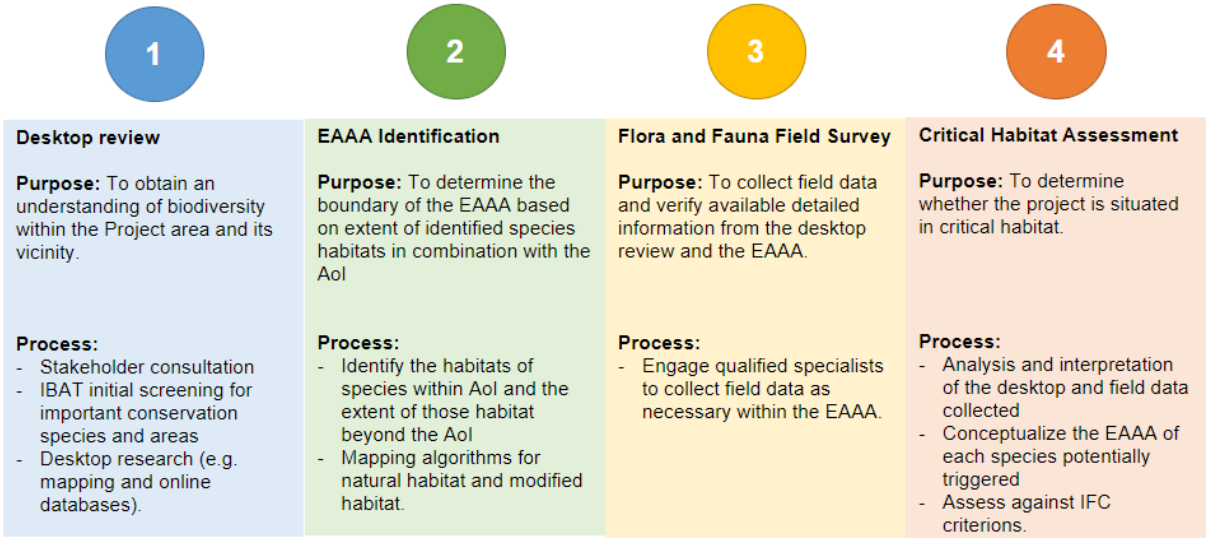


Figure 8.1 Steps of the Critical Habitat Assessment

8.1.1 Desktop Review

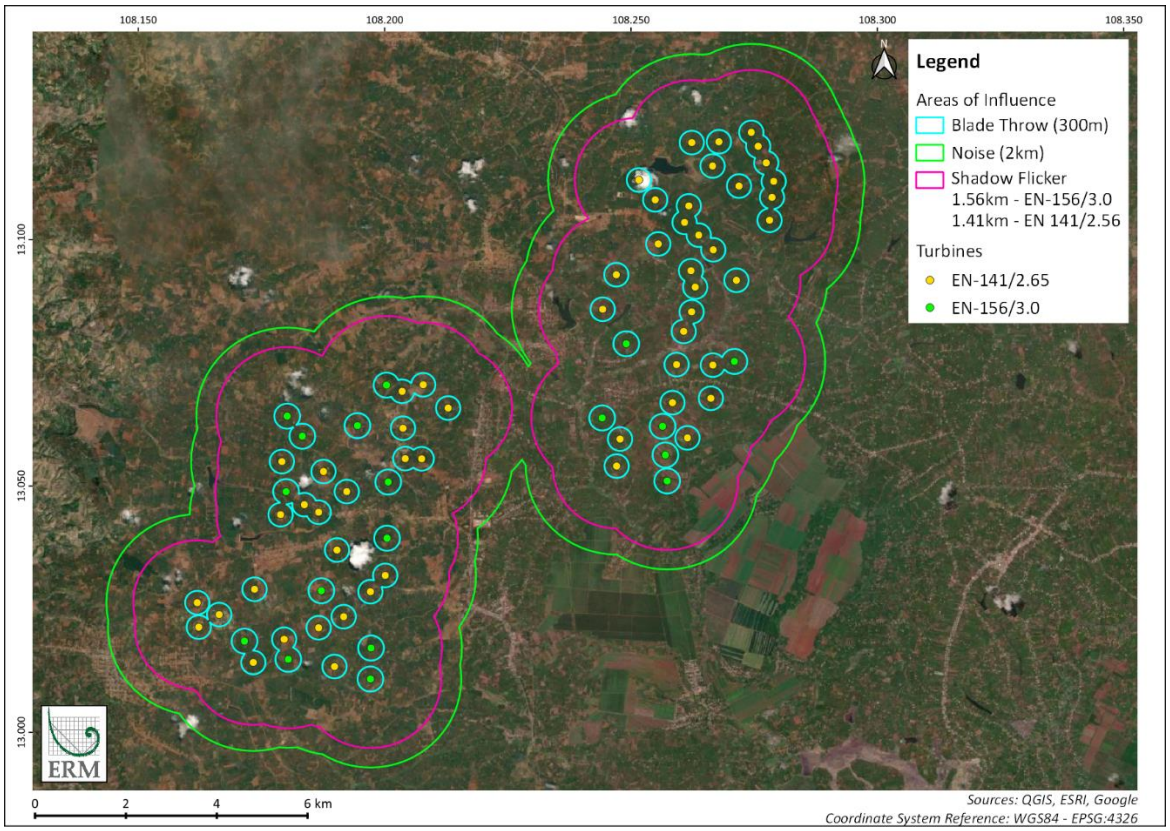
The desktop review involves gathering relevant information derived from relevant publications and online databases (including the Integrated Biodiversity Assessment Tool [IBAT]). Where possible, this information is then confirmed in consultation with relevant biodiversity stakeholders, including species specialists from the Center for Biodiversity conservation and Endangered species (CBES) and Centre for Natural Conservation (CCD). The purpose of this process is to identify the existing biodiversity values within the Project area of Influence (AoI).

The desktop review enables the characterisation of the Ecoregion within which the Project area is located, as well as the identification of Important Conservation Areas, conservation significant species and invasive species with potential to be present within the Project AoI.

The definition of these areas are as follows:

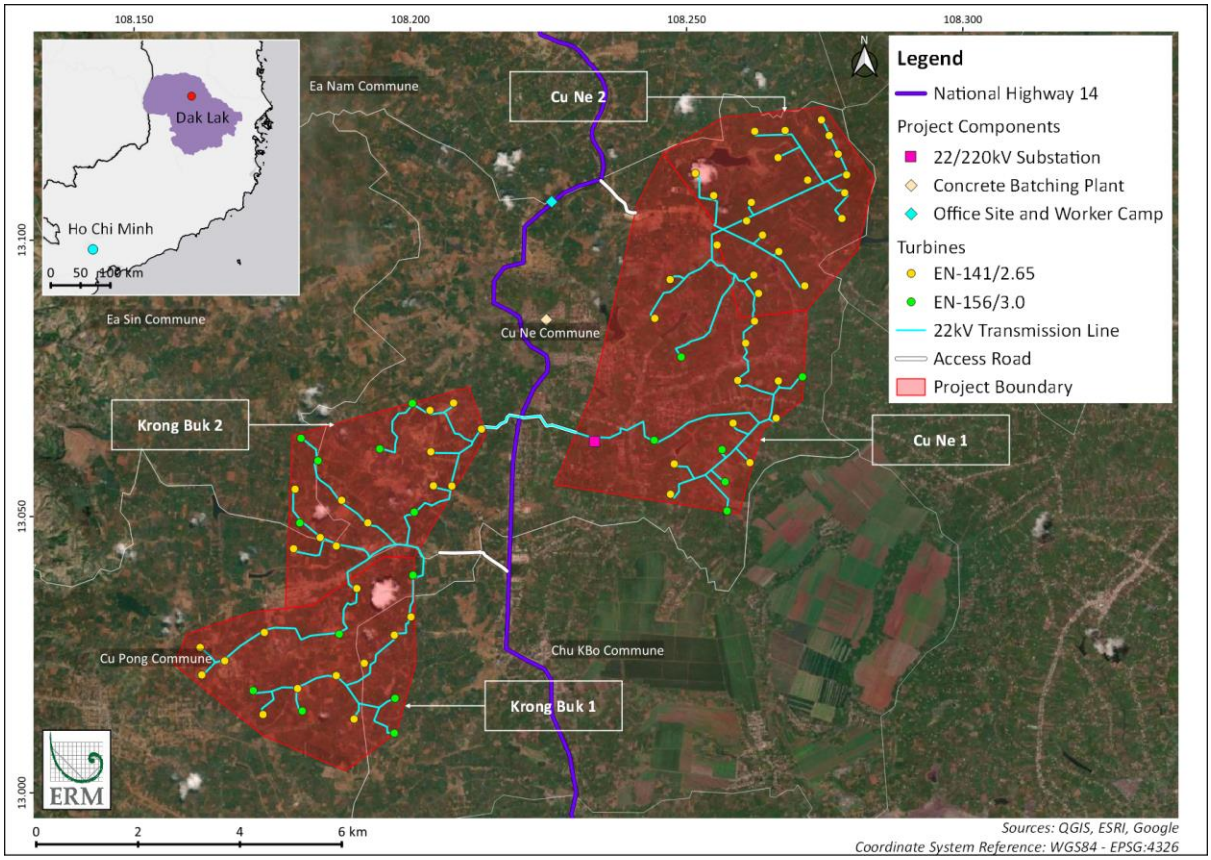
- The Project area is defined as area within the Project boundary where Project activities take place (see Figure 1.1). The Project area is 5,383 ha.
- The Project footprint is defined as areas cleared for infrastructure developments (see Figure 1.1). The total land clerance for temporary and fixed-term components is approximately 120 ha.

- The Project AoI is the area likely to be affected by the Project including all its ancillary aspects, such the Project components and unplanned developments induced by the Project. Three AoIs have been defined for the Project (see Figure 5.2); among which noise is the most relevant aspect for biodiversity impacts. The noise AoI covers approximately 13,795 ha;
- Important Conservation Areas (e.g. WHS, KBAs) within a 50 km radius of the Project area were identified using IBAT; and
- Where a species is identified to have or is likely to have regular occurence in the Project AoI, the Ecologically Appropriate Area of Analysis (EAAA) for that species is defined as required under IFC PS6. The EAAA is used to identify the presence of critical habitat for that species (through application of the IFC PS6 critical habitat thresholds outlined in the associated GN6 (2019) (see Figure 8.19). Where multiple EAAAs overlap, aggregation of these area ican be made. The final EAAA is 31,026.97 ha (see further in section 8.2.3).



Source: QGIS, ESRI, Google, August 2021

Figure 8.2 AoI for Noise



Source: QGIS, ESRI, Google, August 2021

Figure 8.3 Project Area (Project boundary) and Project Footprint (Project Components)

The desktop review considered online sources, literature and environmental studies undertaken within 50 km radius of the Project area. IBAT was used as the main source for identifying the potential presence of globally threatened species and Important Conservation Areas. Additional sources used for screening included:

- NGO webpages and databases including those belonging to the World Wildlife Fund (WWF);
- BirdLife International;
- Circular 35/2018/TT-BTNMT that lists invasive/alien species in Vietnam;
- eBird;
- Global Biodiversity Information Facility (GBIF);
- Global Invasive Species Database (GSID)
- Vietnam Red Data Book (VRDB);
- International Union for the Conservation of Nature (IUCN) Red List of Threatened Species (the 'IUCN Red List') and their profiles; and
- IUCN Red List of Ecosystems (although no assessments of threatened ecosystems has been completed by IUCN for Vietnam).

The data obtained during the desktop review was used to inform all steps of the CHA process (Figure 8.1).

8.1.2 EAAA Identification

IFC PS6 requires the assessment of the distribution of natural habitat and modified habitat in order to identify risks and mitigation to biodiversity values during the impact assessment phase. Natural and modified habitat was delineated using remote sensing and vegetation classification techniques. To discriminate between different land types in the EAAA, ERM used QGIS version 3.8 (Semi-Automatic Classification plugin). Algorithm development was conducted manually by selecting different regions of interest (ROI), which was associated with different land types. The land cover classification algorithm is based on the difference of Normalized Difference Vegetation Indiex (NDVI) in false color combination of three bands (band 2, band 3, and band 4) of satellite imagery. Each object (e.g. vegetation, water, built-up land[17]) has specific range of NDVI.

The boundary of the EAAA was defined based on the species and habitats within the Project AoI which could trigger critical habitat, and their ecological linkages extending beyond the AoI which are necessary to maintain their distribution. The EAAA area was established to account for multiple biodiversity values and overlaps with wide-ranging species (e.g. birds) within the Project AoI. A number of parameters were used to define the EAAA boundary including the surrounding environmental condition, surrounding land uses, likely significant species present, main habitat types and their natural boundaries (e.g. water catchments, large rivers, or geological features), and anthropogenic influences.

The EAAA and information about natural/ modified habitats within the EAAA was used to inform the sampling design of the field surveys and assess the applicability of the critical habitat criteria and thresholds to determine critical habitat for the species and/or ecosystems of concern (see Figure 8.1).

8.1.3 Flora and Fauna Field Survey

Site specific biodiversity data was acquired using a combination of methods including flora and fauna baseline surveys, expert consultation with local specialists from CBES and CCD and interviews with local people. Information was gathered on species and their suitable habitats within the EAAA. Refer to Section 8.2.2 for detailed information on the field surveys undertaken.

8.1.4 Critical Habitat Assessment

According to IFC PS6, critical habitats are areas with high biodiversity value that include at least one or more of the following five values:

1. Habitat of significant importance to Critically Endangered (CR) and/or Endangered[18] (EN) species;
2. Habitat of significant importance to endemic and/or restricted-range species;
3. Habitat supporting globally significant concentrations of migratory species and/or congregatory species;
4. Highly threatened and/or unique ecosystems; and/or
5. Areas associated with key evolutionary processes.

Critical habitat may not be limited to pristine or highly biodiverse areas, but rather may include both modified habitat and natural habitats across the broader landscape. Critical habitats can therefore be a subset of both modified habitat and natural habitat.

[17] Refers to residential areas or infrastructures that have an artificial cover as a result of human activities

[18] As listed on the International Union for the Conservation of Nature (IUCN) Red List of Threatened Species. The determination of critical habitat based on other listings is as follows: (i) If the species is listed nationally / regionally as critically endangered or endangered, in countries that have adhered to IUCN guidance, the critical habitat determination will be made on a project by project basis in consultation with competent professionals; and (ii) in instances where nationally or regionally listed species' categorizations do not correspond well to those of the IUCN (e.g., some countries more generally list species as "protected" or "restricted"), an assessment will be conducted to determine the rationale and purpose of the listing. In this case, the critical habitat determination will be based on such an assessment

CHA for the Project was undertaken against the criteria defined within IFC PS 6 GN6. This involved analysis of the desktop review data, habitat mapping outputs and field survey results. Critical Habitat criteria are defined in PS6 GN6, Paragraphs GN69 to 97. Table 8.1 provides details of the qualifying requirements for Criteria 1 to 5.

The five criteria are 'triggers' in that if an area meets any one of the criteria, it will be considered Critical Habitat irrespective of whether it fails to meet any other criterion. There is no one criterion that is more important than any other for qualifying as Critical Habitat or for determining compliance with PS 6. For ease of reference, these values are referred to as "critical habitat criteria" for the remainder of this document.

Table 8.1 Critical Habitat Criteria

Criteria	Thresholds
Criterion 1: Critically Endangered (CR) / Endangered (EN) species:	Areas that support globally-important concentrations of an IUCN Red-listed EN or CR species (0.5 % of the global population AND 5 reproductive units of a CR or EN species); Areas that support globally-important concentrations of an IUCN Red-listed Vulnerable (VU) species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds in (a); and/or As appropriate, areas containing important concentrations of nationally or regionally listed EN or CR species.
Criterion 2: Habitat of significant importance to endemic and/or restricted-range species;	Areas that regularly hold ≥ 10 % of the global population size AND ≥ 10 reproductive units of a species.
Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species;	Areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 % of the global population of a migratory or congregatory species at any point of the species' lifecycle; and/or Areas that predictably support ≥ 10 % of the global population of a species during periods of environmental stress.
Criterion 4: Highly threatened and/or unique ecosystems; and/or	Areas representing ≥ 5 % of the global extent of an ecosystem type meeting the criteria for IUCN status of CR or EN; and/or Other areas, not yet assessed by IUCN, but determined to be of high priority for conservation by regional or national systematic conservation planning.
Criterion 5: Areas associated with key evolutionary processes	Criterion 5 has no tiered system though IFC PS6 describes this criterion to be one of the following: ■ Physical features of a landscape that might be associated with particular evolutionary processes (for example isolated areas, areas of high endemism, spatial heterogeneity, environmental gradients, edaphic (i.e. soil-type) interfaces, biological corridors or sites of demonstrated importance to climate change adaptation); and/or ■ Subpopulations of species that are phylogenetically or morphogenetically distinct and may be of special conservation concern given their distinct evolutionary history. The latter includes evolutionarily significant units and evolutionarily distinct and globally endangered species.

Source: IFC (2019)

8.2 Baseline Results

8.2.1 Desktop Review Results

8.2.1.1 Ecoregion Description

According to Queiroz et al. (2013), Vietnam comprises a total of 14 terrestrial ecoregions. This Project lies within the Southeastern Indochina Dry Evergreen Forests [Scientific code IM0210], which occupies an area of 124,320 km^2. This Ecoregion occurs in a broad band across northern and central Thailand into Laos, Cambodia, and Vietnam. Dry evergreen forest is more appropriately called semi-evergreen forest because a significant proportion of canopy tree species are deciduous at the height of the dry season. Semi-evergreen forest is the predominant forest cover in this ecoregion, but it often occurs in mosaics of deciduous dipterocarp or mixed deciduous forest communities. The distribution of dry semi-evergreen forest habitats across a landscape mosaic is largely a function of gradients of soil moisture availability.The ecoregion occurs in humid and sub-humid climatic regions where mean annual rainfall is generally between 1,200 and 2,000 mm, and a significant dry period of 3-6 months occurs each year. The canopy of semi-evergreen forests generally is multilayered and reaches about 30-40 m, with an open structure (WWF n.d.).

Most of the forests in this ecoregion located in Vietnam have already been replaced by plantations. Shifting agriculture has further degraded some areas of this ecoregion. According to WWF (n.d.), the greatest threats to this ecoregion are from large-scale logging concessions that have been granted to multinational companies, such as in Cambodia. Hunting to supply wildlife trade has created more cleared forest patches throughout most of the ecoregion; therefore, the conservation status of this ecoregion is endangered (WWF n.d.).

The following species of conservation significance exist within the Southeastern Indochina Dry Evergreen Forests Ecoregion (Table 8.2).

Table 8.2 Critically Endangered and Endangered Species within the Ecoregion

No.	Scientific Name	Common Name	IUCN	VRDB	Class
1	*Pseudibis gigantea*	Giant Ibis	CR	NL	Aves
2	*Arborophila davidi*	Orange-necked Partridge	NT	EN	Aves
3	*Polyplectron germaini*	Germain's Peacock Pheasant	NT	VU	Aves
4	*Pygathrix nemaeus*	Red-shanked Douc Langur	CR	EN	Mammalia

Notes:

IUCN: IUCN Red List; VRDB: Vietnam Red Data Book; CR : Critically Endangered; EN : Endangered; VU : Vulnerable; NT: Near Threatened; LC: Least Concern; NL: Not Listed

Source: WWF (n.d.)

8.2.1.2 Important Conservation Areas

Table 8.3 lists the Important Conservation Areas within 50 km radius of the Project.

Table 8.3 Presence of Important Conservation Areas within 50 km Radius of the Project

Category	Presence
Biosphere Reserves	No
World Heritage Sites	No

Category	Presence
Ramsar Sites	No
Protected Areas	Yes
Key Biodiversity Areas	Yes
ASEAN Heritage Parks	No

8.2.1.2.1 Protected Areas

There are four nationally protected areas situated within a 50km radius of the Project Area, three of which are nature reserves and one is national park. These areas are described in Table 8.4 and their locations presented on Figure 8.4. Based on the desktop review, a list of species that has been recorded in these protected areas is presented in Appendix D.

Table 8.4 Protected Areas within 50km Radius of the Project Area

No.	Protected Area	Approximate Distance to Project's nearest turbine(km)	Ecological information	Administrative information	References
1	Earal	4.3 km northwest of turbine D4	■ The area was designated a nature reserve as it holds a significant population of Chinese Swamp Cypress *Glyptostrobus pensilis* (IUCN CR; VRDB CR) (about 140 trees). The nature reserve comprises a swampy area surrounded by coffee plantations. ■ There is limited information about the habitats of this nature reserve. ■ The main threats to the population of Chinese Swamp Cypress at Earal are forest fire in the dry season and floods in the rainy season. In addition, the Dak Lak Provincial FPD identified the lack of a buffer zone and the proximity of the site to centres of population as obstacles to management.	■ Country : Vietnam ■ Type: Proposed Nature Reserve ■ Area size: 0.5 km^2 ■ IUCN Management Category: II ■ Designation year : 1994 ■ Management Authority: People's Committee of Dak Lak	(Dak Lak Provincial FPD 1998)
2	Trap Kso	6.1 km southwest of turbine C13	■ The area was designated a nature reserve as it holds a significant population of Chinese Swamp Cypress *Glyptostrobus pensilis* (IUCN CR; VRDB CR) (about 34 trees). The nature reserve comprises a swampy area surrounded by coffee plantations. ■ There is limited information about the habitats of this nature reserve. ■ The Dak Lak Provincial FPD identified fire as the biggest threat to the remaining Chinese Swamp Cypress at Trap Kso.	■ Country : Vietnam ■ Type: Proposed Nature Reserve ■ Area size: 1.28 km^2 ■ IUCN Management Category: Not reported ■ Designation year : 2013 ■ Management Authority: People's Committee of Dak Lak	(Dak Lak Provincial FPD 1998)

No.	Protected Area	Approximate Distance to Project's nearest turbine(km)	Ecological information	Administrative information	References
3	Ea So	22.9 km west of turbine C9	■ Ea So proposed nature reserve supports a range of natural habitat types, including 11,274 ha of evergreen forest, 4,513 ha of semi-evergreen forest and 144 ha of deciduous forest. Blocks of forest are interspersed with areas of natural grassland. ■ The major threats to biodiversity at Ea So proposed nature reserve are hunting, illegal extraction of forest products and clearance of forest for agriculture. These threats are being intensified by increasing population pressure resulting from migration into Ea So commune of people from northern Vietnam and elsewhere in Dak Lak province. Only 134 people live inside the proposed nature reserve but over 3,700 people live in the buffer zone. ■ The government of Vietnam is currently planning to build a highway through the area of the proposed nature reserve, to provide basic infrastructure to this remote area, and to link Dak Lak and Phu Yen provinces. This highway will improve access to the forest and grasslands of the proposed nature reserve, and, as a result, levels of human disturbance are likely to increase. Furthermore, the highway is likely to act as a focus for future migration into the area.	■ Country : Vietnam ■ Type: Proposed Nature Reserve ■ Area size: 211.94 km^2 ■ IUCN Management Category: Not reported ■ Designation year : 1999 ■ Management Authority: People's Committee of Dak Lak	(Dak Lak Provincial FPD 1998)
4	Yok Don	35 km east of turbine A18	■ The vegetation at Yok Don National Park is dominated by a mosaic of deciduous forest and semi-evergreen (mixed deciduous) forest, with smaller areas of evergreen forest, particularly on hills and along watercourses. The deciduous forest is dominated by members of the Dipterocarpaceae family. ■ Unlike the deciduous forest, the semi-evergreen forest at the site has a closed canopy, and is stratified into five layers. Evergreen forest has a limited distribution in the national park, being confined to higher elevations on the range of hills in the south-east of the site. This forest type is denser, and is dominated by members of the Fagaceae, Euphorbiaceae, Sapindaceae, Ebenaceae and Meliaceae families. Because deciduous forest generally	■ Country : Vietnam ■ Type: National Park ■ Area size: 1138.54 km^2 ■ IUCN Management Category: II ■ Designation year : 2001	(Do et al. 2017; Eames & Nguyen 2002)

No.	Protected Area	Approximate Distance to Project's nearest turbine(km)	Ecological information	Administrative information	References
			supports a lower floral diversity than evergreen forest, the diversity of plant species at Yok Don is lower than that at other national parks in Vietnam. ■ Currently, hunting is the greatest direct threat to biodiversity at Yok Don National Park. Another major conservation issue at Yok Don is construction of infrastructure within the national park. For example, a dam was recently built on the Dak Ken stream and a surfaced road to the base of Mount Yok Don is planned. ■ The largest conservation project currently being implemented at Yok Don National Park is the "Creating Protected Areas for Resource Conservation Using Landscape Ecology" (PARC) project, which aims to develop and pilot innovative methods for protecting Vietnam's highly threatened species and habitats. The project document was signed on 20 November 1998, and began implementation in 1999. The principal source of funding for this project is the Global Environment Facility, with counterpart funding from UNDP and the government of Vietnam[19].	■ Management Authority: Vietnam Administration of Forestry	

19 https://www.iucn.org/sites/dev/files/import/downloads/parc_yokdon.pdf

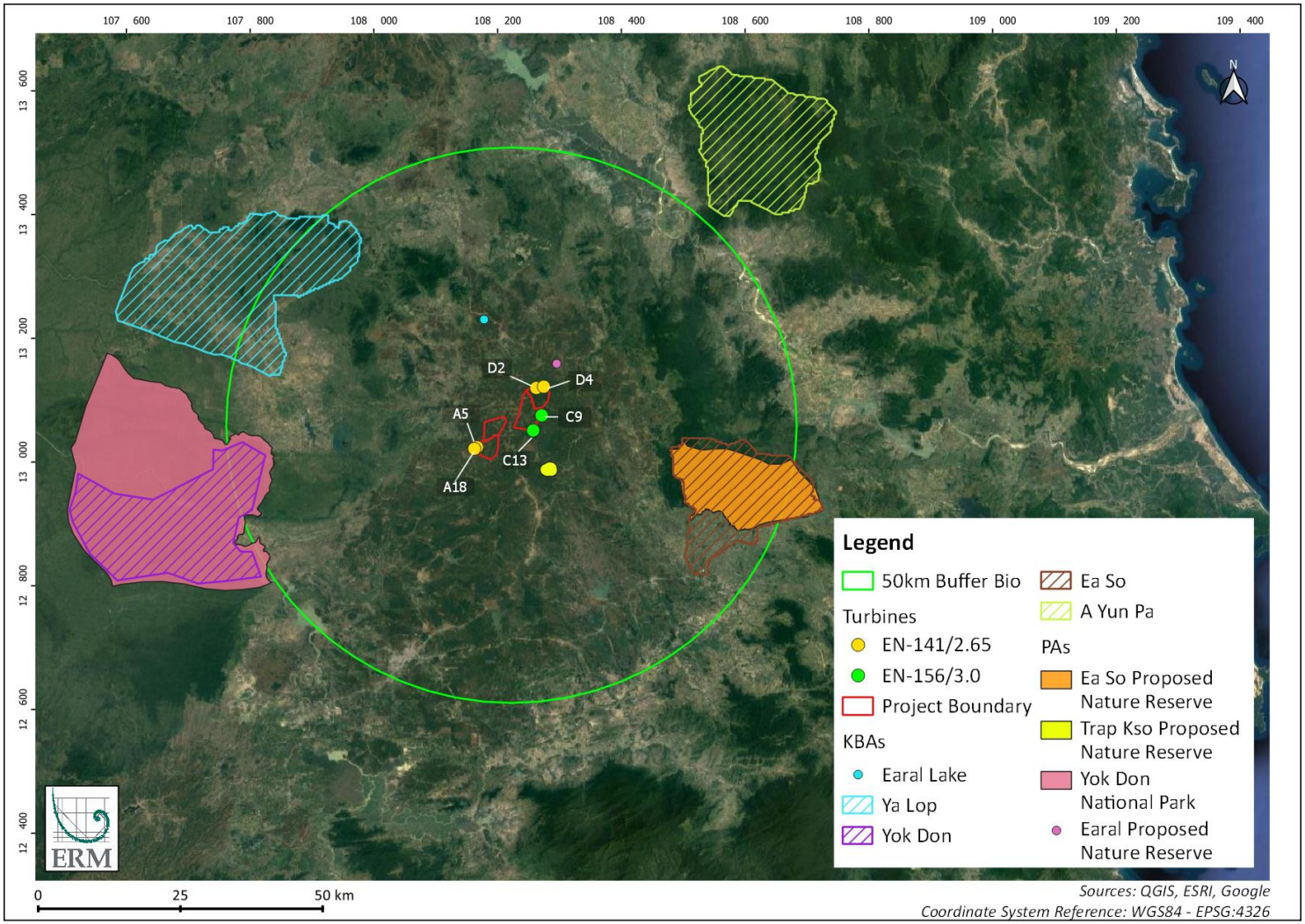
8.2.1.2.2 Key Biodiversity Areas

Four KBAs occur within a 50 km radius of the Project area. There is another KBA located immediately outside of the 50 km buffer (A Yun Pa), so it is also incorporated into the review (Figure 8.4). An overview of these areas is provided in Table 8.5. Based on desktop review, a list of species that has been recorded in these key biodiversity areas is presented in Appendix D. Some examples of bird species recorded in the KBAs included the White-rumped Vulture *Gyps bengalensis* (IUCN CR; VRDB CR); Red-headed Vulture *Sarcogyps calvus* (IUCN CR; VRDB NL); Giant Ibis *Thaumatibis gigantea* (IUCN CR; VRDB NL) and the Lesser Adjutant *Leptoptilos javanicus* (IUCN VU;VRDB VU). However, since the 1990s, these vultures have experienced catastrophic population declines across Southeast Asia and have now been absent in most countries in this region, including Vietnam (according to IUCN).

Table 8.5 KBA within 50 km Radius of the Project

Name	Distance to the Project	Vegetated habitats	Other Information
Ya Lop	36.5 km northeast of turbine A5	■ Forest: 100% coverage. Semi-evergreen rainforest (tropical); Dry deciduous forest (tropical).	■ Area: 73,760 ha ■ Year of most recent assessment: 2012
Ea So	22.9 km west of turbine C9	■ Forest: 57% coverage. Semi-evergreen rain forest (tropical); Moist deciduous forest (tropical) ■ Shrubland: unknown coverage. Secondary scrub.	■ Area: 34,948 ha ■ Year of most recent assessment: 2012
Yok Don	36.7 km east of turbine A18	■ Forest: majority of coverage (% not provided).	■ Area: 137,342 ha ■ Year of most recent assessment: 2012
Lake Earal	15.1 km northeast of turbine D2	■ Limited information about the habitats of this key biodiversity area.	■ Area: 370 ha ■ Year of most recent assessment: 2018
A Yun Pa	53.2 km northwest of turbine	■ Forest: lowland deciduous forest, lowland semi-deciduous forest and lower montane evergreen forest	■ Area: 44,268 ha ■ Year of most recent assessment: 2012

Source: http://www.keybiodiversityareas.org/ and http://datazone.birdlife.org/



Source: QGIS, ESRI, Google, August 2021

Figure 8.4 Protected Areas and Key Biodiversity Areas within 50 km Radius of the Project

8.2.1.3 Invasive Species

Invasive species are non-native species introduced beyond their original range and whose spread causes, or is likely to cause, socio-cultural, economic, environmental harm or harm to human health. These species can become naturalized in their introduced range and often reproduce in large numbers to rapidly spread over large areas. This can result in these species out-competing native plant and/or animal species. The Prime Minister of Vietnam has issued the Directive 42/CT-TTg[20] to strenghten the management and inspection of invasive species.

According to the Global Invasive Species Database (GISD) (no date) and the Vietnamese Circular 35/2018/TT-BTNMT[21], a total of 197 invasive alen species have been identified for Vietnam, of which 181 species could potentially occur within the EAAA (see Appendix E). Among these, six flora and four fauna species have been recorded in Dak Lak province[22] (see Table 8.6)

Table 8.6 Invasive Species in Dak Lak Province

S/N	Class	Scientific Name	Common Name
1	PLANTS	*Chromolaena odorata*	Siam Weed
2	PLANTS	*Parthenium hysterophorus*	Santa Maria Feverfew
3	PLANTS	*Mimosa diplotricha*	Giant False Sensitive Plant
4	PLANTS	*Mimosa pigra*	Black Mimosa
5	PLANTS	*Lantana camara*	Shrub Verbenas
6	PLANTS	*Eichhornia crassipes*	Common Water Hyacinth
7	INVERTEBRATES	*Pomacea canaliculata*	Channeled Applesnail
8	ACTINOPTERYGII	*Oreochromis mossambicus*	Mozambique Tilapia
9	ACTINOPTERYGII	*Pterygoplichthys spp.*	Janitor Fish
10	REPTILIA	*Trachemys scripta elegans*	Red-Eared Slider

8.2.2 Flora and Fauna Surveys

This section summaries the sampling effort and key findings of field surveys undertaken to support the Project's biodiversity impact assessment. For further technical information about the methodologies and result analyses, refer to the technical reports attached in Appendix F, Appendix G, Appendix H.

8.2.2.1 Survey Methodologies

Surveys were carried out for flying animals i.e. avifauna (birds) and chiroptera (bats), as well as habitats, flora, non-volant (i.e. non-flying) animals and herpetofauna (amphibians and reptiles). The survey scopes and methodologies are summarized in Table 8.7. Two survey visits were carried out over the following periods:

- 1st survey: 22 to 25 May 2021
- 2nd survey: 15 to 20 July 2021

[20] Dated 8 December 2020 by the Prime Minister about Strengthening the Management and Control of Alien and Invasive species.

[21] Dated 28 December 2018 by the Ministry of Natural Resrouces and Environment about Promulgating Invasive Alien Species Determination Criteria And Lists.

[22] https://tintaynguyen.com/dak-lak-6-loai-sinh-vat-va-4-loai-dong-vat-ngoai-lai-xam-hai-tren-dia-ban-tinh-2/210629/

- 3rd survey: 10 to 12 December 2021[23]

There are some limitations to the survey designs. The Project has started construction before conducting baseline surveys. According to Table 2.14, at the time of conducting the first survey, construction of road system, wind turbines, installation of electricity system (substation and transmission line) and transportation of equipment to the Project's site were undergoing. At the time of conducting the second survey, construction of those components were nearly finished and prepared for comissioning/installation in August. At the time of the 3rd survey, construction has been concluded. However, during all survey periods, there were no construction activities along any of the sampling transects and in the vicinity of the selected vantage points.

Secondly, the first two surveys were carried out during the rainy season in the central highlands of Vietnam, which usually occurs from May to October each year. During the two surveys in May and July 2021, light to heavy rain usually occured in early morning (5:00 – 7:00) and in the evening (17:00 – 21:00). The weather records for each day surveyed are provided in Table 8.7. The timing of most surveys usually happen from 6:00 to 18:00, except for bat surveys that happen during early morning (4:00 to 6:00 for un-installing traps and going on transects) and in the late afternoon (15:00 to 21:00 for installing traps and going on transects). Therefore, bat surveys were mostly affected as bats are not active in rain; while other surveys were not heavily affected. Bat abundance could therefore be greater than recorded from field surveys.

There were no rain in the third survey because it was out of the raining season.

Table 8.7 Weather Description during the First and Second Surveys

Date	Scope of work	Weather
1st survey: 22 to 25 May 2021		
22 May 2021	■ Conducted vantage point site check for bird ■ Day 1 bat survey	No rain, sunshine
23 May 2021	■ Day 1 vantage point and transects for birds ■ Day 2 bat survey	Cloudy weather. Heavy rain from 19:00 to 20:30
24 May 2021	■ Day 2 vantage point and transects for birds ■ Day 3 bat survey	Light rain from 4:00 to 5:00. Intermitten light rain from 17:00 to 19:00
25 May 2021	■ Day 3 vantage point and transects for birds (final day) ■ Checked and un-installed traps in the early morning for bats	Cloudy weather. Rain from 15:00 to 17:20
2nd survey: 15 – 20 July 2021		
15 July 2021	■ Conducted interview, set up cage and camera traps for non-volant mammals	No rain, sunshine
16 July 2021	■ Day 1 surveys for all scope (birds, bats, non-volant mammals, reptiles and flora)	Very small, intermittent rain from 15:00 to 21:00.
17 July 2021	■ Day 2 surveys for all scope (birds, bats, non-volant mammals, reptiles and flora)	Cloudy weather. Light rain continously between 18:55 and 20:00.

[23] A 3rd survey was planned to take place in August but has been delayed at the time of writing due to COVID-19 restrictions affecting travel. This 3rd survey includes one more vantage point survey targeting avifauna.

Date	Scope of work	Weather
18 July 2021	■ Day 3 surveys for all scope (birds, bats, non-volant mammals, reptiles and fauna) ■ Finished scope for birds	Heavy rain from 5:45 to 8:00. Cloudy all day. Light rain from 15:00 to 16:30.
19 July 2021	■ Day 4 surveys for non-volant mammals, reptiles and flora (final day) ■ Checked and collected traps, finished scope for bats	Intermitten rain from the middle of the day until late afternoon
20 July 2021	■ Collected cage and camera traps of non-volant mammals in the morning.	No rain

Table 8.8 Summary of Survey Methodologies

Target	Survey Technique	Description of methodology	Survey effort
1st survey: 23 to 25 May 2021			
Avifauna	*Vantage Point Survey*	Eight vantage points (VPs) were located within the Project area (one observer per point). At each point, from 5:30 to 18:00, one observer scanned the whole area within 2 km radius from the vantage point using a set of equipment including a HD Swarovski 20x80 telescope, a Nikon 5d camera and Nikon camera lens 500 – 600 mm with 1.4 and 2.0 extenders as well as a HD Swarovski 8x32 binoculars. Breaks were taken from 12:00 to 13:00 (1 hour for lunch and nap). Parameters recorded included information on species taxonomy; number of birds; flight time; height of the flight; type of flight and notes on activity/behaviour were also recorded. Based on the length of turbine blades and the hub heights, height of bird flight was categorized in three bands with regards to the rotor swept zone (RSZ), namely: below RSZ (Band 1: <51m), in RSZ (52 -208m) and above rotor height (>208m). Altitude of flights are recorded using Nikkon Forestry Pro II. The measurement accuracy of this device is ± 0.3 m at ⩽ 1000 m height and above this point is ± 1 m, with a range of 1.6km distance.	From 23 to 25 May, 36 sampling hours total have been conducted at each VP (12 hours per day, for three days at each VP).
	Transects	Four line transects were carried out to survey birds in different habitats through the Project area. Between 05:00 to 18:00, two surveyors walked using a 8x42 binocular or naked eyes to spot animals repeatedly. All information such as weather condition, numbers of all recorded birds' species, target species were recorded. Note that species flight height is not recorded during transects as it is not a requirement of the method itself.	From 23 to 25 May, a total of 36.7 km transect length have been walked in a total of 35.25 effort hours.
Chiroptera	*Mist-nets and harp-traps*	Six trapping stations were set up in the Project area. Traps were placed in plantations fields (coffee, avocado, mixed-crop) and along small streams near plantations fields. At each station, a combination of mist-nets (ranging from 3.0 to 24.0 m in length and approx. 3.0 m high) and harp-traps (ranging from 1.0 to 2.1 m^2 in area) were deployed. The deployment time of all traps was about 12 hours (usually within the time between 15:00 to 6:00) per deployment. Captured bats were photographed, measured and identified to	From 23 to 25 May, a total of 82.7 hours of mist-net sampling (equals to 5,241.1 square meter net*hours [m^2mnh]) and 88.56 hours of harp-traps sampling (equals to 255.02 m^2 per trap hour [m^2tp]) have been covered.

Target	Survey Technique	Description of methodology	Survey effort
		species level based on morphological descriptions of Csorba et al. (2003), Nguyen & Vu (2006), Krushop (2013), Francis (2019) and Wilson & Mittermeier (2019), prior to be released. Collecting methods followed the guidelines for obtaining mammal specimens as approved by the Mammal Society of Japan and the Sikes and the Animal Care and Use Committee of the American Society of Mammalogists.	
	Acoustic stations	At each trapping station, an Echometer M500 digital ultrasonic recorder (Patterson M500-384) and Echometer EM3 digital ultrasonic recorder (Wildlife Acoustics 2016) were also deployed to detect and record bat echolocation calls in the Project area. Both bat detectors allowed recording at sampling rates of 256 kHz and 384 kHz (providing analysis of calls up to frequencies of about 192 kHz). Properties of recorded calls were then analyzed in Hanning windows using spectrograms, oscilloscope tracings, and power spectra features of Call Viewer software.	From 23 to 25 May, a total of 81.1 hours of acoustic stations sampling have been conducted, which recorded 28 echolocations calls.
	Transects	After deploying and/or uninstalling the trapping stations, the surveyors walked slowly along transects (mostly along main roads to comply with Health and Safety requirements), using headlights and acoustic recording machines (the same with those described on “Acoustic Stations” survey techinque) to detect bats. Habitats along the transects included mainly plantations fields, parts of residental areas and ponds/small lakes.	From 23 to 25 May, a total of 124.72 km transect length have been walked in a total of 30 effort hours.
2nd survey: 15 – 20 July 2021			
Avifauna	*Vantage Point Survey*	Same location and methodologies as in 1st survey.	From 16 to 18 July 2021, 36 sampling hours total have been conducted at each VP (12 hours per day, for three days at each VP).
	Transects	Same location and methodologies as in 1st survey.	From 16 to 18 July 2021, a total of 37.1 km transect length have been walked in a total of 33.75 effort hours.

Target	Survey Technique	Description of methodology	Survey effort
Flora	*Transects*	Four flora transects were established across the Project area. On each transect, the survey team walked and observed plants and vegetation 10 m on both sides of the transect to gather botanical information, including species name, geographical coordinates, plant form, and photography (if needed). Specimens were also collected for later species identification. The transects covered different habitat types including secondary forests, shrubs, herbs, and along the coffee, pepper, avocado, cashew, and durian plantations	From 16 to 19 July 2021, a total of 22.71 km transect length have been walked in around 30 hours.
	Plot sampling	On each transect, a single plot was set up comprising an area of 1,000 m^2 (40m x 25m). Sample plots were located in the main habitats: secondary forests and coffee, pepper, avocado, cashew, and durian plantations.	Four plots were sampled from 16 to 19 July 2021. 4,000 m^2 surveyed.
Non-volant mammals	*Interviews*	First, the respondents were asked to name and describe all the mammals, birds, reptiles and amphibians living in the Project area that they know of. Species that might occur were also asked if interviewees did not mention them. Pictures of mammals, birds, reptiles and amphibians were shown to the respondents in order to check and confirm species reported. Locations and the last time of observation were also asked and recorded. The full list of interviewees and questionnaire is presented in Appendix K.	Semi-structured interviews were carried out with 11 local people on 15 July 2021.
	Transects	Four transects were completed within the Project area. Between from 6:00 to 18:00, the survey team walked and observed animals about 30 m on both sides of the transects. A GPS Garmin 62S machine and a smart phone apps named as “Locus Map” (https://www.locusmap.app) were used to record tracks and points/locations. A field guide to the mammals of South-East Asia (Francis, 2008) and the Introduction of Mammals of Indochina and Thailand (WWF, 2000) was used for mammal identification. The transects went through mainly coffee plantations, a minor portion went through grasslands/shrubs and along aritifical ponds and lakes.	From 16 to 19 July 2021, a total of 37.1 km transect length have been walked in a total of 33.75 effort hours.
	Monitoring stations	Eight cage traps and camera traps were deployed within the Project area to detect small mammals. Cage traps (15m x 15m x 25m) used dry fishes as baits. All mammals caught were released back into suitable environment at the point of capture. Cage traps were deployed in the afternoon and checked and in the morning of each following day.	A total of 311 cage trap hours and 437.30 camera hours have been carried out from 15 to 20 July 2021.

Target	Survey Technique	Description of methodology	Survey effort
Chiroptera	*Mist-nets and harp-traps*	Same location methodologies as in 1st survey.	From 16 to 18 July 2021, a total of 77.3 hours of mist-net sampling (equals to 5,410 square meter net hours [m^2mnh]) and 36 hours of harp-traps sampling (equals to 103.68 m^2 per trap hour [m^2tp]) have been covered.
	Acoustic Stations	Same location and methodologies as in 1st survey.	From 16 to 18 July 2021, a total of 35.6 hours of acoustic stations sampling have been conducted, which recorded 38 echolocations calls.
	Acoustic Transects	Same location and methodologies as in 1st survey.	From 16 to 18 July 2021, a total of 98.96 km transect length have been walked in a total of 35 effort hours
Herpetofauna	*Transects*	Surveyors walked through four transect routes from 7:30 to 10:30, 15:00 to 17:00, and 18:00 to 21:00. Venomous snakes were collected by snake hook or snake tong, and lizards were collected by forceps. Collected amphibians were kept in plastic bags, while snakes and lizards were kept in cloth bags. After photographing alive, species were released at the former location or areas with similar habitats. The transects went through mostly plantations, with a part of some transects went through water bodies.	From 16 to 19 July 2021, a total of 45.51 km transects length has been covered in 35.05 hours.
3rd survey: 10 to 12 December 2021			
Avifauna	*Vantage Point Survey*	Same location and methodologies as in 1st survey.	From 10 to 12 December 2021, 36 sampling hours total have been conducted at each VP (12 hours per day, for three days at each VP). In total, after three surveys, each VP had 108 sampling hours.

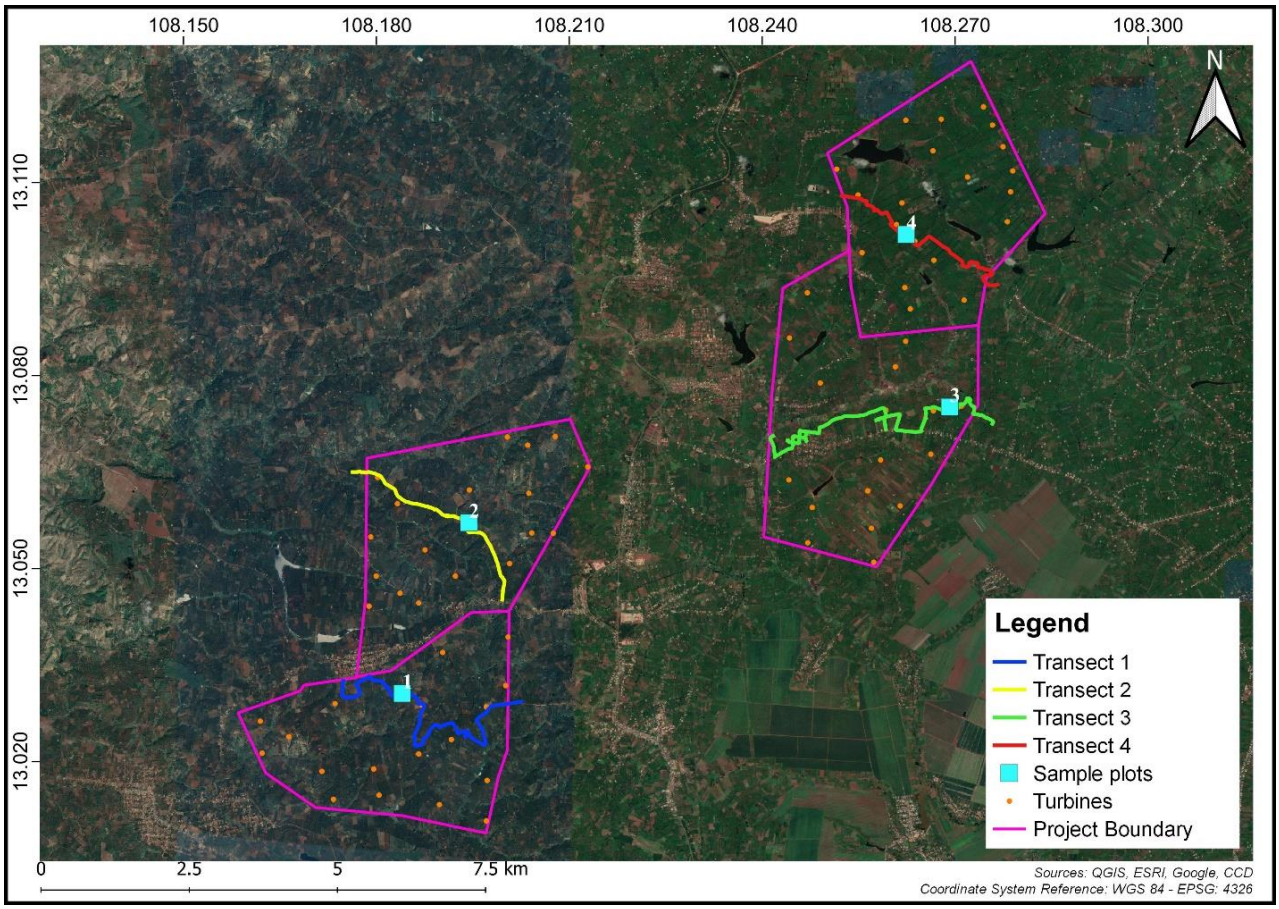
8.2.2.2 Survey Results

This section presents the overall survey results from two biodiversity baseline surveys, focusing on presenting required information for Critical Habitat Assessment and Biodiverstiy Impact Assessment. A list of recorded species in each taxon group can be found in Appendix I. For more details over the survey results, refer to technical baseline reports in Appendix F, Appendix G, Appendix H.

8.2.2.2.1 Flora

Four transects and four sampling plots (1,000 m^2 per plot) were developed for flora sampling (Figure 8.5). The main type of habitat along flora transects and in sample plots was coffee mixed with durian and avocada plantations, which is also the prevalant type of habitat within the Project area (Table 8.9).

The flora survey recorded a total of 202 flora species within the Project area. There are three species that are species of conservation significance, including the Tamalan *Dalbergia oliveri* (IUCN EN; VRDB EN), *Dipterocarpus intricatus* (IUCN EN; VRDB NL) and *Rauvolfia cambodiana* (IUCN NE; VRDB NL) (see Table 8.10 and Figure 8.6). There are also three that are invasive species, according to the Global Invasive Species Database (GISD) and Circular 35/2018/TT-BTNMT, which are the Siam Weed, the Black Mimosa and the Billygoat-weed. They are commonly distributed on all surveyed transects and plots. Details of the species of conservation concern are discussed in Table 8.10.



Source: QGIS, ESRI, Google, August 2021

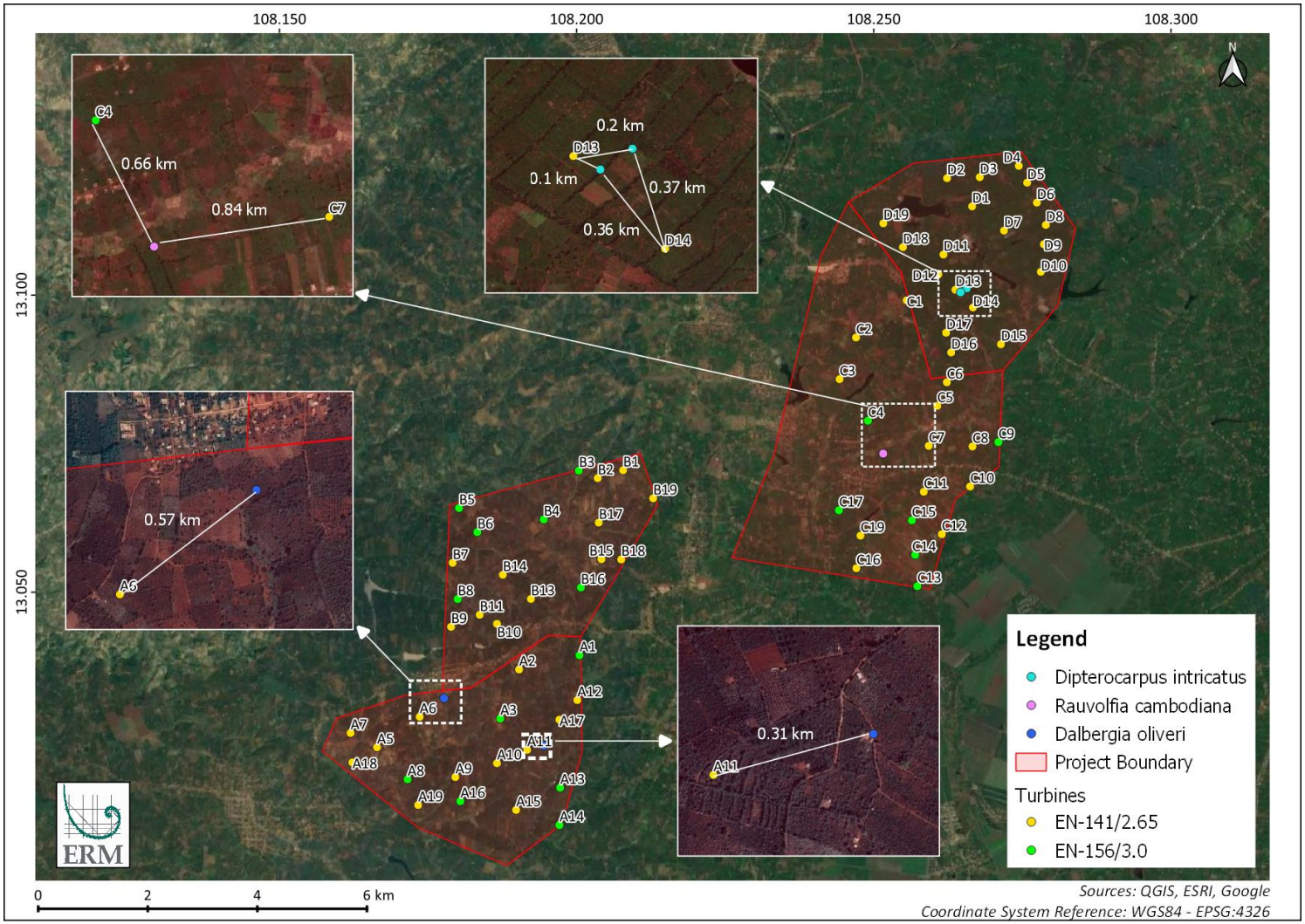
Figure 8.5 Flora Transects and Sampling Plots Locations

Table 8.9 Habitat Descriptions at Each Transect/Sampling Plot

Transects/ Sampling plots	Habitats
Transect 1	The transect positioned along the plantations of coffee mixed with durian and avocado. The survey team investigated along trails and recorded a total of 96 species, dominated by common lianas, herbs, and trees. Most of the species found on this transect are not evaluated (NE) or least concern (LC) in IUCN and VRDB, except for the Tamalan *Dalbergia oliveri* (Fabaceae) which is listed globally and nationally as EN (IUCN EN; VRDB EN).
Transect 2	This transect went through the plantations of coffee mixed with durian, pepper, avocado, and partly secondary forest. The are 81 species recorded which are common lianas, herbs, shrubs and trees. No species of conservation significance were recorded.
Transect 3	This transect went through the the plantations of coffee mixed with durian, pepper, avocado and cashew. A total of 74 species were recorded. The vegetation consists of mostly common species, expect for one species listed as nationally VU in VRDB, which is the *Rauvolfia cambodiana* (Apocynaceae). This species is not listed in IUCN.
Transect 4	The vegetation was mainly by the plantations of coffee only, or mixed with some durian and avocado. The composition is mostly common lianas, herbs and trees. One species is species of global conseravation significance found on this transect, which is the *Dipterocarpus intricatus* (IUCN EN; VRDB NL).
Plot 1	The plot was located in coffee plantation. A total of 15 species was recorded in this plot, none of which is species of conservation concern.
Plot 2	The plot was located in secondary forest. The species diversity was quite high, with a total of 29 species recorded in this plot. No species of conservation concern were recorded.
Plot 3	The plot was located in a coffee and cashew mixed plantations. A total of 11 species were recorded in this plot, none of which are species of conservation concern.
Plot 4	The plot was located in a coffe and avocado mixed plantations. A total of 17 species were recorded in this plot, none of which are species of conservation concern.

Table 8.10 Flora Species of Conservation Concern Recorded during Site Surveys

No.	Scientific name	Vietnamese name / English name	IUCN	VNRB	Description	Distance to nearest turbine	WGS 84 coordinates (decimal degrees)
1	*D. oliveri*	Cẩm lai / Tamalan	EN	EN	Two mature individuals and a few seedlings of *D. oliveri* were found on Transect 1. They were scattered in secondary forest patches and on coffee, pepper, avocado, durian and cashew plantation blocks. This species can be found in primary and secondary forest, mixed deciduous forest, tropical evergreen or semi-deciduous forest, along streams, at alt. up to 1,200 m. In Vietnam, this species has been recorded in Quang Tri, Da Nang, Kon Tum, Giai Lai, Dak Lak, Dak Nong, Lam Dong, Dong Nai, Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, Binh Phuoc, Tay Ninh, Ba Ria-Vung Tau provinces. It can also be found in Myanmar, Thailand, Lao PDR, and Cambodia.	■ One individual at 0.57 km northeast of turbine A6 ■ One individual at 0.31 km east of turbine A11	■ 13.032147, 108.177669 ■ 13.024155, 108.194439
2	*D. intricatus*	Dầu lông	EN	NL	Two individuals of *D. intricatus* were found on Transect 4. They were found in a secondary forest patch and on a coffee plantation block. This species is found in dense deciduous forests and clear forests. It is often recorded in pure stands in deciduous, periodically flooded lowland forests, but can also be found in dense forest at alt. up to 1300 m. In Vietnam, the species is found in Kon Tum, Giai Lai, Dak Lak, Ninh Thuan, Binh Duong, Tay Ninh, Dong Nai, Ba Ria-Vung Tau, Kien Giang provinces. It can also be found in Thailand, Lao PDR, and Cambodia.	■ One individual at 0.1 km southeast of turbine D13 ■ One individual at 0.2 km east of turbine D13	■ 13.100467, 108.264602 ■ 13.101137, 108.265633
3	*R. cambodiana*	Ba gạc cam bốt	NE	VU	Many individuals and seedlings of *R. cambodiana* were found in Transect 3. They were scattered in the secondary forest patches which surround coffee plantations. This species grows on yellowish brown soils on basaltic rocks in the secondary forest and burnt-over land, alt. 400-800 m. In Vietnam, it is found in Quang Tri, Thua Thien Hue, Quang Nam, Quang Ngai, Binh Dinh, Kon Tum, Giai Lai, Dak Lak, Dak Nong, Lam Dong provinces. It can also be found in Lao PDR and Cambodia.	■ One group at 0.66 km north of turbine C4	■ 13.073315, 108.251577



Source: QGIS, ESRI, Google, August 2021

Figure 8.6 Locations of Conservation Significat Flora Species within the Project Area

8.2.2.2.2 Birds

There were eight vantage points and four transects carried out for bird surveys within the Project area (see Figure 8.7 and Figure 8.8). After two surveys in May and July 2021, a total of 100 bird species have been recorded. Of which, most of these were common species (IUCN NE or LC; VRDB NL), except for the:

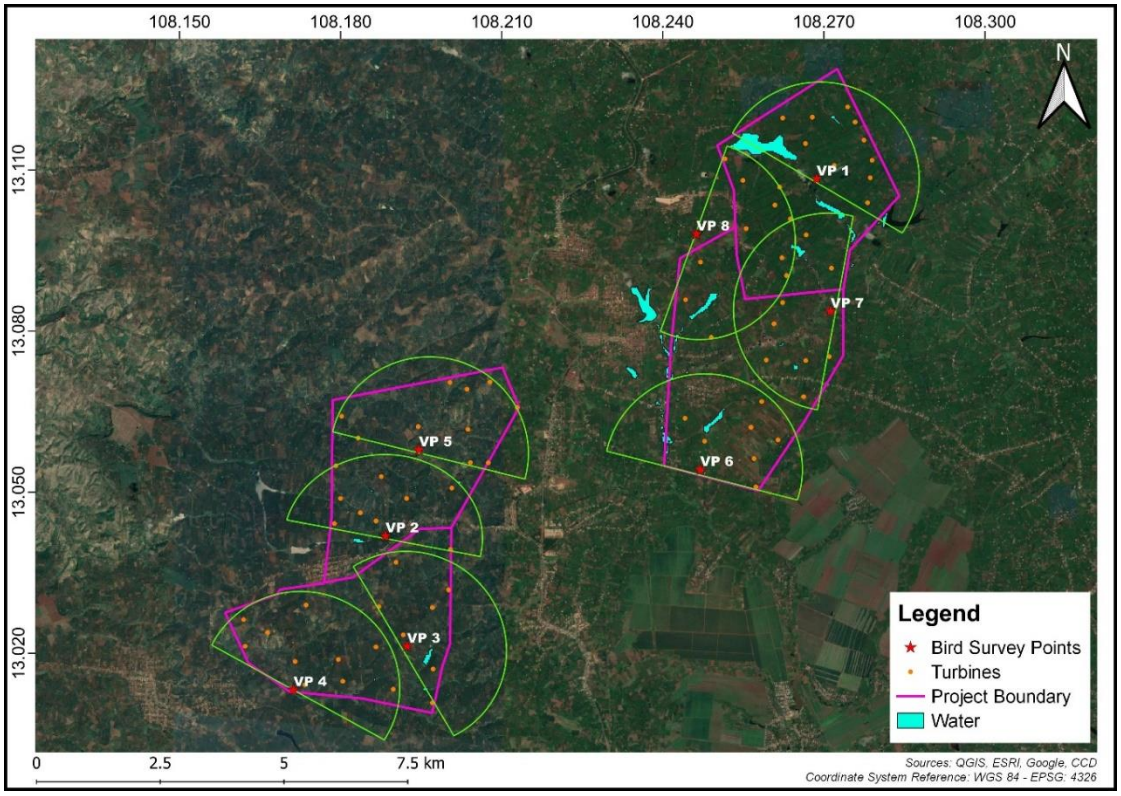
- Red-breasted Parakeet *Psittacula alexandri* (IUCN NT; VRDN NL). A total of 66 individuals of this species were found from both vantage point and transect surveys.
- Grey-headed Parakeet *P. finschii* (IUCN NT; VRDN NL). About 100 individuals of this species were recorded from both vantage point and transect surveys.

The Germain's Swiftlet *Aerodramus germani* (IUCN LC; VRDB NL) was the most abundant species within the Project area, with 3,327 individuals recorded from the surveys. This is exceptionally high, as the abundances of other species were only less than 300 individuals. This could be attributed to the swiftlet farming practice in the province (there are some houses farming for swiftlets located near Vantage Point 2). There were 13 species that had abundances of more than 100 individuals, and 23 species that had abundances equal to or more than 60 individuals (see details in Appendix I).

There is one species that is considered endemic to central Vietnam, which is the Annam Prinia *Prinia Rocki* (IUCN NE; VRDB NL). This species is a new subspecies, split from the Brown Prinia *Prinia polychroa* (IUCN LC; VRDB NL) according to eBird (2021)[24]. The Annam Prinia species has been recorded at Langbian Plateau in Da Lat city, located more than 100 km away from the Project area (eBird, 2021). Although this species' estimated extent of occurrence (EOO) is not available, considering the distance between Da Lat city and the Project area, and the potential for the species to also possibly span areas northwards of Dak Lak where similar ecological characteristics can be found (following a similar distribution pattern to the Brown Prinia, according to IUCN distribution map), the species is unlikely to be a restricted-ranged species (i.e. likely to occur in an area greater than 50,000 km^2).

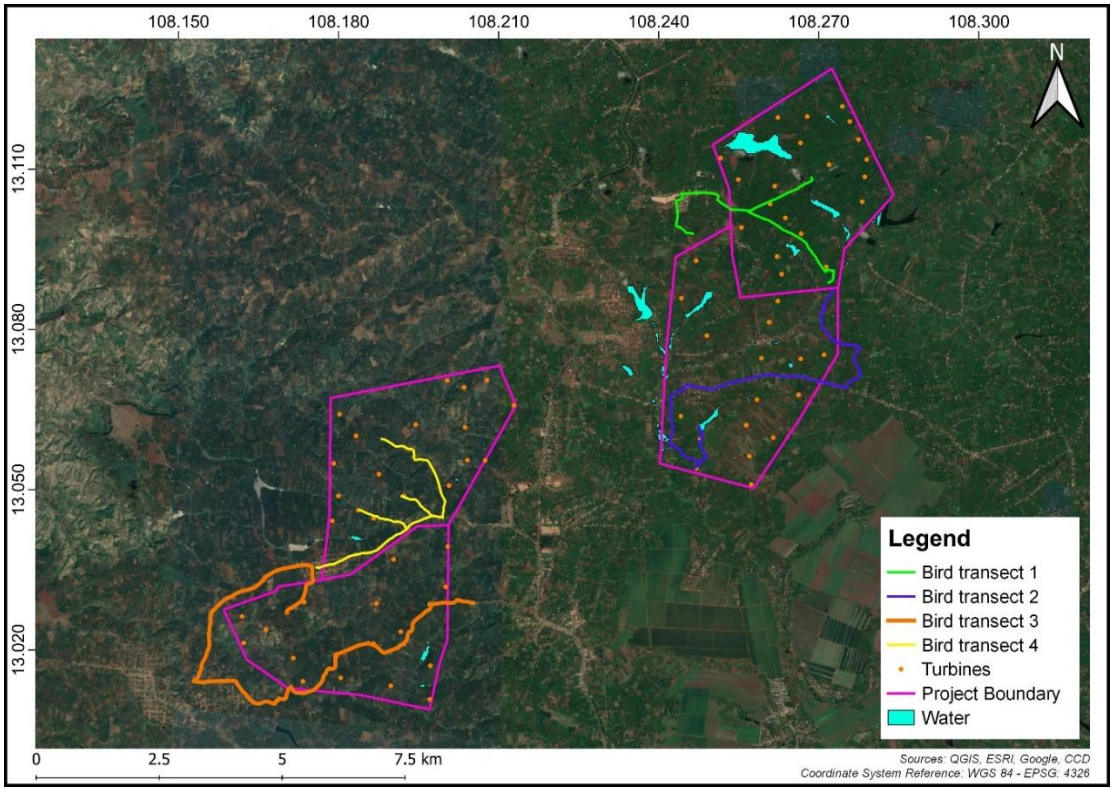
Species that are more prone to collisions with the turbine blades are raptors, species that fly in flocks and those that are actually recorded to fly in the rotor swept zone (RSZ, which is band 2 fly height) during vantage point surveys. Species that are more prone to transmission line electrocution include raptors and species that have large wing spans. Species recorded from the bird surveys that fall into the categories listed above are listed in Table 8.11.

[24] https://ebird.org/news/2021-ebird-taxonomy-update



Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.7 2km arc Observation Coverage at Each Vantage Point



Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.8 Locations of Bird Transects

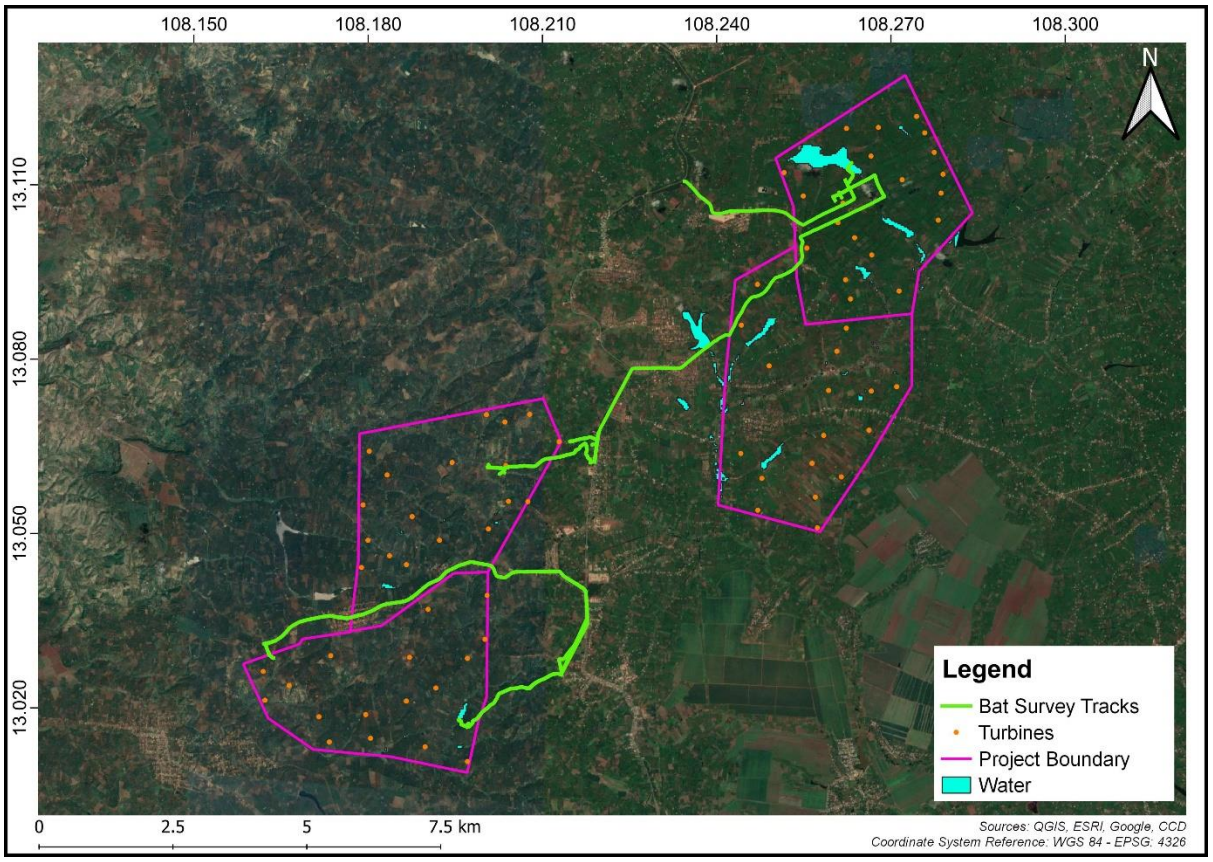
Table 8.11 Species that are Likely to be Impacted by the Project Recorded from Field Surveys

Scientific name	Common name	IUCN	VRDB	Flying in band 2	Raptor	Large wing-span (⩾ 50 cm)	Fly in flock (⩾ 10 individuals)
Accipiter badius	Shikra	LC	NL	X	X	X	
Elanus caeruleus	Black-winged Kite	LC	NL	X	X	X	
Aviceda leuphotes	Black Baza	LC	NL	X	X	X	
Butastur liventer	Rufous-winged Buzzard	LC	NL	X	X	X	
Butastur indicus	Grey-faced Buzzard	LC	NL	X	X	X	
Aerodramus fuciphagus	Edible-nest Swiftlet	LC	NL	X			X
Corvus macrorhynchos	Large-billed Crow	LC	NL	X		X	
Pycnonotus aurigaster	Sooty-headed Bulbul	LC	NL	X			X
Acridotheres leucocephalus	Vinous-breasted Myna	LC	NL	X			X
Hirundo rustica	Barn Swallow	LC	NL	X			X
Ardeola bacchus	Chinese Pond-heron	LC	NL	X		X	
Sturnia sinensis	White-shouldered Starling	LC	NL	X			X
Cypsiurus balasiensis	Asian Palm-swift	LC	NL				X
Apus affinis	Little Swift	LC	NL				X
Centropus sinensis	Greater Coucal	LC	NL			X	
Phaenicophaeus tristis	Green-billed Malkoha	LC	NL			X	

Scientific name	Common name	IUCN	VRDB	Flying in band 2	Raptor	Large wing-span (≥ 50 cm)	Fly in flock (≥ 10 individuals)
Microcarbo niger	Little Cormorant	LC	NL			X	X
Merops orientalis	Asian Green Bee-eater	LC	NL				X
Merops leschenaulti	Chestnut-headed Bee-eater	LC	NL				X
Psittacula alexandri	Red-breasted Parakeet	NT	NL				X
Psittacula finschii	Grey-headed Parakeet	NT	NL				X
Hypsipetes leucocephalus	Black Bulbul	LC	NL				X
Cecropis daurica	Red-rumped Swallow	LC	NL				X
Sturnia malabarica	Chestnut-tailed Starling	LC	NL				X
Passer montanus	Eurasian Tree Sparrow	LC	NL				X
Passer domesticus	House Sparrow	LC	NL				X
Passer flaveolus	Plain-backed Sparrow	LC	NL				X
Lonchura punctulata	Scaly-breasted Munia	LC	NL				X

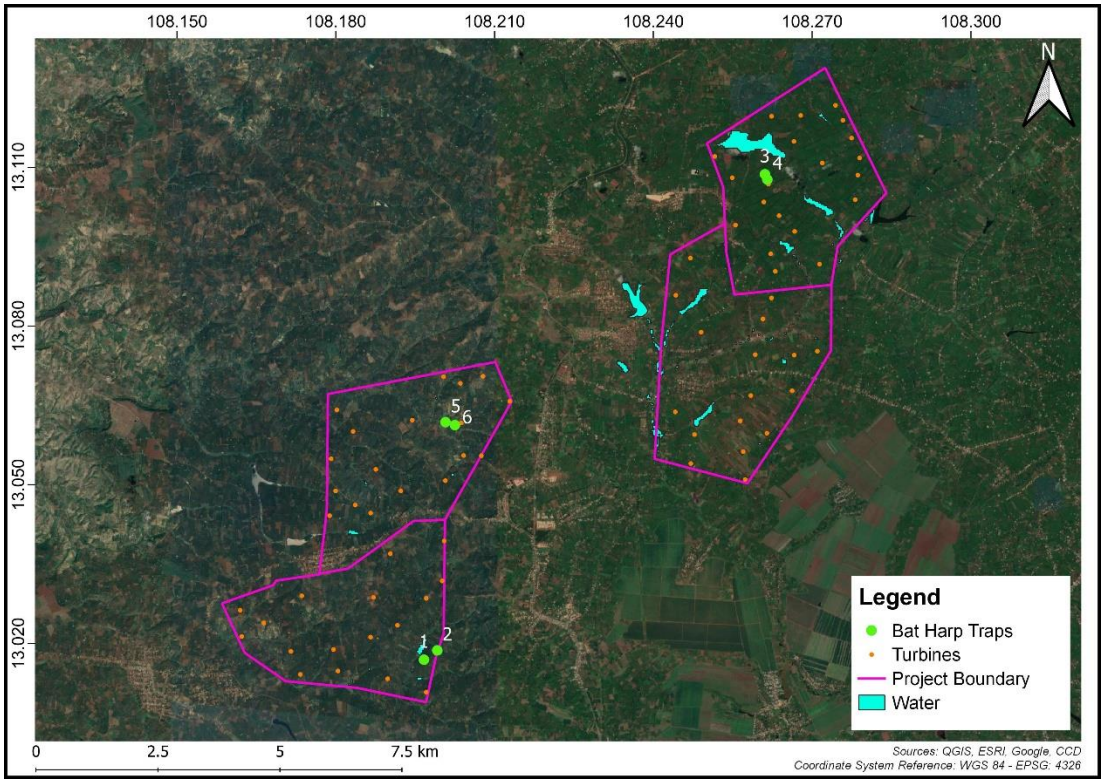
8.2.2.2.3 Bats

Six survey stations (mist-nets, harp-traps and acoustic recorders) and survey transects were used to detect bats (see Figure 8.9, Figure 8.10, and Figure 8.11). The bat surveys in May and July 2021 resulted in 7 species recorded. None of the recorded species were of conservation concern or restricted-ranged species. The most abundant species is Nepalese Whiskered Myotis *Myotis muricola* (IUCN LC; VRDB NL) with 18 individuals recorded, followed by the Java Pipistrelle *Pipistrellus* cf. *javanicus* (IUCN LC; VRDB NL) with 16 individuals. The general abundance of bat recorded from the two surveys was low. All species were observed to fly at band 1 (< 51m). However, bats flying in band 2 or 3 could be hard to spot out since most of bat surveys are conducted during darkness hours.



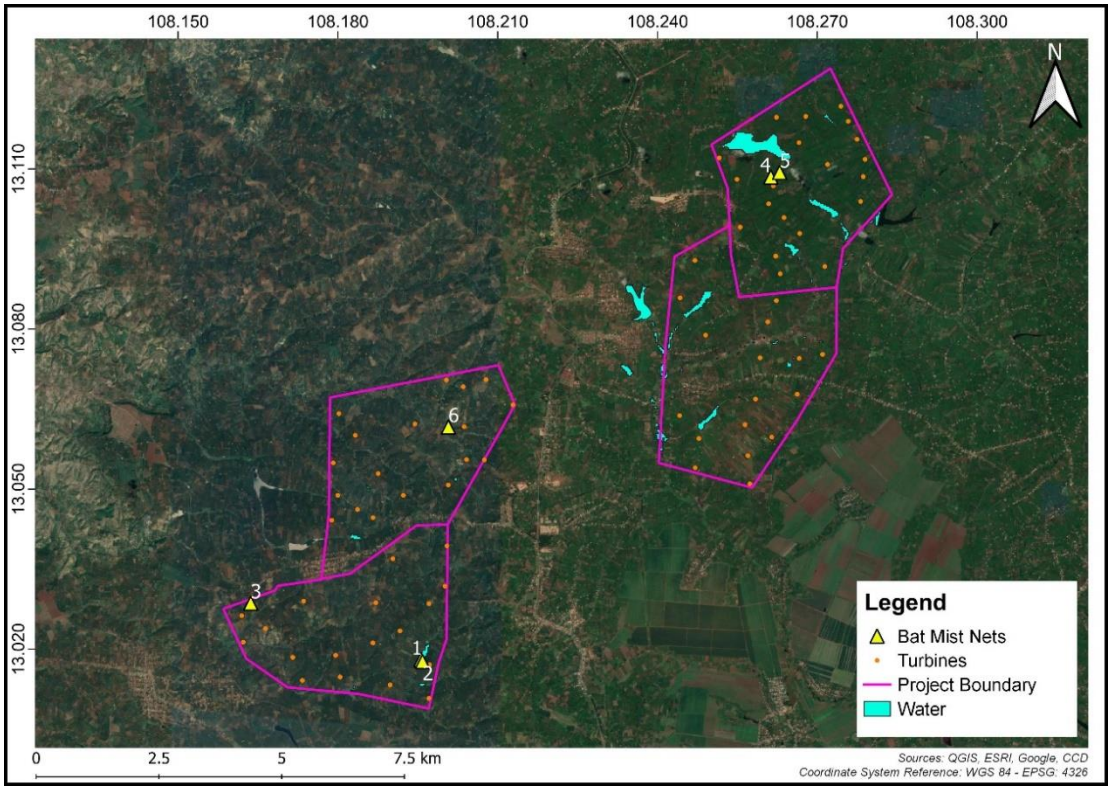
Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.9 Location of Bat Transects



Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.10 Location of Bat Harp-traps



Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.11 Location of Bat Mist-nets

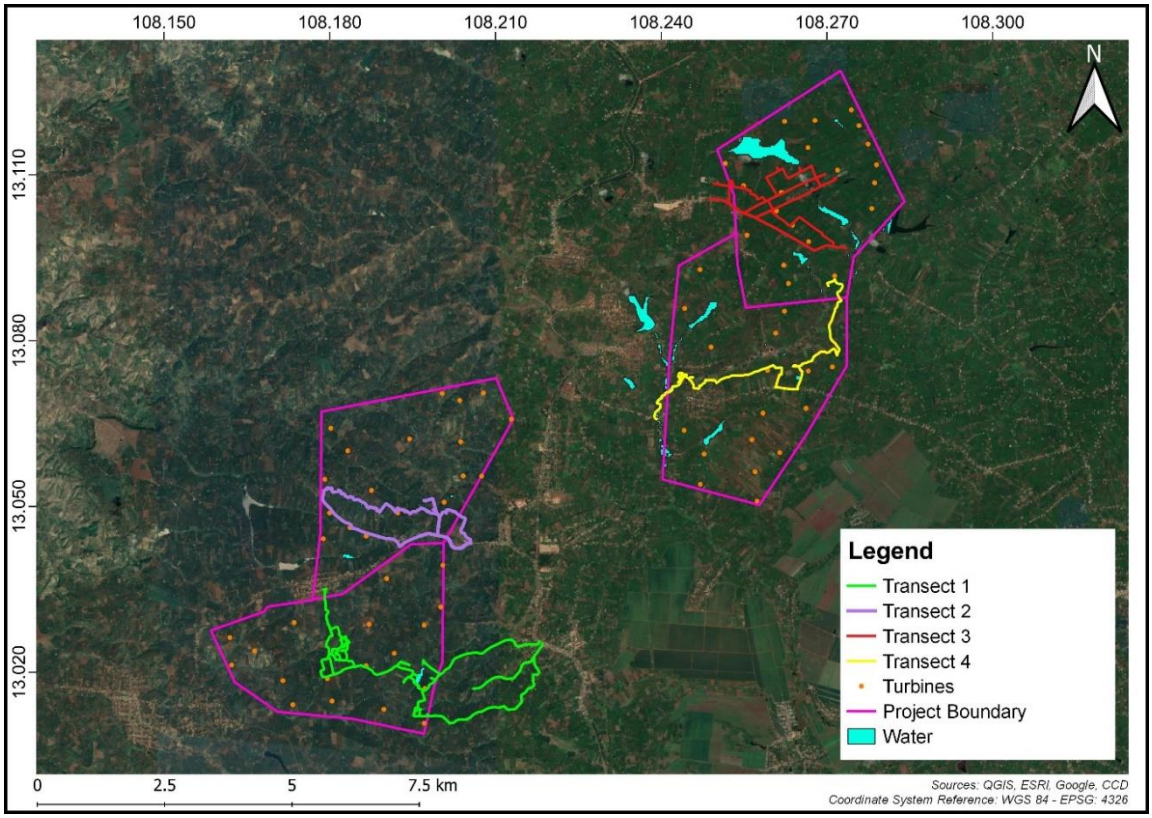
8.2.2.2.4 Non-volant Mammals

The interview survey resulted in nine non-volant mammal species identified to occur in the Project area. Of which, one is a conservation species - the Smooth-coated Otter *Lutrogale perspicillata* (IUCN VU; VRDB EN). One group of four Smooth-coated Otters is still surviving in the Project area (about 0.25 km northwestern of turbine A14, see Figure 8.15) according to the interviewee. The interviewee described the animals have black fur and weighing 7 – 8 kg. They often come to the lakes beside his coffee field in March or April every year to catch fish. The otter group used to have five individuals, but in 2019, one was hunted.

There are four otter species present in Vietnam: smooth-coated otter, Eurasian otter (Lutra lutra), oriental small-clawed otter and hairy-nosed otter (L. sumatrana - considered extinct until 10 years ago). Within the Project area two species are likely to exist: smooth-coated otter and oriental small-clawed otter. Smooth-coated otter has been regarded as very rare in Vietnam (Foster-Turley, 1990).

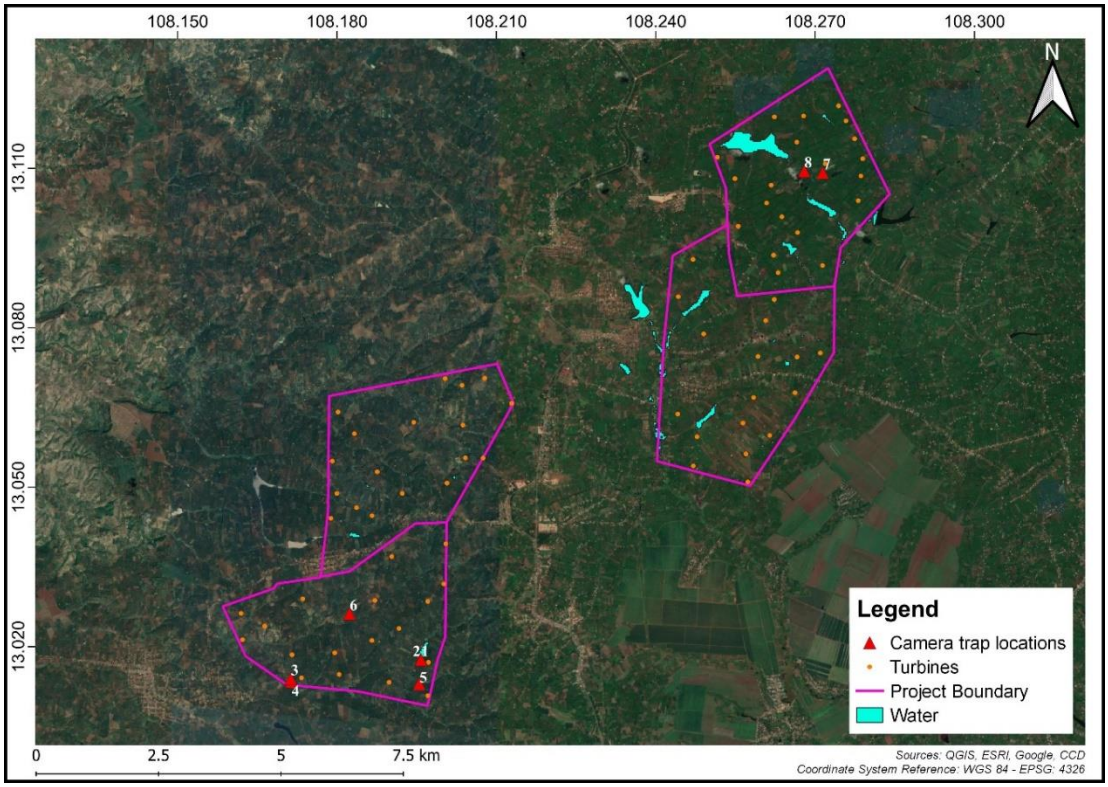
The identification of otter species in the field can be difficult although the close direct observation of a dead individual should increase the success of identification. Generally the smooth-coated otter is substantially larger than the small-clawed otter and this may have been the distinguishing feature used by the interviewee who reported the sighting(s) in the Project area. As no targeted surveys for otters or their signs have been completed as part of this baseline study in 2021, it is assumed on a precautionary basis that smooth-coated otter are present on site for the purposes of the impact assessment.

The locations of non-volant mammal transects, camera traps and cage traps conducted in July 2021 are shown in Figure 8.12, Figure 8.13 and Figure 8.14. There were six species recorded during the non-volant mammals surveys. None are species of conservation concern or restricted-ranged species. The otters that were identified in interviews were not found in field surveys. Squirrels and rats are the main small mammal species recorded in the Project area. They are often hunted/trapped for food by local people (Figure 8.16).



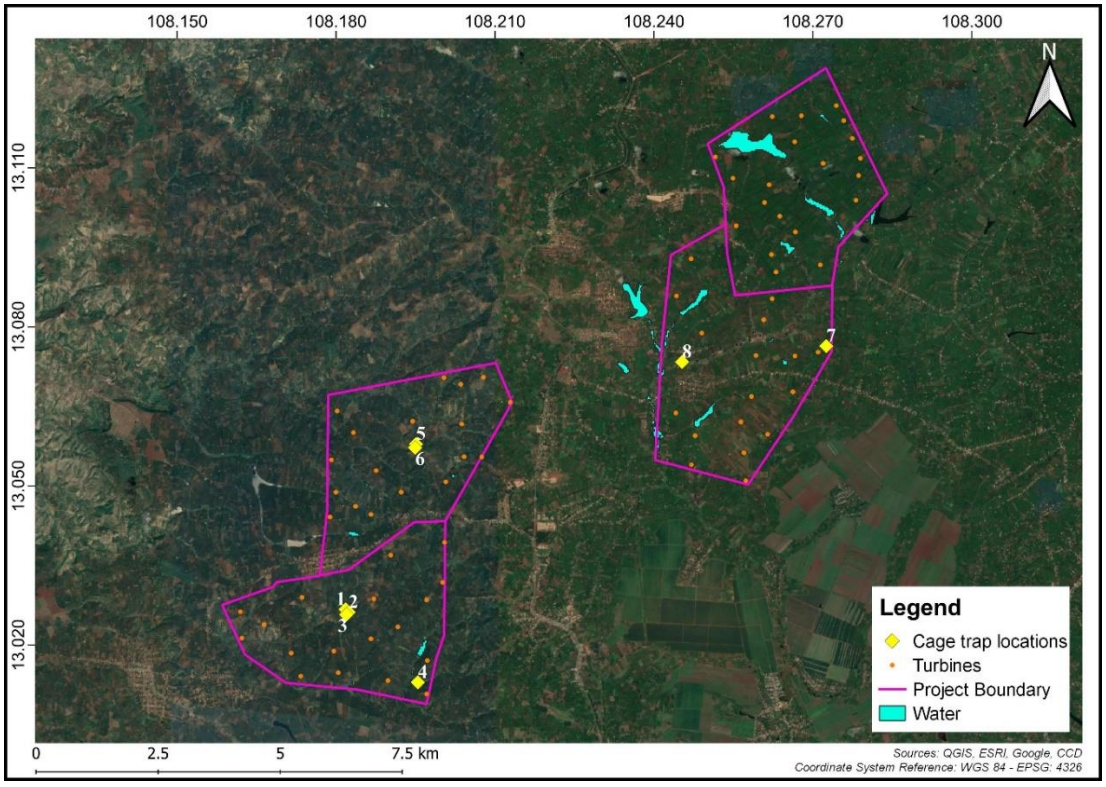
Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.12 Non-volant Mammal Survey Transects



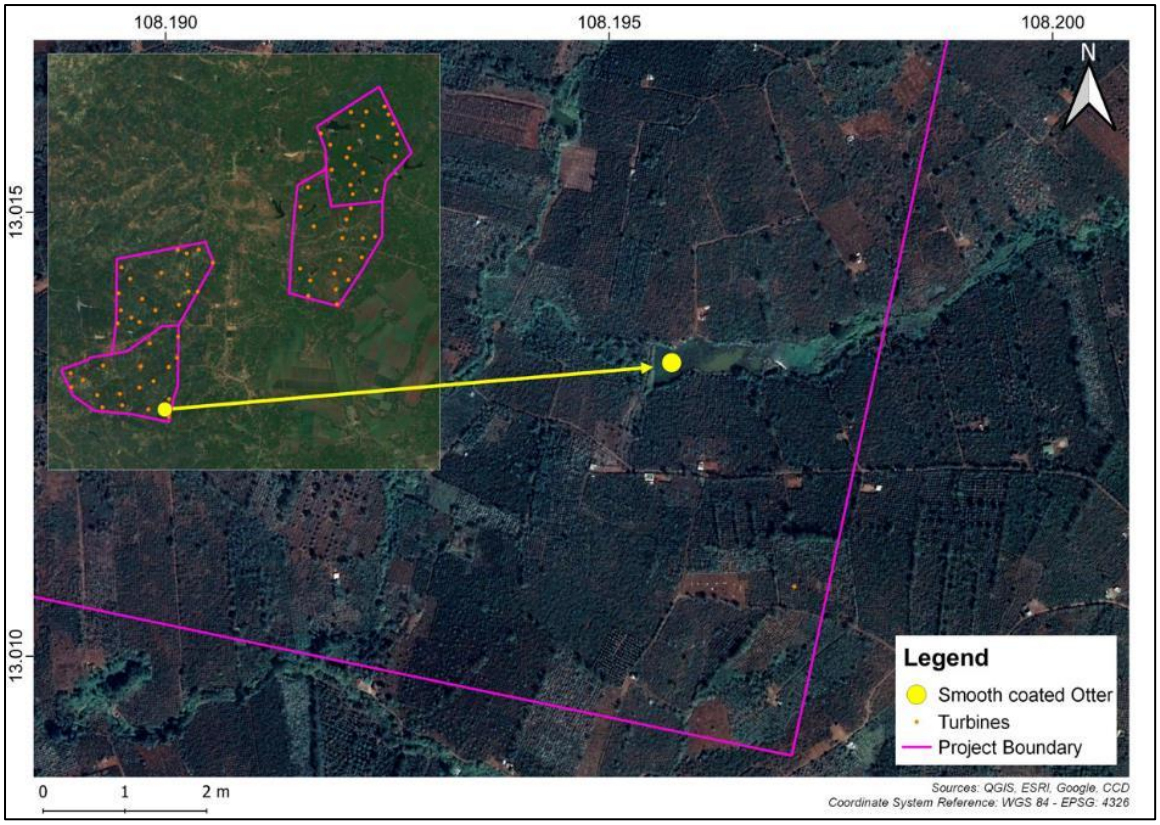
Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.13 Non-volant Mammal Camera Trap Locations



Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.14 Non-volant Mammal Live Trap Locations



Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.15 Location of the Otter Group According to Interviewee

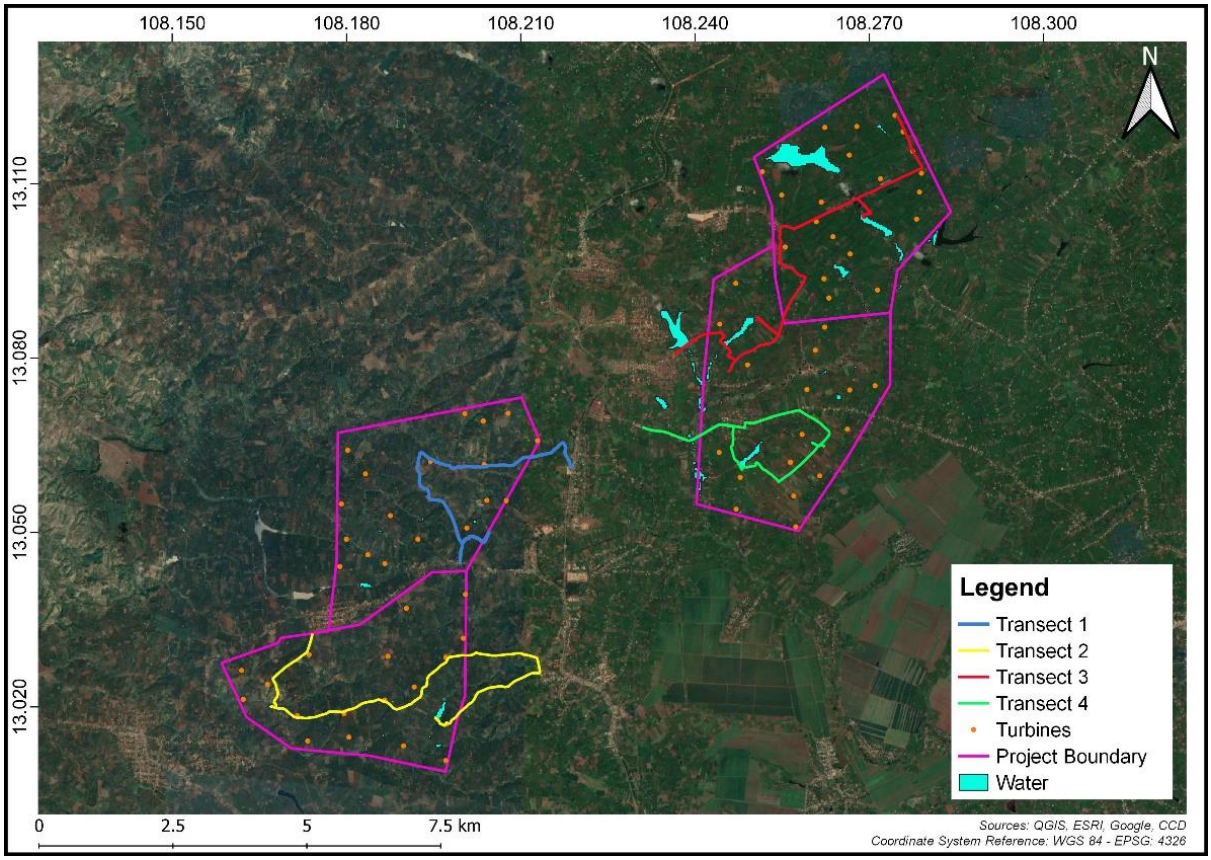
Figure 8.16 Squirrels, Rats and Birds Hunted by Local People for Food

8.2.2.2.5 Herpetofauna

In July 2021, four transects that went through streams, pools and plantations were walked to survey for herpetofauna within the Project area (see Figure 8.17). The survey recorded 27 herpetofauna species, most of which were not species of conservation concern, except for:

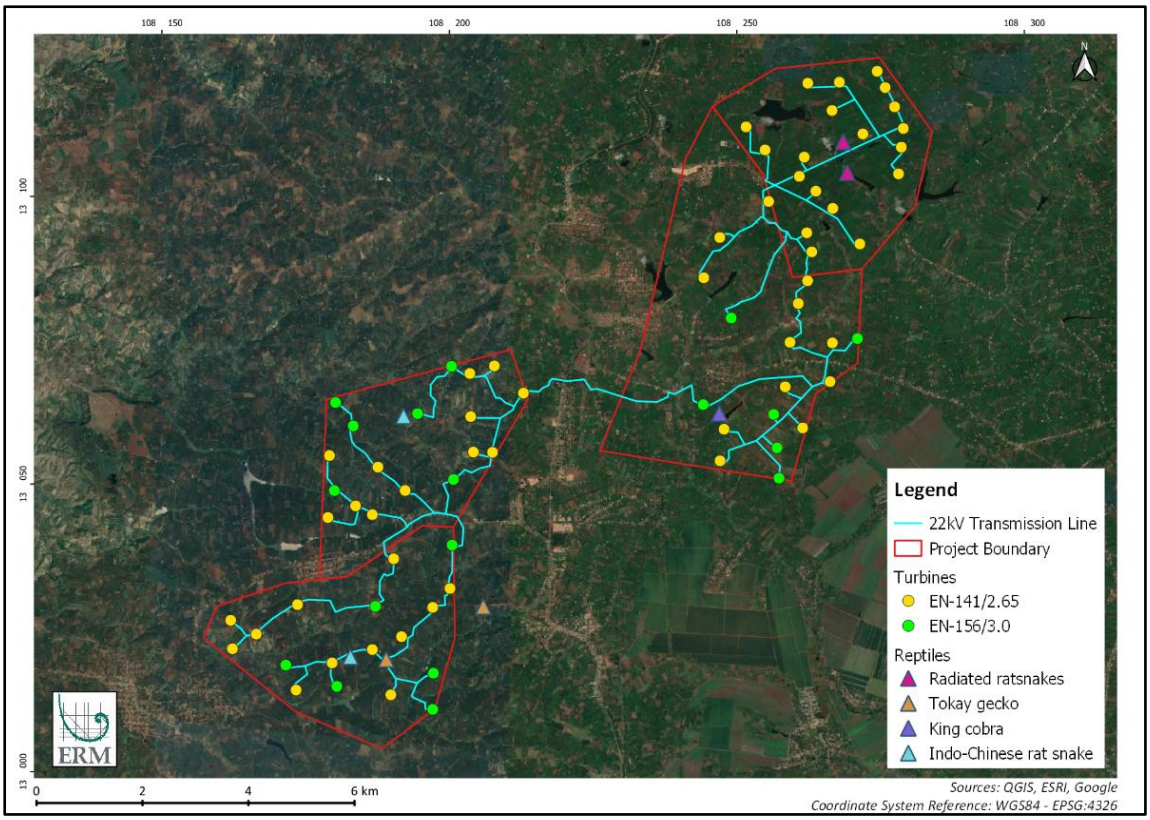
- King Cobra *Ophiophagus hannah* (IUCN VU; VRDB CR): one individual was found on transect 4.
- Indo-Chinese Rat Snake *Ptyas korros* (IUCN NE; VRBD EN): two individuals were found along transects 1 and 2.
- Tokay Gecko *Gekko gecko* (IUCN NE; VRDB VU): two individuals were found along transect 2.
- Radiated Ratsnake *Coelognathus radiatus* (IUCN LC; VRDB VU): three individuals were found along transects 3 and 4 (see Figure 8.18).

Of note is the record of the Dak Lak Narrow-mouth Frog *Microhyla daklakensis* (IUCN NE; VRDB NL) within the Project area. This species that has only been recorded in Dak Lak province to date. This is a newly-discovered species and the taxanomic description was published in ZooKeys on May 2021 (Hoang et al. 2021). At this time, there is a lack of information whether it is a restricted-ranged species. Other frogs species found in Dak Lak province, such as the *Leptobrachium banae* (IUCN LC;VRDB NL) and the Tree-dwelling Narrow-mouth Frog *Nanohyla arboricola* (IUCN VU; VRDB NL), have however current known distributions that are not representative of their reported range (but wider) (according to IUCN). The central highlands region of Vietnam has been found to harbor a high diversity of amphibians and is hot spot for new species discoveries (Hoang et al. 2021).



Source: QGIS, ESRI, Google, CIM, August 2021

Figure 8.17 Herpetofauna Survey Transects



Source: QGIS, ESRI, Google, August 2021

Figure 8.18 Locations of Endangered Reptiles Found

8.2.3 Identification of the EAAA

In order to identify the EAAA for the purpose of the critical habitat assessement, GN6 paragraph 59 states:

> "*The project should identify an ecologically appropriate area of analysis to determine the presence of critical habitat for each species or ecosystem with regular occurrence in the Project area of influence covered by [critical habitat] Criteria 1-4. The client should define the boundaries of this area taking into account the distribution of species or ecosystems (within and sometimes extending beyond the Project area of influence) and the ecological patterns, processes, features, and functions that are necessary for maintaining them. These boundaries may include catchments, large rivers, or geological features. The client will use this area of analysis to assess applicability of the critical habitat criteria and thresholds (see paragraphs GN70–GN83 of this note) to determine critical habitat for the species and/or ecosystems concerned. Critical habitats boundaries should be equivalent in scale to areas mapped for practical site-based conservation management activities. For some wide-ranging species, critical habitat may be informed by areas of aggregation, recruitment, or other specific habitat features of importance to the species. In all cases, the critical habitat should consider the distribution and connectivity of such features in the landscape/seascape and the ecological processes that support them. Where it can be shown that multiple values have largely overlapping ecological requirements and distributions, a common or aggregated area of critical habitat may be appropriate. The final area(s) of critical habitat against which project impacts will be assessed should be revised based on additional knowledge documented through field work and other assessment after the initial critical habitat assessment has been conducted.*"

As states above, the determination of Critical Habitat for a species that triggers the Critical Habitat Criteria extends beyond the project footprint, and is based on the species' ecological requirements and

connectivity with the wider landscape. It is also focused only on those species that regularly occur within the Project Area of Influence (AoI).

The identification of the EAAA for the Project takes into account the habitats where Critical Habitat for species or ecosystems may occur in the Project area (Section 8.2.4) and the contiguity/connectivity of habitats. The EAAA was defined to cover a discrete area within approximately 10 km buffer from the Project center, which should cover the home ranges of any volant species that might occur in the Project area, who usally have large home ranges. This 10 km buffer also includes the Project AOI.

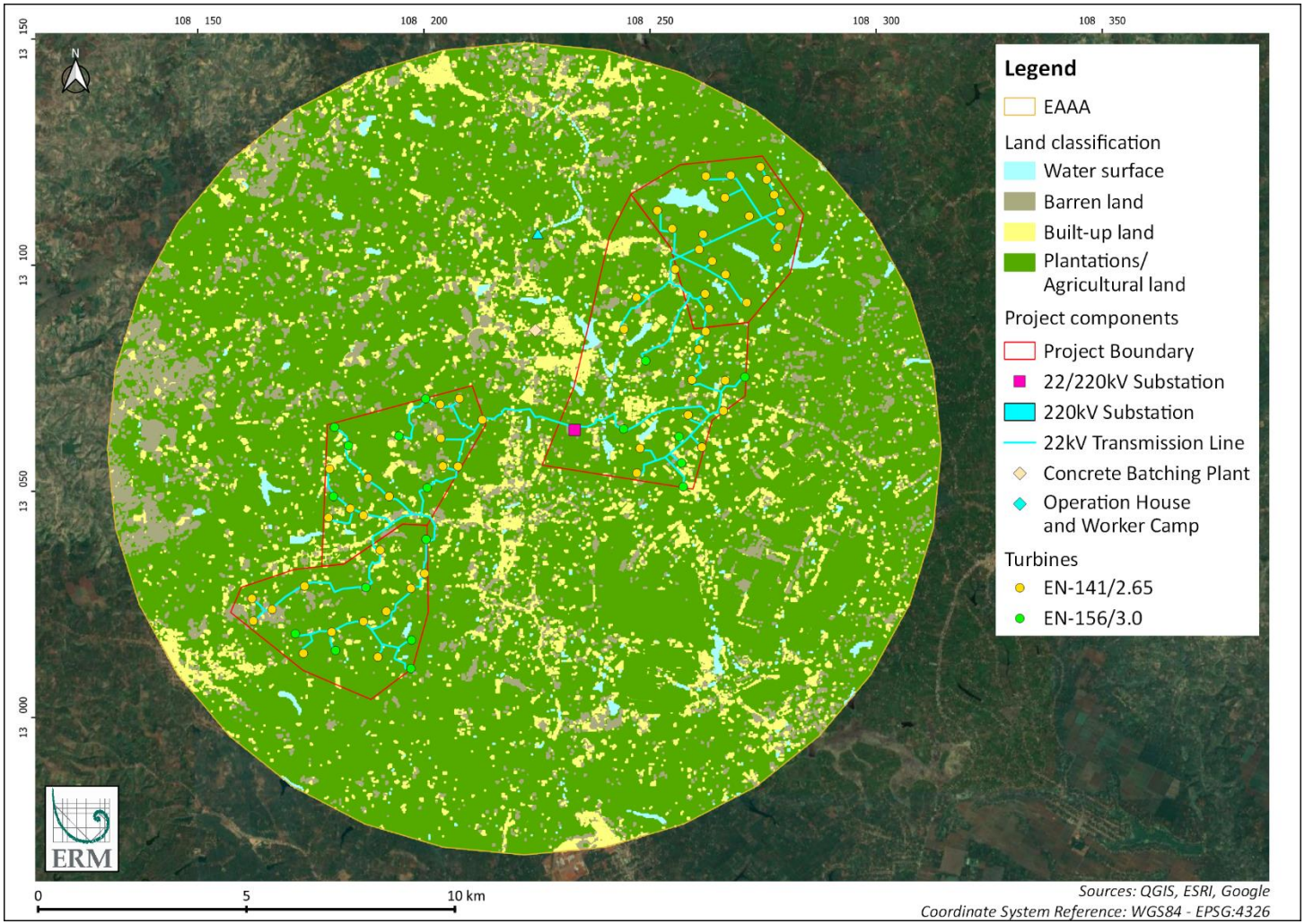
As a result, the EAAA covers an approximate area of 31,027 ha. The land classifications are presented in Table 8.12, Table 8.13 and in Figure 8.19, Figure 8.20 and Figure 8.21. All habitats within the EAAA are considered modified habitats due to human disturbance (e.g. plantations, built-up land). The water bodies in the EAAA are mainly reservoirs and small ponds that are surrounded by plantations and built-up infrastructure and mainly used for water supply; therefore considered as modified habitat.

Table 8.12 Land Classification within Project EAAA

Land class		Definition	Size (ha)	Percentage
Modified	SurfacewWater	Water bodies inlcluding ponds and reservoirs.	343.40	1.11%
	Barren land	Areas that have less than one third of vegetation cover and consists of mostly secondary vegetation	1,985.97	6.40%
	Built-up land	Refers to residential areas or infrastructures that have an artificial cover as a result of human activities	2,223.11	7.17%
	Plantations/ Agricultural land	Arable lands used for the production of crops, fruits and livestock.	26,474.49	85.33%
Total			**31,026.97**	

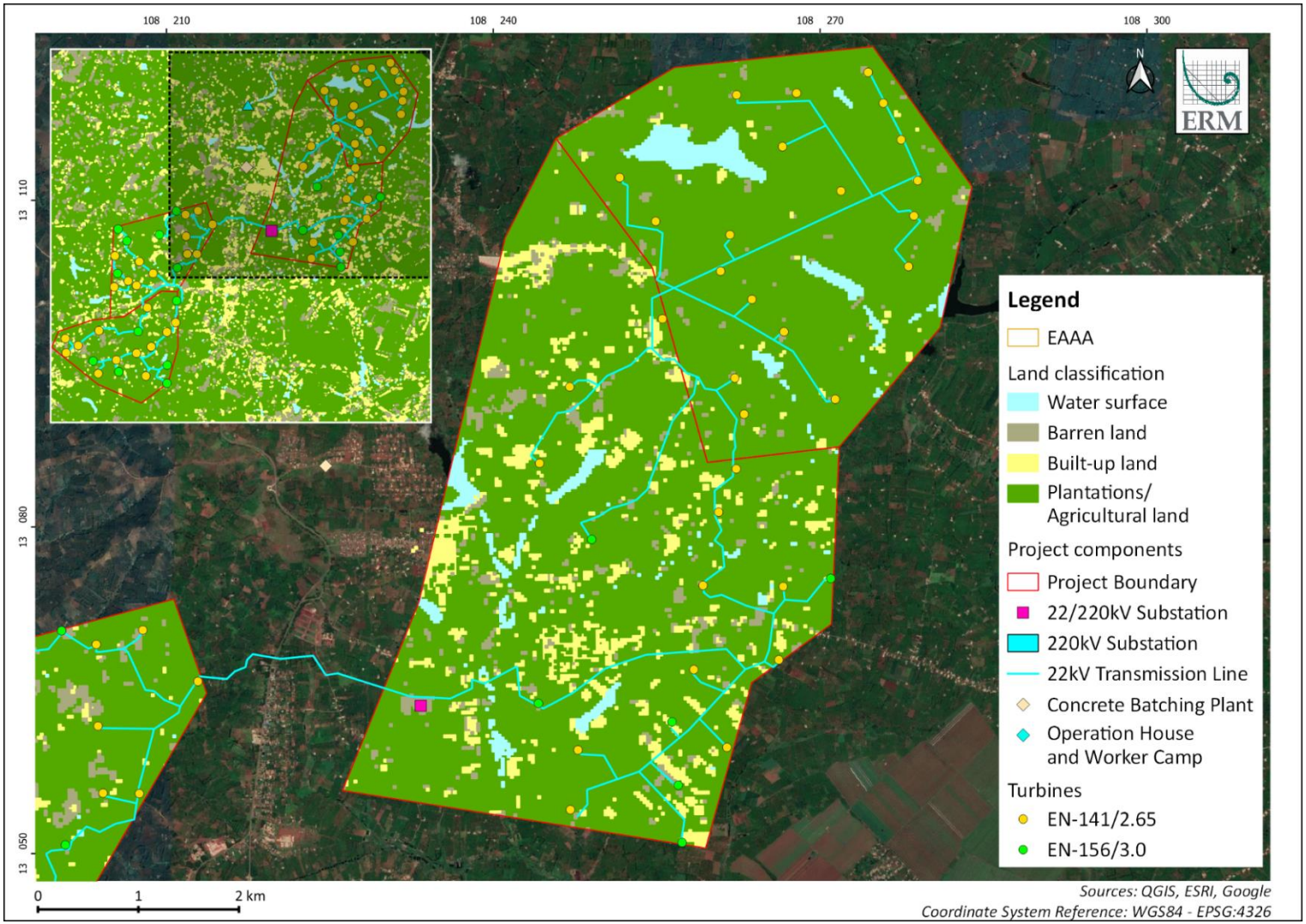
Table 8.13 Land Classification within Project Boundary

Land class		Definition	Size (ha)	Percentage
Modified	Surface water	Water bodies including rivers, lakes, ponds, reservoirs.	99.57	1.89%
	Barren land	Areas that have less than one third of vegetation cover and consists of mostly bushes.	174.00	3.31%
	Built-up land	Refers to residential areas or infrastructures that have an artificial cover as a result of human activities.	274.23	5.21%
	Plantations/ Agricultural land	Arable lands used for the production of crops, fruits and livestock.	4,715.47	89.59%
Total			**5,263.28**	



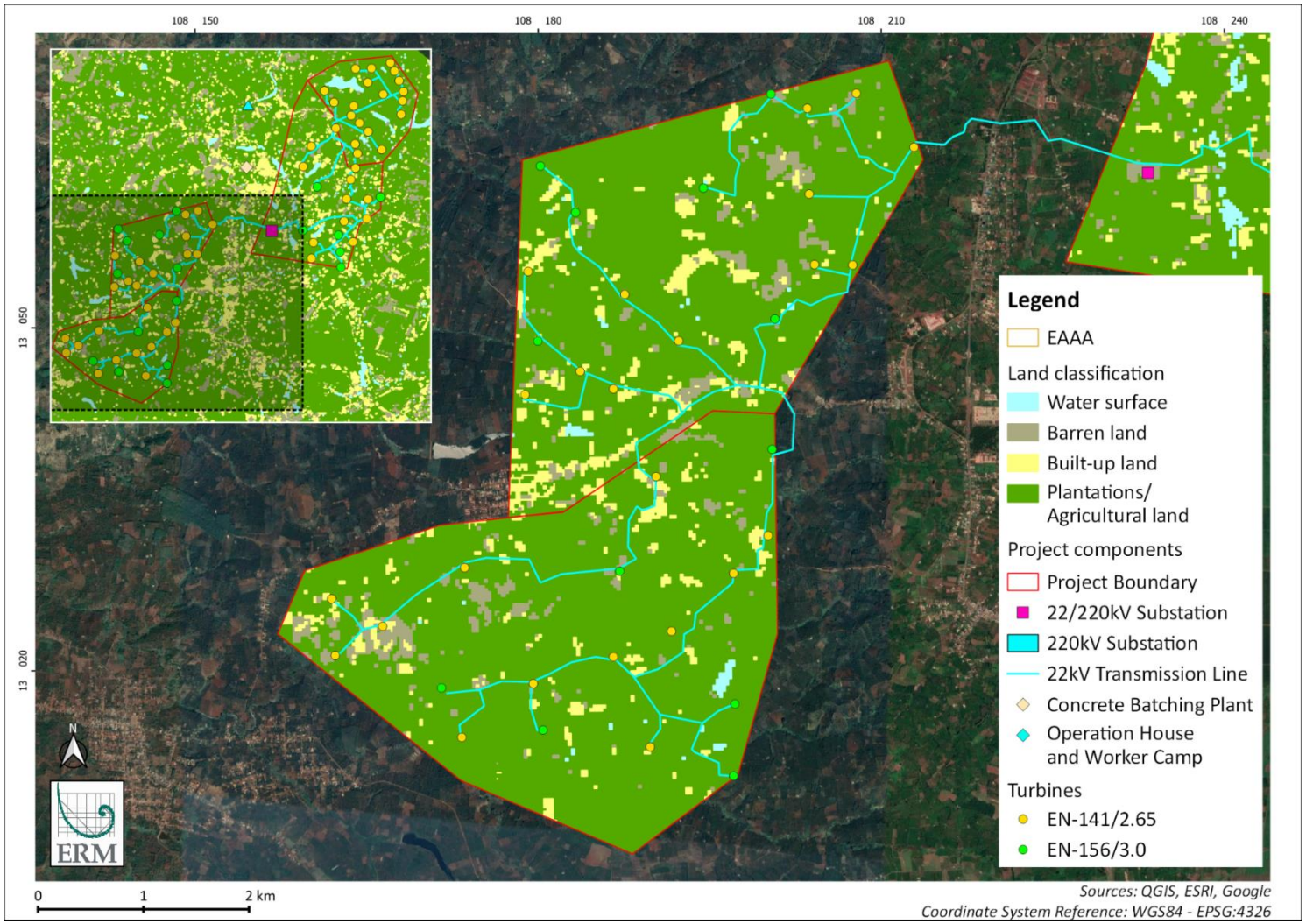
Source: QGIS, ESRI, Google, August 2021

Figure 8.19 Land Classification within the EAAA



Source: QGIS, ESRI, Google, August 2021

Figure 8.20 Land Classifications within Project Boundary – Krong Buk



Source: QGIS, ESRI, Google, August 2021

Figure 8.21 Land Classification within Project Boundary – Cu Ne

8.2.4 Critical Habitat Assessment

8.2.4.1 Candidate Species for Critical Habitat Identified from Desktop Review

8.2.4.1.1 Candidate Species for Critical Habitat Identified from Important Conservation Areas

A compiled list of the species recorded in the Important Conservation Areas within the 50 km radius of the Project (see section 8.2.1.2) is provided in Appendix D. This includes the four KBAs (Ya Lop, Ea So, Yok Don and Lake Earal) and four PAs (Earal, Trap Kso, Ea So and Yok Don).

A preliminary screening of this list was conducted to identify which species, and how many in total, are candidates for the assessment of Critical Habitat criteria 1, 2 and 3. The screening process eliminates any species that are not threatened (CR or EN), restricted-range or migratory/congregatory species. Only candidate species are carried forward to the CHA. Table 8.14 summarises the results from the screening of candidate species identified from PAs and KBAs within 50 km radius from the Project.

Table 8.14 Summary of Numbers of Candidate Critical Habitat Identifed from PAs and KBAs

Criteria	Total number of candidates	Remark
Criterion 1: Critically Endangered (CR)/ Endangered (EN)/ Vulnerable (VU) species	26	10 are mammalian species, two are herpetofauna species, 13 are avian species and one is flora species
Criterion 2: Habitat of significant importance to endemic and/or restricted-range species	1	Includes one flora species
Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species	9	One species is a congregatory mammal, the remainder are avian species[25]

8.2.4.1.2 Candidate Species for Critical Habitat identified from IBAT

A list of species occurring within 50 km radius from the Project was also generated using IBAT. A preliminary screening of the IBAT list for candidate species was conducted. These screening results are presented in Table 8.15. A list of IBAT-suggested species is presented in Appendix J.

Table 8.15 Summary of Numbers of Candidate Species from IBAT

Criteria	Total number of candidates	Remark
Criterion 1: Critically Endangered (CR)/ Endangered (EN)/ Vulnerable (VU) species	85	40 are mammalian species, 20 are herpetofauna species, 22 are avian species and 3 flora species.

[25] Vietnam is located within the East Asia/Australasia Flyway (EAAF). It encompasses large parts of East Asia, all of Southeast Asia and includes eastern India and the Andaman and Nicobar Islands. During the non-breeding period 37 shorebird species are regularly present in Vietnam, but no species are present in numbers that exceed 5% of their Flyway population estimate (Bamford *et al*. 2008).

Criteria	Total number of candidates	Remark
Criterion 2: Habitat of significant importance to endemic and/or restricted-range species	10	Includes one mammal and 9 herpetofauna species.
Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species	218	Two species are congregatory mammalians, the rest belongs to the Aves (birds) class.

8.2.4.1.3 Candidate Species Identified from e-bird

A list of birds that have been recorded in Dak Lak province was generated from e-bird[26] and also screened for candidate species. The results are presented in Table 8.16. Species screened from e-bird are provided in Appendix J.

Table 8.16 Summary of Numbers of Candidate Species from ebird

Criteria	Total number of candidates	Remark
Criterion 1: Critically Endangered (CR)/ Endangered (EN)/ Vulnerable (VU) species	12	■ IUCN: Three EN and five VU species ■ VRDB: Two EN and six VU species
Criterion 2: Habitat of significant importance to endemic and/or restricted-range species	2	Includes the Black-headed Parrotbill *Psittiparus margaritae* (IUCN VU) and Collared Laughingthrush *Trochalopteron yersini* (IUCN EN).
Criterion 3: Habitat supporting globally significant concentrations of migratory species and/or congregatory species	121	■ IUCN: Three EN and five VU species ■ VRDB: Two EN and six VU species

Based on the habitat availability in the EAAA (mostly plantations) and species ecology, a list of candidate species that could potentially occur in the EAAA (species that can tolerate modification) has been generated (see Table 8.17), based on desktop review results of all candidate species identified in the previous sections.

Table 8.17 Modification-tolerant Candidate Species Identified from Desktop Review that Potentially Occur in the EAAA

Scientific Name	Common Name	IUCN	VRDB
AVES			
Emberiza aureola	Yellow-breasted Bunting	CR	NL
Leptoptilos javanicus	Lesser Adjutant	VU	VU
Thaumatibis gigantea	Giant Ibis	CR	NL
Columba punicea	Pale-capped Pigeon	VU	EN
Carpococcyx renauldi	Coral-billed Ground-cuckoo	VU	NL
Clanga clanga	Greater Spotted Eagle	VU	NL

[26] https://ebird.org/region/VN-33?yr=all

Scientific Name	Common Name	IUCN	VRDB
Psittiparus margaritae	Black-headed Parrotbill	VU	NL
Buceros bicornis	Great Hornbill	VU	VU
Trochalopteron yersini	Collared Laughingthrush	EN	NL
HERPETOFAUNA			
Mauremys annamensis	Vietnamese Pond Turtle	CR	CR
Limnonectes toumanoffi	Annam Wart Frog	VU	NL
Cuora amboinensis	Southeast Asian Box Turtle	EN	VU
Indotestudo elongata	Elongated Tortoise	CR	EN
Naja siamensis	Black And White Spitting Cobra	VU	NL
Ophiophagus hannah	King Cobra	VU	CR
Physignathus cocincinus	Chinese Water Dragon	VU	VU
Zhangixalus feae	Thao Whipping Frog	LC	EN
Naja kaouthia	Monocled Cobra	LC	EN
Varanus salvator	Common Water Monitor	LC	EN
NON-VOLANT MAMMALS			
Aonyx cinereus	Asian Small-clawed Otter	VU	NL
Nycticebus pygmaeus	Pygmy Slow Loris	EN	EN
Hylopetes alboniger	Particolored Flying Squirrel	LC	VU
Petaurista philippensis	Indian Giant Flying Squirrel	LC	VU

8.2.4.2 Candidate Species from Field Surveys

The field surveys found six species that are candidates for CHA (all under critical habitat criterion 1) (see Table 8.18). No criterion 2 and 3 species have been identified from the surveys.

Table 8.18 Candidate Critical Habitat Species Identified from Field Surveys

S/N	Scientific name	Common Name	IUCN	VRDB	Individual counts	Found in survey
Flora						
1	*Dalbergia oliveri*	Cẩm lai / Tamalan	EN	EN	>2	July 2021
2	*Dipterocarpus intricatus*	Dầu lông	EN	NL	2	July 2021
Non-volant mammals						
4	*Lutrogale perspicillata*	Smooth-coated Otter	VU	EN	4	July 2021

S/N	Scientific name	Common Name	IUCN	VRDB	Individual counts	Found in survey
Herpetofauna						
5	*Ptyas korros*	Indo-Chinese Rat Snake	NL	EN	2	July 2021
6	*Ophiophagus hannah*	King Cobra	VU	CR	1	July 2021

8.2.4.3 Critical Habitat Assessment Results

Based on results from field surveys, six Critical Habitat candidate species have been identified to occur within the Project area (see Table 8.18). Besides these species, other species could also be present in the Project area as suggested from prelimary IBAT screening, e-bird screening and desktop review of KBAs and PAs, but their occurrences were not confirmed through surveys (see Table 8.17).

As a result, a total of 35 species are assessed in this section (see Table 8.19) as identified from field surveys and desktop review. The full list of CHA for all identified candidate species is presented in Appendix J. Species information was taken from IUCN[27] for each species.

The assessments have concluded that are no species triggered Criterion 1, 2 and 3.

Regarding criterion 4, no ecosystems in Vietnam have been assessed by the IUCN Ecosystem Red List. On the local scale, the EAAA contains only modified habitats, which are not considered as highly threatened and/or unique. The habitats within the Project area do not trigger criterion 4.

Regarding criterion 5, the Project EAAA does not contain any landscape that is associated with evolutionary processes (for example isolated areas, areas of high endemism, spatial heterogeneity, environmental gradients, edaphic interfaces, biological corridors or sites of demonstrated importance to climate change adaptation). The habitats within the Project area do not trigger criterion 5.

[27] https://www.iucnredlist.org/

Table 8.19 Critical Habitat Assessment Results (for candidate species)

Sadsada	Species	IUCN	VRDB	Recorded in	Species Information	Critical Habitat Justification
				Criterion 1		
Lutrogale perspicillata	Smooth-coated Otter	VU	EN	Field surveys	Lives in lowland wetlands and rivers, including sluggish flowing canals and flooded fields; occurs in shallow, open water and is capable of lying buried in mud for lengthy periods if water evaporates during dry seasons. Dependent on swamps and swamp forest. Can move out of the water using its extended fins. It feeds on aquatic insects, young shrimps and small fishes.	Estimates of populations of Smooth-coated Otter in Vietnam and globally are unavailable. According to the VRDB, the species is regarded as EN due to the populations estimated to have under 2500 mature individuals within the country. Therefore, the group of 4 individuals found in the Project area through interview does not represent 0.5% of national population that was estimated to be about 2500 individuals; therefore Criterion 1 is not triggered.
Emberiza aureola	Yellow-breasted Bunting	CR	NL	Desktop review	This species once bred across the northern Palaearctic from Finland, Belarus and Ukraine in the west, through Kazakhstan, China and Mongolia, to far eastern Russia, Korea and northern Japan. However,it is now thought to have potentially completely disappeared from Finland, Belarus, Ukraine and large parts of Russia. The species is migratory, wintering from central and eastern Nepal, Bangladesh, north-east India east to south-east China (Guangdong) and Taiwan (Province of China), south to the north Malay Peninsula and south-east Asia. It winters in large flocks in cultivated areas, rice fields and grasslands, preferring scrubby dry-water rice fields for foraging and reedbeds for roosting. Vietnam is reported to support only non-breeding distributions of the species (Birdlife International, 2021). In addition, there are no reported important Birds and Biodiversity Areas in Vietnam for the species (Birdlife International, 2021). The European population was estimated to number 20,000-100,000 breeding pairs, corresponding to 60,000-300,000 individuals (BirdLife International 2004); this represented 25-49% of the global range. Most recent data estimates the European population to number just 120-600 mature individuals (BirdLife International 2015). Across its entire range, the species is estimated to have declined by 84.3-94.7% between 1980 and 2013 (Birdlife International, 2021). The decline is likely to be driven by excessive trapping at migration and, in particular, wintering sites.	Based on the species' preferred overwintering habitats, the Project area may supports support habitats that support this species. However, due to the lack of IBAs recorded in Vietnam for the species, and the lack of observations made during field surveys in the Project area, it is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units; therefore Criterion 1 is not triggered.
Leptoptilos javanicus	Lesser Adjutant	VU	VU	Desktop review	Inland, birds inhabit natural and human-modified wetlands, both open and forested. Coastal populations frequent mangroves and intertidal flats. It nests colonially in large trees, and historically on cliffs, often at traditional sites in or adjacent to wetlands. It utilises small wetlands within Asian dry forest, and can breed some distance from these; shrinking of pools during the dry season and limited availability can lead to overlap with human uses and resulting disturbance. The lesser adjutant stalks around wetlands feeding mainly on fish, frogs, reptiles and large invertebrates. They may also take small birds and rodents particularly during the breeding season. They are solitary except during the breeding season when they form loose colonies. *Leptoptilos javanicus* has an extensive range across South and South-East Asia. The global population probably numbers 5,500-10,000 mature individuals. In Vietnam, it was found in South Central Coast and South Vietnam, commonly found in Dong Nai in wetlands (Cat Tien National Park), wetlands in Dong Thap Muoi (Tram Chim, Tam Nong, Dong Thap), coastal plain Mekong River and U Minh Melaleuca forest, as well as in Yok Don National Park (Dak Lak) located 35km away from the Project. The species' EOO is 11,300,000 km^2 (Birdlife International, 2021).	The Project area may provide habitats that support this species. However, as this species was not recorded during the field surveys, and the EAAA is significantly smaller in comparison to the species' EOO, it is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units; therefore Criterion 1 is not triggered.
Thaumatibis gigantea	Giant Ibis	CR	NL	Desktop review	The species is mostly confined to northern and eastern Cambodia, where it is probably still fairly widespread but extremely rare; with a few birds from the same population observed in extreme southern Lao PDR (BirdLife International 2001). It has also been recorded from Yok Don National Park (35km away from the Project), with the most recent sighting of a single bird in 2011. Its historical range spanned southern Vietnam and south-eastern and peninsular Thailand, where it is now extinct. Available data suggest that it has a patchy distribution across Cambodia, where it is most abundant. Some areas of high density exist in the Northern Plains, including Preah Vihear Protected Forest and Kulen Promtep Wildlife Sanctuary (with 30-40 nests monitored annually, and 24 pairs monitored in 2014). Other areas appear to have relatively low density populations, which may be clustered in some cases (e.g. Lomphat Wildlife Sanctuary [approximately 10-15 pairs]), Seima Protection Forest	The Project area may provide habitats that support this species. However due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units; therefore Criterion 1 is not triggered.

Sadsada	Species	IUCN	VRDB	Recorded in	Species Information	Critical Habitat Justification
					(estimated at five pairs). The population was estimated at a minimum of 194 mature individuals. Singles, pairs or small parties occur in marshes, pools, wide rivers and seasonal water-meadows in open, predominantly deciduous, dipterocarp lowland forest, although it seems to be dependent on soft mud around seasonal pools. Pools and seasonally flooded grassland with earthworm mounds are important in the breeding season, from June to September (Keo 2008). It appears to be largely resident, but apparently wanders widely in response to local disturbance and seasonal water-levels.	
Columba punicea	Pale-capped Pigeon	VU	EN	Desktop review	*Columba punicea* is locally distributed across its broad range, which encompasses parts of northern India, Bangladesh, Myanmar, Thailand, Laos, Cambodia and Vietnam. In Vietnam it is very rare and local with small numbers recently reported from Mang Den/Kon Plong, Kontum Province in 2010 and from magrove forest at Ho Tram, approx 100 km south-east of Ho Chi Minh City, in 2011. However, large flocks (over 90 individuals) were reported in the past from near Da Lat Plateau (C. Robson in litt. 2012, 2020), whilst regarded as uncommon but resident on some islands in Bai Tu Lam Bay (S. Mahood in litt. 2012), and seen across mangroves in the Red River Delta despite no previous breeding observations nearby (C. Robson in litt. 2020). The global population is considered estimated at 2500-9999 mature individuals. Its EOO is estimated at 1,530,000 km^2. It frequents a wide variety of habitats from the lowlands up to 1,600 m, chiefly primary or secondary evergreen forest, but also open, deciduous dipterocarp forest, bamboo, and agricultural fields or overgrown cultivation, particularly in close proximity to forest.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units; therefore criterion 1 is not triggered.
Carpococcyx renauldi	Coral-billed Ground-cuckoo	VU	NL	Desktop review	The species is restricted to Cambodia, Laos, Vietnam and Thailand. Throughout most of its range (Cambodia, Laos, Vietnam), the population is likely small and extremely patchily distributed as a consequence of population decline caused by increased levels of hunting. The global population size has not been quantified, but the species is reported to be uncommon. The species is heavily threatened by the rapid expansion of industrial drift-fence cable snaring, which has been taking place since the early 2000s.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that EAAA contains areas that support globally important concentrations of an species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore Criterion 1 is not triggered.
Clanga clanga	Greater Spotted Eagle	VU	NL	Desktop review	This species is found throughout western Asia, central Asia, parts of eastern and southern Asia, a few isolated parts of Europe and Africa.The global population is considered estimated at 3300-8800 mature individuals. Its EOO is estimated at 18,100,000 km^2. The preferred habitat types for this species is inland wetlands, marine intertidal, grassland and rocky areas. It is a migratory species, with birds leaving their breeding grounds in October and November to winter in southern Europe, southern Asia and north-east Africa (del Hoyo et al. 1994). They tend to return in February and March.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that EAAA contains areas that support globally important concentrations of an species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore Criterion 1 is not triggered.
Psittiparus margaritae	Black-headed Parrotbill	VU	NL	Desktop review	This species is confined to the Da Lat Plateau in Vietnam, and adjacent Mondulkiri, Cambodia. It is considered locally common to uncommon within its very small range. The global population size has not been quantified, but the species is described as uncommon to locally fairly common. It occurs in primary and secondary forest and at the forest edge, and occasionally feeds in nearby plantations and agricultural areas. It is most often observed in large flocks moving through the forest canopy. Although it has a broad tolerance of habitat degradation, forest within its very small range is being rapidly converted to coffee plantations.	Due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA supports a globally important concentration of this species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore Criterion 1 is not triggered.
Buceros bicornis	Great Hornbill	VU	VU	Desktop review	This species can be found in Asia. In Vietnam, it is rare and declining. The most recent records are from Cat Tien National Park and Deo Nui San in the south, but also from Phong Nha-Ke Bang National Park. Global population is estimated at 13,000 to 27,000 individuals; however EOO is not estimated. This species frequents wet evergreen and mixed deciduous forests, ranging out into open deciduous areas to visit fruit trees. Habitat-use seems to be negatively associated with human population and positively correlated with the density of large tree required for nesting, and it is therefore most common in unlogged forest. Known nest trees include *Tetrameles nudiflora, Dipterocarpus gracilis, Dipterocarpus turbinata, Cleistocalyx nervosum, Shorea faguetiana, Hopea odorata, Neobalanocarpys heimii, Palaquiuum ellipticum, Mangifera indica, Bombax ceiba, Mesua ferrea* and *Syzygium gardneri*.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that EAAA is contains areas that support globally important concentrations of an species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore Criterion 1 is not triggered.
Trochalopteron yersini	Collared Laughingthrush	EN	NL	Desktop review	*Trochalopteron yersini* is endemic to the Da Lat plateau, Vietnam. It is known from a handful of localities the most important of which appear to be Mount Lang Bian, Mount Bi Doup and Chu Yang Sin National Park, and discovered for the first time in Da Nhim Watershed Protection Forest (Mahood and	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that

Sadsada	Species	IUCN	VRDB	Recorded in	Species Information	Critical Habitat Justification
					Eames 2012). It is localised and generally uncommon. The population is estimated to number 2,500-9,999 mature individuals based on an assessment of known records, descriptions of abundance and range size. A government resettlement program has greatly increased human pressure on the Da Lat plateau, increasing problems of forest degradation and fragmentation through logging, shifting agriculture, fuelwood-collection and charcoal production. On Mount Lang Bian, all land below 1,500 m is now logged or under cultivation.	the EAAA holds 0.5% of its global population and 5 reproductive units; therefore Criterion 1 is not triggered.
Mauremys annamensis	Vietnamese Pond Turtle	CR	CR	Desktop review	*Mauremys annamensis* is endemic to central Vietnam, where it occurs in a narrow strip of coastal lowlands between the South China Sea to the east and the Annamite Mountains to the west. Eastward extensions of mountains reaching to the sea form the northern (Hai Van Pass) and southern (Ca Pass) boundaries of the species' distribution. Field surveys in Vietnam for *M. annamensis* in recent years have been mostly unsuccessful, indicating that the species is now extremely rare in the wild. At one site in Quang Ngai Province, fewer than five new turtles were observed each year between 2008 and 2013 in local village households. Published records of *M. annamensis* exist from Quang Nam, Da Nang, and Gia Lai provinces. *M. annamensis* inhabits marshes and slow-moving streams, along with small lakes, ponds and riparian areas of large rivers (such as the Thu Bon River in Quang Nam Province). Local people interviewed by the Asian Turtle Programme (ATP) have reported that the species was also frequently encountered within rice fields around villages in the past. The EOO for *M. annamensis* is estimated at 12,500 km^2. There are no quantifiable data available on the historic or present population sizes of *Mauremys annamensis*.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units; therefore Criterion 1 is not triggered.
Limnonectes toumanoffi	Annam Wart Frog	VU	NL	Desktop review	This species is currently known from 200–1,085 m Asl in eastern Cambodia and central to southern Vietnam. Similar habitat and elevations to those in its known localities extend into adjacent parts of south-eastern Lao PDR; and further surveys may uncover its presence there, so its range has been projected beyond known sites to include these areas of suitable habitat. It has mostly been observed in or adjacent to streams, muddy seeps (Jodi Rowley unpubl. data), pools, puddles, and drainage ditches. The species' EOO is 154,967 km^2, which represents four threat-defined locations. Not much is known about the size of this species' population. This species is associated with various forest types including evergreen and evergreen mixed with both bamboo and deciduous. In Vietnam, the species reproduces around May, when males have been observed calling from presumed mating territories. Habitat loss and degradation due to rapidly expanding agriculture is an ongoing threat to biodiversity throughout Vietnam.). In the Central Highlands of Vietnam large areas of forest are converted to agricultural land to grow cash crop plantations (e.g. rubber, coffee and tea).	The Project area may provide habitats that support this species However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA contains areas that support globally important concentrations of the species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore Criterion 1 is not triggered.
Cuora amboinensis	Southeast Asian Box Turtle	EN	VU	Desktop review	*Cuora amboinensis* occurs throughout Southeast Asia from northeastern India and the hills of eastern Bangladesh through mainland Southeast Asia, but not entering the hill and mountain areas north and east of the Mekong. It occurs throughout the Southeast Asian archipelago, from the Nicobar Islands through Indonesia to the Moluccas and throughout the Philippines. *Cuora amboinensis* is largely restricted to standing water bodies, but opportunistically inhabits most types of water bodies except large rivers and reservoirs. It prefers lowland swampy areas with dense vegetation, but also occurs in intermittent streams in hill forest areas, mangrove creeks, rice paddies and irrigation canals, from tidal areas up to about 400 m altitude. It was found in Gia Lai, Dak Lak, Binh Thuan, Ba Ria - Vung Tau, Tay Ninh, Long An, Kien Giang, Ca Mau. The species' EOO and global population are unknown.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA holds 0.5% of the species' global population and 5 reproductive units; therefore Criterion 1 is not triggered.
Indotestudo elongata	Elongated Tortoise	CR	EN	Desktop review	*Indotestudo elongata* is widely distributed across South and Southeast Asia, scattered occurrences in Vietnam. Severe population decline has occurred recently due to human activities. Subpopulations in Vietnam have since been severely depleted and possibly locally extirpated (R. Timmins pers comm. 2018). Some records of this species were found in Binh Dinh province between 2011-2014. Elongated Tortoise inhabits primarily deciduous forest types (Sal, Dry Dipterocarp, Mixed Deciduous forests) with open, broken canopy allowing sufficient light for a moderate to very dense undergrowth of grasses and herbs; during the dry, leafless season animals may retreat to evergreen stream gallery forest.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units; therefore Criterion 1 is not triggered.
Naja siamensis	Black And White Spitting Cobra	VU	NL	Desktop review	This species is recorded from the Chao Phraya River and the Mekong basin (from Yunnan in southern China to Vietnam). This species inhabits lowland and upland forest and cultivated areas, including rice	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that

Sadsada	Species	IUCN	VRDB	Recorded in	Species Information	Critical Habitat Justification
					paddies. It is found in deciduous, disturbed and open forest, and is absent from closed-canopy evergreen forest. There is no detailed population information available for this species, but snake hunters in the region of U Minh Thuong National Park, Vietnam, report that the species has become much rarer (Like other cobras, this species is heavily harvested in Vietnam).	the EAAA contains areas that support globally important concentrations of the species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore Criterion 1 is not triggered.
Ophiophagus hannah	King Cobra	VU	CR	Desktop review and field survey	The King Cobra is widely distributed in South and Southeast Asia. The EOO is unknown (quite large) for this species but is considered stable. This species is found in a variety of habitats, primarily in pristine forests, but it can also be found in degraded forest, mangrove swamps and even agricultural areas with remnants of woodland. The surviving population of this snake in Vietnam may be very small. No population size are available. This species is threatened by destruction of habitat due to logging and agricultural expansion, as Southeast Asia is experiencing one of the highest rates of deforestation in the tropics and this species appears to be most abundant in forested habitats.	There was one King Cobra found during the field surveys (July 2021). The actual numbers in the Project area could be greater. The populations of King Cobra in Vietnam is unknown, however, the sub-poulation within the Project area is unlikely to represent a 0.5% national population of this species and 5 reproductive units. This species does not trigger criterion 1.
Physignathus cocincinus	Chinese Water Dragon	VU	VU	Desktop review	The Chinese Water Dragon occurs throughout Lao PDR, Cambodia and Vietnam in appropriate habitat. It inhabits evergreen forest, where it is always found in association with streams and rivers. It rests on the branches of trees overhanging the waterway, into which it will plunge to escape danger.The first population-level mark-recapture survey of this species, across 14 stream transects in Thua Thien Hue Province in 2016 and 2017, found that the population appeared stable in two of three districts in this province over this short period but that the population size in this area may have been as low as 232-250 individuals in 2017. "Distinct decline" in the number of individuals encountered was observed over the period between April and June 2017 in the third district, and no mature individuals were recorded in the June survey. Harvesting of this easily-captured species - primarily for food, but also for the international pet trade - constitute serious threats. The species is very widely captive-bred juveniles are taken from the wild for export, especially from Vietnam. The CITES Trade Database reports 44,741 animals exported from Vietnam into European Union countries between 2010 and 2016; in every year but 2010 and 2015 annual exports exceeded 8,200. The EOO and global population of this species is unknown	However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA contains areas that support globally important concentrations of an species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore Criterion 1 is not triggered.
Zhangixalus feae	Thao Whipping Frog	LC OR LR/LC	EN	Desktop review	This relatively widespread species is known from Myanmar, through northern Thailand, northern Lao PDR, southern and central China, and into much of Vietnam. These may not represent the actual limits of the species' distribution as similar habitat and elevations to those at its known localities occur in adjacent areas of northeastern India, southern Laos and eastern Cambodia. Little is known about the size and trends of this species' population except that it has been detected in a number of surveys (and described as extremely abundant at Sa Pa in the early 1940s and abundant in parts of north and central Vietnam. Now the population is rare, about 1-2 individuals may be found at a time in Sa Pa and only 2 locations have been known to occur. This arboreal species occurs mostly in evergreen forest and is associated with water bodies from stagnant pools to flowing streams. It has also been observed in anthropogenically modified environments. Reproduction has been observed in May and June in Vietnam. Habitat loss and degradation due to rapidly expanding agriculture is an ongoing threat to biodiversity throughout Southeast Asia.	This species is mostly found in Sa Pa. There is a lack of records of this species elsewhere in Vietnam. In addition, the species is common worldwide. It is unlikely that the EAAA contains critical habitat for this species that can support 0.5% of global populations and at least 5 reproduction units; therefore Criterion 1 is not triggered.
Naja kaouthia	Monocled Cobra	LC OR LR/LC	EN	Desktop review	This species occurs from northeastern India, Bangladesh and Bhutan across southern China, southward to northern Peninsular Malaysia. It is absent from North Vietnam, where records attributed to this species likely reflect confusion with *N. atra* or *N. siamensis*.This species is common in most of its range. The VRDB explicitly identified this species as *Naja naja*. A 50% decline population decline of this species has been estimated within the preceding ten years (Dang et al. 2007). It is unclear whether this species is undergoing significant decline elsewhere within its range. This species can adapt to a range of habitats, including both natural and anthropogenically-modified environments. It prefers habitats associated with water, such as paddy fields, swamps, and mangroves, but can also be found in grasslands, shrublands, and forests. It also occurs in agricultural land and human settlements, including cities. This species is harvested in Lao PDR, Vietnam, Myanmar and China for both domestic use and export to supply demand for Chinese traditional medicine. It is also used in snake wine in Vietnam and probably throughout its range.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA contains 0.5% of its national population and 5 reproductive units; therefore Criterion 1 is not triggered.

Sadsada	Species	IUCN	VRDB	Recorded in	Species Information	Critical Habitat Justification
Varanus salvator	Common Water Monitor	LC OR LR/LC	EN	Desktop review	This species is extremely widespread throughout southern and Southeast Asia. Recent work has shown that the species is absent from northeastern Myanmar, northern and northeastern Thailand, all but coastal Cambodia, and all of Laos except for the ranges on the Vietnam border and northwestern Vietnam. This species group is thought to be abundant in many places (Gaulke and Horn 2004), including some cities like Bangkok, but no specific population data exists. This species is semi-aquatic and opportunistic and inhabits a variety of natural habitats, such as primary forests and mangrove swamps, agricultural areas (e.g., rice, oil palm) and even cities with canal systems (e.g. in Sri Lanka). Although the species may inhabit all the habitats listed above in at least parts of its range, they cannot all be considered equally as important. The habitats considered most important to this species are mangrove vegetation, swamp and wetlands at altitudes of below 1,000 m. The main threat to this species comes from hunting, as the skin of this species is used in the leather trade, its meat is eaten, and its fat is used in traditional medicine.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA contains 0.5% of the species' national population and 5 reproductive units; therefore Criterion 1 is not triggered.
Aonyx cinereus	Asian Small-clawed Otter	VU	NL	Desktop review	A riverine and lacustrine species, but perhaps passing from estuaries into the sea. Occurs in medium to large-sized rivers of the lower Mekong. Reported to undertake migrations in the Mekong mainstream. From the Khone Falls to the Mekong delta, it migrates upstream during the dry season from October to March and downstream at the onset of the monsoon season from May to July. These migrations are reported to be triggered by the receding or rising of the water levels. Feeds on crustaceans, insects and small fishes.	The Project area may provide habitats that support this species. However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA contains areas that support globally important concentrations of an species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore Criterion 1 is not triggered.
Nycticebus pygmaeus	Pygmy Slow Loris	EN	EN	Desktop review	In Vietnam, researchers have concluded that wild populations of this species are in major decline. In 2002 in Phong Nha-Ke Bang National Park only seven sightings of this species; in Ben En National Park, only eight animals were encountered. 2013-14 surveys in North Vietnam recorded 0.19 individuals/km and 0.4 individuals/km respectively. In South Vietnam in 2013, 0.48 individuals/km were recorded and 0.41-0.44 individuals/km in 2014. Surveys carried out in Central Vietnam in 2015 found low densities of *N. pygmaeus*, with no animals observed in 20 km at Bach Ma National Park, and 0.19 ind./km at Son Tra Nature Reserve. The species has also been observed in Cat Tien National Park and Vinh Cuu Biosphere Reserve, which are both part of the Dong Nai Biosphere Reserve. No estimations about its EOO or global population size are available. This species has been sighted in a wide variety of habitats, including primary evergreen and semi-evergreen forest, forest on limestone, secondary and highly degraded habitats, and bamboo thickets. *N. pygmaeus* is nocturnal and forages alone or in groups of up to four individuals.	The Project area may provide habitats that support this species However, due to the lack of records during field surveys in the Project area, it is unlikely that the EAAA contains 0.5% of the species' global population and 5 reproductive units; therefore Criterion 1 is not triggered.
Dalbergia oliveri	Cẩm lai / Tamalan	EN	EN	Field surveys	The species was found in Myanmar, Thailand, Laos, Cambodia and Vietnam. In Vietnam, they can be gound in Kontum (Sa Thay), Gia Lai, Dak Lak (EaSup, Lak), Dak Nong (Dak Mil), Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, Binh Phuoc, Tay Ninh, Dong Nai, Ba Ria - Vung Tau provinces, accroding to the Vietnam Red Data Book. It is scattered in the dense vergreen and semi-deciduos forest on wet soil or with small slopes, at an altitude of 800 - 900 m. Its beautiful red wood is overexploited.. A protected subpopulation occurs in Nam Cát Tiên National Park. The EOO and global population is unknown.	Two mature individuals were found in field surveys. The global and national populations of this species are unknown. However, it is unlikely that the two mature individuals represent a 0.5% global population of the specíes (which would equal to 400 individuals). Therefore, this species does not trigger critical habitat under criterion 1.
Dipterocarpus intricatus	Dầu lông	EN	NL	Field surveys	This species is native to Indochina where it is found in Thailand, Lao PDR, Cambodia and south Vietnam. It is found at elevations from 100 to 800 m. This is a relatively widespread and common species. It is mostly restricted to dry deciduous forest, lowland to sandstone slope. However there has been between a 30 and 50% population reduction in the last three generations (300 years) due to the expansion of agricultural areas and exploitation for timber. The species is continuing to decline but at a lower rate, threatened by habitat loss.	Two mature individuals were found in field surveys. The global and national populations of this species are unknown. However, it is unlikely that the two mature individuals represent a 0.5% global population of the species (which would equal to 400 individuals). Therefore, this species does not trigger critical habitat under criterion 1.
Ptyas korros	Indo-Chinese Rat Snake	NL	EN	Field surveys	According to VRDB, the species is common in Southeast Asia and South Asia. It can be found throughout Vietnam and can inhabit various types of habitats, including human-associated rural areas and sometimes can go into people's houses. The national population has undergone at least 50% reduction due to loss of habitats and over-exploitation in Vietnam; thus the EN status.	Two individuals were found in field surveys. The national population of this species is unknown. However, it is unlikely that the two mature individuals represent a 0.5% national population of the species (which would equal to 400 individuals). Therefore, this species does not trigger critical habitat under criterion 1.

Sadsada	Species	IUCN	VRDB	Recorded in	Species Information	Critical Habitat Justification
Ophiophagus hannah	King Cobra	VU	CR	Field surveys	The King Cobra is widely distributed in South and Southeast Asia. The EOO is unknown (quite large) for this species but is considered stable. This species is found in a variety of habitats, primarily in pristine forests, but it can also be found in degraded forest, mangrove swamps and even agricultural areas with remnants of woodland. The surviving population of this snake in Vietnam may be very small. No population size are available. This species is threatened by destruction of habitat due to logging and agricultural expansion, as Southeast Asia is experiencing one of the highest rates of deforestation in the tropics and this species appears to be most abundant in forested habitats.	There was one King Cobra found during the field surveys. The actual numbers in the Project area could be greater. The populations of King Cobra in Vietnam is unknown, however, the sub-poulation within the Project area is unlikely to represent a 0.5% national population of this species and 5 reproductive units. This species does not trigger criterion 1.
					Criterion 2	
Psittiparus margaritae	Black-headed Parrotbill	VU	NL	Desktop review	This species is confined to the Da Lat Plateau in Vietnam, and adjacent Mondulkiri, Cambodia. It is considered locally common to uncommon within its very small range. The global population size has not been quantified, but the species is described as uncommon to locally fairly common. It occurs in primary and secondary forest and at the forest edge, and occasionally feeds in nearby plantations and agricultural areas. It is most often observed in large flocks moving through the forest canopy. Although it has a broad tolerance of habitat degradation, forest within its very small range is being rapidly converted to coffee plantations.	This species is considered to unlikely to trigger criterion 1, which requires a 0.5% national population of this species and 5 reproductive units to occur in the Project area. Therefore, it is also unlikely for the EAAA to hold ≥10% of the global population size AND ≥10 reproductive units of a species to trigger criterion 2.
Trochalopteron yersini	Collared Laughingthrush	EN	NL	Desktop review	*Trochalopteron yersini* is endemic to the Da Lat plateau, Vietnam. It is known from a handful of localities the most important of which appear to be Mount Lang Bian, Mount Bi Doup and Chu Yang Sin National Park, and discovered for the first time in Da Nhim Watershed Protection Forest (Mahood and Eames 2012). It is localised and generally uncommon. The population is estimated to number 2,500-9,999 mature individuals based on an assessment of known records, descriptions of abundance and range size. A government resettlement program has greatly increased human pressure on the Da Lat plateau, increasing problems of forest degradation and fragmentation through logging, shifting agriculture, fuelwood-collection and charcoal production. On Mount Lang Bian, all land below 1,500 m is now logged or under cultivation.	The Project area is considered unlikely to support 0.5% national population of this species and 5 reproductive units of the species; therefore criterion 1 is not triggered. It is also unlikely for the EAAA to hold ≥10% of the global population size AND ≥10 reproductive units of a species; therefore it does not trigger criterion 2.
Mauremys annamensis	Vietnamese Pond Turtle	CR	CR	Desktop review	*Mauremys annamensis* is endemic to central Vietnam, where it occurs in a narrow strip of coastal lowlands between the South China Sea to the east and the Annamite Mountains to the west. Eastward extensions of mountains reaching to the sea form the northern (Hai Van Pass) and southern (Ca Pass) boundaries of the species' distribution. Field surveys for *M. annamensis* in recent years have been mostly unsuccessful, indicating that the species is now extremely rare in the wild. At one site in Quang Ngai Province, fewer than five new turtles were observed each year between 2008 and 2013 in local village households. Published records of M. annamensis exist from Quang Nam, Da Nang, and Gia Lai Provinces. *Mauremys annamensis* inhabits marshes and slow-moving streams, along with small lakes, ponds and riparian areas of large rivers (such as the Thu Bon River in Quang Nam Province). Local people interviewed by the Asian Turtle Programme (ATP) have reported that the species was also frequently encountered within rice fields around villages in the past. The EOO for *M. annamensis* is estimated at 12,500 km^2. There are no quantifiable data available on the historic or present population sizes of *Mauremys annamensis*.	The Project area is considered unlikely to support 0.5% national population of this species and 5 reproductive units of the species; therefore criterion 1 is not triggered. It is also unlikely for the EAAA to hold ≥10% of the global population size AND ≥10 reproductive units of a species; therefore it does not trigger criterion 2.
					Criterion 3	
Emberiza aureola	Yellow-breasted Bunting	CR	NL	Desktop review	This species once bred across the northern Palaearctic from Finland, Belarus and Ukraine in the west, through Kazakhstan, China and Mongolia, to far eastern Russia, Korea and northern Japan. However,it is now thought to have potentially completely disappeared from Finland, Belarus, Ukraine and large parts of Russia. The species is migratory, wintering from central and eastern Nepal, Bangladesh, north-east India east to south-east China (Guangdong) and Taiwan (Province of China), south to the north Malay Peninsula and south-east Asia. It winters in large flocks in cultivated areas, rice fields and grasslands, preferring scrubby dry-water rice fields for foraging and reedbeds for roosting. The breeding season is normally from the second half of June to the beginning of July. The decline is likely to be driven by excessive trapping at migration and, in particular, wintering sites. The species' EOO is 7,390,000 km^2.	The Project area may provide habitats that support this species. However, there is a lack of evidence that this species occur within the EAAA, according to field survey results and desktop review. This species has a proportionally large EOO compared to the EAAA; therfore it is unlikely that the EAAA contains areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species' lifecycle, or areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress. Therefore criterion 3 is not triggered.

Sadsada	Species	IUCN	VRDB	Recorded in	Species Information	Critical Habitat Justification
Leptoptilos javanicus	Lesser Adjutant	VU	VU	Desktop review	Inland, birds inhabit natural and human-modified wetlands, both open and forested. Coastal populations frequent mangroves and intertidal flats. It nests colonially in large trees, and historically on cliffs, often at traditional sites in or adjacent to wetlands. It utilises small wetlands within Asian dry forest, and can breed some distance from these; shrinking of pools during the dry season and limited availability can lead to overlap with human uses and resulting disturbance. Leptoptilos javanicus has an extensive range across South and South-East Asia. the global population probably numbers 5,500-10,000 mature individuals. In Vietnam, it is found in South Central Coast and South Vietnam, commonly found in Dong Nai in wetlands (Cat Tien National Park), wetlands in Dong Thap Muoi (Tram Chim, Tam Nong, Dong Thap), coastal plain Mekong River and U Minh Melaleuca forest, as well as in Yok Don National Park (Dak Lak). The species' EOO is unknown.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. This species has a proportionally large EOO compared to the EAAA; therfore it is unlikely that the EAAA contains areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species' lifecycle, or areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress. Therefore criterion 3 is not triggered.
Thaumatibis gigantea	Giant Ibis	CR	NL	Desktop review	The species is mostly confined to northern and eastern Cambodia, where it is probably still fairly widespread but extremely rare; with a few birds from the same population observed in extreme southern Lao PDR (BirdLife International 2001). It has also been recorded from Yok Don National Park, Vietnam, with the most recent sighting of a single bird in 2011. Its historical range spanned southern Vietnam and south-eastern and peninsular Thailand, where it is now extinct. Available data suggest that it has a patchy distribution across Cambodia, where it is most abundant. Some areas of high density exist in the Northern Plains, including Preah Vihear Protected Forest and Kulen Promtep Wildlife Sanctuary (with 30-40 nests monitored annually, and 24 pairs monitored in 2014). Other areas appear to have relatively low density populations, which may be clustered in some cases (e.g. Lomphat Wildlife Sanctuary [approximately 10-15 pairs]), Seima Protection Forest (estimated at five pairs). The population was estimated at a minimum of 194 mature individuals. Singles, pairs or small parties occur in marshes, pools, wide rivers and seasonal water-meadows in open, predominantly deciduous, dipterocarp lowland forest, although it seems to be dependent on soft mud around seasonal pools. Pools and seasonally flooded grassland with earthworm mounds are important in the breeding season, from June to September (Keo 2008). It appears to be largely resident, but apparently wanders widely in response to local disturbance and seasonal water-levels. The species' EOO is 120,000 km^2.	The Project area may provide habitats that support this species. However, there is a lack of evidence that this species occur within the EAAA, according to field survey results and desktop review. This species has a proportionally large EOO compared to the EAAA; therfore it is unlikely that the EAAA contains areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species' lifecycle, or areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress. Therefore criterion 3 is not triggered.
Anhinga melanogaster	Oriental Darter	NT OR LR/NT	VU	Desktop review	The Oriental Darter occurs in Vietnam (previously widespread breeder, once locally common but now almost extinct; however, increasing numbers are now recorded in the non-breeding season). The population is estimated to number at least 22,000 mature individuals and EOO is 19,400,000 km^2. It inhabits shallow inland wetlands including lakes, rivers, swamps and reservoirs.	The Project area may provide habitats that support this species. However, there is a lack of evidence that this species occur within the EAAA, according to field survey results. This species has a proportionally large EOO compared to the EAAA; therefore it is unlikely that the EAAA contains areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species' lifecycle, or areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress. Therefore criterion 3 is not triggered..
Clanga clanga	Greater Spotted Eagle	VU	NL	Desktop review	This species is found throughout western Asia, central Asia, parts of eastern and southern Asia, a few isolated parts of Europe and Africa.The global population is considered estimated at 3,300 - 8,800 mature individuals. Its EOO is estimated at 18,100,000 km^2. The preferred habitat types for this species is inland wetlands, marine intertidal, grassland and rocky areas. It is a migratory species, with birds leaving their breeding grounds in October and November to winter in southern Europe, southern Asia and north-east Africa (del Hoyo et al. 1994). They tend to return in February and March.	The Project area may provide habitats that support this species. However, there is a lack of evidence that this species occur within the EAAA, according to field survey results. This species has a proportionally large EOO compared to the EAAA; therfore it is unlikely that the EAAA contains areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population at any point of the species' lifecycle, or areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress. Therefore criterion 3 is not triggered.
Anastomus oscitans	Asian Openbill	LC OR LR/LC	VU	Desktop review	This species has an extremely large range. The population trend is not known, but the population is not believed to be decreasing rapidly.	There is a lack of evidence that this species occur within the EAAA, according to field survey results. Any populations within the Project EAAA is unlikely to represent a globally important concentrations of this species, and the Project is unlikely to result in the loss of such population which would result in a change to the IUCN Red List status to EN or CR. Therefore criterion 3 is not triggered.

9. SOCIAL BASELINE

9.1 Introduction

9.1.1 Introduction to the Chapter

This Chapter describes details of the socio-economic survey of communities potentially affected by the Huadian Dele Wind Farm Project (the Project) in Krong Buk district, Dak Lak province where the Project components are located. It is one of the specialist studies for the Environmental and Social Impact Assessment (ESIA) report for the Project. The economic and social analyses demonstrate the Project's intention to manage and mitigate its impacts on the local community's living conditions and livelihoods. The objectives of the socio-economic survey are to:

- Gather data about socio-economic conditions of the communities affected by the Project to help identify potential impacts; and
- Identify and understand the perceptions and concerns of stakeholders including local authorities and local communities, who might be affected by the Project's construction and operation activities.

The findings reported are based on a review of socio-economic conditions collected during site visits between 19 and 21 May 2021 and between 13 and 16 July 2021. Efforts have been made to highlight the differences between surveyed areas, ethnicity, and between genders on a number of socio-economic parameters. The study employed the research and engagement methodology which achieves data validity with methodological triangulation and which adheres to International Finance Corporation (IFC) guidelines.

To this aim, ERM adopts a multi-level analysis of socio-economic baseline data. The baseline report will include the following levels of analysis:

- National level;
- Regional level;
- Provincial level;
- District level;
- Commune level;
- Village level; and
- Household level.

In addition, cross-cutting issues are analysed as separate sections:

- Vulnerability analysis;
- Ethnic minorities issues;
- Gender analysis; and
- Human rights considerations.

9.2 Methodology

9.2.1 Research Area

The research area included social receptors in Krong Buk district, Dak Lak province where the Project is located. Specifically, the baseline study focused on four Project affected communes namely Cu Ne, Cu Pong, Ea Sin, and Chu Kbo (see Table 9.1).

Table 9.1 Surveyed Communes Affected by Project Components

Country	Province	District	Affected Commune	Affected Village
Vietnam	Dak Lak	Krong Buk	Cu Ne	Kdro 1, Kdro 2, Drah 1, Drah 2, Kmu, Ea Kung, Ea Siek, Ea Krom, and Ea Nguoi
			Cu Pong	Cu Hriet and Ea Bro
			Ea Sin	Ea My
			Chu Kbo	Kty 4 and Kty 5

Source: ERM

9.2.2 Data Collection

In order to collect the appropriate data, ERM implements a multi-method approach for data collection, which include:

- Secondary data collection (statistical data, annual reports, specialised reports of all analysis levels);
- Semi-structured interviews with local authorities of provincial, district, and commune levels;
- Key informant interviews (KIIs) with village heads and influential people of the affected communities;
- Focus group discussions (FGDs);
- Questionnaire-based household interviews; and
- Field observations.

The socio-economic data collection was designed so that information was gathered at the national, local, and household levels in enough detail to detect changes in the perceptions of affected communities towards the Project. In order to capture the multi-dimensional realities and fuller picture of the subject under investigation, the socio-ecommic survey adopted a multiple method approach. The task includes secondary socio-economic baseline data collection and primary socio-economic data collection. Data for the national level is from secondary data sources and desk-based research while data for the local and household levels is based on both secondary and primary data sources.

9.2.2.1 Secondary Data Collection

The study collected secondary data sources such as socio-economic statistical data and published reports from reliable sources at the national, provincial, and district levels. In addition, socio-economic reports were collected from local authorities at the provincial, district, and commune levels. Secondary sources were used to build a socio-economic baseline at national and local levels including the following aspects:

- Demographic profiles: population, ethnicity, and religion;
- Administration and institutions;
- Natural conditions;
- Infrastructure and public services: road network, electricity, water, irrigation system, waste management, education, and health services;
- Land use and tenure;
- Economy, livelihood, and employment;
- Education;

- Health, safety, and security;
- Vulnerability; and
- Archaeological, cultural heritage, and religious sites.

Sources were also identified to provide a basis for comparison between the reported local context, and the primary baseline data collected.

9.2.2.2 Primary Data Collection

9.2.2.2.1 Methods and Sampling

The study undertook the primary data collection with a multi-layer approach to socio-economic analysis using mixed methods which combine qualitative and quantitative methods, including:

- Semi-structured interviews with local authorities;
- Key informant interviews (KIIs);
- Focus group discussions (FGDs);
- Household interviews; and
- Field observations.

In order to organise the interviews and household survey, invitation letters were prepared and sent to the local authorities prior to the meetings. The household survey was organised in collaboration with the commune level authorities, and in particular the village heads. The surveyed households were selected based on (i) diverse and inclusive requirements related to age cohorts, education backgrounds, livelihoods, gender, ethnicity and social groups, and (ii) magnitude of Project's potential impacts. Table 9.2 shows the surveyed sample by geographical location and applied research methods in the study.

Table 9.2 Research Sample by Geographical Location and Research Method

Level of Administration				Number of Engagements			
Province	District	Commune	Village	Interviews with local authorities	KIIs	FGDs	Household Interviews
Dak Lak				4			
	Krong Buk			3			
		Cu Ne		1			
			Kdro 1		1	1	15
			Kdro 2		1	2	11
			Drah 1		1	1	11
			Drah 2		1	1	7
			Kmu		1		
			Ea Kung		1	1	5
			Ea Siek		1		
			Ea Krom		1		
			Ea Nguoi		1		
		Cu Pong		1	2		

Level of Administration				Number of Engagements			
			Cu Hriet		1	3	22
			Ea Bro		1	2	24
		Ea Sin		1	2		
			Ea My		2	1	28
		Chu Kbo		1			
			Kty 4		1	1	11
			Kty 5		1	1	10
Total				**11**	**19**	**14**	**144**

Source: Socio-economic survey conducted by ERM, May and July 2021

9.2.2.2.2 Consultations with Local Authorities

Using semi-structured interviews, ERM collected updated information on the socio-economic conditions of the area as well as the key concerns and perceptions of local authorities about the Project. Suggestions were also presented to the Project for environmental and social performance management and impact mitigation. This consultation assisted the team in confirming development trends and any changes in socio-economic conditions, infrastructure, and public services (see section 6.2.2.1).

9.2.2.2.3 Key Informant Interviews

Nineteen key informant interviews (KIIs) were conducted in the affected communities including Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes. Representatives of village management board (i.e. village head, deputy village head, and village security officer) and representatives of the commune-level Women's Unions and Farmer's Unions were identified as key informants for KIIs. A total of 20 participants (five representatives of the commune-level Women's Unions and Farmer's Unions, 14 village heads, and one village security officer) were engaged in the KIIs (see section 6.2.3). The KII was semi-structured with major questions prepared in advance in the form of checklists. The questions for key informants concentrated on general information about the community, social networks, community context, employment, perceptions about the Project and suggestions for community development schemes. The interviews lasted approximately one hour, and were recorded. The named list of informants and further interview photos are provided in Appendix B of Vol I.

9.2.2.2.4 Focus Group Discussion

A focus group discussion (FGD) approach enables ERM to observe interactions between group members and to listen to their views, opinions, experiences, and attitudes about their socio-economic conditions. This method is useful to get a consensus as people collectively address concerned topics which they may not have previously considered as individuals. By conducting the FGDs, ERM has obtained an understanding of the current socio-economic condition of the impacted villages, their livelihoods, customs and culture, their dependence on natural resources, their access to utility services, and their opinions or concerns about the Project (see section 6.2.3).

The FGD began with an introduction about objectives and methods. The focus group was structured around the following main sections:

- ERM enquired about the participants' socio-economic condition, and their perception about the Project; and
- Participatory mapping was conducted in FGDs. Participants visualised their community cartographically based on their local knowledge and understanding. These community maps were

illustrated and noted in details to provide a clear snapshot about public infrastructure and livelihood activities of the surveyed communities;

- Participants were requested to develop a community vision through developing their future community that they want in the next five years. The desired quality-of-life outcomes were identified that local people and different stakeholders can contribute towards achieving these outcomes over time; and
- Participants, with a focus on women's and vulnerable groups, were asked to list stakeholders who might support them during time of need. These might include friends, family, local authorities or non-governmental organisations (NGOs). Based on a list of stakeholders, participants were invited to rank them in terms of importance for their needs. Visual illustrations were presented to support illiterate people during the discussion.

Photos and note-taking were carried out during the focus group, which lasted from one to one and a half hours. The list of FGD respondents and further FGD photos are provided in Appendix B of Vol I.

Several participatory tools and techniques were adopted during the group work, including:

- Community resource mapping;
- Gendered labour division raking;
- Seasonal calendar;
- Public infrastructure and service ranking;
- Well-being ranking;
- Support circle;
- Community needs ranking.

9.2.2.2.5 Household Interviews

9.2.2.2.5.1 Sampling

Household interview is one among multiple research methods that help the researcher to have fuller understanding of potential impacted community. It is not aimed to generalise to the commune's population given the nature and scale of impacts of wind power project components. We proposed a non-probabilistic sampling strategy, particularly purposing sampling technique for the household survey. Households will be selected to be inclusive in terms of socio-economic conditions, vulnerability, ethnicity, and magnitude of impacts.

The survey was conducted in Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes where the Project components will be located and/or impact on local communities. At the community level, a sample of 144 households residing near to the Project site was purposively selected for household interviews (see section 6.2.3).

9.2.2.2.5.2 Survey Questionnaire

The survey used the household questionnaire method, whereby a set of data was collected at the household level using structured questionnaires. The questionnaire for the household interview was designed to capture the following data and information:

- Family status and demographics (i.e. population, residency, household size, age, religion, and marital status);
- Vulnerability profile (i.e. gender, ethnicity, age, physical or mental disability, and economic disadvantage may be more adversely affected by the Project development);
- Education background (i.e. education level of members in the surveyed households);

- Occupation, livelihood, and working status (employed or self-employed, no work or unpaid work);
- Housing, household assets, and land holdings (i.e. land use pattern);
- Health conditions of the household being interviewed;
- Economic conditions (i.e. income and expenditure [seasonal income is also accounted for], and debts affordability);
- Current conditions of local public services and infrastructure including road, electricity and water supply, waste management, market, education, healthcare, internet and telecommunications; as well as the household's access to these services;
- Engagement in community organisations and social support;
- Community relations;
- Gender analysis;
- Ethnic minority analysis; and
- Human rights analysis.

The point of contact for interviews at the household level was any appropriate adult member of the household. The household surveys were conducted by meeting in the village community houses or at their houses, subject to availability.

9.2.2.2.6 Field Observations

Field observations were carried out during the surveys, at the village and commune levels covering the following aspects:

- Health facilities;
- Education facilities;
- Community security;
- Commune and village government facilities;
- Public transport services and infrastructure;
- Daily community activities; and
- Community use of natural resources and livelihood.

9.2.3 Data Analysis

The data collected was systematically transcribed and thematically analysed. The method for identifying, analysing, and reporting themes from data transcripts was applied. Narrative development, network analysis, and community asset mapping were also used to highlight different aspects of the research issues.

Data collected from the paper-based questionnaires of the household surveys was entered using Microsoft Excel. Before the analysis however, multiple checking processes were conducted to identify potential errors. Some of the answers were cross-checked to make sure of the consistency of the data. The final databases for the surveys were then analysed using Excel to provide different frequency and percentage tables. The baseline analysis is based on the following categories:

- Demographic information;
- Employment and Livelihoods;
- Income and expenditure;
- Land, housing and household assets;

- Health;
- Access to public infrastructure;
- Community and social relations;
- Local perceptions and evaluation of the Project; and
- Local needs for community development.

In addition, major cross-cutting issues including vulnerability, gender, and human rights are analysed and presented as separate sections.

9.2.4 Limitations

Even though every effort was made to achieve the best database and sample-size, the research team recognises that the key limitation to this study is the quality and extent of available information. Firstly, this study relies on the most recent reports and statistical information available at the time of writing (i.e. statistical data 2019 for some socio-economic indicators), which may not accurately reflect current social and economic conditions. However, this information remains the most up to date official data source available at the time of writing. In addition, the levels of data availability and coverage as well as statistical quality are not standardised particularly at the district and commune contexts, making for a less unified analysis. Efforts were made to cross-check and triangulate information from different sources to confirm their accuracy.

Secondly, most interviewees are male household heads but in some parts of the questionnaire were about gender issues, where both the household head and their spouse were engaged for their opinions. Gender analysis was presented in this report as an integral part even though mostly men as household owners were involved in the interviews. Further, women groups were invited to FGDs so that their own views and needs could be elaborated.

Thirdly, some surveyed Ede people could not communicate fluently in Vietnamese with the interviewers. The household interviews with Ede people were only conducted with the support of a local interpreter who is local Ede and can speak Vietnamese fluently. This partly made difficulties for the interviewers to capture all feelings and inner thoughts of the interviewees and this took a longer time for interviewers to complete the interviews than expected. In addition, some detailed household information was not obtained, but the survey team double-checked information with the village head and re-contacted respondents for data confirmation when needed.

Finally, FGD participants were selected and invited by the village heads based on pre-determined criteria. However, there was a likelihood that the selection of FGD participants was based on the proximity of villagers rather than their locations evenly throughout the village. As a strategy to increase the representativeness of FGD samples, at least two group discussions were conducted within a category of group discussions.

9.3 National Socio-Economic Context

This section describes the country of Vietnam in terms of demographics, institutional context, economy and industry, and human rights.

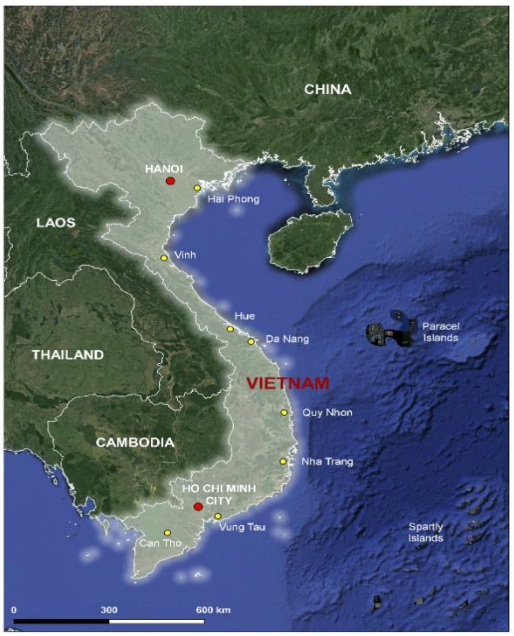
9.3.1 Demographic Profile

The Socialist Republic of Vietnam is located on the Indochina peninsula in the Southeast Asia. It is bordered by China to the North, Laos, and Cambodia to the West, the Gulf of Thailand to the Southwest, and the East Sea to the East and South, and has a mainland area of 331,235 km^2 and more than 4,000 islands. It has a population of 97.58 million (2020), an increase of 1.1% over 2019, of which the urban population is 35.93 million people (36.8%), and the rural population is 61.65 million people (63.2%).

The male and female populations are 48.59 million and 48.99 million people respectively with the corresponding shares of 49.8% and 50.2%[28] (see Figure 9.1).

VIETNAM

Full name	**Socialist Republic of Vietnam**
Capital	**Ha Noi**
Largest city	**Ho Chi Minh**
Area	**331,235 km²**
Ethnic groups	**85.3% Kinh**
	14.7% Ethnic minorities
Religion	**86.3% Folk (2019)**
	6.1% Catholicism
	4.8% Buddhism
	2.8% Others
Population	**97.58 million people (2020)**
GDP (Total)	**VND 6,293.1 trillion (2020)**



Source: General Statistics Office of Vietnam (2020a, 2020b); Central Population and Housing Census Steering Committee (2019)

Figure 9.1 Vietnam at a Glance

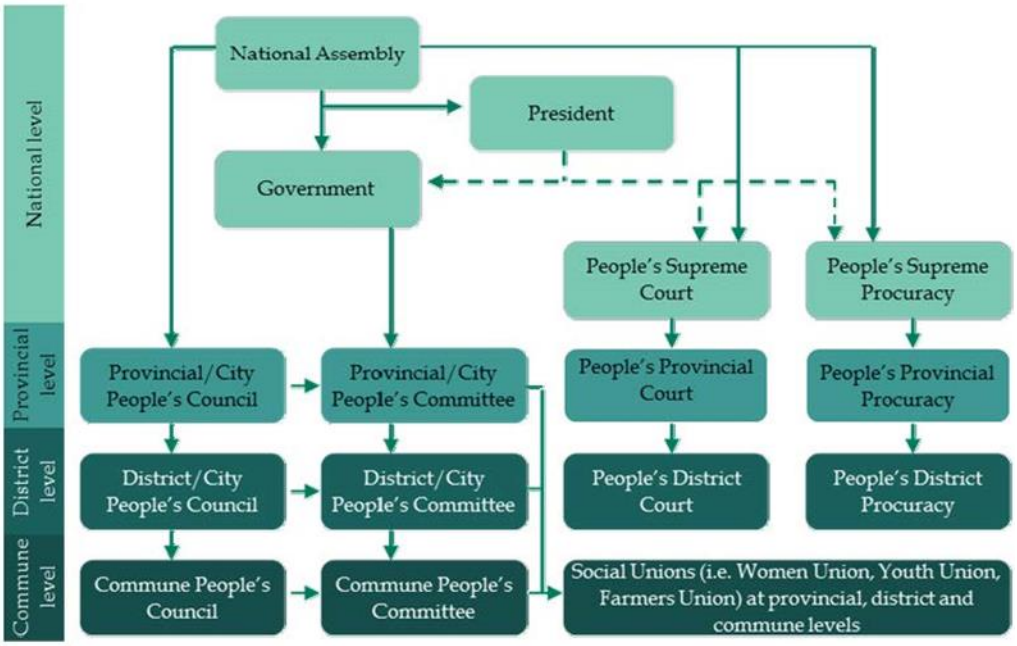
In 2019, there were 16 religions in Vietnam with 13.2 religious adherents, accounting for 13.7% of total population. Of the 13.2 religious adherents, 5.9 million people practiced Catholics, accounting for 44.6% (6.1% of total national population); and 4.6 million people were identified as Buddhists, accounting for 35% (4.8% of total national population). The number of people following other religions such as Caodaism, Muslim, and Hoa Hao Buddhism took a small proportion of total religious adherents[29].

9.3.2 Institutional Context

Vietnam's system of governance has four levels: national, provincial, district and commune in Figure 9.2. Provincial, district and communal levels are classified under local governance.

[28] General Statistics Office of Vietnam (GSO, 2020b)

[29] Central Population and Housing Census Steering Committee (2019)



Source: ERM

Figure 9.2 The State System of Vietnam

At the national level, the State of Vietnam consists of the National Assembly, the President, the Government, the People's Supreme Court and the People's Supreme Procuracy.

- The National Assembly is the supreme organ of the state and the only body with constitutional and legislative power to draw up, adopt, and amend the constitution and to make and amend laws, to legislate and implement state plans and budgets, to initiate or conclude wars, and to assume other duties and powers it deems necessary.
- The President represents Vietnam both domestically and internationally, maintains the regular and coordinated operation and stability of the national government, and safeguards the independence and territorial integrity of the country.
- The Government is the executive organ of the National Assembly and the highest body of state administration of the Socialist Republic of Vietnam. It carries out the overall management of work for the fulfilment of the political, economic, cultural, social, national defence, security and external duties of the State.
- The Supreme People's Court supervises the judicial work of both the local People's Courts, which are responsible to their corresponding People's Councils, and the Military Tribunals. The People's Courts function at all levels of government except the commune, where the commune administrative committee functions as a primary court.
- The Supreme People's Procuracy, with its local and military subdivisions, acts as a watchdog for the state. It monitors the performance of government agencies, maintains vast powers of surveillance, and acts as a prosecutor before the People's Courts.

At the local level, organisation of institutional governance from the provincial/city level to the commune level consists of:

- The People's Council at provincial, district, and commune levels[30]: a body of state power at the local level, representing the rights of the people and is elected by local people; and
- The People's Committee at provincial, district, and commune levels: the executive body of the People's Councils and State administrative agencies at the local level. The People's Committee at the provincial/city and district level includes departments for fields such as agriculture and rural development, natural resources and environment, transport etc. The number of staff varies from commune to commune depending on the population size and land mass of a commune. Currently, Vietnam has 11,162 commune-level administration units, including 1,567 wards, 597 towns and 9,064 communes[31]. The capacity of the rural commune's human resources needs to be strengthened to meet increasing demands of national development. Of 145,112 permanent staff at the commune level, 31% are reported to have no formal education.

While they are not recognised under the State's local administration system, village level institutions are the basic unit of Vietnamese society and their interactions with the State are vital to understanding Vietnamese socio-political characteristics and citizen behaviour[32]. Under the National Target Program for New Rural Development[33], village leadership and participation are becoming more important for village development planning and grassroots democracy, and thus community development.

During ERM's interviews with village heads, the village structure basically includes the Village Party Branch, led by the village party branch secretary (*Bí thư Chi bộ thôn*), Village People's Board (*Ban Nhân dân thôn*), led by the village head (*Trưởng thôn*), and Committee of Actions (CoA) of the Fatherland Front's at the village (*Ban Công tác Mặt trận thôn*). Each village has its mass organisation system including Women's Union, Farmer's Association, Veteran's Association, Youth Union, and Elderly Association, and other social organisations such as the Red Cross Union and the Study Promotion Association.

9.3.3 Economy and Industry

Vietnam is described as 'a development success story' with the dramatic transformation of one of the poorest countries in the world at the time of economic reforms in the 80s (Doi Moi or Renovation reforms), to 'low middle-income status' over a period of 25 years[34]. In 2020, gross domestic product (GDP) at current prices was estimated at VND 6,293.1 trillion. GDP in 2020 increased by 2.9% over 2019, which is the lowest increase in the period 2011-2020 but a great success of Vietnam in the context of complicated coronavirus disease of 2019 (COVID-19). The agriculture, forestry and fishery sector increased by 2.7%; industry and construction by nearly 4%; and the service sector by 2.3%. The GDP per capita in 2020 was VND 64.5 million, an increase of VND 1.5 million over 2019[35].

The structure of the economy has experienced a positive shift with the share of agriculture gradually reducing, and the share of industry and services increasing. In 2020 the share of the agriculture, forestry, and fishery sector accounted for 14.9%, while the share of the industry and service sectors

[30] Provincial level includes cities under the central governance (*thành phố trực thuộc trung ương*) and provinces (*tỉnh*). District level includes cities under the provincial governance (*thành phố trực thuộc tỉnh*), quarters (*quận*), district-level town (*thị xã*), and districts (*huyện*). Commune level includes commune-level town (*thị trấn*), wards (*phường*), and communes (*xã*).

[31] Mai Duc Ngoc (2015)

[32] See further Nguyen The Anh (2003)

[33] National Target Program for New Rural Development: The program aims to improve the economy and living standards of Vietnam's rural areas. To be recognised as a "new rural commune", there are 19 main criteria to be compulsorily met, including (1) planning and planning implementation, (2) communication information, (3) irrigation, (4) electricity, (5) school, (6) cultural facilities and infrastructure, (7) rural market, (8) post, (9) residential houses, (10) income, (11) household poverty, (12) labour force structure, (13) type of production organisations, (14) education, (15) health care, (16) cultural lives, (17) environment, (18) system of social organisation, (19) security and social order.

[34] DFAT (2017)

[35] GSO (2021)

was 33.7% and 41.6% respectively and the taxes less subsidies on products accounted for 9.8% (corresponding figures for 2019 were 14%, 34.5%, 41.6% and 9.9%)[36].

In 2020, there were 54.8 million people in the labour force (people aged 15 years and over), accounting for 56.2% of total population. This was a reduction of nearly 1 million people over the previous year due to the negative impacts of the COVID-19 pandemic leading to lay-off leave, decrease in working hours and income. The employed population aged 15 years and above working in economic activities was 53.6 million people in 2020, a decrease of around one million people compared to that in 2019. Of the employed population, 17.7 million people work in the agriculture, forestry and fishery sector, a reduction of 7.2% compared to 2019, 16.5 million people in industry and construction, an increase of 0.3%; and 19.4 million people in the service sector, a rise of 0.1%. The unemployment rate of the labour force at working age was nearly 2.5% in 2020 with the corresponding figures of urban and rural areas of 3.9% and 1.8% respectively[37].

Vietnam's living standards have been generally improved. The Human Development Index (HDI) reached a good level of 0.704 in 2019. Vietnam was ranked 117 out of 189 countries in the latest United Nations Human Development Report 2020[38].

There was a sharp increase in the national monthly income per capita at current prices during the period 2010-2019. In 2020, the national monthly income per capita at current prices was VND 4.25 million[39], nearly the same as that in 2019. The monthly income per capita at current prices of urban and rural areas was at around VND 5.6 million and VND 3.5 million respectively in 2020.

The overall multi-dimensional poverty rate[40] was 4.8% in 2020, a decrease of 0.9% from 2019. In urban areas, the rate of multi-dimensional poverty was 1.1%, a reduction of 2.3% and in rural areas it was 7.1%, a decline of 4.8% against 2019[41]. The North Midlands and Mountain Areas, the Central Highlands, and the North Central and Central coastal areas were the regions with the highest multi-dimensional poverty household rates, 16.4%, 12.4%, and 7.4% respectively. However, these areas saw a remarkable reduction in the percentage of multi-dimensional poor households (by 2.0%, 1.5%, and 1.3% respectively from 2018). As shown in Figure 9.3, the South East region recorded the lowest rate in 2019, 0.5% - a decrease of 0.1% over 2018. The poverty rate of the Mekong Delta has recorded a

[36] GSO (2020b)

[37] GSO (2020b)

[38] UNDP (2018, 2019, 2020)

[39] GSO (2021)

[40] Multi-dimensional poverty households are households whose monthly average income per capita is at or below income-based poverty line (welfare poverty line) or whose monthly average income per capita is above income-based poverty line but below the minimum living standard and deprives from at least three indices for measuring deprivation of access to basic social services. The multi-dimensional poverty line is defined from two criteria, including income-based criteria and basic-social-service-based criteria as follows:

Income-based criteria:

- Income-based minimum living standard is the income level that guarantees to afford basic minimum needs for a person to survive, including food, foodstuff demands and non-food consumption suitable with socio-economic situation of the province/city directly under central management in each period.
- Income-based poverty line (also welfare poverty line) is the income level which household is considered as income poverty if its income is lower than that level.

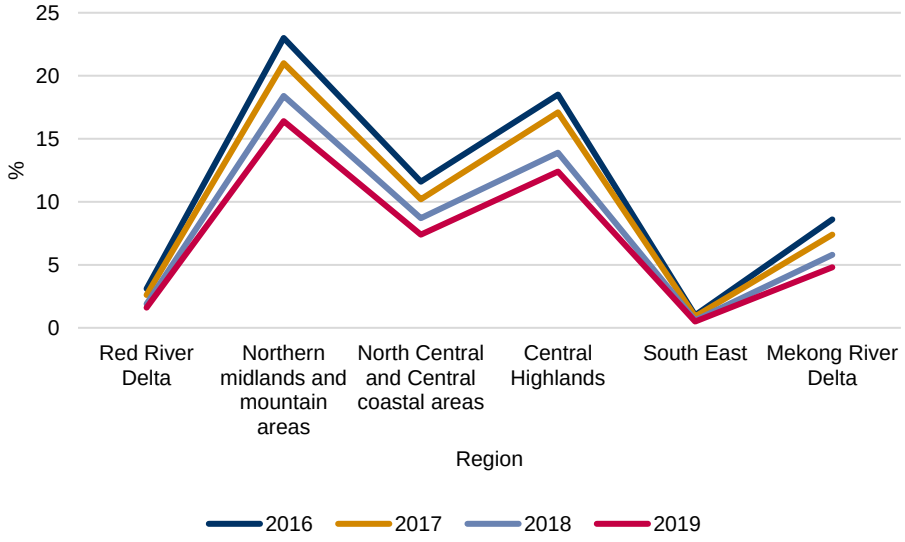
Criteria for deprivation of accessing to basic social services:

- Five basic social services include: health, education, housing, clean water and sanitation and information accessibility.
- Ten indicators for measuring level of deprivation: (1) adult education; (2) child school attendance; (3) accessibility to health care services; (4) health insurance; (5) quality of house; (6) housing area per capita; (7) drinking water supply; (8) hygienic toilet/latrine; (9) use of telecommunication services; and (10) assets for information accessibility.

Source: GSO (2018, 771)

[41] GSO (2020a)

consecutive decrease over the period from 8.6% in 2016 to 4.8% in 2019 and a constantly lower ratio compared to the national average poverty rate.



Source: GSO (2020a)

Figure 9.3 Vietnam's Multi-Dimensional Poverty Rate by Region 2016-2019

9.3.4 Renewable Energy Planning and Development

Renewable energy sector in Vietnam is regarded as one of the most vibrant in Southeast Asia presenting significant opportunities for investors. Electricity demand in Vietnam is projected to increase by 8% annually until 2025[42]. Therefore, the Government is promoting the development of renewable energy in addition to existing energy sources to ensure energy security and to address the growing power demand. In 2015, the Vietnam Government approved 2068/QD-TTg on the Development Strategy for Renewable Energy of Vietnam (DSRE) by 2030 with a vision to 2050. The Decision describes the development strategy and orientation for renewable energy as follows:

> "To encourage the mobilisation of all resources from the society and people for renewable energy development to strengthen the access to the modern, sustainable and reliable energy source with rational price for all people; promote the development and use of renewable energy, increase in domestic energy supply source, gradually increase the proportion of renewable energy in production and consumption of national energy to decrease the dependence on the fossil fuel, contribute to ensure the energy security, mitigation of climate change, environmental protection and sustainable socio-economic development."

In 2016, the Government approved the revised National Power Development Master Plan ("PDP VII") for the 2011- 2020 period, with a vision for 2030 under the Decision No. 428/QD-TTg. This Master Plan provides the development orientation for renewable energy sources in 2020, 2025, and 2030 as summarised in Table 9.3. As one of the Government's incentives for renewable energy investment in Vietnam, feed-in-tariffs (FiTs) are currently among the lowest in the world[43].

[42] Vietnam Briefing (2020))

[43] Vietnam Briefing (2019)

Table 9.3 Targets Set in PDP VII for Renewable Energy by 2020, 2025, and 2030

Type	Capacity	2020	2025	2030
Wind	Total Capacity (MW)	800	2,000	6,000
	Electricity Production (%)	0.8	1	2.1
Hydropower	Total Capacity (MW)	21,600	24,600	27,800
	Electricity Production (%)	29.5	20.5	15.5
Biomass	Electricity Production (%)	1	1.2	2.1
Solar	Total Capacity (MW)	850	4,000	12,000
	Electricity Production (%)	0.5	1.6	3.3

Source: Vietnam Briefing (2019)

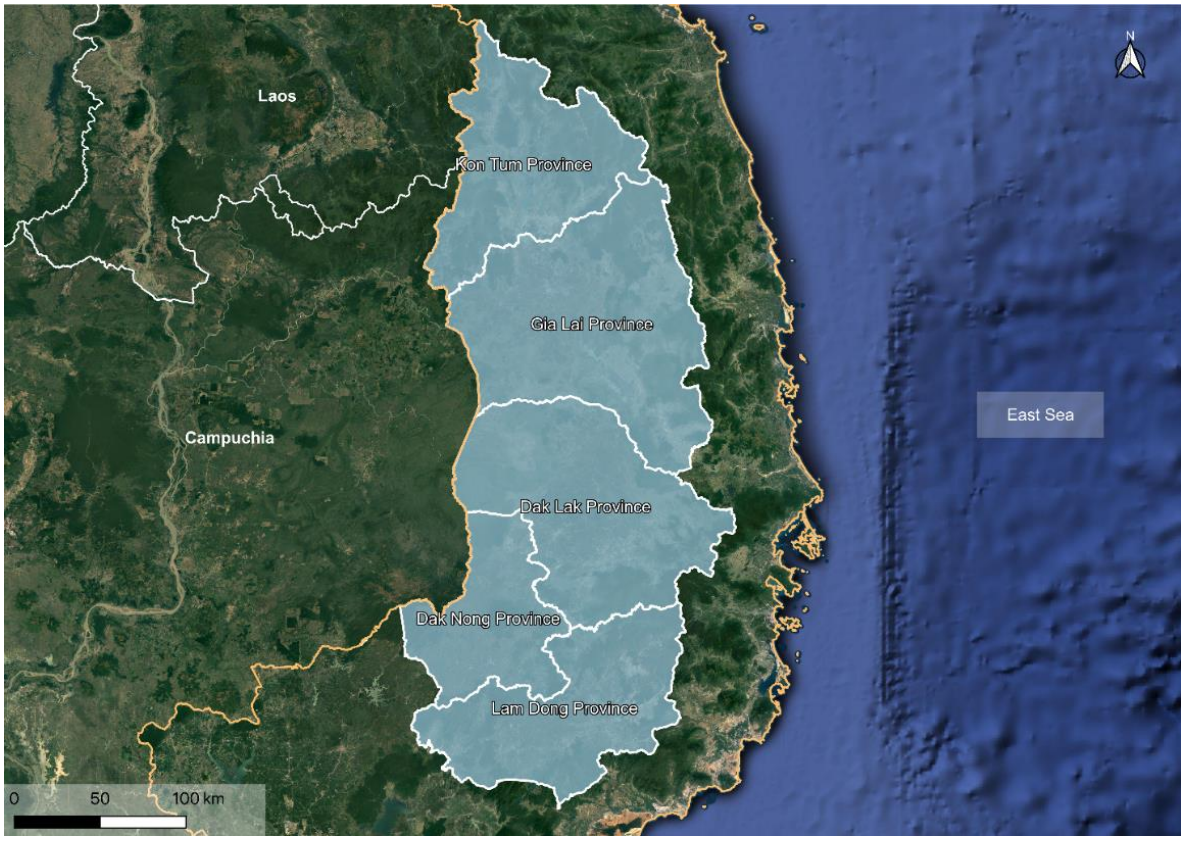
9.4 Regional Socio-Economic Context

Section 9.3 has already considered the national context. This section now presents the snapshot of the regional context of the Central Highlands, which has recently been promoted to be a national hub for renewable energy development, including wind power projects.

9.4.1 Overview of the Central Highlands

The Central Highlands of Vietnam, or “Tây Nguyên”, is one of the six regions of Vietnam, consisting of five provinces (Dak Lak, Dak Nong, Gia Lai, Kon Tum, and Lam Dong) (see Figure 9.4). As of 31 December 2018[44], the total land area of the Central Highlands was 5,450.8 thousand ha (accounting for 16.5% of the national area). About 90% of the total land area are agricultural production and forestry land. Gia Lai province has the largest agricultural land area (800.7 thousand ha), followed by Dak Lak (627 thousand ha), while Kon Tom has the smallest agricultural land area (266.2 thousand ha) in the region.

[44] GSO (2021)



Source: QGIS, Google Satellite, July 2020

Figure 9.4 Map of the Central Highlands

9.4.2 Demographic Profile

The Central Highlands is one of the regions with a large number of ethnic minorities and diversity of ethnic composition (see Table 9.4). According to statistics of the completed results of the 2019 Vietnam Population and Housing Census, the Central Highlands have the population of 5,842.7 thousand people (accounting for 6.1% of the Vietnamese population), of which Kinh people account for 62.3% of the region's population[45]. This region is the home to 52 of the 54 existing ethnic groups in Vietnam.

Table 9.4 Population of Provinces in the Central Highlands

Province	Total Population	Kinh Population	Ethnic minority Population	Percentage of Ethnic Minority Population (%)
Kon Tum	540,438	243,572	296,866	54.9
Gia Lai	1,513,847	814,056	699,791	46.2
Dak Lak	1,869,322	1,202,000	667,322	35.7
Dak Nong	622,168	419,808	202,360	32.5
Lam Dong	1,296,906	963,290	333,616	25.7
Total	**5,842,681**	**3,642,726**	**2,199,955**	**37.7**

Source: Vietnam Population and Housing Census (2019)

[45] GSO (2020)

9.4.3 Economic Development

In the period 2016-2020, the Central Highlands' average growth rate reached nearly 6.7% per year and the gross regional domestic products (GRDP) per capita by 2020 reached VND 55.6 million per person, which was 1.4 times higher than that in 2016. The economic structure shifted in a positive direction, increasing the proportion of industry - construction and services. In 2020, the proportion of agriculture, forestry, and fishery sector accounted for 33.5%; industry and construction accounted for 21%; the service sector accounted for 40.8%; and product tax minus product subsidies accounted for 14.7%.

Provinces in the region have basically fulfilled the main targets of socio-economic development. Agriculture has made good progress, continuing to affirm the region's strengths in high-tech agricultural production, agricultural products, and perennial industrial crops. Industry has made good growth. In which, bauxite-alumina complexes in Lam Dong and Dak Nong provinces operated effectively; hydroelectric projects came into operation, contributing to the State budget revenue. Tourism continues to develop and make important contributions to socio-economic development. Particularly, the completion of the Ho Chi Minh route and the opening of domestic and international routes in three out of five provinces (Gia Lai, Dak Lak, and Lam Dong) in the region have created favourable conditions in connecting and developing tourism.

Based on reports from provinces in the region, the Ministry of Investment and Planning (MIP) forecasts the average GRDP growth in the 2021-2025 period to be about 7-8%. Regarding the economic structure in 2025, it is expected that agriculture, forestry and fishery sector accounts for 29.6%; the sector of industry and construction takes 25.4%; the service sector represents 40.4%; and the taxes less subsidies on production makes up 4.6%. The average GRDP by 2025 is expected to reach about VND 85 million per person. Capital mobilisation for development investment in the 2021-2025 period is about VND 705 trillion, an average increase of 10% per year. Total State budget revenue in the region in the period 2021-2025 is expected to reach VND 177 trillion, an average increase of 10-11% per year. Export turnover will reach about USD 4.5 billion by 2025[46].

At a recent seminar on human resources in the Central Highlands, it is shared that the labour force with technical expertise and qualifications in the whole country is 22%, while the Central Highlands is only 14%, the lowest among Vietnam’s regions. Most of the Central Highlands labourers do not have technical expertise and do simple jobs; working capacity, sense of labour disciplines, and industrial working style remain low, not meeting the requirements of employers. Meanwhile, in the past 10 years, labour restructuring in the Central Highlands has been very slow. The proportion of workers in agriculture is still very high, 72% in 2018. The rate of salaried workers in the Central Highlands only accounts for 22% compared to 44% in the whole country[47].

9.4.4 Renewable Energy Planning and Development

The Central Highlands is considered a large renewable energy center in Vietnam, especially wind power. This abundant resource will make an important contribution to the development of the great land while attracting huge investment capital from domestic and foreign enterprises.

In June 2020, the Prime Minister issued Document No.693/TTg-CN on the addition of wind power projects to electricity development planning (see Table 9.5). In this document, the Ministry of Industry and Trade (MOIT) is requested to accelerate the process of approving the inclusion of more wind energy projects into the Master plan to avoid the inherent possibility of electricity shortage nationwide as large coal thermoelectricity power plants have not started until 2023. In which, in the Central Highlands region, Dak Lak, Gia Lai, Dak Nong, Kon Tum, and Lam Dong provinces proposed to supplement the planning to 91 projects with a total capacity of 11,733.8 MW (see Table 9.6).

[46] Phuong Anh (2020)

[47] Dinh Thi, Hoang Thanh, and Cao Nguyen (2019)

Table 9.5 Wind Power Projects Proposed to be Supplemented in Vietnam

Region	Number of Projects	Capacity (MW)
North Central Areas	51	2,918.8
South East Areas	2	602.6
South Central Areas	10	4,193.1
South West Areas	94	25,540.9
Central Highlands Areas	91	11,733.8
Total	**248**	**44,989.1**

Source: MOIT (2020)

Table 9.6 Wind Power Projects Proposed to be Supplemented in the Central Highlands

Provinces	Number of Projects	Capacity (MW)
Dak Lak	23	2,683.4
Dak Nong	6	460.0
Gia Lai	59	8,368.0
Kon Tum	2	153.5
Lam Dong	1	68.9
Total	**91**	**11,733.8**

Source: MOIT (2020)

9.5 Local Socio-Economic Context

This section provides details about the local context where the Project components are located, including demographic information (i.e. population, ethnicity, and religion), public infrastructure, land use, economy, education, health, vulnerability, and cultural sites. The local context includes three levels of analysis: provincial (Dak Lak province), district (Krong Buk district), and communal (Cu Ne, Cu Pong, Ea Sin, and Chu Kbo communes) levels.

9.5.1 Provincial Level: Dak Lak

9.5.1.1 Overview of Dak Lak Province

- Geographical Location

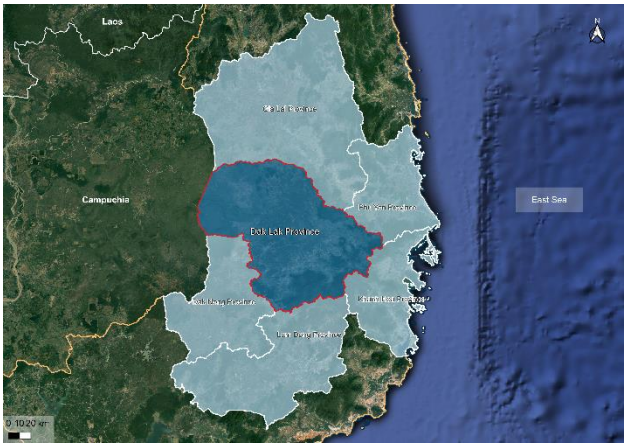
Dak Lak province is situated in the center of the Central Highlands, at the riverhead of the Srepok river system and a part of the Ba river. The province covers an area[48] of 13,030.5 km^2, accounting for around 3.9% of the national natural area. It borders Gia Lai province to the North, Lam Dong and Dak Nong provinces to the South, Phu Yen and Khanh Hoa provinces to the East, and Mondulkiri province of Cambodia to the West[49] (see Figure 9.5). In addition, Dak Lak province is located in the Cambodia - Laos - Vietnam development triangle area, so the province plays an important role as the socio-economic center of the Central Highlands region in particular and Vietnam in general.

[48] Dak Lak Province Statistics Office (2020a)

[49] Dak Lak Province Portal (2015)

DAK LAK PROVINCE

Area	13,030.5 km^2 (2020)
Population	1,886,937 people (2020)
Population density	145 people/km^2
Number of cities	1 (Buon Me Thuot)
Number of towns	1 (Buon Ho)
Number of districts	13
Poverty rate	4.97% (2020)
Main ethnic groups	Kinh, Ede, Nung, Tay, M'Nong, Mong, and Gai Rai



Source: Dak Lak Provincial People's Committee (Dak Lak PPC, 2020); Dak Lak Province Statistics Office (2020a)

Figure 9.5 Dak Lak Province at a Glance

- Administrative Units

Dak Lak has 15 district-level administrative units including one city (Buon Ma Thuot), one town (Buon Ho), and 13 districts (Ea H'leo, Ea Sup, Krong Nang, Krong Buk, Buon Don, Cu M'gar, Ea Kar, M'Drak, Krong Pac, Krong Bong, Krong Ana, Lak, and Cu Kuin). Buon Ma Thuot city is the political, economic, and cultural center of the province. The province has 184 commune-level administrative units, comprising 12 district-level towns, 20 wards, and 152 communes.

- Topography

The topography[50] of Dak Lak is characterised by a gradual sloping terrain from the Southeast to the Northwest with diverse topographical areas: a large plateau with gently sloping, wavy, and fairly flat terrain located in the West, and the end of the Truong Son range is interspersed with low plains along the main rivers. In general, the province's topography is divided into four main terrain categories[51], including:

- Mountain terrain: This includes high mountain area - Chu Yang Sin with many rugged terrain mountain ranges over 1,500 m high; and average and low mountain area - Chu Do Jiu with an average altitude of 600 - 700 m located in the Northwest of the province;
- Flat plateau: This occupies most of the province's natural area. There are two large plateaus: Buon Ma Thuot plateau and M'Drak plateau (or Khanh Duong plateau). The terrain of these areas slops gradually from the Northeast to the Southwest;
- Ea Sup semi-plateau terrain: This is a large area adjacent to the plateaus in the West. The surface of this area is eroded. The terrain is quite flat with gently undulating hills and the average altitude is 180 m;
- Krong Pak - Lak lowland area terrain: This is located in the Southeast of the province, between the Buon Ma Thuot plateau and the Chu Yang Sin high mountain range, with an average altitude of 400 - 500 m.

[50] Dak Lak Province Portal (2015).

[51] Ministry of Planning and Investment (2021)

- Natural Ecosystems

Dak Lak has diverse natural ecosystems including rivers, forests, and montane ecosystems. The province is the home to many important rivers that connect to the Mekong river, including the Srepok river system. Most of Dak Lak province falls within the catchment of the Srepok river.

Dak Lak is well-known for the richest forest ecosystem in the Central Highlands representing a range of forest types - deciduous, semi-deciduous, dry-dipterocarp, grassland, and evergreen forest[52]. The provincial forest coverage reached 38.7% in 2020, an increase of 0.14% compared to 2019[53]. Dak Lak forest has many kinds of wood and medicinal plants, including some valuable woods such as Cam Lai, Trac, Lim, Sen, Tau, Ca te, Giang Huong, and Yew. It is also a habitat of many rare animals which are recorded in the red book of Vietnam and the world, and distributed mainly in Yok Don national park (Ea Sup and Buon Don districts), Chu Yang Sin national park (Lak and Krong Bong districts), Nam Kar conservation area (Krong Ana district), and Ea So conservation area (Ea Kar district). Dak Lak forest, located in the upstream of major rivers and streams, plays an important role in protection of aquatic resources for the province and also for the whole region[54]. In addition, the flow and water capacity of the rivers depend entirely on the upstream forest. It can be seen that the key ecosystems of the province including forest and the Srepok River are inter-related.

The province also features diverse types of soil[55], in which main soil groups include gray soil (Acrisols) on sloping terrain, accounting for 579,309 ha (44.1% of the total provincial land area) and distributing in all districts; red soil (Ferralson) accounting for 311,340 ha (23.7%) and distributing in Buon Ma Thuot city; and brown soil (Lixisols) distributing in low sloping terrains and making up 146,055 ha (11.1%). In addition, others account for 21.1% out of total land area such as alluvial soil (Fluvisols), gley soil (Gleysols), peat soil (Histosols), black soil (Luvisols), dark brown soil (Phaeozems), soil with compact clay layer, differentiated mechanical layer (Planols), newly modified land (Cambisols), inert erosive soil (Leptosols), and chapped soil (Vertisols).

- Water Sources

Overall, Dak Lak has a dense network of rivers and lakes which are evenly distributed among areas. There are three main river systems including Srepok, Ba, and Dong Nai rivers, along with hundreds of reservoirs and 833 streams with a total length of over 10 km. Groundwater source is concentrated in Basalt forrmations and Neogene sediments and exists in fissures or holes. The groundwater source is rich in minerals such as magnesium, calcium, sodium, chlorine, and hydrocarbonate[56].

- Climate

The climate of Dak Lak province is divided into two sub-zones[57]. Overall, the climate varies among topographical forms and different altitudes. The Northwest sub-zone has a hot and dry climate in the dry season while the Eastern and Southern sub-zones have a cool and temperate climate. The weather is hot all year round in areas below 300 m in height; hot and humid in areas with atitude at 400 to 800 m; but cool in areas over 800 m elevation.

There are two distinct seasons: the rainy season (from May to the end of October) and the dry season (from November to April next year). Statistically, 90% of the annual rainfall is concentrated in the rainy season, while the rainfall is negligible in the dry season. The annual average temperature is 24°C and the temperature difference between the hottest and coldest months is small, just over 5°C.

[52] ADB (2016)
[53] Dak Lak PPC (2020)
[54] Ministry of Planning and Investment (2021)
[55] Ministry of Planning and Investment (2021)
[56] Dak Lak Province Portal (n.d)
[57] Dak Lak Province Portal (2015)

9.5.1.2 Demographic Profile

9.5.1.2.1 Population

Dak Lak is the most populous province in the Central Highlands region and is ranked 10th in the whole country[58]. In recent years, the population of Dak Lak province has increased due to mechanical population increase, mainly by free migration. As a result, this causes many pressures for the province to solve issues related to residential and productive land, living conditions, security, and ecological environment[59].

By 2020, the province had a total population of 1,886,937 people, an increase of 0.8% compared to 2019[60]. The male and female distribution rate was 50.5% and 49.5% respectively. Most of the provincial population lived in rural districts, accounting for 75.3% while the remaining 24.7% resided in urban areas (see Table 9.7). The provincial population density was 145 people/km^2 in 2020, much lower than the national average (295 people/km^2). The population was unevenly distributed, mainly in Buon Ma Thuot city, town and districts along the National Roads No. 14, 26, and 27 such as Krong Buk, Krong Pak, Ea Kar, and Krong Ana. Buon Ma Thuot city, Buon Ho town, Krong Pac and Cu Kuin districts showed the highest population density[61]. Meanwhile, the population density was quite low in the districts towards the Northwest (Ea H'leo, Ea Sup, and Buon Don) and the Southeast (Lak, Krong Bong, and M'Drak).

In 2020, the natural growth rate was recorded at 13.6%, slightly higher than the previous year (13.1%). The crude birth rate[62] was 18.5‰ and the crude death rate[63] was 4.9‰[64].

Table 9.7 Population Distribution by Gender and Residential Area in Dak Lak 2017-2020

Year	By Gender				By Residential Area			
	Male (people)	%	Female (people)	%	Urban (people)	%	Rural (people)	%
2017	933,199	50.43	917,115	49.57	454,951	24.59	1,395,363	75.41
2018	938,732	50.43	922,786	49.57	459,118	24.66	1,402,400	75.34
2019	944,189	50.42	928,385	49.58	463,270	24.74	1,409,304	75.26
Prel. 2020	952,219	50.46	934,718	49.54	466,479	24.72	1,420,458	75.28

Source: Dak Lak Province Statistics Office (2020a); Dak Lak Province Statistics Office (2020b)

9.5.1.2.2 Ethnicity

By 2019, Dak Lak had 1,869,322 inhabitants of 50 ethnic groups, excluding foreigners and unidentified ethnic minority people. The Kinh group numbered 1,202,000 (64.3% of the Dak Lak population), the

[58] The Hung (2019).
[59] Kim Hoang and Trang Tran (2020)
[60] Dak Lak Statistics Office (2019), Dak Lak PPC (2020)
[61] Dak Lak Province Statistics Office (2020a)
[62] Crude birth rate is an indicator which is one of two components of natural population increase. The crude birth rate indicates that for every 1,000 people, how many live births are in the reference period.
[63] Crude death rate is an indicator which is one of two components of natural population increase. The crude death rate indicates that for every 1,000 people, how many deaths are in the reference period.
[64] GSO (2021)

Ede population was 351,278 people (18.8%), and the other ethnic minority groups had 316,044 people (16.9%)[65]. Dak Lak had 184 communes in ethnic minority areas with 2,485 villages[66].

By 2019, Dak Lak had 667,305 ethnic minority people, accounting for 35.7% out of the total population of the province. Of which the male-to-female ratio is nearly equal with 333,589 males and 333,716 females. By residential area, the majority live in rural areas, accounting for 91.6% (611,084 people) while in urban areas, this figure is 8.4% (56,221 people)[67].

9.5.1.2.3 Labour Force

By 2019, the provincial labour force (15 years of age and above) was 1,117,631 people, a slight increase of 1.9% compared to that in 2018. The employed labour force in 2019 was 1,095,012 people, equivalent to 98% of the labour force or 58.5% of the provincial population. Women (47.1%) accounted for a lower share of the labour force as compared to that of men (52.9%) (see Table 9.8).

Table 9.8 Workforce Distribution by Gender and Residential Area in Dak Lak 2017-2019

Year	By Gender				By Residential Area			
	Male (people)	%	Female (people)	%	Urban (people)	%	Rural (people)	%
2017	556,025	52.17	518,918	47.83	250,339	23.07	834,604	76.93
2018	578,593	52.75	518,269	47.25	256,620	23.40	840,242	76.60
2019	590,976	52.88	526,655	47.12	255,171	22.83	862,460	77.17

Source: Dak Lak Province Statistics Office (2020a)

According to statistical data 2019, the percentage of the trained labour force (15 years of age and above) was 14.4%. In terms of gender distribution, the rates were 15.1% in males and 13.7% in females. As for residential location distribution, the rates were 38.2% in urban areas and 7.5% in rural areas respectively. The unemployed labour force at the working age in 2019 was recorded at 2.1% in which the rate in urban areas doubled that of rural areas, 3.4% versus 1.7% respectively. By gender, the unemployment rate of female was higher than that of male (2.5% versus 1.9% respectively) [68].

In 2020, the whole province created jobs for about 30,163 people (reaching 100% of the plan), of which, the number of labourers going abroad to work were 1,100 people (reaching 91.7% of the plan). Of the 30,200 labourers having jobs in 2020, there were 16,600 people having secondary occupations, 14,190 female labourers, and 9,965 labourers of ethnic minority groups. By sectors, there were 12,300 people working in industry and construction, 8,233 people working in agriculture and forestry, and 9,630 people working in trade and services[69].

In addition, in 2020 the provincial Social Policy Bank[70] approved 3,324 applications for accessing to loan schemes for employment with total capital of VND 119,642 million, contributing to job creation to 3,324 labourers, including 1,782 female labourers, 952 labourers of ethnic minority groups, and four disabled labourers. The Bank supported 107 people to access loans for working abroad by contract, including 51 female workers, 24 ethnic minority workers, 27 workers from poor households, 49 workers from near poor households, and eight workers from households with meritorious services to the revolution.

[65] General Statistics Office (2020)
[66] CEMA and GSO (2019)
[67] CEMA and GSO (2019)
[68] Dak Lak Province Statistics Office (2020a)
[69] Dak Lak Province Department of Labour, War Invalids and Social Affairs (DOLISA, 2020)
[70] DOLISA (2020)

9.5.1.2.4 Religion

By 2019, Dak Lak province had four main different religions with 609,536 followers, accounting for 32% out of total provincial population. Of all Catholicism, Buddhism, Protestantism, and CaoDaism followers, 40.5% or 247,000 people were of ethnic minorities. The province had 796 establishments and places for religious and spiritual activities in 2019[71].

9.5.1.3 Public Infrastruture

9.5.1.3.1 Roads and Transportation

Situated in the center of the Central Highlands, Dak Lak is considered as the central location for commodities exchange. Traffic infrastructure has been spread evenly throughout the province, highly connected, and expanding in all four directions. Dak Lak has key national highways such as National Roads 14, 14C, 26, 27, and 29 passing through, which help Dak Lak connect to major economic centers such as Da Nang or Ho Chi Minh cities, and large industrial zones such as the Dung Quat or Chu Lai industrial zones, and key national tourist centers such as Khanh Hoa province, where there is a convenient seaport for foreign trade. The convenient transportation system among the areas creates favorable conditions for the development of services and commerce of Dak Lak province[72].

- Road Network

The road system in the province includes five national roads namely National Roads 26, 27, 29, 14, and 14C with a length of over 576 km; 13 provincial roads with a total length of 457 km; urban roads with a total length of 751.1 km; district roads with a total length of 1,403.8 km; commune roads with a length of 3,220.1 km; and village roads with a length of 4,079.3 km. By the end of 2020, most of roads in the whole province were rehabilitated and upgraded. Specifically, 96% of provincial roads, 91.6% district roads, and 65% communal and inter-communal roads were concreted and 100% of communes had asphalted roads to the central areas[73&74].

- Waterway

Dak Lak province has about 544 km of waterways formed by the Srepok, Krong No, and Krong Na rivers. There are about 834 inland waterway vessels operating in some districts and city. The inland waterway docks include four sand gathering whrafs (Quynh Ngoc, Giang Son, Lang Thai, and Cu Pam) and five wharfs (Buon Trap, Binh Hoa, Quang Dien, Krong No, and Buon Jul)[75].

- Airway

Dak Lak province has one airport located in Buon Ma Thuot city, which is a mixed military and civilian airport. It has return flights from Buon Ma Thuot to Ho Chi Minh, Ha Noi, Da Nang, and Hai Phong cities. The runway had been upgraded since 2010 with a length of 3,000 m and a width of 45 m, as well as auxiliary equipments and airfield lighting system[76].

9.5.1.3.2 Electricity Supply

By 2020, 99.5% of communes in the province had access to electricity, with 99.8% of households using electricity from the national grid[77].

[71] Dak Lak Online Newspaper (2019)
[72] Dak Lak Portal (2015)
[73] Dak Lak PPC (2020)
[74] Dak Lak Portal (2015)
[75] Dak Lak Portal (2015)
[76] Dak Lak Portal (2015)
[77] Dak Lak Portal (2015)

The electricity system was developed according to the development plan of the electricity sector. The electricity grid system in the province includes: 500kV, 220kV, 110kV, 35kV, 22kV, 10kV, and 0.4kV transmission lines. There are two 220kV transformer stations; nine 110kV transformer stations; one 35kV transformer station; 22kV, 10kV, and 0.4kV transformer stations; 407,640 single-phase meters; and 28,312 three-phase meters[78].

9.5.1.3.3 Water Supply

By 2020, 90% of the population in urban areas used clean water, and 95% of rural people accessed to hygienic water sources[79].

The province had 168 concentrated water supply projects with an investment value of nearly VND 400 billion funded by the central, provincial, and district budgets, and the official development assistance (ODA) capital. Currently, there were only 41 projects operating sustainably (24.4%); 56 works in relative operation (33.3%); 20 works operatin inefficiently (11.9%); and 51 works out of working (30.4%)[80].

9.5.1.3.4 Irrigation System

By 2020, the province had a total of 785 irrigation works[81] including 610 reservoirs with a total reservoir capacity of over 680 million m^3, 118 weirs, and 57 pumping stations. The canal system was solidified over 1,230 km out of the total length of 2,031 km and this contributed to increase the irrigation rate for crops to 82% by the end of 2020, an increase of 1.5% compared to that in 2019[82].

9.5.1.3.5 Domestic Waste Management and Drainage

According to statistics in 2019, the amount of solid waste generated in the whole province was about 527,056 tons per year, equivalent to 1,444 tons per day and 0.85 kg per person per day on average. Especially, about 1.35 kg of waste was generated by a person in a day in Buon Ma Thuot city. Meanwhile, the total amount of solid waste collected in 2019 was 224,038 tons per year, equivalent to an average of 613.8 tons per day, much lower than the amount of waste generated[83].

The rate of domestic solid waste collection in the whole province was still low at 42.5% in 2019. Especially, this percentage was lower in rural areas where the solid waste collection services still remained limited. In the province, 100% of the district centers and around 51% of the communes (78 out of 152 communes) accessed solid waste collection services[84]. There were 17 service units involved in domestic solid waste collection, transportation, and treatment.

There were 15 landfills in the province with a total area of 67.71 ha, of which Cu Ebur commune's landfill and Cu Kuin district's landfill are classified as sanitary while most of the remaining landfills have not met sanitary requirements, which potentially causes environmental pollution[85].

9.5.1.3.6 Telecommunications

By the end of 2020, all of the communes had an electronic communication network and fixed broadband internet services. In addition, 4G internet access services were being kept investing and upgrading to

[78] Dak Lak Portal (2020)
[79] Dak Lak PPC (2020)
[80] Ngoc Linh (2019)
[81] Department of Agriculture and Rural Development (DARD 2020)
[82] Dak Lak PPC (2020)
[83] Dak Lak PPC (2019)
[84] Dak Lak PPC (2019)
[85] Dak Lak PPC (2019)

approach more users[86]. The total revenue of production and business of the industry in 2020 was estimated at VND 302,600 billion, up to 101.7% compared to that of 2019[87].

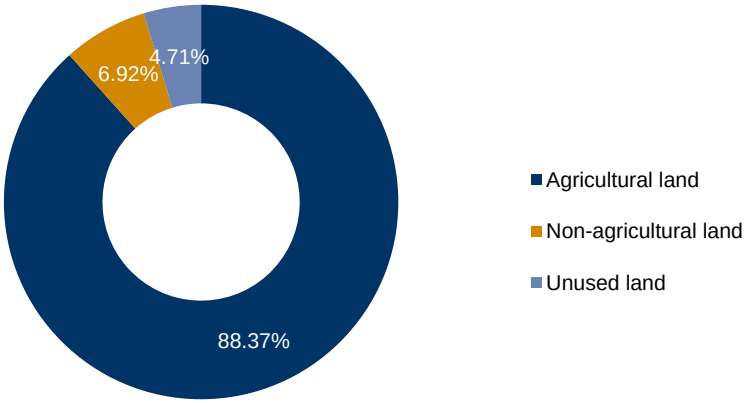
By December 2020, the total number of telephone subscribers of the province reached 1,952,868, equivalent to 103 subscribers per 100 people. The number of internet subscribers was 336,031 indicating 25.8 subscribers per 100 people on average[88].

9.5.1.4 Land Use and Tenure

The total landmass[89] of Dak Lak province by the end of 2018 was 1,303,049 ha, of which 88.4% is agricultural land, 6.9% non-agricultural land, and 4.7% unused land (see Figure 9.6).

As for agricultural land, the principal land use in the province was agricultural cultivation, occupying 54.5% of the total agricultural area which features 61.8% of perennial crop land and 38.2% of annual crop land. This was followed by forestry land (45.1%). In addition, a small proportion of agriculural land was used for aquaculture and other purposes, accounting for 0.4%[90].

In terms of non-agricultural land, the provincial residential land in urban and rural territories made up 16.7%. Specially used land for offices, security and defence, non-agricultural production and business, and public purposes took up 60.4% of the total landmass. Other non-agricultural lands such as religious land, cemetery, rivers, and specialized water surfaces, and others occupied 22.9%[91].



Source: Dak Lak Province Statistics Office (2020a)

Figure 9.6 Land Use Structure of Dak Lak Province 2018

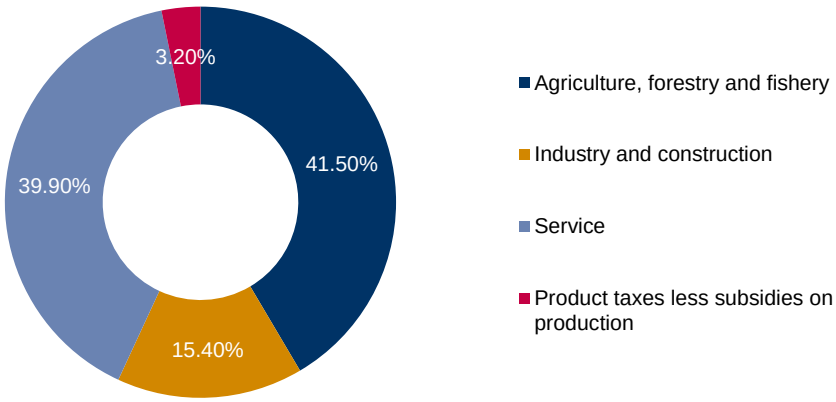
9.5.1.5 Economic Development

In 2020, the socio-economic growth of the province reached nearly 9.9% compared to 11.1% of the plan[92]. Dak Lak's GRDP at current prices in 2020 was estimated to reach VND 61,800.7 billion,

[86] Dak Lak Provincial Portal (2020)
[87] Dak Lak PPC (2020)
[88] Dak Lak PPC (2020)
[89] Dak Lak Statistics Office (2019)
[90] Dak Lak Statistics Office (2019)
[91] Dak Lak Statistics Office (2020)
[92] Department of Labour, War Invalids and Social Affairs of Dak Lak Province (2020).

increasing by 9.9% compared to that of 2019. This growth rate made Dak Lak ranked 30^{the} out of 63 provinces[93].

In terms of economic structure in 2020, the agriculture, forestry, and fishery sector accounted for 41.5%, industry and construction sector was 15.4%, service sector was 39.9%; and taxes less subsidies on products was 3.2% (the corresponding structure in 2019 was 36.1%, 16.5%, 45.2%, and 2.2% respectively)[94] (see Figure 9.7).



Source: Dak Lak PPC (2020)

Figure 9.7 Economic Structure of Dak Lak Province 2020

9.5.1.5.1 Agriculture, Forestry, and Fishery

The production value[95] of the agriculture, forestry, and fishery sector reached VND 25,363 billion at current prices in 2020, an increase of 19.4% over 2019. This also contributed 41.5% to the province's economy.

9.5.1.5.1.1 Agriculture

- Cultivation

In 2020, the total planting area[96] was 664,020 ha, increased by 4,822 ha compared to 2019 (0.7%), in which, the planted area for annual crops was 327,159 ha (increasing by 3,303 ha or 1% compared to 2019). The total grain production was at 1,256,668 tons. The planted areas of some important crops in Dak Lak in 2020 and their comparision with 2019 are presented in Table 9.9 below.

Table 9.9 Planted Area of Rice and Other Crops in Dak Lak 2020

Crop	Planted Area in 2020 (ha)	Compared to 2019 (%)
Rice	107,585	+2.4
Maize	87,278	-3.4
Sweet potato and cassava	52,668	+8.6

[93] Dak Lak PPC (2020)
[94] Dak Lak PPC (2020)
[95] Dak Lak PPC (2020)
[96] DARD (2020)

Crop	Planted Area in 2020 (ha)	Compared to 2019 (%)
Sugarcane	16,131	+1.6
Bean, soybean, peanut, and sesame	34,566	No data
Vegetables	14,025	No data
Plants for cattle raising	6,805	No data
Other annual plants	4,595	No data
Herbs	3,506	No data

Source: DARD (2020); Dak Lak Province Statistics Office (2020a)

In 2020, the planted area for perennial crops was 336,861 ha (increasing by 1,519 ha over 2019), of which the area for perennial industrial plants was 306,239 ha and that of fruit trees was 30,622 ha (up by 6.8% over 2019), accounting for 90.9% and 9.1% respectively.

The perennial crops in Dak Lak featured a high proportion of coffee, pepper, rubber, cashew crops, and fruit crops including avocado, durian, jackfruit, mango, longan, rambutan, lychee, pitaya, banana, pineapple, macadamia, passion fruit, and others. Some figures on planted area and production of some crops are shown in Table 9.10 below.

Dak Lak is known to be the coffee province of the country, accounting for almost one third of coffee production in Vietnam[97]. It is the home of Robusta coffee, of which Vietnam is the world's second largest exporter. In the 2020 crop, Dak Lak had 208,250 ha of coffee, an increase of 0.1% compared to the last crop. The coffee output standed at 483,850 tons, a rise of 1.6% compared to the previous crop. Dak Lak has continued to maintain the coffee area, to focus on replanting coffee trees, to apply solutions aiming to improve productivity, output and quality to meet export requirements.

Table 9.10 Planted Area and Production of Some Perennial Crops in Dak Lak 2020

Crop	Planted Area		Production	
	2020 (ha)	Compared to 2019 (%)	2020 (thousand tons)	Compared to 2019 (%)
Coffee	208,250	+0.1	483,850	+1.6
Pepper	34,500	-1.8	75,818	+2.3
Rubber	37,700	-0.2	37,890	+4.7
Cashewnut	23,995	+0.6	23,162	+8.0
Fruit crops	32,416	No data	No data	No data

Source: DARD (2020); Dak Lak Province Statistics Office (2020a)

- Livestock

The total flock of cattle and poultry in 2020 was 14,186,650 heads, increasing by 4% compared to 2019. Particularly, the province had 39,650 buffaloes (an increase of 1.7% compared to 2019), 267,000 cows (a rise of 2.2%); 850,000 pigs (a rise of 4.9%); 13,000,000 poultries (a rise of 4%); and 230,500 swarms of bees (an increase of 2.7%). In addition, the production of meat was about 220,490 tons (up to 47%

[97] GSO (2018)

compared to 2019) and the production of eggs of all kinds was about 300 million eggs (an increase of 48.5% compared to 2019)[98].

By the end of 2020, the province recorded the small-scale outbreaks of African swine fever and other infectious diseases in cattle and poultry in some localities. Specifically, the Afrian swine fever was recorded in 252 households from 150 villages of 64 communes of 15 districts with total deaths of 2,965 heads and total destroyed weight of 154,761 kg. Basically, these diseases were early detected and timely contained[99]. According to the evaluation of the Ministry of Agriculture and Rural Development (MARD), Dak Lak is one of the leading provinces in African swine fever prevention and control and re-herding.

9.5.1.5.1.2 Forestry

Dak Lak province currently has about 446,000 ha of natural forest and 68,700 ha of planted forest[100]. In 2020, the area of newly planted concentrated forest was 2,390 ha, a decrease of 36.3% compared to 2019. The provincial forest coverage in 2020 was estimated at 38.7%, increasing by 0.1% compared to 2019[101].

In 2019, the output of exploited timber was about 367,840 m^3, an increase of 4.1% over 2018, and the output of harvested firewood was 400 thousand ster[102], a decrease of 2.3% over 2018[103].

For non-timber forest products (NTFPs), in 2019, bamboo (1,250 thousand plants), cork (1,780 thousand plants), rattan (103 tons), fresh asparagus (1,752 tons), and resin (nine tons) were the major ones in the provincial output list[104].

9.5.1.5.1.3 Fishery

In 2019, the fishery output[105] reached 19,839 tons, increasing 7.2% in comparison with the previous year, of which aquaculture output scored 18,084 tons (up by 7.7% over 2018) and catching output attained 1,755 tons (up by 2.2% over 2018). By types of aquatic product, the provincial fish output reached 19,473 tons, up by 7.3%, shrimp output reached 70 tons, up by 1.4%, and other aquatic products reached 296 tons, up by 2.1%.

Ea Sup and Ea Kar districts had the largest areas of aquaculture, 1,648 ha and 1,497 ha respectively. Regarding the fishery outputs in 2019, Ea Sup district had the largest production with 5,085 tons while Ea Kar showed the opposite with only 653 tons[106].

9.5.1.5.2 Industry

By 2020, the production value of the industry section (at constant 2010 prices) was estimated at VND 17,805 billion (reaching 98.4% of the plan), an increase of 7.9% compared to the same period in 2019[107]. Due to the impacts of the COVID-19 pandemic, industrial production had a lower growth rate compared to the previous year, of which some indexs of industrial production (IIP) in 2020 increased by 7.5% compared to 2019.

[98] DARD (2020)
[99] DARD (2020)
[100] Anh Dung (2020)
[101] DARD (2020)
[102] Ster is a measurement unit for types of wood which cannot measure diameter, length to determine its volume.
[103] DARD (2020)
[104] Dak Lak Statistics Office (2020)
[105] Dak Lak Statistics Office (2020)
[106] Dak Lak Statistics Office (2020)
[107] Dak Lak PPC (2020)

Industrial growth in 2020 reflected a rise of 5% over the previous year. In 2020, the processing and manufacturing sector continued to be one of the best performers of the whole industry, contributing 70.2% in the structure of the overall industrial production value. However, the production of coffee, tapioca starch, sugar, and beer decreased compared to that of 2019 due to the impacts of the COVID-19 pandemic and the limited supply of raw materials.

This was followed by the electricity and water generation and distribution, accounting for 28% out of the structure, up to 11% compared to 2019. The mining industry accounted for 1.8%. Basically, both of these industries grew quite steadily in 2020[108].

By the end of 2020, Dak Lak province had 10,375 operarting businesses, of which 1,574 new businesses were established, increasing by 33.7% compared to 2019[109].

9.5.1.5.3 Wind Power Planning and Development

Dak Lak is the center of the Central Highlands and has a lot of potential for renewable energy development. The investment in renewable energy projects over the years has contributed to the socio-economic development of the province, contributed significantly to the province's budget, and created more jobs for local workers. In addition, the development of renewable energy in Dak Lak province has supplied a stable source of electricity to the national electricity system with about 3.5-4 billion kWh per year. This also has ensured national energy security[110].

According to the Dak Lak Provincial Wind Power Development Plan to 2020 with a vision to 2030, the province has seven planned areas with a total area of 41,484.4 ha and with installed capacity of 1,383 MW[111] (see Table 9.11)

Table 9.11 Wind Power Development to 2020 with a Vision to 2030 of Dak Lak Province

No. of Areas	Wind Speed (m/s)	District/Town	Commune/Ward	Survey Area (ha)	Capacity (MW)
1	6.15 – 6.35	Ea H'leo	Ea H'leo, Ea Wy, and Cu Mot	1,748.86	58.3
2	6.10 – 6.30	Ea H'leo	Cu Amung, Cu Mot, Ea Khal, and Ea Wy	2,780.49	126.02
3	6.00 – 6.25	Ea H'leo	Ea Sol, Dlie Yang, Ea Hiao, and Ea Ral	5,094.34	169.81
4	6.18 – 6.42	Ea H'leo	Ea Hiao	1,588.70	52.96
		Krong Nang	Dlie Ya andCu Klong	4,552.84	151.76
5	6.20 – 6.50	Krong Nang	Ea Tan	3,174.46	105.82
		Krong Buk	Cu Ne, Chu Kbo, Cu Pong, and Ea Sin	7,631.58	254.47
6	6.25 – 6.55	Cu M'gar	Cu Dlie M'nong, and Ea Tar	4,340.47	144.68
		Krong Buk	Ea Ngai	1,344.64	44.82
		Buon Ho	Doan Ket, An Binh, and Dat Hieu	1,712.19	57.07

[108] Dak Lak PPC (2020)
[109] Dak Lak DPI (2021)
[110] Kim Bao (2020a)
[111] Van Thanh (2018)

No. of Areas	Wind Speed (m/s)	District/Town	Commune/Ward	Survey Area (ha)	Capacity (MW)
7	6.28 – 6.71	Cu M'gar	Ea Tul and Ea Drong	2,053.63	68.45
		Buon Ho	Cu Bao, Binh Thuan, Binh Tan, and Thong Nhat	4,462.20	148.74

Source: Van Thanh (2018)

By the end of 2020, the province had six wind power projects added to the planning with expected total capacity of 657 MW[112], including:

- Ea H'leo Wind Farm Plant 1 and 2 Project with the capacity of 57 MW;
- Ea Nam Wind Farm Plant Project with the capacity of 400 MW;
- Cu Ne 1 Wind Farm Plant Project with the capacity of 50 MW;
- Cu Ne 2 Wind Farm Plant Project with the capacity of 50 MW;
- Krong Buk 1 Wind Farm Plant Project with the capacity of 50 MW; and
- Krong Buk 2 Wind Farm Plant Project with the capacity of 50 MW.

9.5.1.5.4 Trade and Services

In 2020, retail sales of goods and services at current prices[113] was VND 83,500 billion, a growth of 11.3% over 2019.

Dak Lak has favorable natural conditions such as the quality of fertile basalt soil, a diverse system of rivers and streams, and a large water surface area of over 50,000 ha. This helps the province develop agriculture, forestry and aquaculture industries.Table 9.12 below describes some main export items of the province, in which coffee is considered as an outstanding export product of the province, especially Buon Me Thuot coffee.

Table 9.12 Main Agricultural Export Items in Dak Lak 2019

Product	Crop Area (ha)	Annual Export Revenue (USD)	Annual Average Production (tons)	Annual Average Export Production (tons)	Main Markets
Coffee	Over 200,000	400 million	450,000	200,000	65 nations such as Japan, India, the South Korea, the United States, and Europe
Rubber	Over 38,000	8 million	31,000	No data	Over 24 nations such as Germany, Holland, Malaysia, the United States, and China
Pepper	Over 27,000	30 million	48,000	3,000	The United States, European Union, and Japan
Cashew	Over 21,000	No data	23,000	No data	China, the United States, Hong Kong, Taiwan, and Singapore

Source: Mai Thanh (2019)

[112] Dak Lak PPC (2020)
[113] Dak Lak PPC (2020)

The businesses in the province positively promoted and expanded three more export markets in Norway, South Africa, and Jordan which boosted the province's export turnover. However, due to the impacts of the COVID-19 pandemic, the province's export activities were interrupted, especially the province's agricultural products. Therefore, the export turnover of the province in 2020 was affected and decreased over the same period. The province's export turnover was USD 600 million, down by 3.2% compared to 2019.

Import turnover was USD 250 million, a sudden increase of 194.1% compared to 2019. This increase was attributed to the activities of importing equipment for project implementation of energy projects, including Xuan Thien La Sup solar power project and Cao Nguyen Energy Investment Joint Stock Company[114].

In 2020, the number of visitors to Dak Lak province totalled 693,115, a decrease of 27.4% over 2019, of which, international visitors accounted for 17.5 thousand arrivals. The number of visitors to Dak Lak in 2020 dramatically dropped due to the impacts of the COVID-19 pandemic. The total tourism revenue of the province was estimated at VND 625 billion, down by 40.5% compared to 2019[115].

Dak Lak had 136 businesses operating on the field of freight and passenger transportation by the end of 2020. The total passengers transported was 34 million people, a decrease of 70.9% over 2019 and the total volume of freight carried was 10 million tons, a decrease of 65.3% compared to 2019[116].

9.5.1.6 Education

According to statistical data at the beginning of the school year 2019-2020, the province had 1,026 schools (of which 86 are non-public) with 15,762 classes at kindergarten and general education levels (from primary to upper secondary education levels), decreasing by 17 schools and increasing by 59 classes over the previous school year (see Table 9.13). In addition, the whole communes had 471,881 pupils in the levels from kindergarten to upper secondary school, increasing by 8,907 pupils compared to the previous school year[117].

Table 9.13 Education System of Dak Lak Province in the School Year 2019-2020

Level	Number of Schools	Number of Classes	Number of Teachers and Staff	Number of Pupils
Kindergarten	330	3,533	9,120	99,662
Primary	405	7,020	13,784	190,025
Lower secondary	234	3,625	9,138	123,406
Upper secondary	57	1,584	4,162	58,788
Total	**1,026**	**15,762**	**36,204**	**471,881**

Source: Dak Lak Provincial Department of Education and Training (2020)[118]

In addition, Dak Lak also had other education establishments[119], including:

- One continuing education center;
- One center for supporting the development of inclusive education for disabled children;

[114] Dak Lak PPC (2020)
[115] Dak Lak PPC (2020)
[116] Dak Lak PPC (2020)
[117] Dak Lak Provincial Department of Education and Training (2020).
[118] Dak Lak Provincial Department of Education and Training (2020).
[119] Dak Lak PPC (2020), Dak Lak Province Statistics Office (2020a)

- One research committee on education of ethnic minority children;
- Six vocational training schools;
- Seven colleges;
- Two universities;
- Seven scientific and technology service organisations;
- Eleven education and training establishments; and
- Eighteen scientific research and technology development organisations.

By the end of 2020, the rate of schools meeting national education standards[120] was 50.2%, a rise of 1.9% compared to 2019. All of the villages had kindergartens and the rate of school-age children in 2020 reached 86%, an increase of 0.8% compared to the previous year[121].

By 2019, 100% of districts and city had accomplished the universalisation of preschool education for five-year-old children. Regarding the primary education and lower secondary education of the province, the universalisation rate in 2019 reached level 2 and level 1 respectively[122]. In addition, the rate of illiteracy elimination in 2019 attained at level 1[123].

[120] See further Circular 19/2018/TT-BGDDT, Circular 17/2018/TT-BGDDT, and Circular 18/2018/TT-BGDDT on education quality control and recognition of meeting national standards for kindergartens, primary schools, and lower secondary, and upper secondary schools respectively.

[121] Dak Lak PPC (2020)

[122] The standards for recognition of educational universalisation and illiteracy eradication are described in Decree 20/2014/ND-CP of Vietnam Gorvenment which was valid from 24/3/2014. Following the Decree, the related standards include:
Standards for recognition of universalization standards for primary education at level 2:
- For communes:
+ Ensuring standards for recognition of meeting universalization standards for primary education at level 1;
+The rate of 6-year-old children entering grade 1 is at least 95%;
+ The rate of 11-year-old children completing primary school is at least 80% or at least 70% for communes with extremely difficult socio-economic conditions; the remaining 11-year-olds are all in primary school.
- For districts: At least 90% of communes are recognized to meet the standards of universal primary education level 2.
- For the province: 100% of districts are recognized to meet the standards of universal primary education level 2.
Standards for recognition of meeting universalization standards for lower secondary education at level 1:
- For individuals: To be granted a lower secondary school diploma.
- For communes:
+Ensure standards for recognition of meeting universalization standards for primary education at level 1 and standards for recognition of meeting standards for level 1 literacy;
+ The rate of young people and teenagers between the ages of 15 and 18 graduating from lower secondary schools is at least 80% or at least 70% for communes with extremely difficult socio-economic conditions.
- For districts: At least 90% of communes have met the standards of universalization of lower secondary education at level 1.
- For the province: 100% of districts have met the standards of universalization of lower secondary education at level 1.
Standards for recognition of illiteracy eradication at level 1:
- For communes: At least 90% of people between the ages of 15 and 35 are recognized as having reached level 1 literacy standards; for communes with extremely difficult socio-economic conditions, at least 90% of people between the ages of 15 and 25 are recognized as having reached level 1 literacy standards.
- For the district: At least 90% of communes are recognized as meeting the level 1 illiteracy eradication standards.
- For the province: At least 90% of the districts are recognized to meet the level 1 illiteracy eradication standards.
Source: 20/2014/ND-CP of Vietnam Gorvenment

[123] Dak Lak Provincial DOET (2020)

9.5.1.7 Health, Safety and Security

By 2019, the province had 226 health establishments including 26 hospitals, four midwifery facilities, one leprosariums, 185 health stations at commune or ward levels, enterprise's medical unit, and ten other medical facilities. There were 6,116 patient beds (32.7 beds per 10,000 people), 6,690 medical staff (of which there were 1,531 doctors, 802 physicians, 2,086 nurses, 540 midwives, 484 medical technicians, and 1,247 other medical staff), and 544 pharmaceutical staff. The ratio of doctor per 1,000 people of the province was 0.8 and this rate is lower than World Health Organisation (WHO) standards (one doctor per 1,000 people)[124].

By 2020, 100% of communes reached the set of national health criteria and had medical stations basically meeting local needs of medical examination[125].

In terms of disease prevention and control, in 2020, the province recorded six cases of rabies (100% deaths and an increase of 50% compared to 2019), 609 cases of dengue fever (no death and a decrease of 29.5%), 107 cases of malaria (no death and a reduction of 78.8%), 1,026 cases of hand, foot and mouth disease (no dealth and a decrease of 8.2%), and 49 cases of diphtheria (no death) recorded[126].

In 2020, there were 284 roadway traffic accidents in Dak Lak province, causing 202 deaths and 189 injuries. The number of traffic violation cases decreased by 15 cases compared to 2019. The number of injured people decreased by 17.8% and the number of deaths increased by 10.4% over the same period in 2019[127].

By October 2020, the province also recorded three cases of COVID-19 that had been successfully treated. As of July 29, 2021, the whole province of Dak Lak has 178 cases of COVID-19. In which, the districts with the highest number of cases are Cu Kuin (51 cases), Buon Ma Thuot city (34 cases), and Krong Bong (27 cases)[128]. The Dak Lak PPC has also made timely preparations to prevent the disease from spreading in the community.

9.5.1.8 Archaeological, Cutural Heritage, and Religious Sites

Dak Lak has plenty of natural and humanistic tourism resources. The diversity of topography brings about many ecological zones with unique landscapes such as Dray Nur waterfall (Krong Ana district), Krong Kmar waterfall (Krong Bong district), Gia Long lake (Krong Ana district), Thuy Tien lake (Krong Nang district), Dray K'nao waterfall (M'Drak district), Lak lake (Lak district), and Ea Sup Thuong lake (Ea Sup district). The province possesses a variety of conservation areas including Yok Don national park (Buon Don district), Chu Yang Sin national park (Lak and Krong Bong districts), Nam Kar nature reserve (Lak and Krong Ana districts), Ea So nature reserve (Ea Kar district), Trap Kso nature reserve (Krong Nang district), Ea Ral nature reserve (Ea H'leo district), and Lak Lake historical and cultural forest (Lak district).

In addition, the province has many nationally-recognised historical sites, which contain important historical and cultural values over many periods. Some remarkable sites include Dak Lak museum, House Exiled Buon Ma Thuot, Bao Dai private residence, Lac Giao village house, Sac Tu Khai Doan pagoda, and Ban Me Thuot bishop's palace in Buon Ma Thuot city, CADA plantation and shrine (Krong Pak district), Yang Prong tower (Ea Sup district), and Dak Tuar (Krong Bong district) (see Figure 9.8). The estimated average distance between the Project site and these above-mentioned physical cultural heritage sites is about 10-65 km.

[124] Dak Lak Province Statistics Office (2020a)
[125] Dak Lak Provincial Portal (2020).
[126] Dak Lak PPC (2020)
[127] Dak Lak PPC (2020)
[128] Dak Lak Department of Health (2021)

By 2021, the province has 38 historical, cultural, and scenic relics recognised including: two special national monuments (House Exiled Buon Ma Thuot and Truong Son - Ho Chi Minh trail), 17 nation-levelled cultural relics and heritages, and 19 province-levelled monuments[129].

Thuy Tien waterfall

House Exiled Buon Ma Thuot

Source: Duong Nguyen (2021)

Figure 9.8 Cultural and Historical Relics in Dak Lak Province

9.5.2 District Level: Krong Buk

9.5.2.1 Overview of Krong Buk District

Krong Buk district[130] is located in the Northern gateway of Dak Lak province. It is 60 km apart from Buon Ma Thuot city center, along the National Road 14 connecting Buon Ma Thuot city of Kon Tum province and Pleiku city of Gia Lai province. The district has seven administrative units. The district center is close to National Road 14 in Cu Ne and Chu Kbo communes. The geographic location of Krong Buk district is characterised as follows:

- The East borders Krong Nang district;
- The West borders Cu M'Gar and Ea H'Leo districts;
- The South borders Cu M'Gar district and Buon Ho town; and
- The North borders Ea H'Leo district.

In addition, the district is about 60 km apart from Buon Ma Thuot airport, which facilitates commodities exchange with the Central Highlands, Central Coast provinces, and the whole country. This is a favourable condition in the socio-economic development of the district[131] (see Figure 9.9).

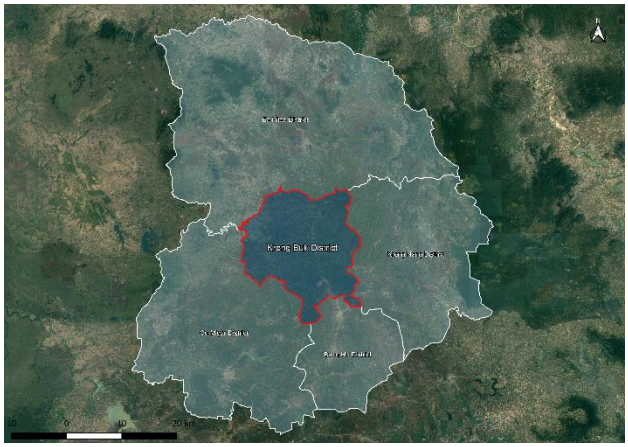
[129] Duong Nguyen (2021)

[130] Krong Buk district portal (2021)

[131] Krong Buk district portal (2021). Available at:

KRONG BUK DISTRICT

Area	357.82 km^2
Population	69,687 people (2021)
Population density	194.75 people/km^2
Number of communes	7
Poverty rate	6.3% (2021)
Main ethnic groups	Kinh, Ede, Tay, Muong, Nung, and Gia Rai



Source: Krong Buk District Ethnic Minority Affairs Office (2021)[132]

Figure 9.9 Krong Buk District at a Glance

Krong Buk district has three main topographic forms. Firstly, the topography of the volcanic plateau covers most of the Southern, Eastern, and central areas of the district with strong cleavage forming bowl-shaped hills while the terrain tends to lower to the West and South. Secondly, the medium low mountain terrain surrounding the Western area, with steep slopes formed from granite rocks. Finally, accumulated plain topography includes alluvial flats, terraces of rivers and streams in Ea Tul and Krong Buk stream basins.

Administratively, Krong Buk district consists of seven communes with 106 villages, in which 42 villages are of ethnic minority groups[133] (see Table 9.14).

Table 9.14 Number of Communes and Villages in Krong Buk District

Commune	Number of Villages	Villages
Chu Kbo	21	Kim Phu, Tan Lap, Hop Thanh, Binh Minh, Hoa Loc, An Binh, Quang Ha, Thong Nhat, Doc Lap, Lien Hoa, Nam Trung, Nam Thai, Nam Loc, Nam Tan, Kty 1, Kty 2, Kty 3, Kty 4, Kty 5, Nam Anh, and Ea Nho.
Cu Ne	21	Ea Plai, Ea Zin, Ea Nguoi, Mui 1, Mui 2, Mui 3, Drao, Ktong Drun, Ea Kroa, Dhia 1, Dhia 2, Ea Kung, Village 6, Ko, Drah 1, Drah 2, Kdro 1, Kdro 2, Ea Krom, Kmu, and Ea Siek.
Pong Drang	21	Villages 7, 8, 8A, 9, 9A, 10, 11, 12, 13, 14, 15, Tan Lap 2, Tan Lap 3, Tan Lap 4, Tan Lap 5, Tan Lap 6, Tan Lap 7, Ea Tut, Ea Nur, Tang Mai, and Cu Blang.
Cu Pong	18	Tlan, Ea Tuk, Adrong Diet, Ayun Ea Klok, Kbuor, Ea Bro, Ayun Ea Liang, Ea Kram, Ea Dho, Khal, Cu Hiam, Kdoh, Cu Hriet, Ea Druich, Dray Hue, Cu Jout, Xom A, and Cu Bang.
Ea Ngai	9	Villages 1, 2, 3, 4, 5, 6, 7, 8, 9.
Ea Sin	8	Ea Sin, Ea Pong, Cu Kanh, Cu Mtao, Ea Kring, Ea Kap, Ea My, and Ea Klang.

[132] Krong Buk District Ethnic Minority Affairs Office (2021)

[133] Due to the population characteristics of Dak Lak province, the village administrative unit is called by two ways which are “thôn” meaning Kinh ethnic dominant villages and “buôn” meaning ethnic minority villages.

Commune	Number of Villages	Villages
Tan Lap	8	Villages 1, 2, 3, 4, 5, 6, Tan Thinh, and Tan Hoa.

Source: Dak Lak PPC (2021a)

9.5.2.2 Demographic Profile

9.5.2.2.1 Population

By July 2021, the population of Krong Buk district is 69,687 people corresponding to 16,731 households. In 2020, the birth rate of the district decreased to 0.14‰ (reaching 100% of the plan) and the natural population growth rate was 0.94% (reaching 100% of the plan)[134].

9.5.2.2.2 Ethnicity

The district has 14 ethnic minority groups[135] with 24,344 people from 5,397 households, accounting for 32.2% of the total district population[136]. Of the ethnic minority population, there are 5,080 households with 23,238 people recognised as indigenous ethnic minority groups. Ede is the main ethnic minority group in the district while other ethnic minorities such as Muong, Tay, Thai, Nung, and Dao only account for a small population.

9.5.2.2.3 Labour Force and Employment

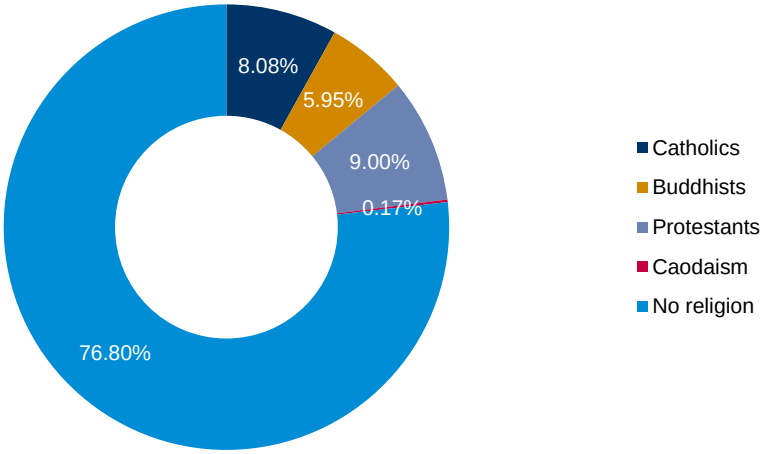
In 2019, the Krong Buk district had 744 labourers working in non-state enterprises, 67 people working in cooperatives, and 3,751 persons working in non-agricultural, forestry and fishery establishments[137]. By the end of 2019, 1,350 new jobs had been created, which reached 129% of the plan (1,050 new jobs)[138].

In 2020, the district[139] supported employement to 1,056 people. In addition, vocational training is given priority to poverty reduction in rural areas with 1,480 people vocationally trained in 2020.

9.5.2.2.4 Religion

Krong Buk district currently has four religions recognised by the State, namely Buddhism, Catholicism, Protestantism, and Caodaism with 15,229 followers, accounting for 23.2% of the total population (see Figure 9.10). Among them, 5,302 people are Catholics, 3,903 are Buddhists, 5,905 are Protestants and 119 are Caodai followers[140].

[134] Krong Buk DPC (2020)
[135] Krong Buk District Ethnic Minority Affairs Office (2021)
[136] Krong Buk Distric Ethnic Minority Affairs Office (2021)
[137] Krong Buk District Statistics Office (2020)
[138] Huynh Chien Thang (2020)
[139] Krong Buk DPC (2020)
[140] Nhu Quynh (2019a)



Source: Krong Buk District Statistics Office (2020)

Figure 9.10 Religion Groups Composition of Krong Buk District 2019

9.5.2.3 Public Infrastructure

9.5.2.3.1 Roads and Transportation

In 2020, Krong Buk District People's Committee (DPC) invested in repairing 47 rural transport constructions to serve the traveling demands of local people. Specifically, upgraded branches of roads were in Ea Kung, Mui 1, Drah 2, Dhia 2, Drao 2, Ea Zin, Ea Plai and Kdro 1 villages of Cu Ne commune; Ea Bro, Kbuor, Tlan, Ea Dho, Cu Blang, Ea Klok, Cu Hiam and Ea Kram villages of Cu Pong commune; village 9, 13, 15 and Tan Lap 7 of Pong Drang commune; Binh Minh, Thong Nhat and Nam Tan villages of Chu Kbo commune; village 5 of Ea Ngai commune; and Ea My village of Ea Sin commune[141].

Particularly, Tan Lap commune built nearly 13 km of rural roads with a total cost of about VND 20.3 billion from the State and people's contributions. Currently, 100% of the commune's main roads have been paved with asphalt; 13.43 km of village roads were concreted; more than 85% of the intra-village roads were hardened in 2020.

In Chu Kbo commune, by the end of 2020, nine communal roads with a length of 5.2 km were concreted with a total cost of more than VND 4.7 billion, in which local people voluntarily contributed nearly VND 1 billion. The village roads were also widened with the road surface at 3.5 m at least.

By the end of 2020, the district completed and put into use of 106 rural roads. Up to now, 80% of roads from commune center to villages and 57% of inter-village roads have been hardened. Pong Drang, Tan Lap, and Chu Kbo communes are the leading localities in completing rural road network[142].

9.5.2.3.2 Electricity Supply

Electrifying hard-to-reach rural remote areas remains a challenge in Krong Buk district due to its terrain complexity. Reportedly, some remote villages such as Ea Kap, Ea Kring, Ea Klang, and Ea My villages, and self-governance areas such as Ea Mak and Cu Kbieng of Ea Sin commune have not been connected with the national power grid. Local people have been mainly reliant on self-generated power with unstable quality. Meanwhile, some households access the electricity source provided by private

[141] Krong Buk DPC (2020)

[142] Nhu Quynh (2020a)

suppliers with the price of VND 3,200 - 4,100 per kWh that is nearly three times higher than that of the national electricity company[143].

According to the wind power and solar power planning to 2020 and by 2030, Dak Lak province strives to achieve an installed capacity of nearly 5,250 MW. Of which, Krong Buk is identified as one of seven districts of the province with wind power potentials in both dry and rainy seasons. The wind speed in these planned areas for wind power is very good, meeting the requirements for wind power reaching from 6m/s to 9.5m/s[144].

In 2020, Dak Lak PPC approved investors to do survey the wind power potential projects in Krong Buk district. Particularly, the wind measurement research area was 1,350 ha, located in Cu Ne and Chu Kbo communes. The investor proposed to build a wind power plant in this area, with a capacity of 150 MW. A total investment of VND 3,500 billion of the project is expected to be implemented from 2021 - 2023[145]. Moreover, with the natural feature of large year-round sunshine, the district also has the potential to develop solar power.

9.5.2.3.3 Water Supply

The district has two concentrated water supply works (including one in Ea Sin commune and one in Cu Ne commune) and 13 other works for residential areas. Of the 13 residential water supply works, two works in Ea Sin commune are handed over from the former Krong Buk DPC (now Buon Ho town) while the remaining 11 works are serving the demand of 1,337 households. However, the serious water shortage for domestic use and farming are still recorded in Krong Buk district, especially in Ea Sin commune in the dry season. Therefore, local households have to buy more bottled water to use, which costs a few VND tens of thousands more each day[146].

The percentage of people using hygienic water in the district in the first six months of 2021 was 91.3%, rising by 1.2% compared to that in 2019[147].

9.5.2.3.4 Irrigation System

In 2019, Krong Buk district's irrigation system just met about 30% of the irrigation needs for crops, and the rest depended on natural creeks, streams, dug ponds and lakes, which ran out of water in the dry season, resulting in the inevitable risk of large-scale drought. Local farmers in Krong Buk district struggled to access water for crops even at the beginning of the dry season in 2019. Ea Sin commune is considered as the most drought-prone area in the district. The whole commune has two irrigation reservoirs namely Ea Kia and Ea Kar with the water supply capacity for about 400 ha cultivation land, which had dried up so far[148].

Currently, the whole district has 42 irrigation works. Of which, Krong Buk Irrigation Branch (of Dak Lak Irrigation Works Management One Member Company Limited) manages 19 reservoirs and dams, eight reservoirs are managed by enterprises and localities, and 15 works are managed by commune irrigation groups. In the first six months of 2021, three irrigation works have been upgraded and repaired with a total cost of about VND 2,500 million[149].

9.5.2.3.5 Domestic Waste Management

In 2021, Krong Buk district has one company (named Thanh Dat Company) specialising in solid waste collection and treatment in the district with one garbage compactor assigned by the Krong Buk DPC,

[143] Nhu Quynh (2018)
[144] BKE-Solar.com (n.d.)
[145] Minh Thong (2020)
[146] Bao Trung (2020)
[147] Krong Buk DPC (2021)
[148] Le Thanh (2019)
[149] Krong Buk DPC (2021)

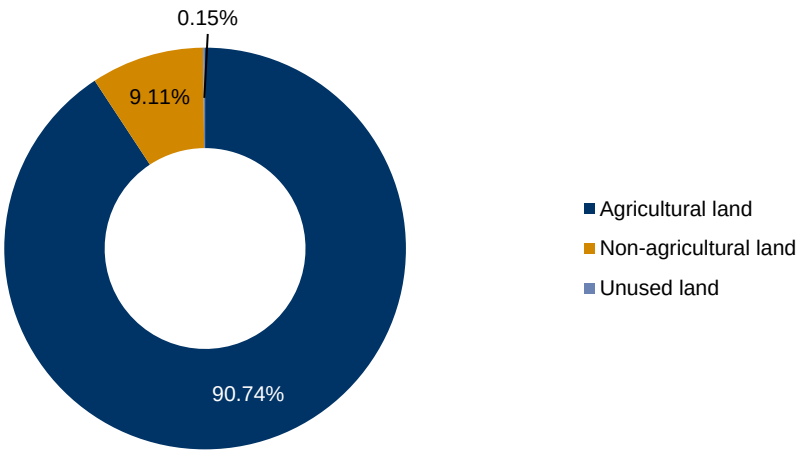
one truck with a tonnage of 5 tons, and four tractors for transporting waste. The unit mainly carries out collection services on National Road 14, Provincial Road 8, and inter-commune roads.

In addition, the district has two units operating in the waste collection in Tan Lap commune (named Tan Lap Dong cooperative) and Cu Pong commune (Cu Pong's Youth cooperative). The operating expenses of the units are mainly based on the monthly environmental service fee.

However, garbage segregation has not been done yet. In addition, the awareness of people in rural areas about environmental issues (particularly environmental protection) is still low. Specifically, the current issues that the district has faced are the abuse of plant protection drugs in production, the discharge of water and garbage, and the limitation in investing in sanitation works (water tanks, sewers, and latrines)[150].

9.5.2.4 Land Use and Tenure

The total landmass of Krong Buk district in 2021 is 35,767.57 ha. Agricultural land, which is mostly used for planting perennial trees, accounts for 90.7%. It surpasses other types of land in the district (see Figure 9.11). Meanwhile, non-agricultural land including lands for residency, security, defence, industrial zones, commercial services, non-agricultural production, extraction, infrastructure development, waste management, religion, office, graveyard, public use, and natural assets accounts for 9.1%. In addition, the rest of 0.2% are unused land[151].



Source: Dak Lak PPC (2021)

Figure 9.11 Land Use Structure of Krong Buk District 2019

9.5.2.5 Economic Development

In 2020, despite facing many difficulties due to the impacts of the COVID-19 pandemic, Krong Buk district achieved 11 out of 15 socio-economic development targets[152] and exceeded the plan. In which,

[150] Krong Buk DPC (2021)

[151] Dak Lak PPC (2021b)

[152] The targets include:

(1) Total production value (2010 constant price) reaches VND 3,755 billion

(2) Economic structure: agriculture, forestry and fishery sector reaches 58.5%, industry reaches 10% and trade and service sector reaches 31.5%

(3) Economic growth by production value (2010 constant price) reaches 7.7%

the State budget revenue was VND 78,156 billion (equivalent to 119.7% over the plan) and total production of cereals was 12,189 tons (reaching 101.6% over the plan)[153].

9.5.2.5.1 Agriculture, Forestry, and Fishery

At the end of 2020, the total value of agricultural, forestry and fishery production of Krong Buk district was VND 2,129 billion, accounting for 57% of the economic structure of the district (compared to the plan of 58%) and the economic growth of the sector was 6.1%[154].

- Agriculture

According to the Farmers' Association of Krong Buk district, in recent years, the movement of farmers' emulation in good production and business in the district has motivated local farmers in developing the existing agricultural production strengths, contributing to the restructuring of the agricultural sector closely linked to the needs of the market.

With a total agricultural area of 25,852.09 ha, mainly growing perennial crops, agricultural production plays a key role in the district's economic structure, accounting for more than 59%. The crop structure has changed from monocropping to polycropping with common plants such as coffee, durian, cocoa, macadamia, pepper, avocado, and Thai custard apple, contributing to increase the production efficiency in agriculture. The livestock industry continues to develop, contributing to meeting the food demand for the markets in the district, simultaneously increasing income and improving the lives of farmers[155].

In 2020, the total arable land area of the district was 30,525.92 ha (reaching 102.5% of the plan), of which the planted area of annual crops was 3,844 ha (reaching 102.5% of the plan) and the total production of cereal crops was 12,189 tons (reaching 101.6%)[156].

In the winter-spring crop in 2019-2020, the total planted area of the crop was 188 ha, an increase of 3 ha compared to the same period of the previous year, with the total production of cereal crops at 517.7 tons (see Table 9.15).

(4) Total state budget revenue reaches VND 65,250 billion
(5) Total state budget expenditure reaches VND 355,985 billion
(6) Total grain production reaches 12,000 tons; Coffee output reaches 44,000 tons
(7) The area having LURCs provided for households and individuals reaches 500 ha
(8) Maintaining standards of universalization and illiteracy eradication in 7 communes; Striving to build and request recognition of national standard 1 school
(9) Reducing fertility rate to 0.14‰; Natural population growth rate reaches 0.94%; Population is 65,570 people; 7 communes meet the national set of health criteria; the rate of children under 5 years of age suffering from malnutrition reaches 19.5%
(10) The percentage of poor households reduces by 2- 2.5% (In which, the rate of poor households among ethnic minorities decreases by 4%)
(11) The total number of households achieving the title of well-behaved family in the district reaches 13,000 households; The total number of villages achieving the title of cultural village in the district reaches 85 villages;
(12) Forest coverage rate (including rubber trees) reaches 6.8%
(13) Striving for 1 commune to basically meet new rural standards; The rate of rural population using hygienic water reaches 91.5%.
(14) Ensuring the recruitment target of the province assigned
(15) The rate of investigation and clarification of criminal cases reaches 85%; Reducing the rate of traffic accidents on all three indicators of the number of cases, the number of deaths and the number of injured by 5-10%.

[153] Nhu Quynh (2020b)
[154] Krong Buk DPC (2020)
[155] Minh Thuan (2020)
[156] Krong Buk DPC (2020)

Table 9.15 Planted Area, Average Yield, and Productivity of Winter-Spring Crops in Krong Buk District 2020

Crop	Planted Area (ha)	Average Yield (quintals/ha)	Productivity (tonnes)
Rice	86	57	490.2
Maize	5	55	27.5
Beans	16	6	9.6
Vegetable	61	70	427
Others	20	-	-

Source: Krong Buk DPC (2020)[157]

In the midsummer crop in 2020, the total planted area of the crop was 2,826 ha, an increase of 140 ha compared to the same period of the previous year, with the total production of cereal crops at 7,641 tons. In which, the planted area of rice was 87 ha with the productivity at 522 tons; the planted area of upland rice was smaller with 63 ha producing 189 tons of rice while maize occupied the biggest arable land with 1,100 ha and its productivity reaches 6,930 tons. In addition, there were 720 ha of sweet potato, 615 ha of cassava, 60 ha of green bean, 30 ha of soybean, 40 ha of peanut, 82 ha of other beans and 29 ha of vegetables[158].

In the autumn-winter crop in 2020, the total planted area of the crop was 830 ha (including 650 ha of growing maize, 120 ha of growing sweat potato, 40 ha of growing beans, and 20 ha of growing vegetable), reaching 106.41% of the plan, with the total production of cereal crops at 4,030 tons.

In addition, the total area of perennial crops in the district was 26,715.42 ha (including 20,620.77 ha of coffee, 2,099.1 ha of rubber, 1,101.2 ha of pepper, 3.7 ha of cocoa, 473.9 ha of cashew, and 2,416.75 ha of fruit trees of all kinds). The total coffee production in the 2020-2021 crop is estimated at 44,200 tons, reaching 100.5% of the plan[159].

In 2020, the district coordinated with functional agencies to implement agricultural production projects such as high-tech agricultural production program and coffee replanting program, and to organise 20 training courses on plant-disease prevention and control with 640 participants[160].

About husbandry, in 2020, the total herd of cattle and poultry in the district was about 265,094 heads, including 2,230 buffaloes and cows, 8,974 pigs, 249,867 poultry, 1,752 goats, and 2,271 rabbits. In 2020, there was an outbreak of African swine fever in Cu Bang village of Cu Pong commune and Village 9 and Village 2 of Ea Ngai commune with a total of 155 diseased and destroyed pigs weighted 9,972 kg. By end 2020, the African swine fever occurred in Kty 5 village of Chu Kbo commune with four diseased and destroyed pigs[161].

- Forestry

In 2020, Krong Buk district planted 4,100 ornamental and dispersed trees (such as Hopea odorata, Indochina dragonplum, Acacia, and Khaya senegalensis) and 10.3 ha of concentrated forest[162]. The forest coverage rate reached 6.5% in 2020.

[157] Krong Buk DPC (2020)
[158] Krong Buk DPC (2020)
[159] Krong Buk DPC (2020)
[160] Krong Buk DPC (2020)
[161] Krong Buk DPC (2020)
[162] Krong Buk DPC (2020

- Fishery

In 2019, the area of aquaculture of Krong Buk district was 83 ha, reaching 101.22% compared to the previous year. The production of fishery was 716 tonnes which increased 8.48% compared to the previous year, accounting for 3.6% of the province production of fishery[163].

In 2020, according to the Dak Lak Fisheries Department, due to the prolonged drought situation, aquaculture farmers in Dak Lak province generally and in Krong Buk district particularly faced many difficulties. Specifically, most of the ponds were dry, so farmers collected fish and stopped the new stocking. Local households had to clean the pond and wait for the pond to have enough water in the rainy season before continuing to raise fish[164].

9.5.2.5.2 Industry

In 2019, Krong Buk district recorded 357 industrial facilities including 12 non-state enterprises and 345 private enterprises. By industrial sectors, there were three facilities operating in mining and quarrying and 354 facilities working in manufacturing. Of these 354 manufacturing facilities, the number of foodstuff and beverage facilities were the highest with 112 facilities, followed by the number of facilities producing clothes with 55, metal products with 57, furniture with 36, and facilities assembling and repairing motor vehicles with 54. Some of main industrial products of Krong Buk district in 2019 were other constructions, clothes, and iron doors[165].

At the end of 2020, the total value of industrial and construction production of Krong Buk district was VND 425 billion, accounting for 11.4% of the economic structure of the district (compared to the plan of 10%) and the economic growth of the sector was 32.4%[166].

9.5.2.5.3 Collective Economy and New Rural Construction

From 2010 to October 2019, Krong Buk district mobilised over VND 1,386 billion from many sources to implement the National Target Program on New Rural Development. From this capital source, the district upgraded and repaired 150 km of village and intra-village roads, renewed and repaired 10 irrigation works, and built 277 houses for poor households. In addition, by October 2019, vocational training schemes for rural workers were actively implemented, creating jobs for 6,760 workers.

In 2020, Pong Drang and Chu Kbo communes of Krong Buk district met 19 out of 19 criteria[167] in the new rural development. In addition, the total number of achieved and basically achieved criteria of the district was 116 out of 133. On average, each commune achieved 16.57 criteria, reaching 97.5% of the plan[168].

In April 2021, Tan Lap commune was recognised as meeting new rural standards, after Pong Drang and Cu Kbo communes. In total, Krong Buk has three communes meeting new rural standards in the total of seven communes of the district[169].

9.5.2.5.4 Trade and Services

At the end of 2020, the total value of trade and service sectors of Krong Buk district was VND 1,179 billion, accounting for 31.6% of the economic structure of the district (compared to the plan of 31.5%). The economic growth of the sector was 1.64%. In the district, there are currently 2,400 business establishments in the field of trade and services, mainly in Pong Drang commune, decreasing by 0.6%

[163] Dak Lak Statistics Office (2020)
[164] Thuan Nguyen (2020)
[165] Krong Buk Statistics Office (2020)
[166] Krong Buk DPC (2020)
[167] Krong Buk DPC (2020)
[168] Krong Buk DPC (2020)
[169] Le Thanh (2021a)

compared to 2019 because small household-scaled establishments have temporarily suspended their business due to the COVID-19 pandemic[170].

In the first quarter of 2021, the total retail sales of goods and services reached VND 266.49 billion[171].

In addition, Krong Buk district has potential for tourism development with five beautiful natural landscapes namely Ea Sup spring (Ea Sin commune), Ea Bro waterfall (Ea Sin commune), Ea Nur village wharf (Pong Drang commune), Stone spring (Ea Ngai commune) and Dray Drak waterfall (Cu Pong commune), together with traditional culture values of ethnic minority groups such as long stilt house culture, wine culture associated with Gong culture.

Krong Buk district has taken advantage of its potential and strengths to develop the local tourism, and received the attention of Party committees, authorities and agencies, departments and branches of the province and district, so the district's propaganda, promotion as well as calls for investment in tourism development are fully and timely implemented[172].

9.5.2.6 Education

In 2020, Krong Buk district had 46 schools and ten private classes with the total number of pupils at 15,383 (an increase of 250 pupils compared to the previous school year) (see Table 9.16). In which, 5,736 pupils were of ethnic minority groups. The whole district had 13 schools meeting the national standards.

There are also two upper secondary schools in Krong Buk. As regulated by the Ministry of Education and Training, these two upper secondary schools were established under the decision of the President of Dak Lak Provincial People's Committee, and is under the management of the Department of Education and Training of Dak Lak province.

Table 9.16 Education System in Krong Buk District 2020-2021

Level	Number of Schools	Number of Classes	Number of Pupils	Number of Ethnic Minority Pupils
Kindergarten	18	139	3,680	1,287
Primary	18	275	7,118	3,014
Lower secondary	10	129	4,585	1,435
Total	**46**	**543**	**15,383**	**5,736**

Source: Krong Buk DPC (2020)

9.5.2.7 Health, Safety and Security

In 2019, there were seven standard commune health stations distributing in all seven communes with medical human resources of 104 people (including 26 doctors, 17 physicians, 31 nurses, 17 pharmacists, three midwives, four technicians and six others[173]). In 2020, Krong Buk district multi-functional medical center was completed and put into operation with a scale of 100 beds[174] (see Figure 9.12).

[170] Krong Buk DPC (2020)
[171] Le Thanh (2021b)
[172] Hong Mong (2020)
[173] Krong Buk Statistics Office (2020)
[174] Krong Buk DPC (2020)

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.12 Photo of Krong Buk District Multi-Functional Medical Center

By November 2020, the district provided health insurance for 40,425 people. In which, 1,279 people were in poor households, 2,761 people were in near poor households, 20,571 people were of ethnic minority groups, 5,994 people lived in extremely difficult localities, 8,049 were children under six years old, 301 were elderly people, 466 people were under social protection programs, and 1,004 were meritorious people.

Since 2021, Krong Buk district social insurance agency has promoted the installation of Vietnam Social Security Identification (VssID) - a digital social insurance application on a mobile device platform to help participants of social and health insurance schemes easily and conveniently access to information and practice public services. In May 2021, the whole district has over 1,700 people accessing and installing the VssID (reaching more than 70% of the 2021 target). It is targeted that by the end of 2021, there will be 60,000 people who are participants of social insurance or health insurance schemes, students, and pensioners accessing the application[175].

In the fight against the spreading of the COVID-19 pandemic, Krong Buk district implemented preventive measures. As of July 29, 2021, there are only three cases of COVID-19 infection in Krong Buk district[176].

In 2020, there were 52 cases of violations of the law on social order in the district (a decrease of three cases compared to the same period in 2019), of which 50 cases were investigated and clarified (reaching the rate of 96.1%). The fight against crime and law violation was focused. In 2020, there were 16 cases of economic violation, 15 cases of environmental violation, 11 cases of drug abuse, two explosions, six suicides, three deaths due to drug shock, two deaths due to disease, and one case of food poisoning[177].

In 2020, there were 17 traffic accidents in the district, killing eight people and injuring 12 others. The district police made records of 1,335 cases of violations of the Law on Road Traffic, of which 1,200 cases were fined with the amount of money contributed to the state budget at VND 838.98 million. In addition, the police force handled 15 cases of illegal religious activities[178].

[175] Nhu Quynh (2021)
[176] Dak Lak Department of Health (2021)
[177] Krong Buk DPC (2020)
[178] Krong Buk DPC (2020)

9.5.2.8 Archaeological, Cultural Heritage, and Religious Sites

Krong Buk district has five beautiful landscapes[179], including:

- Ea Sup stream is located in Ea Bong village of Ea Sin commune, bordering Ea Sup district and Cu Mgar district. It is about 12 km far away from the center of Ea Sin CPC by forest road. In the past, most of the ethnic minorities used to catch fish in this stream for their meals. This stream often dries up rapidly in the dry season;
- Ea Bro waterfall is located four km away from Ea Sin Commune People's Committee;
- Dray Drak waterfall is located in Khal village, Cu Pong commune. It is about 20 m high, and about 6 km far away from the center of Cu Pong commune on the way to Ea Sin commune (see Figure 9.13);
- Stone stream is located in Village 8, Ea Ngai commune on provincial road 8; and
- The water wharf is in Ea Nur village. It is 2 km away from the center of Pong Drang commune. This site is associated with the water wharf worshiping festival of the Ede ethnic group.

These mentioned landscapes of Krong Buk district have great potentials for tourism development but have not been fully exploited due to the specific characteristics of the geographical location. It is therefore of vital importance to carry out adequate tourism planning for sustainable development associated with economic development of the district[180]. The estimated average distance between the Project site and these above-mentioned physical cultural heritage sites is about 2-12 km.

Source: Internet

Figure 9.13 Dray Drak Waterfall in Cu Pong Commune

9.5.3 Commune Level

This section analyses details about the four surveyed communes for the Project, including Cu Ne, Cu Pong, Ea Sin, and Chu Kbo (see Table 9.17). Cu Pong and Cu Ne communes are predominant with Ede ethnic minority group while Ea Sin and Chu Kbo have the Kinh majority. Ea Sin commune is the smallest commune with the natural area of 62.19 km^2 and the population of 3,160 people, which is about one-thirds of the population of the three remaining communes. Cu Ne and Chu Kbo communes record the highest number of villages, and these communes are socio-economically developed compared to

[179] Krong Buk District Portal (n.d.a)
[180] Krong Buk District Portal (n.d a)

Cu Pong and Ea Sin communes. Ea Sin commune is the most vulnerable commune with the highest poverty rate recorded at nearly 37.7% by end 2020. Further details about each commune are presented in Table 9.17 below.

Table 9.17 Overview of the Surveyed Communes

Categories	Cu Ne Commune	Cu Pong Commune	Ea Sin Commune	Chu Kbo Commune
Natural area	71.88 km^2	75.62 km^2	62.19 km^2	62.94 km^2
Population	14,134 (2020)	12,131 (2020)	3,160 (2020)	11,687 (2019)
Number of households	3,446 (2021)	2,791 (2021)	831 (2021)	3,003 (2020)
Number of administrative units	21	18	8	21
Main ethnic groups	Kinh and Ede	Kinh and Ede	Kinh and Ede	Kinh and Ede
Religion	Buddhism, Catholicism, and Protestantism	Protestanism, Christianity, and Buddhism	Buddhism, Catholicism, and Protestantism	Buddhism, Catholicism, and Protestantism
Commune categorisation	Zone I	Zone II	Zone III	NA
Number of extremely difficult villages	7	4	0	1
Poverty rate	8.4% (end 2020)	10.1% (end 2020)	37.7% (end 2020)	5.5% (end 2020)

Source: Dak Lak PPC (2021a); Krong Buk Statistics Office (2020); Cu Ne CPC (2021b); Ea Sin CPC (2020a),

9.5.3.1 Cu Ne Commune

9.5.3.1.1 Overview of Cu Ne Commune

Cu Ne commune located on the National Road 14 is away about 21 km towards the Northeast of the center of Krong Buk district[181]. The geographic location of Cu Ne commune is characterised as follows (see Figure 9.14):

- The North borders Ea Nam commune of Ea H'leo district;
- The Northeast borders Ea Tan commune of Krong Nang district;
- The Southeast borders Ea Toh commune of Krong Nang district;
- The South borders Chu Kbo commune of Krong Buk district; and
- The West borders Ea Sin and Cu Pong communes of Krong Buk district.

Cu Ne commune is located in the medium mountainous terrain of Buon Ma Thuot plateau. The highlight of this terrain is the difference between the East of National Road 14 with a gently hilly terrain and the Western part of National Road 14 with a dissected sloping terrain[182].

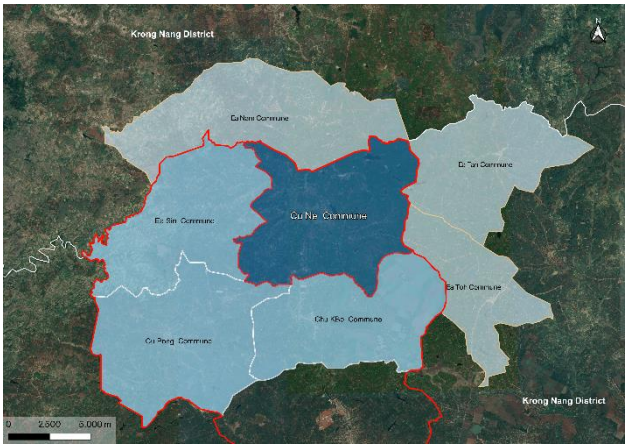
[181] Krong Buk District Portal (n.d.b)

[182] Krong Buk District Portal (n.d.b)

The commune was established in 2007. It has 21 administrative villages including 14 *buôn*[183] and seven *thôn*, named Ea Plai, Ea Zin, Ea Nguoi, Mui 1, Mui 2, Mui 3, Drao, Ktong Drun, Ea Kroa, Dhia 1, Dhia 2, Village 6, Ea Kung, Ko, Drah 1, Drah 2, Kdro 1, Kdro 2, Ea Krom, Kmu, and Ea Siek.

CU NE COMMUNE

Area	71.88 km^2
Population	14,134 people
Number of villages	21
Number of households	3,446 (2021)
Poverty rate	8.4% (end 2020)
Main ethnic groups	Kinh and Ede



Source: Cu Ne CPC (2021b); Dak Lak PPC (2021a)

Figure 9.14 Cu Ne Commune at a Glance

9.5.3.1.2 Demographic Profile

Statistically, by June 2020, Cu Ne commune had a total population of 14,134 people with 61% of the population were of ethnic minorities, mainly known as Ede people[184]. In 2020, the birth rate was 11.6‰, a decrease of 0.4‰ compared to the plan (12‰) while the birth rate of third child was 25%, increasing 6% compared to the plan (19%)[185]. In addition, the labor force of the commune in 2020 was 10,107 people[186].

Cu Ne commune has three religions including Buddhism, Catholicism, and Protestantism. In 2020, the total number of religious followers was 3,305 people corresponding to 609 households. In which, 180 people were Buddhists, 605 people were Catholics, and 2,520 were Protestants[187].

9.5.3.1.3 Public Infrastructure

- Roads

In the center of Cu Ne commune, there is the National Road 14 passing by, which facilitates cultural and socio-economic exchanges[188].

- Electricity

In 2018, 100% of households in Cu Ne commune were directly connected to the national electricity grid[189].

[183] *Buôn* refers to a village of Ede indigenous peoples who lived for a long time ago while *Thôn* refers to a village of the Kinh majority and other people from ethnic minorities migrating to live in this area.
[184] Cu Ne CPC (2021a)
[185] Cu Ne CPC (2021b)
[186] Dak Lak DOLISA (2020)
[187] Cu Ne CPC (2021b)
[188] Krong Buk District Portal (n.d b)
[189] Le Thanh (2018a)

- Water Supply

Due to the characterics of the communal topography, the surface water source is also divided into two distinct areas including the East of National Road 14 and the West of National Road 14 as follows:

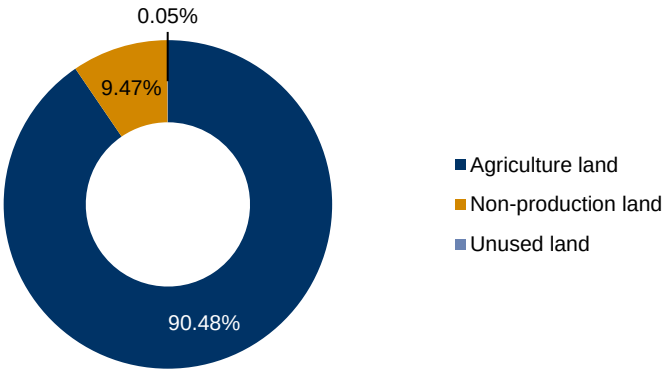
- The area to the East of National Road 14 accesses water source from Ea Kroa, Ea Drao, Ea Siak, Ea Kmu streams, and other small streams. Most of these streams flow all year round from Northwest to Southeast with a relatively high flow. There are also large and small ponds and dams with an area of over 80 ha, which provide an important water source for agricultural production in the area.
- The area to the West of National Road 14 has a plenty of streams such as Ea Sup Ne, Ea Bro, Ea Kring, Ea Mui, Ea Nang, Ea Gir, Ea Klang, and Ea Ne. All these streams flow from East to West direction with quite different flow rates in the rainy and dry seasons. In addition, there are a number of dams in the area such as Ea Klang dam with an area of 6 ha.

The source of groundwater is relatively abundant. Groundwater sources are mainly exploited by households to use for family activities and irrigation for some small crop areas. An average depth of household's groundwater well is from 15 to 25 m[190].

In 2020, the percentage of rural population using hygienic water of the commune was 98.1%, a decrease of 0.1% compared to 2019 (98.2%)[191].

9.5.3.1.4 Land Use and Tenure

The total natural landmass of the Cu Ne commune was 7,188.4 ha in 2020, making up 20.1% of Krong Buk district's natural land area. According to the Land Use Plan of the Dak Lak province in 2021, the communal total landmass includes 6,503.8 ha of agricultural land (see Figure 9.15), 680.8 ha of non-production land, and 3.8 ha of unused land[192].



Source: Dak Lak PPC (2021b)

Figure 9.15 Land Use Plan of Cu Ne Commune 2021

9.5.3.1.5 Economic Development

- Agriculture

In 2020, the agricultural production land of the commune was 4,798.03 ha, of which, 4,601.71 ha was the planted area of perennial trees and 196.32 ha was the planted area of annual crops.

[190] Krong Buk District Portal (n.d.b)
[191] Cu Ne CPC (2021b)
[192] Dak Lak PPC (2021b)

Of the 4,601.7 ha of the planted area of perennial trees, An Thuan coffee establishment managed 330.62 ha, the area used by migrant farmers was 370 ha, the planted area of rubber was eight ha, the planted area of coffee owned by the local people was 3,666.16 ha with the production at 5,499 tons (reaching 122% of the plan), and the replanted area of coffee was 59.7 ha. In addition, there were 132.73 ha of black pepper (decreasing 9.87 ha compared to 2019 due to diseases), four ha of macadamia, and 30.5 ha of durian.

Of the 196.32 ha of the planted area of annual crops, there were 21.7 ha of growing cassava, 28.5 ha of growing maize with the production at 290.4 tons, 90 ha of growing rice, 0.8 ha of growing chives, 9.52 ha of growing passion fruit, and 45.8 ha of growing beans[193].

- Fishery

In 2019, Cu Ne commune's area of aquaculture was 13.69 ha, accounting for 16.5% the district's area of aquaculture[194].

9.5.3.1.6 Education

At the end of the school year 2020-2021, the number of primary and lower secondary pupils was 2,273, a decrease of 73 pupils compared to the number at the beginning of the school years (2,346 pupils) (see Figure 9.16). In which, there were 49 pupils transferring to other schools and 27 others dropout. The rate of pupils having good and very good performance in the lower secondary education reached 29.34% (or 184 out of 627 pupils)[195].

Kindergarten in Ea Kung village

Primary school in Ea Kung village

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.16 Schools in Ea Kung Village, Cu Ne Commune

9.5.3.1.7 Health

In 2020, 279 under-one-year-old children were fully vaccinated, reaching 107% of the plan (see Figure 9.17). Cu Ne communal health station provided reproductive healthcare and medical treatment for 366 women. The rate of children under five years of age suffering from malnutrition accounted for 20.1%, not meeting the plan at 19.9%[196].

[193] Cu Ne CPC (2021b)
[194] Krong Buk Statistics Office (2020)
[195] Cu Ne CPC (2021a)
[196] Cu Ne CPC (2021b)

In the first six months of 2021, the total number of people visiting the communal health station for medical examination and treatment reached 561 people[197].

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.17 Photo of Cu Ne Communal Health Station

9.5.3.2 Cu Pong Commune

9.5.3.2.1 Overview of Cu Pong Commune

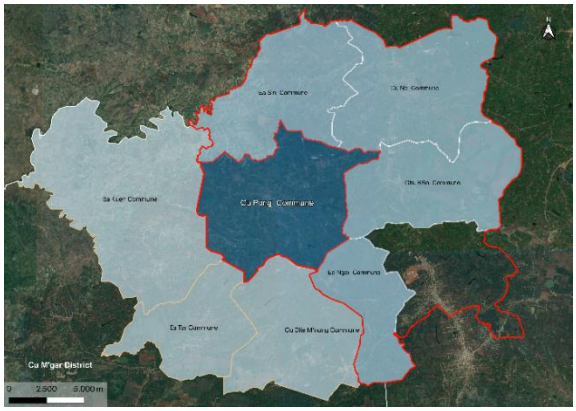
Cu Pong commune is located 30 km in the West of Krong Buk district[198] (see Figure 9.18). The geographic location of Cu Pong commune is characterised as follows:

- The North borders Ea Sin and Cu Ne communes of Krong Buk district;
- The East borders Chu Kbo commune of Krong Buk district;
- The South borders Ea Tar and Cu Dlie Mnong commune of Cu M'Gar district; and
- The West borders Ea Kueh commune of Cu M'Gar district.

Cu Pong commune has a complex topography, which is divided by hills, mountains, and a dense system of rivers and streams. The terrain of the commune is divided into two main types including hilly sloping terrain and hilly areas. Established in 2007, Cu Pong currently has 18 administrative villages including Tlan, Ea Tuk, Adrong Diet, Ayun Ea Klok, Kbuor, Ea Bro, Ayun Ea Liang, Ea Kram, Ea Dho, Khal, Cu Hiam, Kdoh, Cu Hriet, Ea Druich, Dray Hue, Cu Jout, Xom A, and Cu Bang

.CU PONG COMMUNE

Area	75.62 km^2 (2020)
Population	12,131 people (2020)
Population density	140.42 people/km^2 (2020)
Number of villages	18
Number of households	2,791 (2021)
Poverty rate	10.1% (end 2020)
Main ethnic groups	Kinh, Ede, M'nong, and Gia Rai



Source: Krong Buk District Statistics Office (2020); Dak Lak PPC (2021a)

Figure 9.18 Cu Pong Commune at a Glance

[197] Cu Ne CPC (2021a)
[198] Krong Buk District Portal (2021b)

9.5.3.2.2 Demographic Profile

Statistically, by 2020, Cu Pong commune had a total population of 12,131 people[199]. Over 80% of the population were ethnic minority people, mainly Ede ethnic group[200]. The natural growth rate was recorded at 8.5‰, decreasing by 2.6‰ over the previous year. The birth rate was 11‰, a decrease of 3.6‰, and the death rate was 2.6‰, a decrease of 0.3‰ over 2019[201].

Protestanism, Christianity, and Buddhism are three main religions in Cu Pong commune. Their followers accounted for 21.5% of the population. Of which, Protestianism has the highest number of followers with 2,000 people, while the followers of Christianity and Buddhism are lower with 163 and 446 people respectively[202].

9.5.3.2.3 Public Infrastructure

- Roads

Basically, 90% of inter-district roads and 32% of inter-commune roads in Cu Pong commune were asphalted and concreted in 2018[203]. In 2020, Cu Ne CPC was invested VND 1,922 million to build inter-village roads in the commune. In which, VND 1,862 million were from the state budget, and VND 60 million were contributed by local people. The total length of constructed roads was 1,138m, of which, 150m was in Ea Liang village, 155m was in Ea Kram village, 113m was in Ea Klok, and 720m was in Tlan village[204].

- Electricity supply

In 2018, all villages in Cu Pong commune had accessed to the national electricity system with the rate of households using electricity at 99% [205].

- Water Supply

The commune has a variety of surface water sources from main streams (such as Ea Mok, Ea Sup, Ea Kok, Ea Ban, Ea Knung, Ea Drao, and Ea Tul streams) and lakes (such as Ea Bro, Ea Knung, Ea Klok, Krong Ana, and Adrong Diet lakes). The stream system is evenly distributed throughout the commune with its density of 0.62km/km^2. These streams supply a main part of irrigation water for perennial crops in the dry season; however, they are often dried up, causing many difficulties for farming activities[206]. The groundwater source is mainly for daily life and partly for irrigation of crops in the dry season. The average depth of groundwater wells in the commune is 18 - 20 m[207].

In 2020, the number of households accessing hygienic water reached 2,653 households, accounting for 99.5% out of the total 2,667 households in the commune. The number of poor households using hygienic water was 274 households, accounting for 96.8%[208].

- Irrigation System

By 2020, Cu Pong commune had 13 irrigation works. In 2020, the CPC upgraded Ea Bro 2 dam and reservoir to ensure the safety in the rainy season[209].

[199] Cu Pong CPC (2021)
[200] Le Huong (2020)
[201] Cu Pong CPC (2021)
[202] Cu Pong CPC (2021)
[203] Tuan Anh (2018)
[204] Cu Pong CPC (2020)
[205] Hoang Vy (2018)
[206] Krong Buk District Portal (2021b)
[207] Krong Buk District Portal (2021b)
[208] Cu Pong CPC (2020)
[209] Cu Pong CPC (2021)

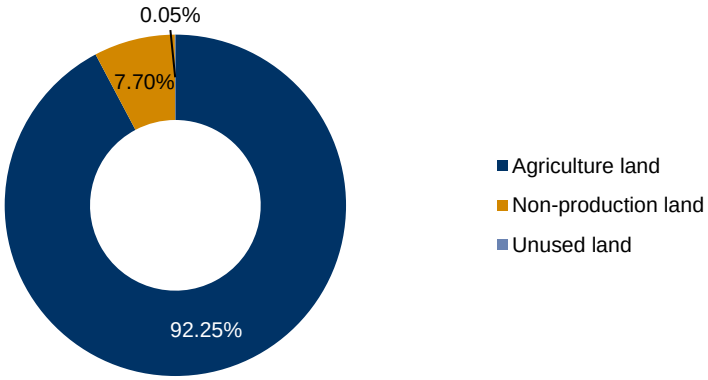
- Solid Waste Management

The commune had a waste collection service which was implemented by Cu Pong Youth cooperative[210] with a monthly payment of VND 20,000 - 30,000 per household. The cooperative signed contracts with ten youth villagers in the commune to collect solid waste. Over 600 households residing in the center of the commune registered this service through the communal authority[211].

In 2020, the number of households having hygienic latrines was 1,881 out of 2,369 households, reaching 79.4%. All seven schools in the commune had hygienic water and latrines (100%). The number of households with hygienic livestock barns was 212 out of 346 households having livestock barns, reaching the rate of 61.3%[212].

9.5.3.2.4 Land Use and Tenure

The total natural landmass of Cu Pong commune was 7,562.3 ha, making up 21.1% of Krong Buk district's natural land area. According to the Land Use Plan of the Krong Buk province in 2021, the communal total landmass includes 6,976.7 ha of agricultural land (see Figure 9.19), 582 ha of non-production land, and 3.6 ha of unused land[213].



Source: Dak Lak PPC (2021b)

Figure 9.19 Land Use Plan of Cu Pong Commune 2021

In 2020, the CPC issued 153 land registration certificates with the total 124.2 ha, of which 146 cases were registered for agricultural land with a total area of 124 ha and other seven cases were for non-agricultural land with an area of 0.2 ha[214].

9.5.3.2.5 Economic Development

By 2020, the total budget revenue of Cu Pong commune was estimated at VND 673 million, reaching 96.7% compared to the communal plan[215].

[210] Cu Pong CPC (2020)
[211] Le Thanh (2020)
[212] Cu Pong CPC (2020)
[213] Dak Lak PPC (2021b)
[214] Cu Pong CPC (2021)
[215] Cu Pong CPC (2021)

- Agriculture, Forestry, and Fishery

In 2019, Cu Pong commune had 287.47 ha planted area of cereals with the production of 1,628.85 tons, accounting for 14.6% of the district production. Planted area of rice was 39.79 ha providing the production at 171.17 tons, occupying 10% of the district production[216].

Due to unfavourable weather conditions in 2020, agricultural production remained still low. For perennial crops, the area of coffee accounted for 3,813.2 ha with an average yield of 2.4 tons/ha and the total production of 8,450 tons, achieving 100.6% compared to the communal development plan. In addition, the area for pepper planting was 240 ha with an average yield of 5 tons/ha. The planted area of durian trees was about 171 ha. The total cultivation area for annual crops was about 508 ha, of which 35 ha was for upland rice planting, 98.5 ha for wet rice, 97 ha for maize, 217 ha for cassava, and 58.9 ha for all kinds of bean.[217].

- Fishery

In 2019, Cu Pong commune's area of aquaculture was 11.23 ha, accounting for 13.5% the district's area of aquaculture[218].

- Industry, Trade, and Service

By 2020, the commune had 269 small private business establishments trading in food, baverage services, groceries, motorbike repair, and mechanical garages. Due to the impacts of the COVID-19 pandemic, these establishments faced many difficulties affecting their business activities and income[219].

9.5.3.2.6 Education

By the end of the school year 2019-2020, Cu Pong commune had six public schools, including two kindergartens of 699 attendees dividing into 22 classes, three primary schools, and one lower secondary school with a total of 1,871 pupils divided into 64 classes [220] (see Table 9.18 and Figure 9.20).

Table 9.18 Education System in Cu Pong Commune 2019-2020

Level	Number of Schools	Number of Classes	Number of Pupils
Kindergarten	2	22	699
Primary	3	49	1,291
Lower secondary	1	15	580
Total	6	86	2,570

Source: Cu Pong CPC (2021)

In 2020, Cu Pong educational program faced several periods of disruption due to the impacts of the COVID-19 pandemic. However, the commune had maintained a good quality of teaching and strengthened the educational facilities and equipment. As a result, 100% (or 277) children in school age entering grade one, 100% (or 123) pupils graduating from lower secondary education, and the dropout rate at all class levels of the commune was at 0.7%, accounting for 13 out of 1,884 school intake pupils (including eight pupils in primary schools and five pupils in lower secondary schools)[221].

[216] Krong Buk District Statistics Office (2020)
[217] Cu Pong CPC (2021)
[218] Krong Buk Statistics Office (2020)
[219] Cu Pong CPC (2021)
[220] Krong Buk District Statistics Office (2020)
[221] Cu Pong CPC (2021)

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.20 Photo of Primary School in Cu Hriet village, Cu Pong Commune

9.5.3.2.7 Health, Safety and Security

Cu Pong commune has a health station serving for basic health examination and check-ups (see Figure 9.21). The health station has been invested to meet the national standard of health, with medical equipments such as testing machines and ultrasound machines and medical staff[222]. In 2020, the health station of the commune received a total of 2,667 visits for examinations and treatments.

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.21 Photo of Cu Pong Communal Health Station

In 2020, the commune recorded some diseases including dengue fever (five cases), hand-foot-mouth disease (three cases), measles (four cases), tuberculosis (four cases), mental health (17 cases). In addition, the commune also had expanded immunization programs for specific groups including 44% of children under one year old fullly vaccinated and 50% of women (comprising pregnant women and women in the age of 15-35) vaccinated[223].

[222] H'Xiu (2019)
[223] Cu Pong CPC (2021)

As for COVID-19 prevention, the CPC has implemented the Government's Resolution No. 42/NQ-CP and Decision No. 15/QD-TTg of the Prime Minister in order to review and synthesise beneficiary to receive financial support from the government.

In term of security, there had been nine cases of violation in the commune, of which:

- Two cases of property burglary;
- Three gambling cases involving 15 attendees;
- Three cases of intentional destruction of property; and
- One case of setting off firecrackers.

In terms of traffic safety, in 2020, there were nine cases, including one traffic accident causing one death and eight crashes with 10 people injured. The commune also recorded four other accidents related to suicide (one case), electric shock (one case), drowning (one case), and unknown cause (one case). In addition, seven people involved in the usage of narcotics and illicit drugs were detected[224].

9.5.3.3 Ea Sin Commune

9.5.3.3.1 Overview of Ea Sin Commune

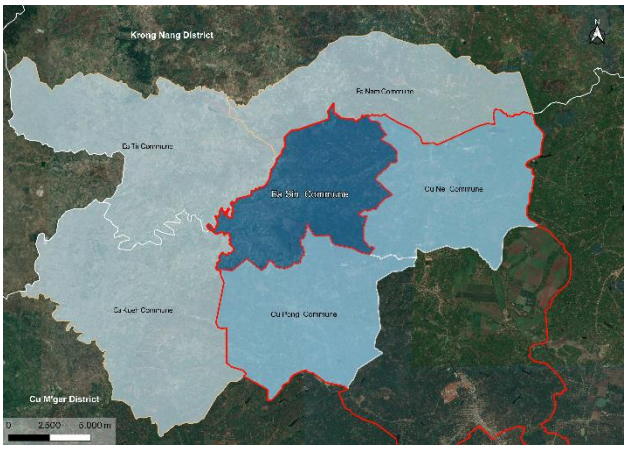
Ea Sin commune is located in the Northwest of Krong Buk district, and is 35 km away from the district center. The geographic location of Ea Sin commune is characterised as follows[225]:

- The East borders Cu Ne commune;
- The West borders Ea Tir commune of Ea H'leo district, and Ea Kueh commune of Cu M'gar district;
- The North borders Ea Nam communes of Ea H'leo district; and
- The South borders Cu Pong commune.

Ea Sin commune was established in August 2007 on the basis of combining the 1,809 ha of Cu Pong commune with 1,649 people and 4,471 ha of Cu Ne commune with 1,652 people[226]. Ea Sin commune has eight villages (Ea Sin, Ea Pong, Cu Kanh, Cu Mtao, Ea Kring, Ea Kap, Ea My, and Ea Klang).

EA SIN COMMUNE

Area	62.19 km^2 (2020)
Population	3,160 people (2020)
Number of villages	8
Number of households	831 (2021)
Poverty rate	37.7% (end 2020)
Main ethnic groups	Kinh and Ede



Source: Ea Sin CPC (2020a); Dak Lak PPC (2021a)

Figure 9.22 Ea Sin Commune at a Glance

[224] Cu Pong CPC (2021)
[225] Krong Buk District Portal (n.d c)
[226] Vietnam Gorvenment (2007)

9.5.3.3.2 Demographic Profile

In 2020, Ea Sin commune had a total population of 3,160 people corresponding to 816 households. In which, there were 1,107 females and 2,053 males. In addition, the number of households registered for temporary residence was 215 households with 670 people[227].

In the commune, there are currently 14 ethnic groups living together namely Kinh, Ede, Thai, Gia Rai, Muong, Tay, San Diu, Nung, Tho, Xo Dang, Dao, Hoa, Kho Mu and Man. In which, Ede and Kinh are two main ethnic groups in the locality with the dominant population[228].

In 2020, there were three religions in Ea Sin commune. There were 120 followers (27 households) of Catholicism; 95 followers (31 households) of Buddhism; and 248 followers (61 households) of Protestantism[229].

9.5.3.3.3 Public Infrastructure

- Roads

In 2020, Ea Sin commune completed the construction of five rural roads with a total length of 3 km in the Cu Mtao, Ea My, Ea Klang, Ea Kap, and Ea Kring villages[230].

- Electricity Supply

In 2020, six out of eight villages of the commune were connected to the national electricity grid. Households in the remaining two villages (namely Ea Klang and Ea Kap) had to buy electricity from the third party (a private unit invested to pull the power line from national electricity grid into the villages and sell electricity to the local people). In addition, the commune built 3 km of medium voltage lines and one low voltage transformer station in Ea Kring village, providing electricity for 58 households[231]. By May 2021, 67% of households have accessed to the national electricity grid[232].

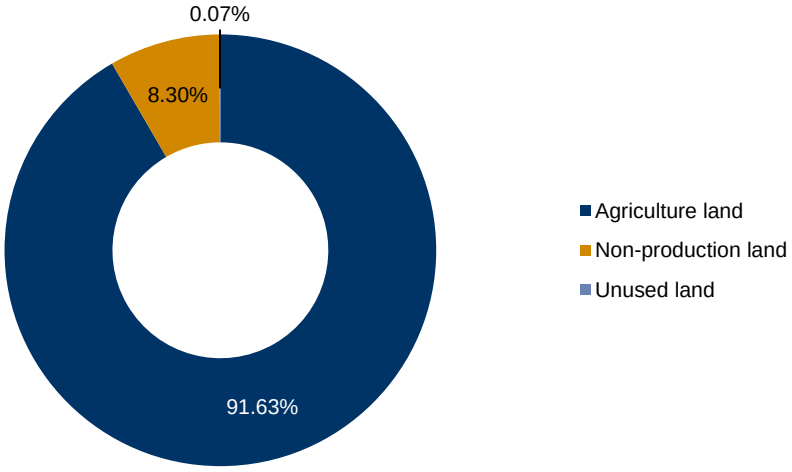
- Water Supply

In 2020, Ea Sin commune built and put into operation concentrated domestic water supply works in Cu Mtao, Cu Kanh, Ea Pong, and Ea Sin villages. In addition, the percentage of poor households using hygienic water reached 91%, exceeding the target of 81%[233].

9.5.3.3.4 Land Use and Tenure

The total natural landmass of the Ea Sin commune was 6,218.96 ha, making up 17.4% of Krong Buk district's natural land area. According to the Land Use Plan of the Krong Buk province in 2021, the communal total landmass included 5,698.55 ha of agricultural land (see Figure 9.23), 516.03 ha of non-production land, and 4.38 ha of unused land[234].

[227] Ea Sin CPC (2020a).
[228] Ea Sin CPC (2020a)
[229] Ea Sin CPC (2020a)
[230] Ea Sin CPC (2020a)
[231] Ea Sin CPC (2020a)
[232] Le Thanh (2021c)
[233] Ea Sin CPC (2020a)
[234] Dak Lak PPC (2021b)



Source: Dak Lak PPC (2021b)

Figure 9.23 Land Use Plan of Ea Sin Commune 2021

9.5.3.3.5 Economic Development

- Agriculture

In 2019, the planting cereal area of the commune was 511.35 ha with the productivity of 2,906.10 tons, accounting for 26% of the district production. The area of rice production was 33.1 ha with the productivity of 142.39 tons, accounting for only 8.3% of the district production[235].

In 2020, the total planted area of coffee was 3,562 ha. Of which, only 3,534.2 ha contributed the production. The yield was estimated at two tons per ha, reaching the target. The total planted area of cassava was 120 ha, a decrease of 30 ha compared to the same period in 2019 and the average yield was five tons per ha. The total cashew growing area was 120 ha. Of which, the area for harvest was 287 ha. The average yield is nine quintals per ha, an increase of one quintal per ha compared to 2019.

In addition, the commune implemented a production plan for the summer-autumn crop in 2020 with a total area of 147.5 ha. Specifically, there were five ha of growing rice (reaching 100% of the plan), 42 ha of growing maize (decreasing by 100 ha compared to 2019), 12 ha of growing sweet potato (increasing by 10 ha compared to 2019), 30 ha of growing beans of all kinds (increasing 8 ha compared to 2019), and one ha of growing beans (achieving 50% of the plan)[236].

- Fishery

In 2019, the aquacultural production area of the commune was 4.86 ha, accounting for 5.9% the district aquacultural production area[237].

9.5.3.3.6 Education

In 2020, Ea Sin commune had Bui Thi Xuan Ethnic Minority Semi-Boarding Primary School and Lower Secondary School and Hoa Hong kindergarten (see Figure 9.24). The number of lower secondary pupils was 90 (studying in four classes). For primary education, there were 11 classes with 248 pupils. The

[235] Krong Buk Statistics Office (2020)
[236] Ea Sin CPC (2020a)
[237] Krong Buk Statistics Office (2020)

number of children in kindergarten was 125. In addition, there were six cases of dropout including three pupils in primary level and three pupils in lower secondary level[238].

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.24 Photo of Ethnic Minority Semi-Boarding Primary School and Lower Secondary School in Ea Sin Commune

9.5.3.3.7 Health, Safety and Security

Ea Sin commune has a health station providing basic health care services to local people. In 2020, there were 1,798 visits for medical examination and treatment at Ea Sin commune health station (see Figure 9.25). In which, four patients were transferred to higher levels [239]. The rate of fully vaccinated children of under one year old reached 98.3%[240]. The communal health station[241] was equipped with eight staff including two males and six females, of which there were one doctor, three nurses, and four medical staff. In addition, the commune had eight village-level health staff.

Regarding the prevention of COVID-19 pandemic, in the first six months of 2021, the commune health station received 34 medical declarations and nine cases for home health monitoring[242]. Up to 29 July, 2021, there is no infected case detected in the locality.

In term of security, in 2019, Ea Sin commune was the only locality of Krong Buk district to receive the title of “commune free of drug addicts and crimes”[243]. In 2020, rural security situation was stable. Specifically, the commune received only 14 crime reports, including six cases of property theft, two cases of murders, two gambling cases, two intentional injury cases, one property destruction case, and one case of violation of regulations on vehicle control[244].

[238] Ea Sin CPC (2020a)
[239] Ea Sin CPC (2020a)
[240] Ea Sin CPC (2020b)
[241] Ea Sin CPC (2021)
[242] Ea Sin CPC (2021)
[243] Nhu Quynh (2019b)
[244] Ea Sin CPC (2020a)

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.25 Photo of Ea Sin Communal Health Station

9.5.3.4 Chu Kbo Commune

9.5.3.4.1 Overview of Chu Kbo Commune

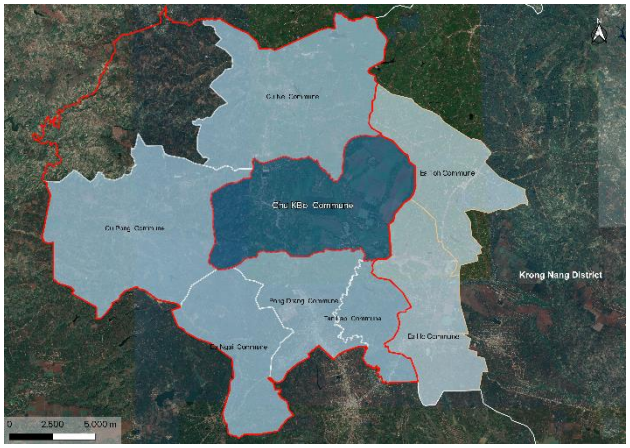
Chu Kbo commune is located in the East of Krong Buk district (see Figure 9.26). The geographic location of Chu Kbo commune is characterised as follows[245]:

- The East borders Ea Ho and Ea Toh communes;
- The West borders Cu Pong commune;
- The North borders Cu Ne commune; and
- The South borders Pong Drang, Ea Ngai, and Tan Lap communes.

Established in 2007, Chu Kbo has 21 administrative villages including Kim Phu, Tan Lap, Hop Thanh, Binh Minh, Hoa Loc, An Binh, Quang Ha, Thong Nhat, Doc Lap, Lien Hoa, Nam Trung, Nam Thai, Nam Loc, Nam Tan, Kty 1, Kty 2, Kty 3, Kty 4, Kty 5, Nam Anh, and Ea Nho.

[245] Krong Buk District Portal (n.d. c)

CHU KBO COMMUNE	
Area	62.94 km^2 (2021)[246]
Population	11,687 people (2019)
Population density	185.77 people/km^2 (2019)
Number of villages	21
Number of households	3,003 (2020)
Poverty rate	5.5% (end 2020)
Main ethnic groups	Kinh and Ede



Source: Krong Buk District Statistics Office (2020); Dak Lak PPC (2021a)

Figure 9.26 Chu Kbo Commune at a Glance

9.5.3.4.2 Demographic Profile

Statistically, by 2019, Chu Kbo commune[247] had a total population of 11,687 people and the population density was 185.8 people/km^2. Main ethnic groups are Kinh and Ede. Local religious people follow Buddhism, Catholicism and Protestantism. The labor force of the commune in 2020 was 8,556 people[248].

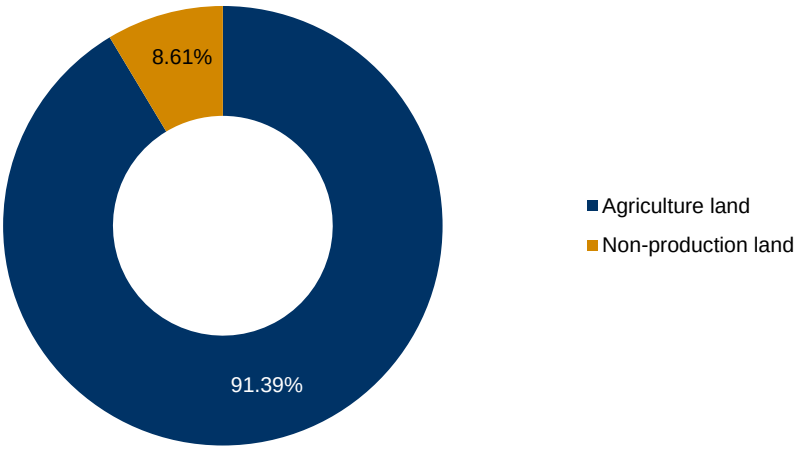
9.5.3.4.3 Public Infrastructure

In 2020, with the support from the provincial and district's capital, Chu Kbo commune also encouraged local people to contribute to clear site and give reciprocal contributions to build nine rural roads with a total length of 5,160m (including 500m in Kty 2 village, 500m in Hoa Loc village, 500m in Nam Trung village, 600m in Nam Tan village, 1,500m in Kty 4 village, 420m in Thong Nhat village, 420m in Quang Ha village, 420m in Hop Thanh village, and 300m in Quang Ha village). The total funding was VND 4,782 billion, of which: VND 4,090 billion from the state capital and VND 692 million from local people's contribution[249].

9.5.3.4.4 Land Use and Tenure

The total natural landmass of the Chu Kbo commune was 6,294.65 ha, making up 17.6% of Krong Buk district's natural land area. According to the Land Use Plan of the Krong Buk province in 2021, the communal total landmass included 5,752.7 ha of agricultural land (see Figure 9.27) and 541.95 ha of non-production land[250].

[246] Dak Lak PPC (2021b)
[247] Krong Buk Statistics Office (2020)
[248] Department of Labor, War Invalids and Social Affairs of Dak Lak Province (2020).
[249] Chu Kbo CPC (2020)
[250] Dak Lak PPC (2021b)



Source: Dak Lak PPC (2021b)

Figure 9.27 Land Use Plan of Chu Kbo Commune 2021

9.5.3.4.5 Economic Development

- Agriculture

In 2019, the planting cereal area of the commune was 521.8 ha with the productivity of 2961.8 tons, accounting for 26.5% of the Krong Buk district's production. Planted area of rice was 178.96 ha providing the production at 769.87 tons, occupying 45% of the district production. Notably, Chu Kbo recorded the highest rice production in Krong Buk district in 2019[251].

In 2020, the planted area of cereals of the commune was 153.73 ha with the productivity at 542.93 tons (reaching 155% of the plan). In addition, the area of coffee cultivation was 2,100 ha with the yield at 2.8 tons per ha and the total productivity at 5,880 tons (reaching 104% of the plan)[252].

Regarding husbandry, in 2020, the total herd of cattle and poultry in the commune was 1,969 heads including 732 cows, 585 pigs, 476 goats, 14,904 chickens, 266 ducks, 754 gooses, 438 pigeons, 1,243 dogs, 222 cats, and 354 swarms of bees. In addition, there were one pig farm in Nam Anh village, one dog farm in Kty 2 village, and two pig family-farms in Kty 1 village[253].

- Forestry

The forest coverage rate[254] was 20% as recorded in 2020.

- Fishery

In 2019, the aquacultural production area of the commune was 21.9 ha, accounting for 26.4% of Krong Buk district's aquacultural production area[255].

- Industry, Trade, and Service

In 2020, the total number of enterprises and business households in the commune was 114 units. In which, 29 businesses were managed by the DPC, 85 business households had the revenue above the

[251] Krong Buk Statistics Office (2020)
[252] Chu Kbo CPC (2020)
[253] Chu Kbo CPC (2020)
[254] Chu Kbo CPC (2020)
[255] Krong Buk Statistics Office (2020)

tax collection threshold, and 29 business households had the revenue below the tax collection threshold[256].

9.5.3.4.6 Education

In the school year 2020-2021, the whole commune had seven schools including two kindergartens, three primary schools (see Figure 9.28), and two lower secondary schools. The total number of pupils was 2,633, of which, 400 children were in kindergartens, 1,292 pupils followed primary education, and 941 pupils studied in lower secondary schools.

In addition, in the school year 2020-2021, Chu Kbo commune had five out of seven schools met the national standards in education quality. The average rate of students eligible for higher grades at all levels was 98%[257].

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.28 Photo of Primary School in Chu Kbo Commune

9.5.3.4.7 Health, Safety and Security

In 2020, Chu Kbo communal health station examined and treated 1,507 cases (see Figure 9.29). The health station promptly handled one case of malaria, five cases of dengue fever, and one outbreak of dengue fever in Quang Ha village. Regarding the prevention of COVID-19 pandemic, in 2020, there were 312 medical declaration cases in the commune, of which 235 people were quarantined and no infected cases were detected[258].

Regarding the security situation, in 2020, the CPC directed the Commune Public Security Division to coordinate with relevant departments to strengthen the work of ensuring political security, social order and safety in the commune. However, criminal activities have become more complex. In 2020, 54 cases occurred in the commune, an increase of 29 cases compared to 2019. Specifically, there were five cases of property theft, one property robbery case, one intentional injury case, seven cases of gambling, two cases of unexplained deaths, two cases of illegal drug possession, 22 cases handled administrative violations of illegal drug use, six cases of being compulsorily sent to detoxification establishments, three cases of illegal fireworks, two cases of fire, and three cases of traffic accidents[259].

[256] Chu Kbo CPC (2020)
[257] Chu Kbo CPC (2020)
[258] Chu Kbo CPC (2020)
[259] Chu Kbo CPC (2020)

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.29 Photo of Chu Kbo Communal Health Station

9.5.4 Village Level

Potentially affected communities of the survey includes:

- Cu Hriet and Ea Bro villages of Cu Pong commune;
- Ea My village of Ea Sin commune;
- Kdro 1, Kdro 2, Drah 1, Drah 2, Ea Kung, Ea Siek, Ea Krom, Kmu, and Ea Nguoi villages of Cu Ne commune;
- Kty 4 and Kty 5 villages of Chu Kbo commune.

This section provides an overview of demographic profile and economic structure of the Project's affected villages based on the data collected from consultations with local authorities, KIIs, and FGDs.

9.5.4.1 Village Characteristics

In Dak Lak province, especially in Krong Buk district, the village administrative unit is called by different Vietnamese terms:

- *Buôn* refers to a village of Ede indigenous peoples who lived for a long time ago.
- *Thôn* refers to a village of the Kinh majority, Ede and other people from different ethnic minorities migrating to live in this area.

A total of 14 *Buôn* and *Thôn* (hereby called village) were surveyed in terms of socio-economic conditions. Of which, seven villages are called *Buôn* (Cu Hriet, Ea Bro, Kdro 1, Kdro 2, Drah 1, Drah 2, and Kmu) and seven are *Thôn* (Ea My, Ea Siek, Ea Nguoi, Ea Kung, Kty 4, and Kty 5). Findings from the KIIs and FGDs and secondary data research indicated distinct characteristics of *Buôn* and *Thôn* as presented in Table 9.19 and Figure 9.30.

Table 9.19 Characteristics of *Buôn* and *Thôn*

Characteristics	Buôn	Thôn
Establishment	*Buôn* refers to an ethnic minority village where Ede indigenous people who lived for a very long	*Thôn* refers to an interspersed village with the Kinh majority, Ede, and other ethnic

Characteristics	Buôn	Thôn
	time ago. Kinh people and other ethnic groups (i.e. Muong and Thai) migrating from different provinces (i.e. Thua Thien Hue, Quang Binh, Nghe An, Ha Tinh, Yen Bai, and Cao Bang) have settled in the indigenous people village.	minority groups from the North such as Muong, Tay, Nung, Thai, and San Dui. Such interspersed village was formed due to the migration movement in the Central Highlands after 1975. Kinh people have become the majority inhabitants in some areas previously dominated by ethnic minorities.
Village leaders	Each *Buôn* has a village patriarch who is the hereditary leader with a powerful role in terms of community unity, traditional functions, community property use, and dispute settlement. Specifically, the village patriarch is responsible for organising community worshipping activities, preserving Ede traditions and customs, and supporting the locals in important household affairs such as weddings or funerals. Administratively, each *Buôn* is manged by a village head who is often of Ede ethnicity. Even though the village leader - frequently younger and with fixed term elections - officially has a more important role in local administration, the village patriarch is respectful and trusted for his advice and decisions about the ethnic community.	Each *Thôn* is managed by a village head who is normally of Kinh ethnicity group.
Religion	The KII findings showed that Ede people in *Buôn* often follow Protestantism while a large number of population are identified as non-religious	Buddhism, Christianity, and Catholicism are recorded in the surveyed Kinh villages.
Housing	In Ede villages, the cultural house and residential house are mostly built in the traditional stilt format.	In Kinh villages, the cultural house and residential house are mainly built on the ground.

Source: Socio-economic survey conducted by ERM, July 2021

Cultural house in Kro 2 ethnic minority village

Cultural house in Ea Kung village

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.30 Difference in Cultural House Styles between Ede and Kinh Villages

9.5.4.2 Demographic Profile

Of the 14 surveyed villages, seven ethnic minority villages (***Buôn)*** including Cu Hriet, Ea Bro, Kdo 1, Kdo 2, Drah 1, Drah 2, and Kmu have a high proportion of Ede people. Specifically, Drah 1 has 100% of Ede households while in the remaining villages, Ede households accounts for from 50% to over 90%. Meanwhile, the proportion of ethnic minority households in Kinh dominant villages such as Ea My, Ea Siek, Ea Nguoi, Ea Kung, Kty 4, and Kty 5 remains modest. In these villages, Ede group with other Muong, Thai, and San Dui ethnic minority groups have been integrated with the Kinh majority.

Table 9.20 Demographic Features of the Surveyed Villages

Province	District	Commune	Village	Number of Households				Ethnic Minority Household Rate (%)	Number of Population				Vulnerability	
				Total	Ede	Kinh	Other Ethnic Minorities		Total	Ede	Kinh	Other Ethnic Minorities	Poor Households	Near Poor Households
Dak Lak	Krong Buk	Cu Ne	Kdo 1	137	95	40	2	70.8	546	416	126	4	14	7
			Kdo 2	202	151	51	-	74.8	926	692	234	-	16	4
			Drah 1	125	125	-	-	100.0	508	508	-	-	14	-
			Drah 2	125	120	5	-	96.0	669	649	20	-	12	1
			Kmu	113	57	56	-	50.4	460	230	230	-	17	6
			Ea Kung	176	2	171	3	2.8	690	8	670	12	5	8
			Ea Siek	78	1	73	4	6.4	365	4	342	19	4	5
			Ea Krom	82	-	78	4	4.9	337	-	325	12	-	3
			Ea Nguoi	304	2	283	19	6.9	1,148	3	1,071	74	6	17
		Cu Pong	Cu Hriet	250	216	34	-	86.4	900	770	130	-	12	31
			Ea Bro	170	125	45	-	73.5	770	410	360	-	9	27
		Ea Sin	Ea My	160	2	152	6	5.0	370	3	350	17	21	14
		Chu Kbo	Kty 4	116	-	116	-	0.0	560	-	560	-	2	9
			Kty 5	116	-	116	-	0.0	446	-	446	-	4	3

Source: Socio-economic survey conducted by ERM, July 2021

9.5.4.3 Access to Public Infrastructure

9.5.4.3.1 Village Roads

The surveyed villages have an inter-village and intra-village road system for local commuting. However, rural roads have been damaged and need to be upgraded for convenient commuting according to local evaluation. The surfaces of many rural roads are mainly dusty and slippery, which are most likely causes of these road accidents (see Figure 9.31). Upgrading local road systems is given priority as good all-weather roads are an essential component facilitating safe access to markets, employment opportunities, education facilities, and also health establishments.

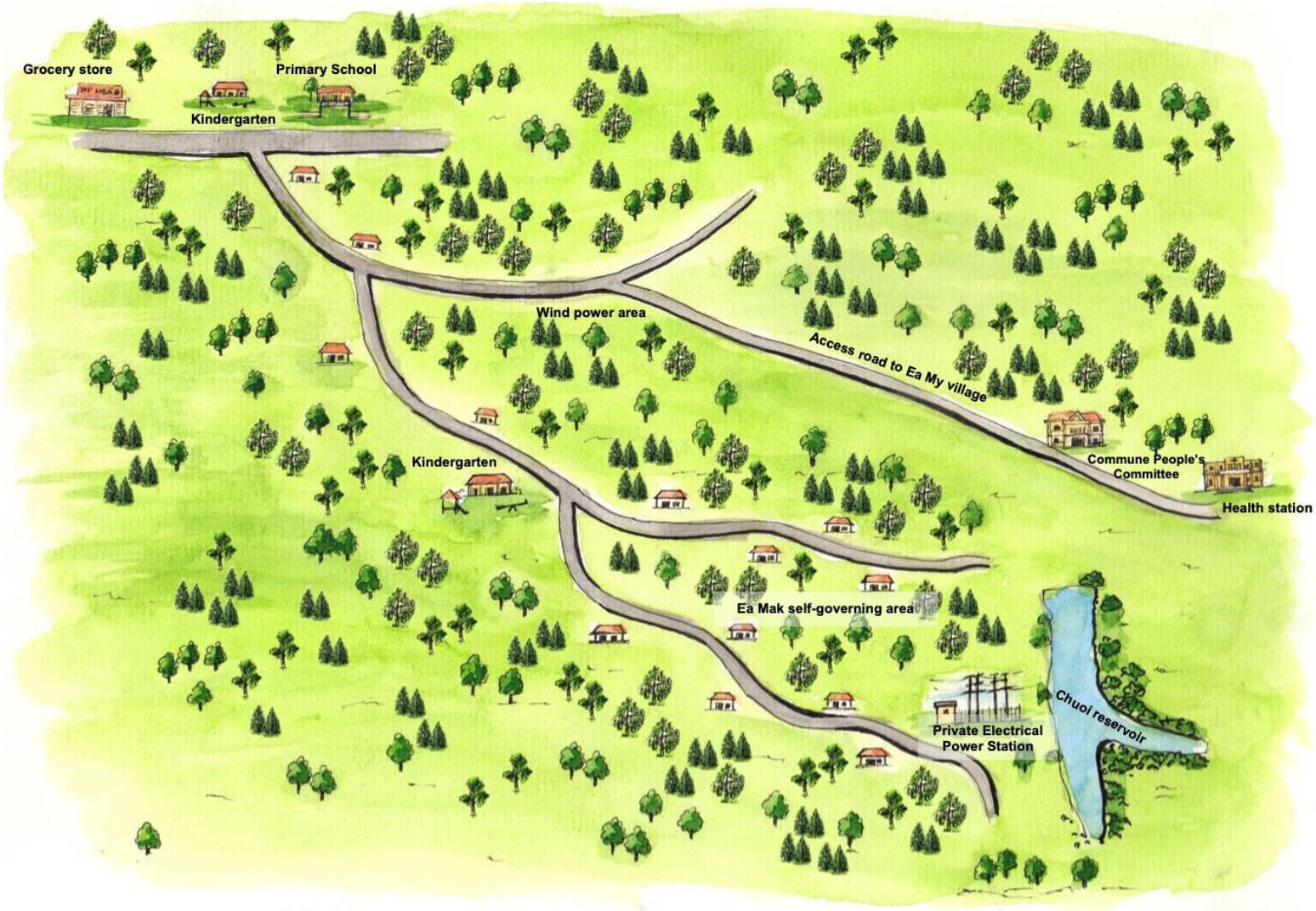
Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.31 Dirt Roads in Drah 1 (left) and Ea My (right) Villages

9.5.4.3.2 Electricity Supply

Most of the surveyed villages, including ethnic minority and Kinh villages access the national electricity grid and evaluate the electricity quality as stable, except Kty 5 and Ea My villages. In Kty 5, the national electricity grid only covers around one-third of village households while the remaining pull the electricity lines from the electricity poles with the cost of VND 3-5 million per household (KII, male respondent, Kinh ethnicity, Kty 5 village, Chu Kbo commune, 15 July 2021).

According to the Ea My village representative, Ea Mak, which was originally a self-governing area of Ea Sin commune but merged into the Ea My village since 2020, has around 32 households with residence registration and several non-resident cultivation households. These 32 households have not been directly connected with the national electricity grid but self contribute to pull the electricity lines with the cost of VND 20 million per ha. Local households have to pay VND 3,500 per kWh to a private third party, which is much higher than that provided by the official electricity retail prices ranging from approximately VND 1,600 VND to VND 3,000 VND per kWh (KII, male respondent, Kinh ethnicity, Ea My village, Ea Sin commune, 14 July 2021) (see Figure 9.32).



Source: FGD conducted by ERM, July 2021

Figure 9.32 Ea Mak Area of Ea My Village

9.5.4.3.3 Water Supply

Water from dug wells is the primary source for daily use and production activities (see Figure 9.33). Nearly 86% of the surveyed villages complained about the water shortage, especially from August to January of the following year. Local households deal with water shortage by purchasing water from households having drill wells, asking their neighbours for water, or waiting for one day to get water. Only in Kmu and Kty 5 villages, water supply is evaluated as relatively meeting local needs.

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.33 Water Source from Dug Wells in the Surveyed Villages

9.5.4.3.4 Solid Waste Management

The coverage of solid waste collection service is very limited in the surveyed villages. Only five out of 14 surveyed villages have the solid waste collection service available for households located in the National Road 14 crossing villages and this service operate once a week. These households have to pay a service fee of VND 10,000 - 20,000 per month. The remaining households in the surveyed villages mainly dump or throw garbage into surrounding areas or burn their domestic waste.

9.5.4.3.5 Local Schools

Basic education facilities, such as kindergarten, primary and lower secondary schools are located in most of the surveyed villages (see Table 9.21), except Drah 2 whose cultural house is temporarily used as a class for kindergarten children. Findings from field observation showed that local schools are equipped with basic teaching and learning facilities; however, recreational areas within the school areas need to be further upgraded or invested.

Table 9.21 Local Schools in the Surveyed Villages

Communes	Villages	Current Facilities
Cu Ne	Kdro 1	The village has a private kindergarten. Primary, lower, and upper secondary schools are located in the neighbouring village - Kdro 2.
	Kdro 2	Local pupils can easily pursue their schooling with an adequate school system from kindergarten to upper secondary schools located right in the village.
	Drah 1	School facilities are evaluated as in good conditions.
	Drah 2	No official kindergarten in the village instead the village community house is temporarily used as kindergarten. There are a primary and lower secondary schools located in the village but for upper secondary education, pupils can attend schools in Kdro 2 village.

Communes	Villages	Current Facilities
	Kmu	There is a lower secondary school in the village while kindergarten and primary school are not avaible at the village. Pupils can study at the primary school in Ea Kung village and the upper secondary school in the district center, about 4 km away from the village.
	Ea Kung	Local children can attend kindergarten, primary, and lower secondary education levels in the village and neighbouring villages. For upper secondary education, they travel to Kdro 2 village for schooling.
	Ea Siek	The village does not have any basic education facilities. Local pupils can attend schools in other neighbouring villages such as Ea Kung, Kdro 2, and Ea Nguoi villages.
	Ea Krom	There is no school located in the village but pupils can attend schools located in neighbouring villages, about 3-4km away from.
	Ea Nguoi	Binh Minh kindergarten in the village is in good conditions. Primary and lower secondary schools are located in other villages, about 1-7km away from.
Cu Pong	Cu Hriet	There is a kindergarten and primary school located right in the village. For lower and upper secondary education, pupils go further 5-7 km for schools located in the commune and district centers.
	Ea Bro	Pupils can attend kindergarten and primary schools in the Cu Hriet neighbouring village. They travel to the district or commune centers for higher education levels.
Ea Sin	Ea My	A kindergarten is located in the village, primary and lower secondary schools are in the commune center, about 2km away from, and an upper secondary school is in the district center, about 10km away from.
Chu Kbo	Kty 4	There is no school located in the villages so children can travel to neighbouring villages for schooling.
	Kty 5	Local children attend kindergarten, primary, lower and upper secondary schools in Nam Loc and Nam Anh villages (2 km away) and Cu Ne commune (1.5 km away).

Source: Socio-economic survey conducted by ERM, July 2021

9.5.4.3.6 Health Stations

Villagers can access local health stations for basic health treatment, which are normally located in the commune centers. Local health stations mainly provide basic health check-up and treatment while complicated health issues are referred to health care establishments in the provincial and district levels.

9.5.4.3.7 Local Markets

There are no official markets in the surveyed villages but local people can buy goods or food from temporary markets or local grocery stores (see Figure 9.34). They visit markets in Pong Drang commune or Buon Ho town for higher shopping needs.

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.34 Temporary Markets in Ea Kung Village

9.5.4.4 Economic Structure

The findings from KIIs with representatives of the surveyed villages showed that land-based livelihoods are reported as the driving force of surveyed communities. Wage-based livelihoods provide a source of income for a smaller batch of population and most of the people with waged employment are working for private companies in other provinces or as day labourers in agricultural production in the district or province during their farming-off time. A very modest number of local population run businesses and this livelihood is more common among Kinh households (see further Table 9.22).

- Land-based livelihoods

Main crops are coffee, avocado, durian, and pepper. Intercropping is regarded as a predominant cultivation method in the surveyed localities. Intercropping is the cultivation of two or more crops simultaneously on the same field to produce a greater yield on a given piece of land by making use of resources or ecological processes that would otherwise not be utilised by a single crop. Many surveyed Ede and Kinh households normally intercrop between coffee and pepper, avocado, and durian for ensuring production efficiency (see Figure 9.35).

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.35 Intercropped Production Area in Ea Sin Commune

Apart from main crops, other crops such as vegetables and macadamia are planted. In addition, local household develop small scale livestock raising models. Common livestock in the surveyed villages are cows, chickens, ducks, goats, and sheep. Animal by product are for domestic use only.

The labour supply for their agricultural production comes from family members or labour exchanges. Labour exchange is quite popular among farming households when they do not have enough money to hire casual workers, but it can still be considered as hired labour with payment received in-kind in terms of each other's labour input. Labour exchange is usually based on close-knit groups, extended family or agricultural production group, which is a way to strengthen community cohesion.

- Wage-based Livelihoods

Wage-based livelihoods are the second biggest income source in the surveyed villages. As reported, a considerable number of youths in the locality move to other cities or provinces (i.e. Ho Chi Minh city, Binh Duong and Dong Nai provinces) to work for textile and footwear companies with an income of around VND 6-10 million. Some others work as day labourers such as bricklayers or seasonally waged agricultural workers over Dak Lak province. Day labour brings an income of VND 150,000 - 170,000 per day.

- Enterprise-based Livelihoods

A very limited number of households, mostly Kinh earn income from small businesses such as groceries, fertilizer and agricultural materials trading. Besides, unfortunately, there is limited information about traditional craft of Ede bussiness recorded during the survey.

Table 9.22 Livelihoods Structure of Surveyed Villages

Commune	Village	Land-based Livelihoods	Wage-based Livelihoods	Enterprise-based Livelihoods	Average Annual Income
Cu Ne	Kdro 1	About 90% of households rely on agricultural production with the focal crop of coffee and have a monthly income of around VND 4 million.	5% of households have an income from working for governmental organisations with a monthly income of VND 10 million and from working as day labourers in Binh Duong province and Ho Chi Minh city with a daily wage of VND 150,000 - 200,000.	5% of households, mainly Kinh, do small businesses with a monthly income of VND 5 million.	
	Kdro 2	100% of local households earn incomes from coffee planting.	About nine Kinh and Ede people are public servants. Some are day labourers in Binh Duong and Dong Nai provinces and Ho Chi Minh city.	12 Kinh households run grocery stores.	VND 80 million per household
	Drah 1	100% of households do agricultural production as the main livelihood with focal crops of avocado, durian, coffee, and jackfruit.	Since 2020, due to unstable agricultural product prices, local people migrated to other provinces for working as day labourers or company workers with the monthly income of VND 6 million. Only three village people work as public servants.	No small business is recorded in the village.	VND 40 million per household
	Drah 2	100% of households rely on agricultural production.	Some local people work as day labourers for other households in the village. Some work in Binh Duong or other Southern provinces	No small business is recorded.	
	Kmu	100% of households rely on agricultural production.	Local people mainly work as day labourers in the district with a daily wage of VND 170,000. Working out of the district and province is very limited during the COVID-19 pandemic.	Some Kinh households do small businesses.	VND 20 million per capita
	Ea Kung	95% of local household work in agricultural production.	2.5% are day labourers and public servants.	2.5% do small business.	VND 60 million per household
	Ea Siek	Agricultural production is the main livelihood.	Some work as day labourers with a wage of VND 160,000 -170,000 per day.	Small business is not well-developed in the village.	VND 20-22 million per capita
	Ea Krom	100% of local households rely on agricultural production.	About 9-10 people are workers in Binh Duong and Dong Nai provinces and Ho Chi Minh city.	Two households run small businesses such as food stores or agricultural medicine services.	VND 100-150 million per household

Commune	Village	Land-based Livelihoods	Wage-based Livelihoods	Enterprise-based Livelihoods	Average Annual Income
	Ea Nguoi	90% of local households depend on agricultural production.	Three or four people are company workers and a very limited number of local people is engaged in the village management board. Local people tended to give up their agricultural production to seek work opportunities in Ho Chi Minh city and Binh Duong province since 2019 due to low land-based income.	27 households run small businesses (i.e. grocery stores, fertilizer and agricultural materials trading).	VND 100-170 million per household
Cu Pong	Cu Hriet	All households mainly reply on agricultural production with main crops of avocado, coffee, pepper, and durian.	Around 100 people work as day labourers in other districts with a daily wage of VND 170,000 - 180,000 or in Binh Duong province and Ho Chi Minh city.	Five Kinh household run small businesses.	VND 15 million per capita
	Ea Bro	Agricultural production is the main livelihood to all local households.	About 25 people are day labourers in Binh Duong during 3-5 months per year with a monthly wage of VND 7.5 million.	About seven Kinh and Ede households work in small business.	VND 60 million per household
Ea Sin	Ea My	All households live on agricultural production with main coffee and pepper crops.	Some households work as day labourers in the district or other areas. Labour exchange is common among Kinh and Ede households.	Only three Kinh households run grocery stores.	
Chu Kbo	Kty 4	Agricultural production is the main livelihood to 90% of local households but its income reduces gradually due to weather conditions, low agricultural product prices, and high investment.	Around four people are public servants. About 30-40 local people work seasonally in Binh Duong and Ho Chi Minh due to low coffee price.	10% of local households do small business in food and drink supply.	VND 30-40 million per household
	Kty 5	99% of local household reply on agricultural production.	A very few number of local men are bricklayers or seasonal workers in Binh Duong and Ho Chi Minh city while women work for textile, footwear, and electronics companies.	1% do small business	VND 10-15 million per capita

Source: Socio-economic survey conducted by ERM, July 2021

9.6 Household-Levelled Socio-Economic Analysis

9.6.1 Demographic Profile

9.6.1.1 Surveyed Population

The population of the 144 surveyed households is 704 people[260] (see Table 9.23). In which, Cu Ne included 49 households with the population of 250 people, while Cu Pong had 46 households with 224 people. Furthermore, these figures are 28 households with 126 people in Ea Sin and 21 households with 104 people in Chu Kbo.

Table 9.23 Surveyed Households and Population by Commune

Province	District	Commune	Village	No. of Households (N=144)		No. of Population (N=704)	
				N	%	N	%
Dak Lak	Krong Buk	Cu Ne	Kdro 1	15	10.4	76	10.8
			Kdro 2	11	7.6	56	8.0
			Drah 1	11	7.6	60	8.5
			Drah 2	7	4.9	36	5.1
			Ea Kung	5	3.5	22	3.1
		Cu Pong	Cu Hriet	22	15.3	107	15.2
			Ea Bro	24	16.7	117	16.7
		Ea Sin	Ea My	28	19.5	126	17.9
		Chu Kbo	Kty 4	11	7.6	53	7.5
			Kty 5	10	6.9	51	7.2

Source: Socio-economic survey conducted by ERM, July 2021

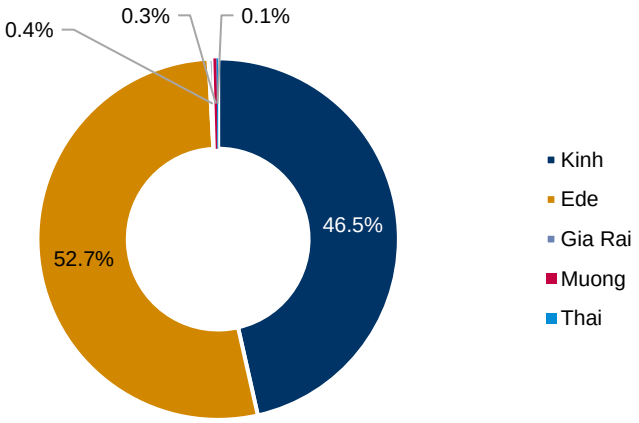
Notably, of a group of 28 interviewed households living in Ea Mak area of Ea My village (see Table 9.23), seven households are non-resident cultivators as they just live in temporary houses set up close to their planted area in Ea My village to take care of their crops during the farming time. After crops, they will return to their home village.

[260] The surveyed 704 population include (1) those who are registered in the household record book and living in the households; (2) those who are registered in the household record book but are not currently living in the households; and (3) those who are not registered in the household record book but are currently living in the households.
In presenting the data, it is noticeable that people whose names are recorded in the formal household registration book (which has to be kept and continually updated in Vietnam) but who are not living with the family, are included in the demographic statistics but are not included in household expenditure and income statistics. This includes for example, females who have married recently and moved into a separate dwelling with their husbands, or those who are working in other cities/provinces and are not contributing to household income or expenditure. However, those listed as students living in other areas are still included in household expenditure calculations and have been reported.

9.6.1.2 Ethnicity

Most of the surveyed population are Kinh and Ede ethnic group, in which Ede group claimed 52.7% while Kinh ethnic group had a smaller figure with 46.5% (see Figure 9.36). The rest of the surveyed population include Gia Rai (0.4% or three people), Muong (0.3% or two people), and Thai (0.1% or one person) ethnic groups who moved to Kinh or Ede group through interethnic marriage (three Gia Rai and two Muong people married with Ede people while one Thai person married with a Kinh spouse). These people become accustomed with Ede and Kinh traditions and regard themselves as a part of their Ede or Kinh household which they belong to. Therefore, the report focuses on highlighting the differences between Kinh group (including one Thai person from a Kinh household) and Ede group (including three Gia Rai and two Muong people from Ede households) based on some predetermined social and economic indicators.

By commune, all of the surveyed households in Ea Sin and Chu Kbo communes are of Kinh ethnic group. Meanwhile, most of the surveyed households in Cu Ne and Cu Pong communes are of Ede ethnic group. Ethnicity-mixed households are not common in the surveyed communes, except one Muong-Ede household in Cu Pong commune, three Gia Rai-Ede households in Cu Ne and Cu Pong communes, and one Thai-Kinh household in Chu Kbo commune.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.36 Surveyed Population by Ethnicity

Most of the 704 surveyed population (312 people or 44.3%) can speak both Ede and Vietnamese fluently. In addition, 319 people (45.3%) only speak Vietnamese. About 73 people (10.4%) only use Ede for communication and most of them (41 out of these 73 people) are under schooling age. Furthermore, six people can speak other Muong, Gia Rai, and Thai languages.

9.6.1.3 Residency

The average length of residency in family of the surveyed population is 18.8 years with the average range of residency from one year (all communes) to 88 years (Cu Pong commune) (see Table 9.24). The length of residency in the village of the surveyed population ranges from one to 88 years with the average residence length of 19.7 years. It can be seen that the average years of residence among Ede people in Cu Ne and Cu Pong communes are longer than those among Kinh people in Ea Sin and Chu Kbo communes. According to explanation made by village heads in Cu Pong and Cu Ne communes through KIIs, Ede people have settled in these surveyed areas for a long time through many generations while most of the Kinh households are migrants from all over Vietnam such as Yen Bai, Quang Ngai, Lao Cai, Thai Binh, and Nam Dinh provinces, resulting in planned and unplanned settlements in different communes of Dak Lak province. Planned resettlement in Dak Lak started in the 1950s and has continued in phases managed by the State's economic, social, and political policies. Many Kinh

households undergone spontaneous immigration from 1985 onwards when the coffee sector took off in the Central Highlands, especially Dak Lak province.

Table 9.24 Length of Residency of the Surveyed Population

Length of Residence (year)	Cu Ne Commune (N=250)	Cu Pong Commune (N=224)	Ea Sin Commune (N=126)	Chu Kbo Commune (N=104)	All Surveyed Communes (N=704)
Average years of residence in family	18.1	19.2	19.3	19.0	18.8
Average years of residence in village	21.9	21.7	14.3	16.5	19.7

Source: Socio-economic survey conducted by ERM, July 2021

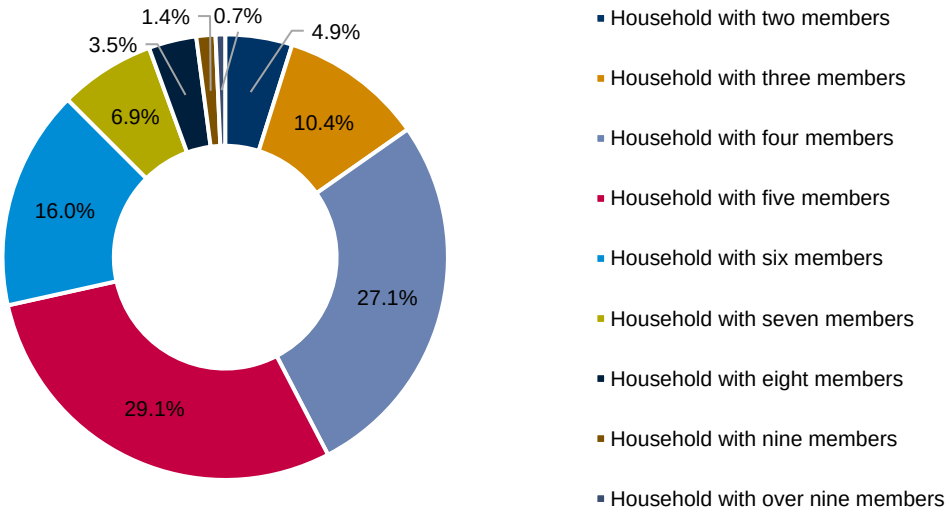
9.6.1.4 Household Size

Of the 144 surveyed households, the average household size are 4.9 people per household with the range of two to 13 people per family (see Table 9.25). Noticeably, no household with one member living alone was recorded. Kinh households recorded a smaller size of a household with the maximum member of eight people. The majority of the surveyed households include four to five members (see Figure 9.37). Reportedly, the biggest household size in the surveyed villages is 13 members as recorded in an Ede household, accounting for 0.7%.

Table 9.25 Average Household Size of the Surveyed Households

Household Size (people)	Kinh Households (N=71)	Ede Households (N=73)	All Surveyed Households (N=144)
Average family size	4.6	5.2	4.9
Minimum family size	2	2	2
Maximum family size	8	13	13

Source: Socio-economic survey conducted by ERM, July 2021



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.37 Surveyed Households by Size

9.6.1.5 Age Group

It is common to split the surveyed population into three broad age groups: 30.7% of the surveyed population as children and young adolescents (under the age of 15), 62.2% in the 15-60 year old group, and 7.1% in the elderly group (over 60 years old) (see Table 9.26). A large share of the population in the 15-60 bracket is seen as essential to maintain economic and social stability of the surveyed communities.

Table 9.26 Surveyed Population by Age Group

Age Group	All Surveyed Population (N=704)	
	N	%
Under 15 years old	216	30.7
From 15 to 60 years old	438	62.2
Over 60 years old	50	7.1

Source: Socio-economic survey conducted by ERM, July 2021

9.6.1.6 Religion

Most of the surveyed population list themselves as having no religious affiliation[261], accounting for 82.8% (including 37.5% in Kinh ethnic group and 45.3% in Ede ethnic group) while the remaining have lots of different faiths such as Protestantism (7.2%), Catholicism (6.4%), and Buddhism (3.6%) (see Table 9.27). By commune, the survey findings showed that Protestantism and Catharism are main religions among Ede population in Cu Ne and Cu Pong communes while most of the Kinh religious adherents in Ea Sin and Chu Kbo communes have a belief in Buddhism and Catholicism.

As shared by FGD participants, Ede ethnic group worships multiple Gods, including the Gods of Thunder, Mountains, Rivers and Forests. In addition, Ede people mainly worship their ancestors (FGD, ethnic minority group, Cu Hriet village, Cu Pong commune, 13 July 2021).

Table 9.27 Surveyed Population by Religion

Religion (%)	Cu Ne Commune (N=250)		Cu Pong Commune (N=224)		Ea Sin Commune (N=126)	Chu Kbo Commune (N=104)	All Surveyed Communes (N=704)		All Surveyed Communes (N=704)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
No religion	20.0	61.2	15.6	74.1	88.1	65.4	37.5	45.3	82.8
Protestantism	0.0	15.2	0.0	3.6	9.5	0.0	0.7	6.5	7.2
Catholicism	0.0	0. 0	0.0	4.9	2.4	29.8	4.8	1.6	6.4
Buddhism	3.6	0.0	1.8	0.0	0.0	4.8	3.6	0.0	3.6

Source: Socio-economic survey conducted by ERM, July 2021

[261] According to the Law No. 02/2016/QH14 dated 18 November 2016 issued by National Assembly on Religion and Folk Belief, as stated in Paragraph 1 of Article 6, every person has the right to freedom of religion and folk belief and the right to follow or not to follow a religion

9.6.1.7 Marital Status

A high percentage of the surveyed population is married, accounting for 49.4% or 348 people, and about 36.8% or 259 people are under marriage age[262] (see Table 9.28). A small proportion of the surveyed population defines their marital status as single[263], accounting for 10.1%. A further 2.3% of the surveyed population are widowed[264] and some 1.1% are divorced[265]. In addition, around 0.3% get married before the marriage age[266] and all of them are of Ede ethnic group. This situation occurs among the ethnic minority groups in Vietnam (see further in Section 9.10.3.2). Even though the local authorities have made efforts to reduce child marriage and consanguineous marriage through training and propaganda activities, this situation is still on-going.

Table 9.28 Surveyed Population by Marital Status

Marital Status	Surveyed Population by Ethnicity (N=704)				All Surveyed Population (N=704)	
	Kinh (N=336)		Ede (N=368)			
	N	%	N	%	N	%
Married	156	47.6	192	51.1	348	49.4
Single	43	13.2	28	7.5	71	10.1
Widowed	5	1.5	11	2.9	16	2.3
Child marriage	0	0.0	2	0.5	2	0.3
Divorced	3	0.9	5	1.3	8	1.1
Under marriage age	121	36.8	138	36.7	259	36.8

Source: Socio-economic survey conducted by ERM, July 2021

9.6.1.8 Education

For education, the analysis was based on data from 623 people - data from 81 people (28 people in Cu Ne commune, 27 people in Cu Pong commune, 16 people in Ea Sin commune, and ten people in Chu Kbo commune) were not included. These 81 people include 76 children under schooling age (30 Kinh children and 46 Ede children), and other five Kinh people who are in schooling-age but not attend school at the survey time.

9.6.1.9 Literacy

Most of the surveyed population are literate with 92.8% or 578 people while around 7.2% (45 people out of the surveyed population including 44 Ede people and one Kinh person) are illiterate (see Table 9.29). It is noted that the illiteracy rate of the Ede population in the surveyed communes is higher than that of Kinh people. This could be explained that compared to Kinh group, socio-economic conditions of Ede group have been more disadvantaged, which may affect low educational attainment.

[262] The 2014 Marriage and Family Law of Vietnam regulates that the marriage age is 18 years or older for females and 20 years or older for males. Those who are under the age stipulated as the law for marriage are classified as the 'under marriage age' group.

[263] Female aged 18 years or over and male aged 20 years or over who are not married are identified as single.

[264] A person becomes widowed because of the loss of his or her spouse through death.

[265] A person becomes divorced when his or her marriage has been legally dissolved.

[266] Child marriage or early marriage is the informal union entered by an individual before reaching the marriage age as stipulated by law.

By working age groups, of the 45 illiterate people, two Ede people are below working age (aged of eight and 14) due to physical disabilities, 22 people are of working age (aged from 25 to 57 years), and 21 people are over the working age (from 58 to 88 years old).

Table 9.29 Surveyed Population by Literacy

Literacy (%)	Cu Ne Commune (N=222)		Cu Pong Commune (N=197)		Ea Sin Commune (N=110)	Chu Kbo Commune (N=94)	All Surveyed Communes (N=623)		All Surveyed Communes (N=623)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Illiterate	0.5	8.5	0.00	12.7	0.0	0.0	0.2	7.0	7.2
Literate	23.0	68.0	18.78	68.5	100.0	100.0	46.9	45.9	92.8

Source: Socio-economic survey conducted by ERM, July 2021

9.6.1.10 Educational Attainment

Most of the surveyed literate people (90.3% or 522 people) have been attending or completed general education, specifically 27.2%, 40.7%, and 22.5% at primary, lower secondary, and upper secondary levels respectively (see Table 9.30). Furthermore, about 0.5% or three literate people finished vocational education, 1.4% reached college level (one person dropped out, two people are in the progress, and three people completed the study program), and 5.8% reached university education level (one dropped out, 16 attending, and 17 finished). It is worthy to note that 11 people or 1.9% (10 Ede people and one Kinh person) can read and write even though they have not attended any format education programs.

Table 9.30 Surveyed Population by Educational Attainment

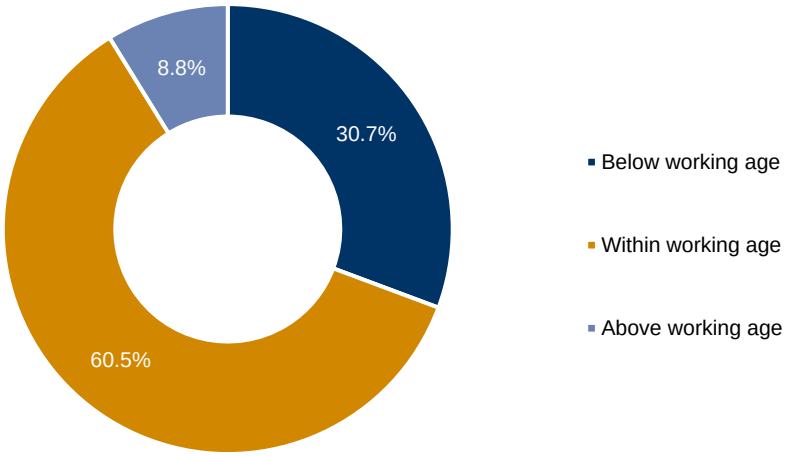
Educational Attainment (%)	Cu Ne Commune (N=202)		Cu Pong Commune (N=172)		Ea Sin Commune (N=110)	Chu Kbo Commune (N=94)	All Surveyed Communes (N=578)		All Surveyed Communes (N=578)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Literate without schooling	0.0	3.0	0.0	2.3	0.0	1.1	0.2	1.7	1.9
Primary education	2.5	22.3	6.4	29.7	24.5	19.1	10.6	16.6	27.2
Lower secondary education	8.4	27.7	8.7	27.3	57.3	39.4	22.8	17.9	40.7
Upper secondary education	7.9	19.3	4.7	15.1	16.4	24.5	11.2	11.3	22.5
Vocational school education	0.5	0.0	0.0	0.6	0.9	0.0	0.3	0.2	0.5
College education	0.5	1.0	0.0	0.6	0.9	3.2	0.9	0.5	1.4
University education	5.4	1.5	1.7	2.9	0.0	12.8	4.4	1.4	5.8

Source: Socio-economic survey conducted by ERM, July 2021

9.6.1.11 Labour Force

9.6.1.11.1 Working Age Population

The surveyed communes have a large working-age population[267] with 60.5% (426 people including 205 Kinh and 221 Ede people) (see Figure 9.38). Meanwhile, about 30.7% of the surveyed population are below working age with 216 people (96 Kinh and 120 Ede people), and 8.8% are above working age (27 Kinh and 35 Ede people).



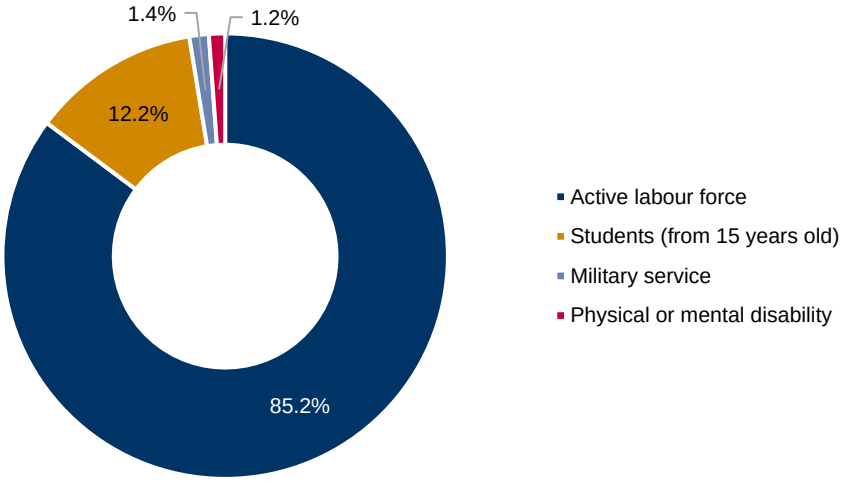
Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.38 Surveyed Population by Working Age Group

9.6.1.11.2 Active Labour Force

Of the 426 working age population, 363 people (85.2%) are identified as active in the labour force as they are able and likely to work (see Figure 9.39). Of the remaining 14.8% not engaging in work, most of them are students with 12.2% (52 people including 39 Kinh and 13 Ede people). In addition, six Ede people (1.4%) are engaging in military services and five people (1.2%) including three Kinh and two Ede people are incapable of working due to chronic diseases or mentally disabilities (three people with mental disability, one person suffering from stroke, and the another one having brain tumour).

[267]Under the Vietnam's Labour Code: (1) Below working age (below 15 years old); (2) Working-age population consists those aged 15 and 55 years old for females and 15-60 for males, considered able and likely to work; (3) Above working age (over 55 years old for females and 60 years old for males).



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.39 Active Labour Force of the Surveyed Working Age Population

There are 50 out of 62 over-working-age people (aged 56 to 77 years) engaged in work such as cultivation (45 people), husbandry (one person), small business (three people), and company worker (one person). This makes a total of 413 people in the surveyed active labour force, accounting for 58.7% of the total surveyed population. Of these 413 people within active labour force, 411 people are working, one Kinh person in Chu Kbo commune is unemployed, and one Kinh person also in Chu Kbo commune is doing unpaid work (i.e. housework).

9.6.2 Livelihood Engagement

Of the 413 surveyed active labour force, one person does unpaid work (i.e. housework) and another one is unemployed (both of them are of Kinh group in Chu Kbo commune). Therefore, this section analyses employment of the 411 surveyed population and briefly describes livelihood activities of the surveyed households based on the results of the FGDs, KIIs, and household surveys.

9.6.2.1 Main Livelihoods

The agriculture sector is still a major source of livelihood for the surveyed population. Statistically, the largest percentage of the 411 working people is engaged in land-based livelihoods (84.9% or 349 people) (see Table 9.31). Wage-based livelihoods have the second largest working population (10.7% or 44 people). Meanwhile, only 18 people or 4.4% generate their household income from enterprise-based livelihood.

Table 9.31 Main Livelihoods of the Surveyed Working Population

Main Livelihoods (%)		Cu Ne Commune (N=145)		Cu Pong Commune (N=135)		Ea Sin Commune (N=77)	Chu Kbo Commune (N=54)	All Surveyed Communes (N=411)		All Surveyed Communes (N=411)
		Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Land-based	Cultivation	11.0	66.1	11.2	80.7	88.3	81.4	34.8	49.9	84.7
	Husbandry	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.2	0.2
Wage-based	Public servant	2.8	4.1	0.0	1.5	0.0	3.7	1.5	1.9	3.4

Main Livelihoods (%)		Cu Ne Commune (N=145)		Cu Pong Commune (N=135)		Ea Sin Commune (N=77)	Chu Kbo Commune (N=54)	All Surveyed Communes (N=411)		All Surveyed Communes (N=411)
		Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
	Company worker	2.1	2.1	1.5	2.2	7.8	9.3	3.9	1.5	5.4
	Day labourer	0.7	2.8	0.0	0.7	0.0	3.7	0.7	1.2	1.9
Enterprise-based	Small business	6.9	0.7	2.2	0.0	3.9	1.9	4.1	0.3	4.4

Source: Socio-economic survey conducted by ERM, July 2021

By ethnicity, the number of Ede people working in land-based livelihoods is higher than that of Kinh people with 200 Ede people (48.7%) versus 148 Kinh people (36%). Meanwhile, the opposite feature is applied in wage-based livelihoods with 26 Kinh people (6.3%) and 18 Ede people (4.4%). Notably, the number of Kinh people earning income from enterprise-based livelihoods is dominant with 4.1% (17 people) while only 0.2% (one Ede person) works in this sector.

9.6.2.1.1 Land-based Livelihoods

A total of 349 surveyed people (84.9% of the total 411 working people) consider land-based livelihoods as their main occupation. Cultivation (i.e. coffee, avocado, durian, and pepper planting) is the most common work among the surveyed population with land-based livelihoods (84.7% or 348 people). In which, 143 people are of Kinh group and the rest 205 are Ede people, corresponding to 34.8% and 49.9% of the total 411 working people (see Table 9.32 and Figure 9.40). There are no significant differences between two groups (i.e. Kinh and Ede) in cultivation methods. Noticeably, only one Ede person considers husbandry as their main occupation although there are up to 66 surveyed households reportedly owning livestock such as chicken, cows, pigs, buffaloes and goats. This implies that livestock raising seems not to be a significant livelihood in the locality, which may be attributed to limited grazing area and high investment in cage building. Local households mainly raise poultry and cattle as supplementary food for their daily meals. Generally, there are no significant differences in the cultivation methods between both surveyed ethnic groups.

Table 9.32 Surveyed Working People with Land-based Livelihoods

Land-based Livelihoods (%)	Cu Ne Commune (N=145)		Cu Pong Commune (N=135)		Ea Sin Commune (N=77)	Chu Kbo Commune (N=54)	All Surveyed Communes (N=411)		All Surveyed Communes (N=411)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Cultivation	11.0	66.1	11.2	80.7	88.3	81.4	34.8	49.9	84.7
Husbandry	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.2	0.2

Source: Socio-economic survey conducted by ERM, July 2021

Maize and pepper intercropping in Kty 5 village, Chu Kbo commune

Coffee field in Ea My village, Ea Sin commune

Cow raising in Kdro 1 village, Cu Ne commune

Goat grazing in Ea My village, Ea Sin commune

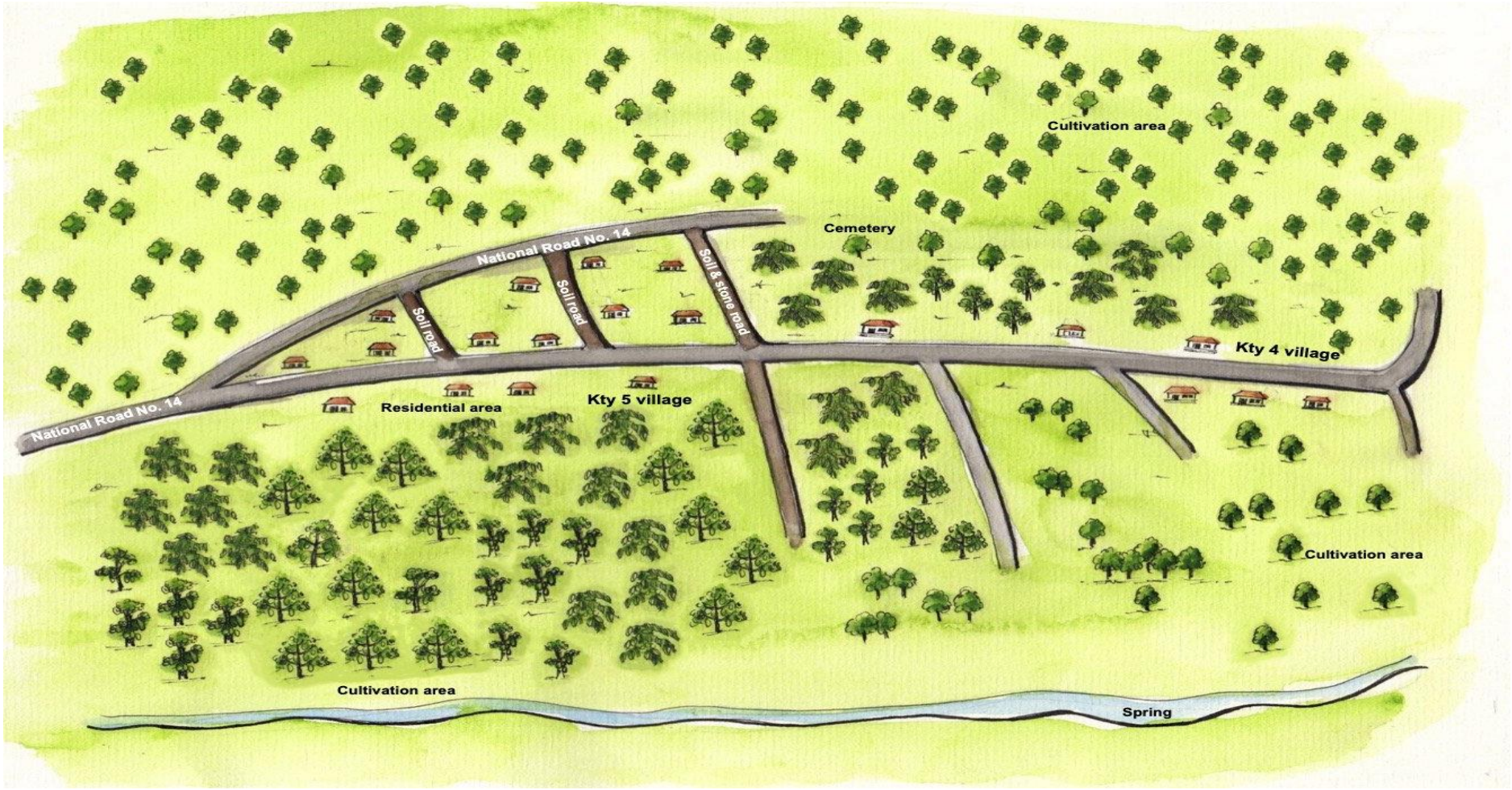
Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.40 Cultivation and Husbandry in the Surveyed Communes

9.6.2.1.1.1 Agricultural Production

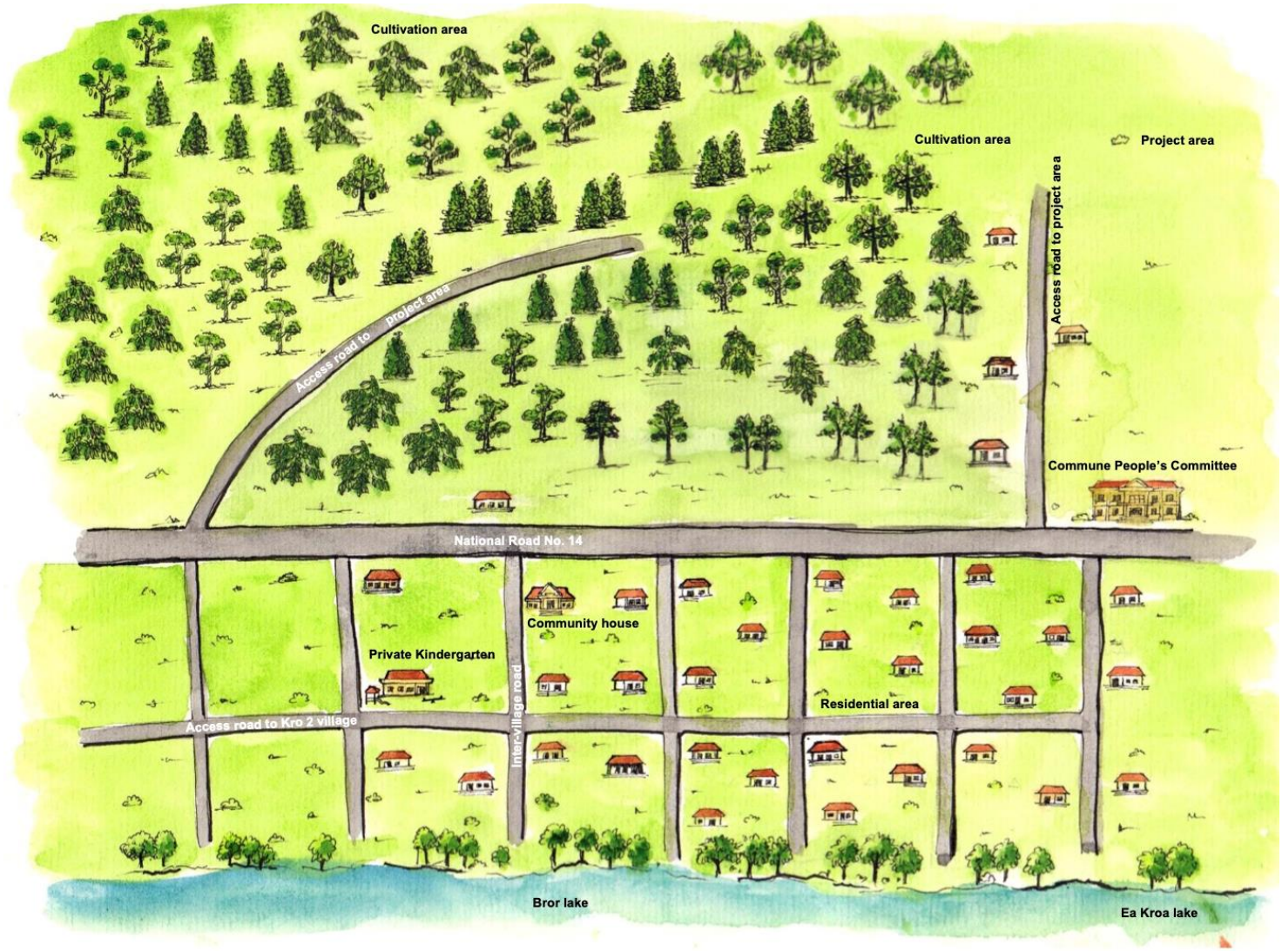
- Cultivation and Husbandry Area

Through the household interviews, most of the surveyed households affirmed that they have their own land for agricultural production with areas ranging from 13 m^2 to 200,000 m^2. Specifically, there are 30 households (20.8%) having agricultural land for annual crops, 107 households (74.3%) having agricultural land for perennial trees, and six households (4.2%) owning forestry farming land. The average agricultural area is 31,916 m^2 per household (including 13,286 m^2 for annual crops and 18,630 m^2 for perennial trees) while the average of forestry farming land is 27,817 m^2 per household. The survey findings showed that the average annual crop production area of Kinh group is larger than that of Ede group (15,942 m^2 versus 11,412 m^2). The cultivation area is quite close to residential areas (see Figure 9.41, Figure 9.42, and Figure 9.43).



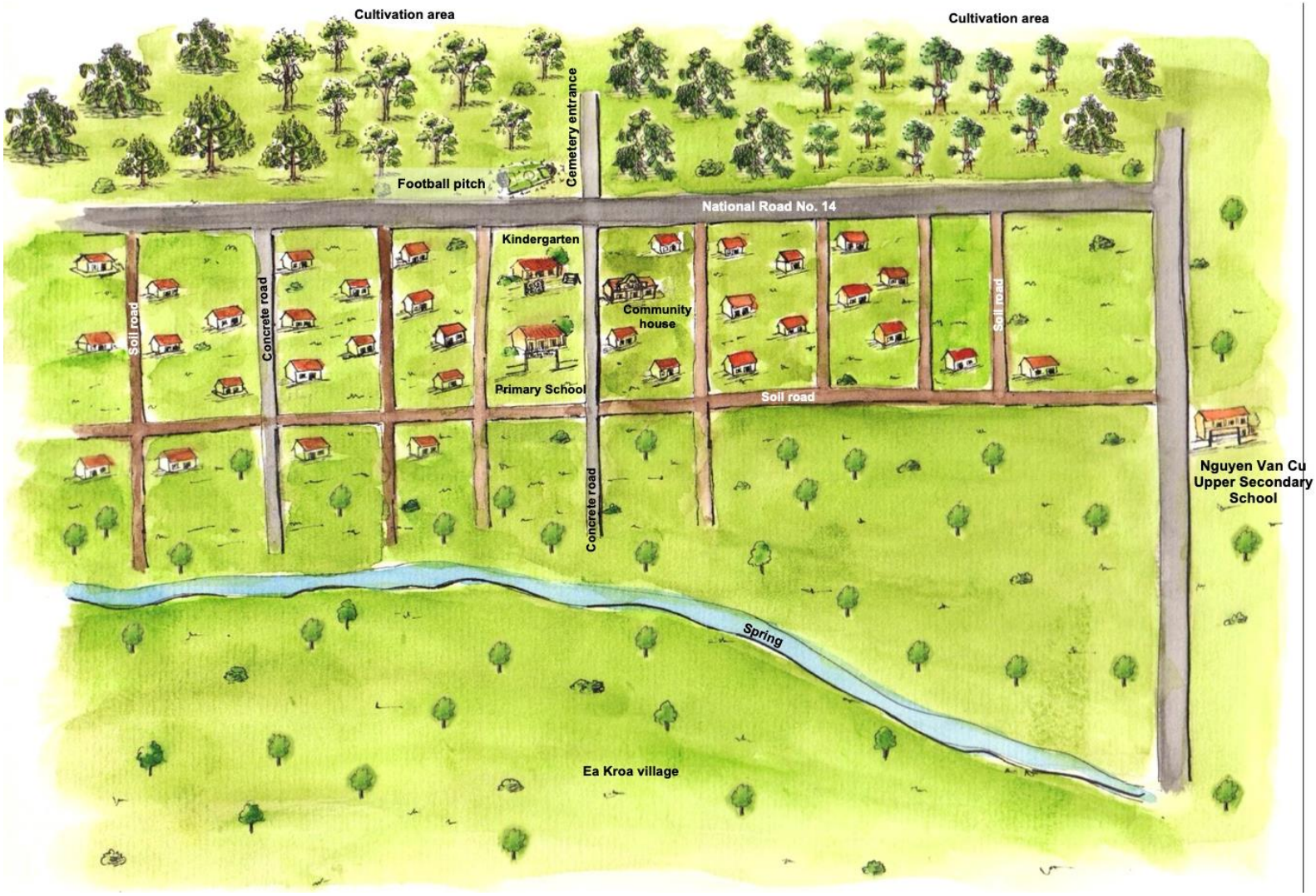
Source: FGD conducted by ERM, July 2021

Figure 9.41 Cultivation Area of Kty 5 Village, Chu Kbo Commune



Source: FGD conducted by ERM, July 2021

Figure 9.42 Cultivation Area of Kdro 1 Village, Cu Ne Commune



Source: FGD conducted by ERM, July 2021

Figure 9.43 Cultivation Area in Kdro 2 Village, Cu Ne Commune

- Agricultural Equipment and Vehicles

Statistically, around 59.7% of the total 144 households assert that they own agricultural equipments and vehicles. Specifically, both local Kinh and Ede farmers utlise mostly tractors for daily travelling to the field and carrying out the products. Other recorded equipments are agrimotor, lawn mower, insecticide sprayer and coffee grinder, pepper grinder, and food grinder for animals (see Figure 9.44).

A tractor in Kdro 2 village, Cu Ne commune

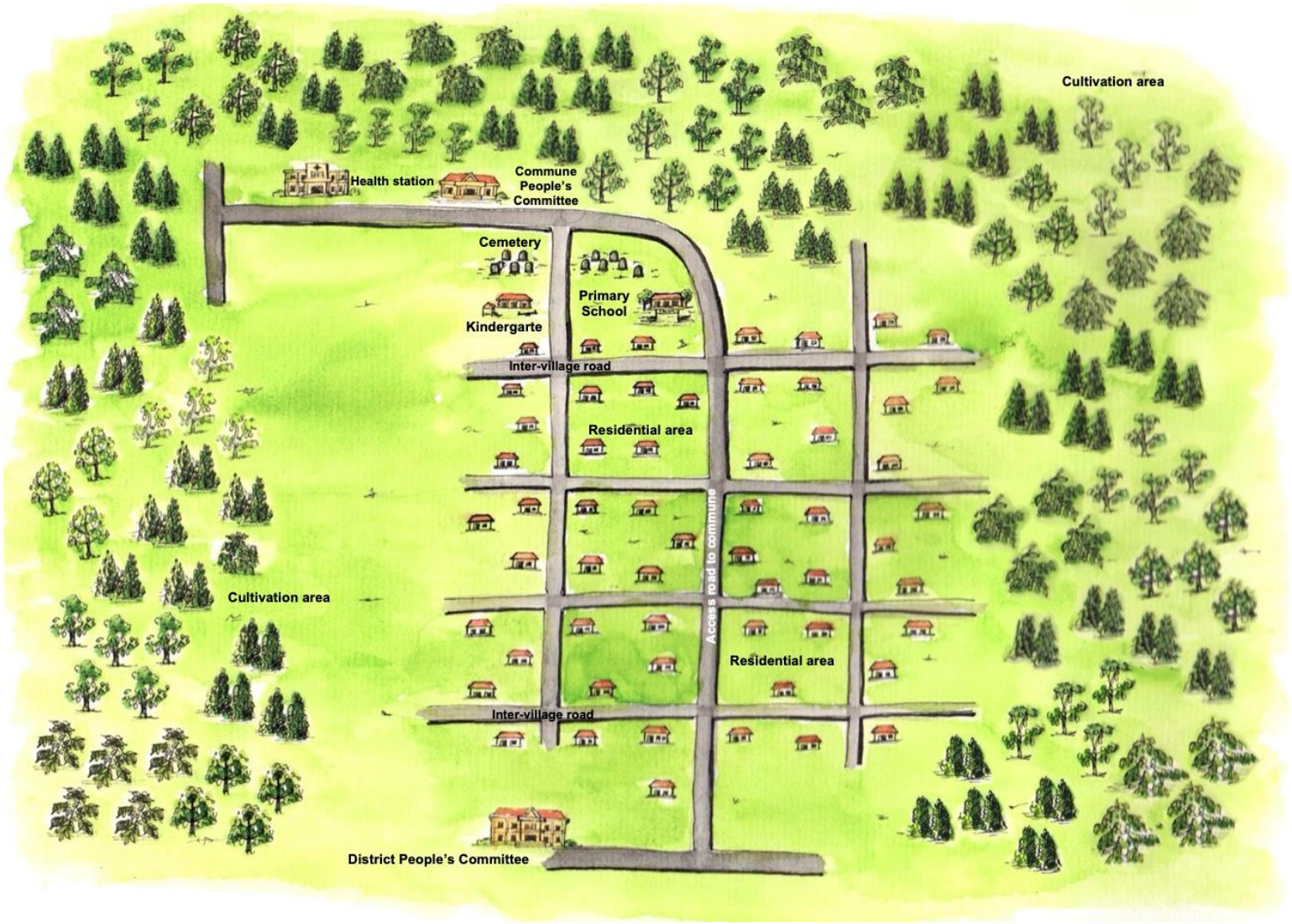
A tractor in Ea My village, Ea Sin commune

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.44 Tractor as Common Agricultural Equipment in the Surveyed Communes

- Main Crops

Coffee, avocado, durian, and pepper are main crops (see Table 9.33). Normally avocado, durian, and pepper are intercropped with coffee for increasing the production efficiency (see Figure 9.45). Apart from the abovementioned main crops, local farmers plant more diverse crops such as macadamia, maize, banana, and jackfruit for income security. Normally, seeds for cultivation are purchased in the agricultural suppliers in the locality. Agricultural products are sold to local traders or agricultural product purchasing agents.



Source: FGD conducted by ERM, July 2021

Figure 9.45 Intercropping Practice in Cu Hriet Village, Cu Pong Commune

Table 9.33 Main Crops in the Surveyed Communes

Main Crops	Harvest Season	Crop Production	Product Price	Description
	September to December (according to lunar calendar)	The production volume is around 3 tons per ha with about 900 plants in one ha of planted area, which may be declined to 1.5 or 2 tons per ha due to crop failure or disease outbreak.	Coffee is sold to local coffee traders with the price of VND 30,000 - 35,000 per kilogram.	Coffee is the most important perennial crops and predominantly grown by smallholder farmers in the survey areas. Coffee income represents one of the highest earning livelihood options for most surveyed households. Main coffee type is Robusta as it fits well in the local climate and basaltic soil. On the arable land area, coffee is also intercropped with other plants such as pepper, avocado, and durian. A coffee plant could bear beans after three years of planting. Each plant has a life cycle of around 10 years. Coffee is mostly fertilized by chemicals and requires water for irrigation. The production investment (fertilizer, pesticide, harvesting cost, and grinding) is quite high, reportedly accounting for 50% of total crop income. On average, each ha of coffee planting area, farmers have to spend around VND 50 million for crop inputs; of which 70% are used for fertilizers. Every hectare of coffee often consumes at least ten bags of fertilizers (around 500kg).
	July and August every year	In one hectare of land, there are around 200-300 trees living, which can produce around five tons per hectare.	At the time of survey, one kilogram of avocado costs only from VND 2,000 to 10,000.	Avocado is a very popular crop in the surveyed communes, with two main variations including ‘Boot’ and ‘034’. After 3-5 years of planting, farmers can harvest the fruit to sell. The avocado production price is insufficient for most farmers to cover their cost of production when the price continuously decreases.

Main Crops	Harvest Season	Crop Production	Product Price	Description
	July to August (according to lunar calendar)	The number of durian trees in each hectare of planted area ranges from 140 (Cu Pong commune) to 200 (Ea Sin commune), which can produce around 15 tons.	One kilogram of durian costs from VND 35,000 to 70,000.	Durian is a popular crop in the surveyed communes. Durian are normally intercropped with coffee planting to increase production efficiency. Durian is often harvested every year after seven years of planting.. Thanks to the favours in geographical and natural conditions, local durian's taste is evaluated exceeding the durian from western provinces in Vietnam, which is considered the opportunity of the agriculture in the locality.
	January and February (according to lunar calendar)	The production volume of around three to four tons per hectare.	One kilogram of pepper can be sold at VND 72,000.	Pepper is intercropped with coffee and other crops. However, local people gradually reduce planted area of pepper due to its low production and price.

Source: Socio-economic survey conducted by ERM, July 2021

- Main Livestock

During field observations, husbandry is not the main livelihood of the people in the locality. Main livestock includes cows, pigs, goats, chickens, ducks, and buffaloes that are raised in a household scale for domestic use as a nutrition source and for offering in ritual ceremonies. Food for husbandry is normally bought from local animal food supplier or available resources such as vegetables or grasses in the locality.

9.6.2.1.1.2 Advantages and Disadvantages in Agricultural Production

Agriculture is the backbone of the surveyed households' economy. Local agricultural production in the surveyed areas is identified as favourable with natural (convenient geographical location and favourable natural conditions) and social capital (community support) specifically:

- Soil conditions are fertile to sustain plant growth and optimize crop yield;
- A high proportion of local farmers own arable land and agricultural equipment;
- Regular trainings on crop production and livestock husbandry conducted by local authorities provide local farmers with knowledge and skills;
- Access preferential loans from Social Policy Banks and commercial banks;
- Local farmers apply machinery in agricultural production such as ploughing, lawnmower, and pump machines;
- The practice of labour exchanges among farming households saves production time and cost and increase community solidarity; and
- Agricultural production areas are close to local residence areas.

Agricultural production activities in the surveyed communities are facing challenges related to water shortage, fluctuating agricultural product prices, low access to financial services, and other issues (see Table 9.34). Water shortage is considered as the primary problem to agricultural production which are closely linked to survival for many farming households while local farmers can't afford more advanced agriculture tools to extract water and to conserve water, apart from groundwater source from dug wells. According to the local people's sharings, water shortage usually occurs from August to January of the following year and is getting worse because of the effects of climate change.

To mitigate the water problems, local farmers apply water allocation plans by dividing watering shifts in different periods. They water half of their crop field once in the morning and wait until afternoon when the water comes back to water the remaining area. However, in a long term, this endeavour needs to be further support to secure adequate water source for agricultural production activities and contribute to poverty alleviation in rural areas.

Other challenges are recorded during the study, including low profit from cultivation, fluctuating agricultural product prices, lack of agricultural trainings, pests and diseases (planococcus citri for coffee and pepper plants and tetranychidae urticae for durian plants).

In addition, the local agriculture is also facing to even more threats when farmers find hard to sell their products because of no agricultural product consumption stakeholders. Local farmers' land capital is shrinking because they could not pay off their debts hence lenders and banks size their land property as collateral (FGDs, agri-forestry groups, Kinh and Ede ethnicity, Ea Bro, Ea My, and Drah 1 villages, 13-15 July 2021).

Table 9.34 Challenges in Agricultural Production

Challenges	Level of Challenges	Cu Pong Commune	Ea Sin Commune	Cu Ne Commune	Chu Kbo Commune
Water shortage in the dry season	High	✓	✓	✓	
High electricity price	Low	✓			
Low profit from cultivation	High	✓	✓	✓	✓
Fluctuating agricultural product prices	Medium	✓			✓
Limited access to financial services, including credit and loans	Medium		✓	✓	
Access road to production areas in poor conditions	Medium	✓	✓		
Lack of agricultural trainings	Medium		✓	✓	
Pests and diseases	Low				✓
Lack of consuming chain	Medium	✓	✓		
Debts	Low			✓	
Wind turbine impacts on agricultural production	Low				✓

Source: FGDs conducted by ERM, July 2021

9.6.2.1.2 Wage-based Livelihoods

Of the 411 surveyed people engaging in work, only 44 people or 10.7% people do wage-based employment. Of these 44 people, most are company workers (5.4% or 22 people), followed by public servants (3.4% or 14 people). Meanwhile, the remaining eight people (1.9%) work as day labourers (see Table 9.35).

Table 9.35 Surveyed Working People with Wage-based Livelihoods

Wage-based Livelihoods (%)	Cu Ne Commune (N=145)		Cu Pong Commune (N=135)		Ea Sin Commune (N=77)	Chu Kbo Commune (N=54)	All Surveyed Communes (N=411)		All Surveyed Communes (N=411)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Public servants	2.8	4.1	0.0	1.5	0.0	3.7	1.5	1.9	3.4
Company workers	2.1	2.1	1.5	2.2	7.8	9.3	3.9	1.5	5.4
Day labourers	0.7	2.8	0.0	0.7	0.0	3.7	0.7	1.2	1.9

Source: Socio-economic survey conducted by ERM, July 2021

- Company Workers

It can be seen from Table 9.35 that Ea Sin and Chu Kbo communes where the surveyed population of Kinh ethnicity are residing, have the highest number of the surveyed people as company workers (7.8% and 9.3% respectively). This figure is quite limited in the two remaining communes, Cu Pong and Cu

Ne, with 4.2% and 3.7% respectively. Company workers mainly work for footwear and garment companies in Buon Ma Thuot city, Ho Chi Minh city or Binh Duong province.

- Day Labourers

Approximately 1.9% (eight of the 411 working people) consider day labour as their main livelivehood. Of which, the number of Ede is higher than that of Kinh people (1.2% verse 0.7% respectively). By commune, a high percentage of day labourers is recorded among the surveyed working population in Cu Ne commune with two Kinh people and three Ede people while there is no people considering day labourer as their main occupation in Ea Sin commune (see Table 9.35).

Common day labour jobs are normally manual work, for example seasonally waged agricultural worker (i.e. coffee picking, weeding, and harvesting) and workers in the construction sites of the wind power projects. Their workplace are mainly in the locality with an average daily wage ranging from VND 180,000 (agricultural works) to VND 300,000 (wind power projects' construction). Especially, wages in rural areas, both in cash terms and in real terms, are generally lower than in cities, and the hours of work are longer (FGDs, wage-based group, Kinh ethnicity, Ea Kung village, Cu Ne commune, 14 July 2021).

- Public Servants

A small number of the surveyed people are public servants (14 people or 3.4%) (see Table 9.35). By ethnicity, the number of Ede people slightly surpasses that of Kinh people (1.9% versus 1.5%). They are teachers, nurses, government officials and currently residing and working in the localities.

9.6.2.1.3 Enterprise-based Livelihoods

Enterprise-based livelihoods are not common in the surveyed areas. Around 4.4% of the working people (18 people including 17 Kinh people and one Ede person) run small businesses. Common business models include groceries, food and beverage services, hair salons, bike repairing service, and sewing services (see Figure 9.46).

A household providing sewing service in Ea Bro village, Cu Pong commune

Grocery store in Cu Hriet village, Cu Pong commune

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.46 Small Businesses in Cu Pong Commune

9.6.2.2 Supplementary Livelihoods

About 32.4% (133 out of 411 working people) have a supplementary occupation. Of which, the number of Ede people surpasses that of Kinh people with 72 people (17.5%) and 61 people (14.8%) respectively. Most of them work as day laborers (71.5% or 95 people) and husbandry (15% or 20

people). In addition, other recorded occupations in the localities are cultivation, small business, and public employment with small proportion at 8.3%, 6.8% and 3% respectively (see Table 9.36). Local surveyed households did not mention about traditional/cultural craft as their supplementary or main livelihood.

Table 9.36 Surveyed Working Population with Supplementary Livelihoods

Supplementary Livelihoods (%)	Cu Ne Commune (N=56)		Cu Pong Commune (N=46)		Ea Sin Commune (N=19)	Chu Kbo Commune (N=12)	All Surveyed Communes (N=133)		All Surveyed Communes (N=133)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Day labourers	3.6	69.6	15.2	56.5	52.6	91.7	22.6	48.9	71.5
Husbandry	0.0	0.0	17.4	0.0	52.6	16.7	15.0	0.0	15.0
Cultivation	7.1	7.1	4.3	0.0	0.0	8.3	5.3	3.0	8.3
Small business	5.4	1.8	8.7	0.0	5.3	0.0	6.0	0.8	6.8
Public servants	1.8	3.6	2.2	0.0	0.0	0.0	1.5	1.5	3.0

Source: Socio-economic survey conducted by ERM, July 2021

Local farmers even own the land on which they work, the tools and equipment they use but their income from agricultural production is insufficient to sustain their households living. They, especially Ede ethnic group, have to seek for extra income sources as day laborers in the locality or out of their residence. Day labourers are seasonal agricultural workers who are both women and men labouring in the crop fields such as weeding, branch chopping, and pesticide spraying. Noticeably, local women are not hired to spray pesticides because this work may effect on women's reproductive health. Men are normally paid higher than women as they can handle heavy works.

The demand for agricultural labour fluctuates with the seasons. Hours of work tend to be extremely long during planting and harvesting, with shorter hours at off-peak times. The FGD findings showed that local day labourers can only work 5-10 days per month and 2-3 months per year.

9.6.3 Income and Expenditure

This section analyses the financial capital of the surveyed households in terms of income, expenditure, and debts. Data from 144 households with 666 people[268] was included in this analysis - 38 people not living in their families and not contributing to household income (including 12 in Cu Ne, 11 in Cu Pong, seven in Ea Sin, and eight in Chu Kbo) were not included in the analysis.

9.6.3.1 Income

9.6.3.1.1 Average Monthly Household Income

The average monthly income of the 144 households is VND 12,066,510 per household and VND 2,608,975 per capita[269] (see Table 9.37). By ethnicity, the average monthly income of Kinh households surpasses that of Ede households (VND 13,488,869 versus VND 10,721,036). Similarly, the average monthly income of a Kinh person is higher than that of an Ede person (VND 3,065,652 versus VND 2,216,080).

268 The 144 surveyed households with 666 people include 49 HHs in Cu Ne with 238 people, 46 HHs in Cu Pong with 213 people, 28 HHs in Ea Sin with 119 people, and 21 HHs in Chu Kbo with 96 people.

269 It is regret that the comparison betwwen the average income of surveyed households and the average income of commune/district levels cannot make due to data unavailability

Table 9.37 Average Monthly Incomes per Household and per Capita

Average Monthly Household Income	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Average monthly income per household (VND)	17,711,736	11,565,000	10,916,296	9,877,072	12,365,595	13,676,032	13,488,869	10,721,036	12,066,510
Average monthly income per capita (VND)	3,935,941	2,325,571	2,519,145	2,100,297	2,909,552	2,991,632	3,065,652	2,216,080	2,608,975
Minimum monthly household income (VND)	1,666,667	708,333	4,200,000	766,667	1,208,333	2,750,000	1,208,333	708,333	708,333
Maximum monthly household income (VND)	53,833,333	81,000,000	18,666,667	46,666,667	43,333,333	25,000,000	53,833,333	81,000,000	81,000,000

Source: Socio-economic survey conducted by ERM, July 2021

The lowest average monthly income per household is VND 708,333 (one Ede household in Cu Ne commune mainly generating income from agricultural production). Meanwhile, the highest monthly income per household is VND 81,000,000 (one Ede household in Cu Ne commune with income source from agricultural production and running business).

9.6.3.1.2 Household Income Structure

Statistically, land-based livelihoods contribute the most significant proportion (80%) to the household income structure as most of the surveyed working population is engaged in land-based works (see Table 9.38). The corresponding shares of the household income structure are 13.8%, 4.7%, and 1.5% for wage-based livelihoods, enterprise-based livelihoods, and other sources (i.e. financial support from children and social allowance).

By ethnicity, this pattern is applied in the two ethnicities while land-based livelihoods are the main income source in both Kinh and Ede groups with 78.3% and 82% respectively. This is followed by wage-based livelihoods with 11.9% for the Kinh households and 15.9% for the Ede households. From enterprise-based livelihoods, Kinh people earn more money than Ede people with the corresponding figures of 7.8% and 1%.

Table 9.38 Average Monthly Household Income Structure

Income Sources (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Land-based livelihoods	67.5	73.6	50.7	91.8	91.6	79.8	78.3	82.0	80.0
Enterprise-based livelihoods	20.4	1.2	18.9	0.8	2.4	1.4	7.8	1.0	4.7
Wage-based livelihoods	11.1	23.8	25.7	6.7	4.0	17.1	11.9	15.9	13.8
Other sources	1.0	1.4	4.7	0.7	2.0	1.7	1.9	1.1	1.5

Source: Socio-economic survey conducted by ERM, July 2021

9.6.3.2 Expenditure

9.6.3.2.1 Average Monthly Household Expenditure

The average monthly expenditure of the 144 households is VND 9,287,404 per household and the VND 2,008,087 per capita (see Table 9.39). By ethnicity, Kinh families' average monthly expenditure exceeds Ede families' one (VND 11,030,071 versus VND 7,683,912), which is equivalent that the average monthly expenditure of a Kinh person is higher than that of an Ede person (VND 2,506,834 versus VND 1,578,998).

The lowest monthly household expenditure is VND 820,000 (one Ede household in Cu Pong commune) while the highest monthly household expenditure is VND 34,700,000 (one Kinh household in Ea Sin commune).

Table 9.39 Average Monthly Expenditures per Household and per Capita

Average Monthly Household Expenditures	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Average monthly expenditure per household (VND)	11,012,153	7,851,378	10,247,037	7,426,491	9,916,518	12,860,635	11,030,071	7,638,935	9,287,404
Average monthly expenditure per capita (VND)	2,447,145	1,578,810	2,364,701	1,579,196	2,333,298	2,813,264	2,506,834	1,578,998	2,008,087
Minimum monthly household expenditure (VND)	2,307,500	1,849,000	3,328,333	820,000	2,108,333	5,336,667	2,108,333	820,000	820,000
Maximum monthly household expenditure (VND)	25,433,333	19,975,000	15,583,333	22,150,000	34,700,000	28,226,667	34,700,000	22,150,000	34,700,000

Source: Socio-economic survey conducted by ERM, July 2021

A number of unexpected or irregular expenses are recorded among 144 surveyed households. Over the last 12 months, 0.5% (seven households) spent around VND 315 million for house refurbishment with an average annual expenditure of around VND 45 million per household (see Table 9.40). Of which, there are five Kinh families and two Ede families spending money on this purpose with the same average amount of expenditure (at VND 45 million per household).

In addition, 17 households (11.8%) spent a total of nearly VND 1,425 million for serious health treatment with an average expense of nearly VND 84 million per household. By ethnicity, the number of Ede families spending on this is twice as much as that of Kinh families (12 versus five households) albeit the total amount that Ede families spent on this expense is much lower than that of Kinh families. Correspondingly, the average expenditure of each Kinh households also exceeds that of Ede households with VND 263 million and VND 9,158,333 respectively.

Furthermore, up to 101 surveyed households (70.1%) invested a total of over VND five billion in production, equivalent to nearly VND 50 million per household. By ethnicity, there are 51 Ede households and 50 Kinh households spending money on this expense with nearly the same total and average amount of expenditure.

Table 9.40 Irregular Expenditures of the Surveyed Households

Irregular Expenditures		All Surveyed Households (N=144)		All Surveyed Communes (N=144)
		Kinh	Ede	
Housing refurbishment	Total Amount (VND)	225,000,000	90,000,000	315,000,000
	Number of Households	5	2	7
	Average (VND)	45,000,000	45,000,000	45,000,000
Serious medical treatment	Total Amount (VND)	1,315,000,000	109,900,000	1,424,900,000
	Number of Households	5	12	17
	Average (VND)	263,000,000	9,158,333	83,817,647
Production investment	Total Amount (VND)	2,445,100,000	2,584,600,000	5,029,700,000
	Number of Households	50	51	101
	Average (VND)	49,900,000	49,703,846	49,799,010

Source: Socio-economic survey conducted by ERM, July 2021

9.6.3.2.2 Household Expenditure Structure

'Food and daily commodities' and 'debt interest payment' are the top spendings in the household expenditure structure, accounting for 31.2% and 22.6% respectively. The remaining (46.2%) goes on 'daily expenses', 'education', 'healthcare', 'clothing, entertainment and community activities' (see Table 9.41).

By ethnicity, this pattern is similar in both Kinh and Ede ethnicities when 'food and daily commodities' and 'debt interest payment' occupy the largest proportions of surveyed families in the two ethnicities. However, Ede households spent more on paying off debt interest (28.3%) compared to Kinh households

(18.4%). In addition, the amount of expenditure that Kinh families invest on education is three time higher than Ede families (15.5% versus 5%).

Table 9.41 Average Monthly Household Expenditure Structure

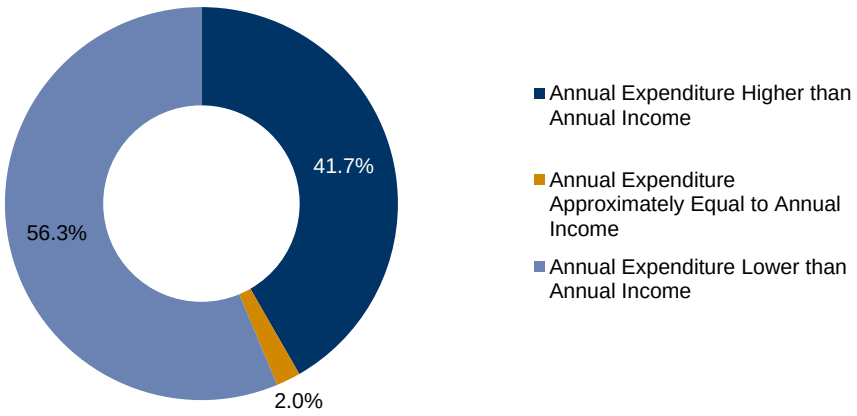
Expenditure Sources (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Food and daily commodities	39.2	29.2	35.6	29.7	33.8	27.2	32.6	29.5	31.2
Debt interest payment	11.3	23.9	12.0	33.0	24.6	17.7	18.4	28.3	22.6
Daily expenses	13.8	16.3	25.0	15.3	18.1	12.7	16.3	15.8	16.1
Education	19.0	4.5	13.1	5.5	10.0	20.3	15.5	5.0	11.1
Clothing, entertainment and community activities	8.9	14.5	12.1	10.5	11.0	8.0	9.7	12.5	10.9
Health care	7.8	11.6	2.2	6.0	2.5	14.1	7.5	8.9	8.1

Source: Socio-economic survey conducted by ERM, July 2021

9.6.3.3 Income and Expenditure Balance

When comparing annual household expenditure against income, about 56.3% of the surveyed households (81 out of the 144 surveyed households) advised that their expenditure is lower than their annual income (see Figure 9.47). Of which, the number of Kinh and Ede households are nearly the same with 40 and 41 households respectively.

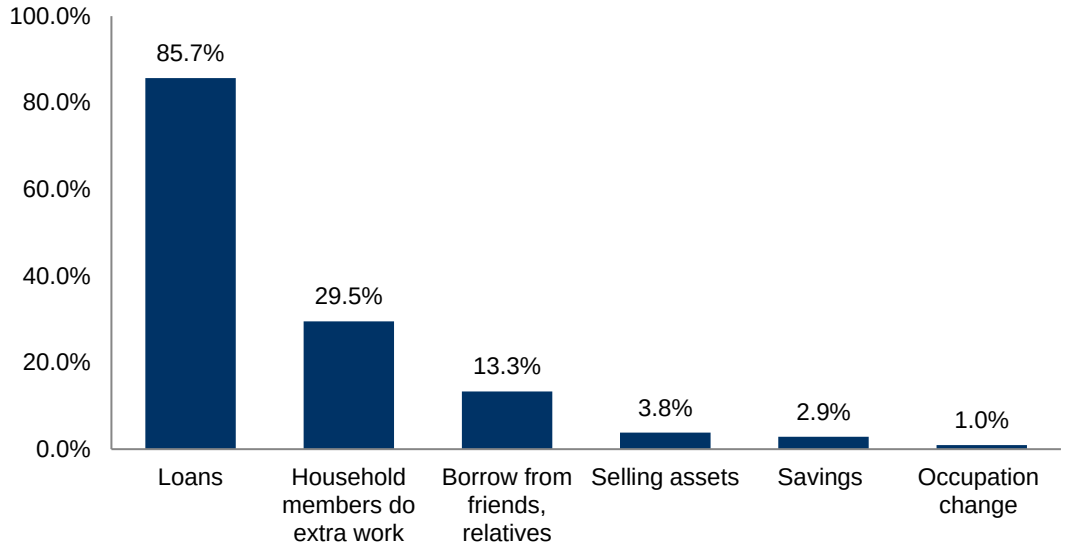
However, around 41.7% or 60 households (including 30 Kinh and 30 Ede families) indicated the opposite that their annual expenditure exceeds their income. In addition, three households (accounting for 2%) have their annual income approximately equal to expenditure.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.47 Household Income and Expenditure Balance

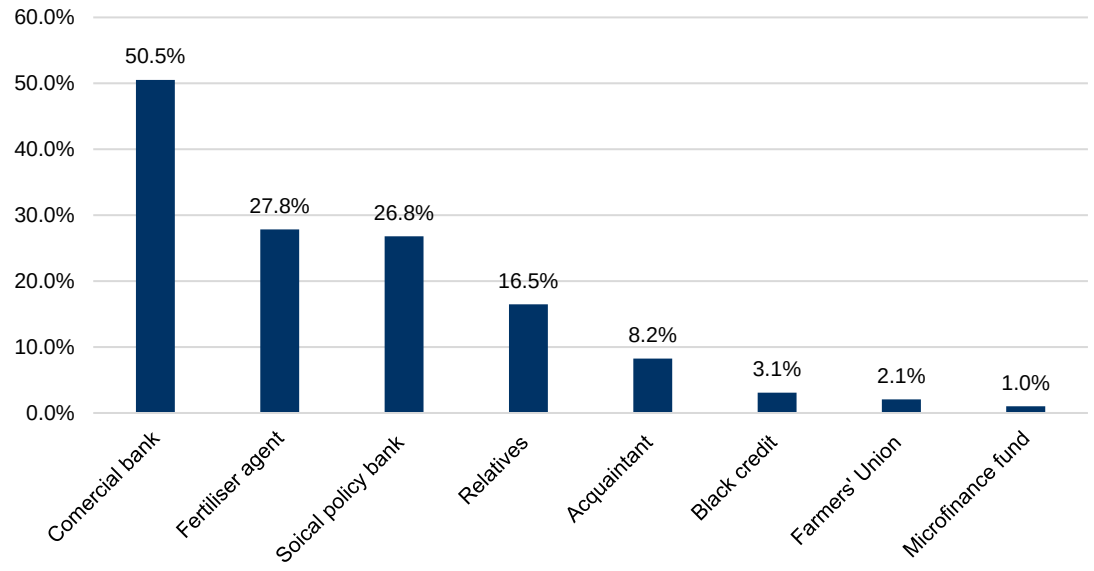
The imbalance between income and expenditure is associated with insufficient income among the 144 surveyed households. Around 72.9% (105 households including 47 Kinh and 58 Ede households) confirmed their financial shortage status within the last three years while the remaining 27.1% stated the opposite. To shorten their financial gap, they can access multiple sources of support. Loans and getting extra work are primary sources (85.7% and 29.5% respectively). In addition, borrowing from friends and relatives, selling assets, using savings, and changing occupation are solutions to cover their expenditure (see Figure 9.48).



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.48 Sources of Household Finance Support

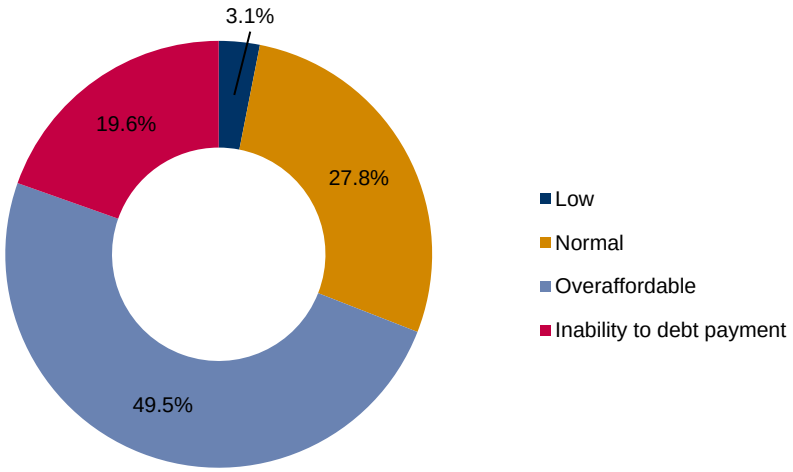
Of the 105 surveyed households having insufficient income, 92.4% (97 households including 43 Kinh and 54 Ede households) are reported to be in debt while the rest households are not (7.6%). Reportedly, commercial banks are the most opted preference with 50.5% (49 households including 25 Kinh and 24 Ede households) (see Figure 9.49). This is followed by fertiliser agents with 27.8% (27 households) and social policy banks with 26.8% (26 households including eight Kinh and 18 Ede households). In addition, relatives and acquaintances are also reported as a source for financial aid with the corresponding figures of 16.5% (16 households including 12 Kinh and four Ede households) and 8.2% (eight households including five Kinh and three Ede households). Moreover, the debts are also from black credit (loans with usurious interest rate), Farmers' Union, and microfinance fund with insignificant proportions.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.49 Sources of Debts among the Surveyed Households

Of 97 households with debts, 26 households provided their detailed debt amount which worth a total of over VND 14 billion - an average debt per household of approximately VND 550 million. Regarding the pressures generated by debts, only 3.1% of 97 surveyed households with debts (including one Kinh and two Ede households) consider their debt pressure to their family to be low, whereas nearly 49.5% or 48 households (including 28 Kinh and 20 Ede households) said that debt payment is beyond their capacity (see Figure 9.50). In addition, 27.8% (12 Kinh and 15 Ede households) confirmed the level of loan pressure is within their affordability. Notably, 19.6% or 19 households with the overwhelming number of Ede households, confirmed that they cannot pay the loans.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.50 Loan Affordability Pressures of the Surveyed Households

The interview findings showed that a significant number of surveyed households get loans from commercial banks because the loan procedures are relatively simple. They use their land use right certificate (LURC) as a deposit for their bank loans. They further explained that the limited amount of loans delivered by social policy banks cannot meet their need for production investment, which force

them to get loans from commercial banks. However, in the reality, many households cannot afford debt payments because of their unprofitable production. Even some households admitted that they no longer have agricultural land because the banks took their land to deduct the debts.

9.6.4 Housing Conditions

9.6.4.1 House Ownership

Most of the interviewed households (134 households or 93.1%) own a private house (see Table 9.42) of which:

- 90 households own LURC for their homestead land;
- 26 households have their house built on their legitimately production land (24 households owning agriculture production land and two households possessing forestry farming land);
- 18 households do not own LURC for their homestead land (as reported by households interviews); and

The remaining 10 households are occupants in their relative's houses (6.9%) including two Kinh households and eight Ede households.

Notably, there are 14 households (including eight Ede households and six Kinh households) owning two houses.

Table 9.42 House Ownership by the Surveyed Household

House Ownership (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Occupant	0.0	10.2	2.2	6.5	3.6	0.0	1.4	5.6	6.9
Privately owned	24.5	65.3	19.6	71.7	96.4	100.0	47.9	45.1	93.1

Source: Socio-economic survey conducted by ERM, July 2021

9.6.4.2 Length of Residence in House

The average length of residence in the house of the surveyed households is 18.9 years. The average residence length of local people in Cu Ne, Cu Pong, and Chu Kbo communes is quite balanced (around 19.1 to 19.7 years). Meanwhile, Ea Sin commune witnesses a smaller number due to a number of non-resident cultivators in the commune (see Table 9.43). The minimum and maximum residence years were one and 65 years respectively and both recorded in Cu Pong commune.

Table 9.43 Length of Residence in the House by the Surveyed Population

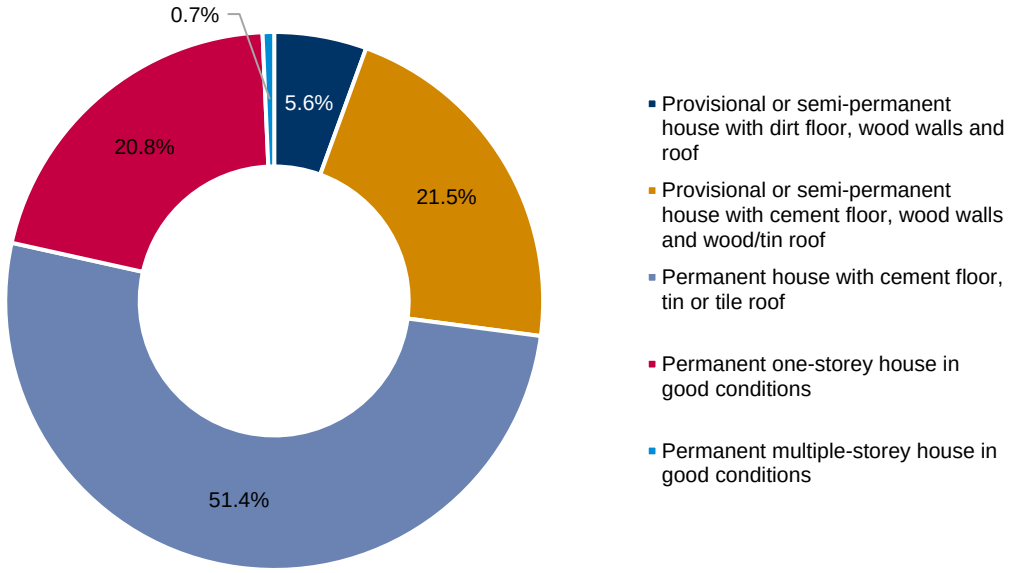
Residence Length	Average Length of Residence (years)	Minimum Length of Residence (years)	Maximum Length of Residence (years)
Cu Ne Commune	19.7	2	57
Cu Pong Commune	19.6	1	65
Ea Sin Commune	16.5	3	27
Chu Kbo Commune	19.1	6	27
All Surveyed Communes	**18.9**	**1**	**65**

Source: Socio-economic survey conducted by ERM, July 2021

9.6.4.3 Housing Types

House conditions in the surveyed areas are relatively in good standards with 72.9% of total surveyed houses are classified as permanent (51.4% permanent houses with cement floor, tin or tile roof, 20.8% permanent one-storey houses, and 0.7% permanent multiple-storey house) (see Figure 9.51). The remaining record 21.5% of households with cement floor, wood walls and wood or tin floor, and about 5.6% of previsional or semi-permanent houses with dirt floor, wood walls and roof (see Figure 9.52). It is noted that Kinh ethnic group have a better house condition than Ede ethnic group.

As observed during the survey, the Ede households live in a traditional stilt house or build a house on the ground like the Kinh. Some also own both types of house including one permanent household with one more stilt house built next to the main house. As shared by a key informant in Cu Hriet village of Cu Pong commune, the change in the construction of houses of the Ede can be explained by the cultural interference between the Kinh and Ede communities. In addition, the construction of traditional stilt houses of the Ede people is very costly because wood materials are increasingly scarce and the expense for building the house is very expensive (KII, Kinh ethnicity, Cu Hriet village, Cu Pong commune, 13 July 2021). The survey also recorded that some households in the surveyed villages buy wood from local stores or local traders or exploit them from forests nearby their house.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.51 Different Housing Types Owned by the Surveyed Household

Semi-permanent, dirt floor, wood walls and roof

Semi-permanent house with cement floor, wood walls wood or tin roof

Permanent house with cement floor, tin or tile roof

Permanent one-storey house in good conditions

Permanent house in good conditions built next to a stilt house

Permanent stilt house in good conditions

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.52 Housing Types in the Surveyed Communes

9.6.4.4 House Materials

As mentioned above, with the majority of houses are in good conditions, cement and brick are commonly used for house construction with the corresponding figure of 87.5% and 75.7% (see Table 9.44). In addition, about 27.8% or 40 households use wood which is normally bought from commercial stores or collected from farming forest areas for construction, 3.5% use leaves, bamboo and rattan. The rest of the respondents, accounting for 9.1% use tile, tin, iron, and steel to build their house.

Table 9.44 House Materials in the Surveyed Communes

House Materials (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	%
Cement	24.5	63.3	19.6	58.7	96.4	95.2	47.2	40.3	87.5
Brick	24.5	53.1	13.0	41.3	92.9	95.2	44.4	31.3	75.7
Woods	0.0	42.9	0.0	4.3	50.0	14.3	11.8	16.0	27.8
Leaves, bamboo, rattan	0.0	4.1	0.0	4.3	0.0	4.8	0.7	2.8	3.5
Others	2.0	6.1	4.3	2.2	14.3	9.5	6.3	2.8	9.1

Source: Socio-economic survey conducted by ERM, July 2021

9.6.4.5 Household Vehicles

Most of the surveyed households own motorbikes, accounting for 95.8% or 138 households. Specially, all of the surveyed households in Ea Sin and Chu Kbo communes own at least one motorbike in their house (see Table 9.45). In addition, 17.3% use bicycle and 2.1% use electric bicycles for daily commuting. A very modest number of households own high-value vehicles, such as cars (1.4% or one Kinh and one Ede households) and truck (0.7% or one Kinh household). Noticeably, four Ede households, accounting for 2.8% do not own any vehicle.

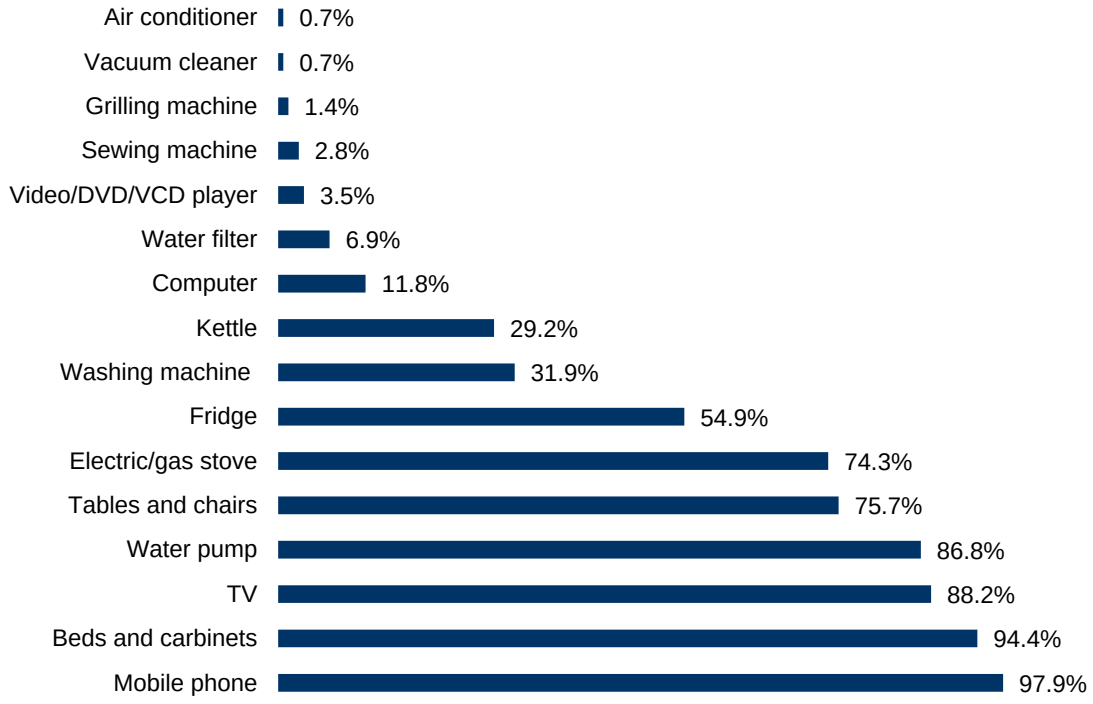
Table 9.45 Household Vehicles Owned by the Surveyed Household

Household Vehicles (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Motorbike	22.4	73.5	21.7	69.6	100.0	100.0	48.6	47.2	95.8
Bicycle	8.2	14.3	2.2	8.7	28.6	4.8	9.7	7.6	17.3
Electric bicycle	2.0	0.0	0.0	0.0	3.6	4.8	2.1	0.0	2.1
Car	2.0	0.0	0.0	2.2	0.0	0.0	0.7	0.7	1.4
Truck	2.0	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.7
No vehicle	0.0	0.0	0.0	8.7	0.0	0.0	0.0	2.8	2.8

Source: Socio-economic survey conducted by ERM, July 2021

9.6.4.6 Household Utilities

The majority of the surveyed households own a communication device (mobile phones with 97.9%) and home appliances (beds and cabinets, coloured televisions, tables and chairs, stove, and fridges). About 86.8% of the surveyed households have water pumps to take groundwater source from bore holes or dug wells for daily use (see Figure 9.53). Apart from that, the surveyed households, mostly Kinh families, also have washing machines (31.9%), kettles (29.2%), computers (11.8%), water filters (6.9%), video, DVD, or VCD players (3.5%), sewing machines (2.8%), grilling machines (1.4%), vacuum machines (0.7%), and air conditioners (0.7%).



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.53 Household Utilities Owned by the Surveyed Household

9.6.4.7 Household Assets

Most of the surveyed households (93.1% or 134 households) possess residential houses. In addition, about 97.9% own land plots for both agricultural production and residence purposes. Approximately 67.4% possess agricultural equipment serving for farming activities (see Table 9.46). Furthermore, 54.9% own animals or poultries, 12.5% have ponds or lakes, 3.5% have savings, and 10.4% have rented land plots.

Table 9.46 Ownership of Household Assets

Household Assets (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Residential house	24.5	65.3	19.6	71.7	96.4	100.0	47.9	45.1	93.1
Land plots	24.5	75.5	19.6	73.9	100.0	100.0	48.6	49.3	97.9
Agricultural equipment	16.3	51.0	10.9	54.3	75.0	61.9	32.6	34.7	67.4
Animal/Poultry	8.2	42.9	15.2	39.1	71.4	42.9	27.8	27.1	54.9
Pond/lake	4.1	10.2	0.0	8.7	21.4	4.8	6.3	6.3	12.5
Savings	2.0	4.1	0.0	0.0	3.6	4.8	2.1	1.4	3.5
Land plots (rented)	2.0	8.2	2.2	13.0	7.1	4.8	3.5	6.9	10.4

Source: Socio-economic survey conducted by ERM, July 2021

9.6.4.8 Electricity Supply

The electricity coverage reaches 100% among the surveyed households. About 119 households or 82.6% accessed the national electricity grid. 100% Ede ethnic households access the national electricity grid. Meanwhile, the remaining 25 households, mostly from Ea My village of Ea Sin commune (17.4%) purchase electricity from a local household who directly purchase electricity from the national grid and resell to other local households. For these households in Ea My village, they have to pay VND 3,500 per kWh to a private third party, which is much higher than that provided by the official electricity retail prices ranging from approximately VND 1,600 VND to VND 3,000 VND per kWh (KII, male respondent, Kinh ethnicity, Ea My village, Ea Sin commune, 14 July 2021) (see further in Section 9.5.4).

9.6.4.9 Water Supply

All surveyed households use ground water for daily use (68.8% use dug wells and 32% possess borehole wells) due to no piped water system being recorded. In addition, they can access multiple additional sources of water such as 20 litre bottled water (13.9%), rain water (2.8%), and water from river, spring, lake nearby their house (2.1%) (see Table 9.47 and Figure 9.54).

Table 9.47 Local Water Sources of Surveyed Households

Water Sources (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Ground water (Dug well)	16.3	51.0	13.0	54.3	71.4	71.4	34.1	34.7	68.8
Ground water (Borehole well)	8.2	24.5	10.9	23.9	28.6	28.6	16.0	16.0	32.0
20 litre bottled water	4.1	12.2	4.3	6.5	7.1	23.8	7.6	6.3	13.9
Rainwater	0.0	0.0	2.2	4.3	3.6	0.0	1.4	1.4	2.8
River, spring, lake	0.0	2.0	0.0	0.0	7.1	0.0	1.4	0.7	2.1

Source: Socio-economic survey conducted by ERM, July 2021


Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.54 Groundwater from Borehole Wells in Drah 1 Village, Cu Ne Commune

9.6.4.10 Sources of Cooking Energy

Firewood is the most common source of cooking energy for the surveyed households with 76.4% (see Table 9.48 and Figure 9.55). The surveyed households collect firewood from production areas or surrounding areas nearby their house. Around 69.4% or 100 households use gas and other 61.1% or 88 households apply electricity for cooking. Less commonly, only 1.4% use charcoal and 0.7% use straw.

Table 9.48 Cooking Energy Sources of the Surveyed Households

Cooking Energy Source (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Firewood	8.2	67.3	13.0	67.4	71.4	31.4	31.9	44.5	76.4
Gas	24.5	38.8	19.6	34.8	68.6	57.1	45.1	24.3	69.4
Electricity	14.3	38.8	13.0	45.7	51.4	48.6	33.3	27.8	61.1
Charcoal	0.0	0.0	2.2	0.0	2.9	0.0	1.4	0.0	1.4
Straw	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.7	0.7

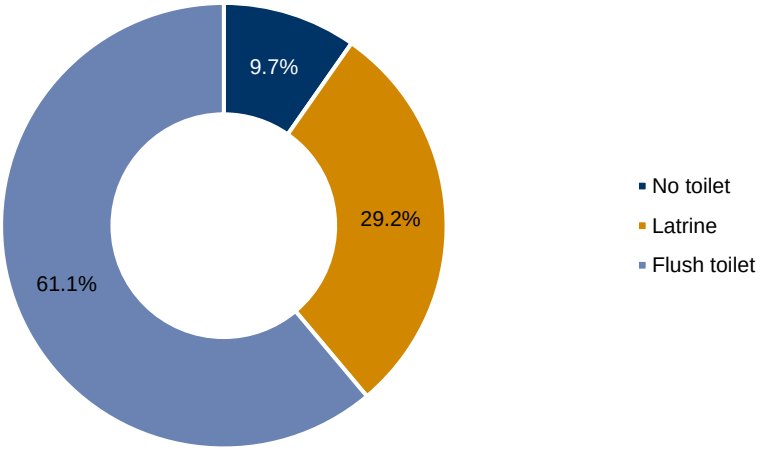
Source: Socio-economic survey conducted by ERM, July 2021

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.55 Firewood for Domestic Use

9.6.4.11 Toilet Conditions

Statistically, 88 of the 144 surveyed households (61.1%) use flush toilets and 42 households or 29.2% have latrines. The remaining 14 households (9.7%) do not have any private toilets (see Figure 9.56). As a result, there is outside defecation in garden areas, in fields or in the forest or some households share toilets with their relatives or neighbours.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.56 Toilet Conditions among the Surveyed Households

9.6.5 Land Holdings

The surveyed households possess different types of land including agriculture land (for annual crops, perennial crops, and forestry farming land) and non-production land (residential and gardening land) (see Table 9.49). It is noted that 26 out of the 144 surveyed households have their residential houses built on production land; of which three households have their houses on annual crop production land, 21 households with houses on perennial crop production land, and two households with houses on forestry farming land.

Table 9.49 Different Types of Land Holdings of the Surveyed Households

Land Types	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Average agricultural land for annual crops per household (m^2)	5,000	9,083	16,933	13,950	500	19,286	15,942	11,412	13,286
Average agricultural land for perennial crops per household (m^2)	16,389	16,453	11,421	22,379	22,635	15,169	18,514	18,740	18,630
Average forestry farming land per household (m^2)	30,000	27500	0	36000	22950	0	43,633	30,333	27,817

Land Types	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Average residential and garden land per household (m^2)	285	1,176	2,468	1,631	971	566	804	1,407	4,737

Source: Socio-economic survey conducted by ERM, July 2021

9.6.5.1 Agricultural Land for Annual Crops

Only 30 out of the 144 surveyed households own agricultural land for annual crops, accounting for 20.8%. Of these households, the average land per households is 13,286 m^2, the largest land area is 50,000 m^2 in Cu Pong commune (Ede household), and the smallest area is 500 m^2 as recorded in one Kinh household residing in Ea Sin commune (see Table 9.50).

About 86.7% or 26 households having a LURC for annual crops land, in which two households in Cu Ne commune, one household in Cu Pong commune, and one household in Chu Kbo commune do not have LURCs for their annual crop cultivation land. Main annual crops are maize and banana.

Table 9.50 Annual Crops Land Ownership of the Surveyed Households

Agricultural Land for Annual Crops	Cu Ne Commune (N=7)		Cu Pong Commune (N=15)		Ea Sin Commune (N=1)	Chu Kbo Commune (N=7)	All Surveyed Communes (N=30)		All Surveyed Communes (N=30)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Average area per household (m^2)	5,000	9,083	16,933	13,950	500	19,286	15,942	11,412	13,286
No. of households with LURCs	1	4	3	11	1	6	11	15	26
Largest area (m^2)	5,000	30,000	20,800	50,000	500	30,000	30,000	50,000	50,000
Smallest area (m^2)	5,000	1,500	10,000	1,000	500	10,000	500	1,000	500

Source: Socio-economic survey conducted by ERM, July 2021

9.6.5.2 Agricultural Land for Perennial Crops

Most surveyed households own agricultural land for perennial crops such as coffee, durian, avocado, pepper, macadamia, and jackfruit, occupying 74.3% or 107 households. The average land for perennial crops of these 107 households are 18,630 m^2, of which Ea Sin commune witnesses the largest area with 200,000 m^2, while Cu Ne commune have the smallest land area with 13 m^2 (see Table 9.51).

About 95 households have a LURC for their perennial land, accounting for 88.8%. Furthermore, one household in Cu Ne, three households in Cu Pong, and one household in Ea Sin commune have rented land or temporarily used land, while three households in Cu Ne, one household in Cu Pong, one household in Ea Sin, and two households in Chu Kbo commune are farming perennial crops on land areas without LURC.

Table 9.51 Perennial Crops Land Ownership of the Surveyed Households

Agricultural Land for Perennial Crops	Cu Ne Commune (N=38)		Cu Pong Commune (N=31)		Ea Sin Commune (N=25)	Chu Kbo Commune (N=13)	All Surveyed Communes (N=107)		All Surveyed Communes (N=107)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Average area per household (m^2)	16,389	16,453	10,361	22,213	22,635	15,169	18,240	19,013	18,630
No. of households with LURCs	8	26	6	21	23	11	48	47	95
Largest area (m^2)	40,000	70,000	30,000	50,000	200,000	40,000	200,000	70,000	200,000
Smallest area (m^2)	13	3,000	4,700	4,000	2,720	1,500	13	3,000	13

Source: Socio-economic survey conducted by ERM, July 2021

9.6.5.3 Forestry Farming Land

Of the 144 surveyed households, only a small number of households confirmed as having forestry farming land, accounting for 4.2% or six households (three Kinh households and three Ede households). Noticeably, no surveyed household in Chu Kbo claimed as owning forestry farming land by any means. In addition, only one Ede household in Cu Ne commune does not own a LURC of the land.

The average area per household for forestry farming land in the surveyed communes is 27,817 m^2, in which one Ede household in Cu Ne commune possess the largest land with 40,000 m^2, while the smallest land area belongs to a Kinh household residing in Ea Sin commune with 14,900 m^2(see Table 9.52).

Table 9.52 Farming Forestry Land Ownership of the Surveyed Households

Agricultural Land for Farming Forestry	Cu Ne Commune (N=3)		Cu Pong Commune (N=1)	Ea Sin Commune (N=2)	All Surveyed Communes (N=6)		All Surveyed Communes (N=6)
	Kinh	Ede	Ede	Kinh	Kinh	Ede	
Average area per household (m^2)	30,000	27500	36000	22950	43,633	30,333	27,817
No. of households with LURCs	1	1	1	2	3	2	5
Largest area (m^2)	30,000	40,000	36,000	31,000	31,000	40,000	40,000
Smallest area (m^2)	30,000	15,000	36,000	14,900	14,900	15,000	14,900

Source: Socio-economic survey conducted by ERM, July 2021

9.6.5.4 Residential and Gardening Land

The majority of the surveyed households (75% or 108 households) own their residential and gardening land with the average area of 4,737 m^2. The largest residential and gardening area is 10,000 m^2 in Cu Pong commune (Ede household) and the smallest land area is 7 m^2 in Ea Sin commune (Kinh household). The LURC ownership rate of residential and gardening land is 83.3% or 90 households (see Table 9.53).

During the survey, the other 28 households not owning the residential and gardenning land area build their house on agricultural land area (including annual and perennial crop land) or farming forestry land.

Table 9.53 Residential and Gardening Land Ownership of the Surveyed Households

Residential and Gardening Land	Cu Ne Commune (N=41)		Cu Pong Commune (N=35)		Ea Sin Commune (N=13)	Chu Kbo Commune (N=19)	All Surveyed Communes (N=108)		All Surveyed Communes (N=108)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Average area per household (m^2)	285	1,176	2,468	1,631	971	566	804	1,407	4,737
No. of households with LURCs	10	22	5	23	13	17	45	45	90
Largest area (m^2)	500	5,000	5,100	10,000	8,000	4,100	8,000	10,000	10,000
Smallest area (m^2)	10	30	340	24	7	10	7	24	7

Source: Socio-economic survey conducted by ERM, July 2021

9.6.6 Health Care

9.6.6.1 Common Health Issues and Risks

More than a half of the surveyed population having health issues over the past 12 months, accounting for 53.6% or 377 people. Significantly, the majority have at least one health issue with 68.4% or 258 people, while about 22% or 83 people have two health issues. Lastly, a number of 36 surveyed people have about three to seven health issues (24 people with three issues, six people with four health issues, one person with five health issues, and one person with seven health issues) (see Table 9.54).

Table 9.54 Surveyed Population with Health Issues

Health Issues	Surveyed Population (N=377)	
	N	%
People with one health issue	258	68.4
People with two health issues	83	22.0
People with over two health issues	36	9.6

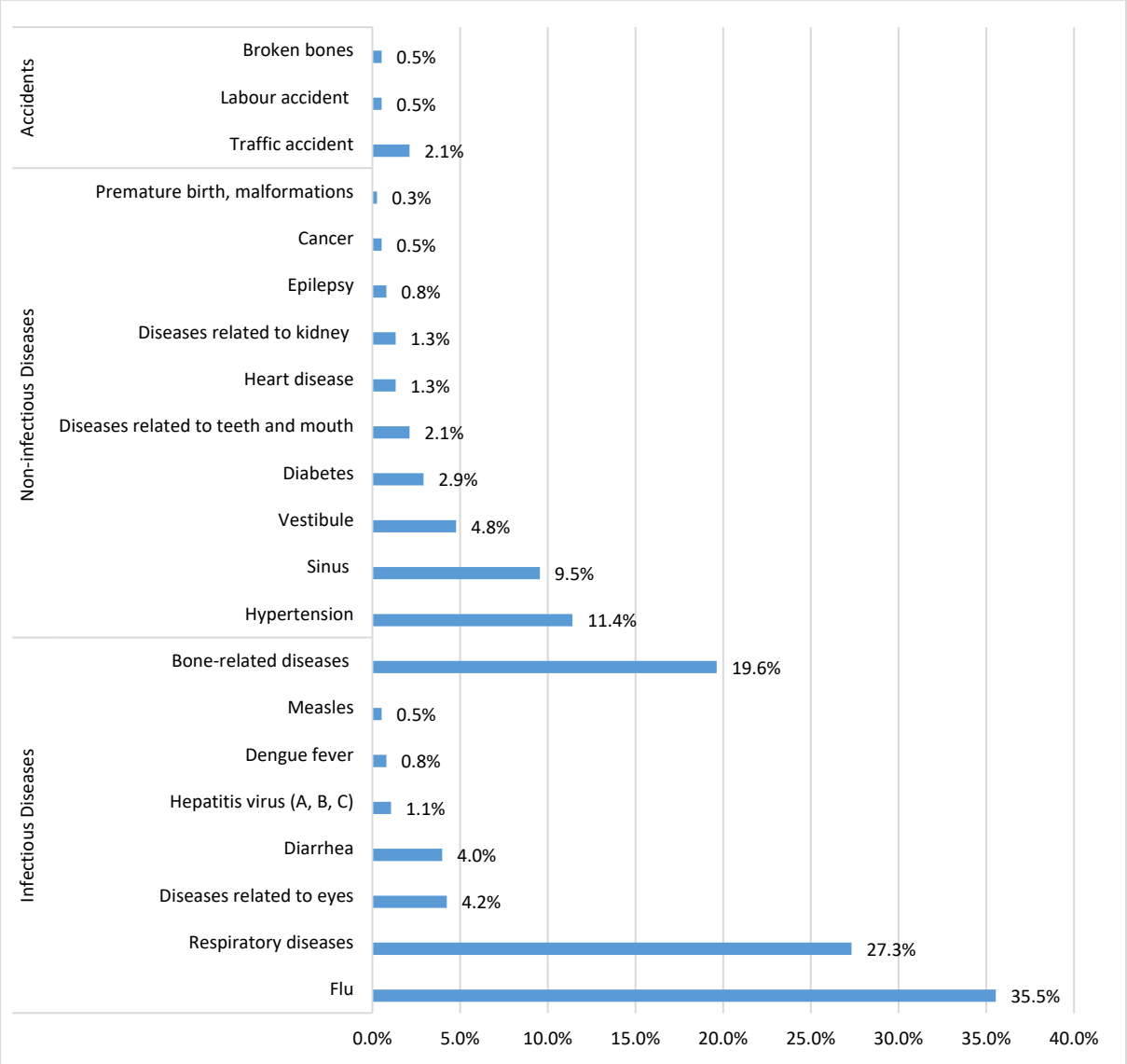
Source: Socio-economic survey conducted by ERM, July 2021

Most common diseases are flu with 134 people or 35.5%, respiratory diseases with 103 people or 27.3% (infectious diseases), sinus with 36 people or 9.5%, bone-related diseases with 74 people or 19.6%, and hypertension with 43 people or 11.4% (non-infectious diseases) (see Figure 9.57). In addition, some diseases are reported including diarrhea, hepatitis virus (A, B, C), dengue fever, measles, eyes-related diseases, premature birth or malformations, vestibule, diabetes, teeth and mouth related diseases, heart diseases, kidney-related diseases, epilepsy, and cancer.

Other diseases included catastrophe, meningitis, colon-related diseases, stomach-related diseases, hemorrhoids, chickenpox, pneumonia, steatosis, gallbladder-related diseases, gynecological-related disease, brain tumors, nerve-related diseases, appendicitis, congenital hemolytic anemia, asthma, goiter, tonsils-related diseases, insomnia, metritis, sciatica pain, inflammatory bowel disease, anemia, pharyngitis county, high liver enzymes, and legs varicose veins.

For accidents, eight people or 2.1% suffered from traffic accidents from the past 12 months. Furthermore, two people or 0.5% get labour accident, while the same number have their leg broken due to falling.

A small number of the 704 surveyed population is recorded with unhealthy living habits. Significantly, 38 people or 5.4% are addicted to tobacco, while 23 people or 3.3% are recorded as alcoholism. Noticeably, two people are suffering from malnutrition, and one person is abusing drugs.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.57 Types of Common Diseases among the Surveyed Population

9.6.6.2 Visit to Health Establishments

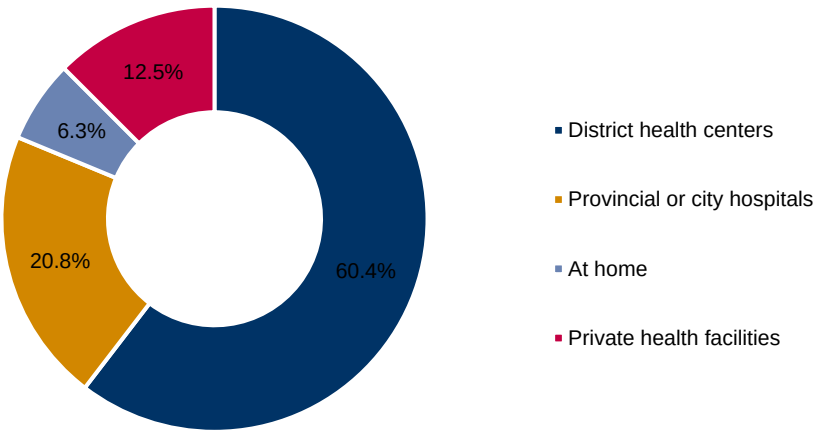
Most of the surveyed households choose to visit district health center (mostly Buon Ho health center) for health check-ups and treatment, accounting for 70.1% or 101 households (33.3% from Kinh households and 36.8% from Ede households) (see Table 9.55). In addition, private health facilities, communal health stations, and provincial or city hospitals are selected by the surveyed households when they have any health problems with the corresponding figures of 19.4%, 17.4%, and 14.6% respectively. About 2.8% visit central hospitals, and 0.7% (one Kinh household) do not visit any health establishment due to no health issue being recorded over the last 12 months.

Table 9.55 Visit to Health Establishments by the Surveyed Household

Visit to Health Establishments (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
District health center	20.4	55.1	13.0	54.3	64.3	71.4	34.0	36.1	70.1
Private health facilities	0.0	16.3	4.3	19.6	14.3	23.8	7.6	11.8	19.4
Communal health station	0.0	16.3	2.2	21.7	14.3	9.5	4.9	12.5	17.4
Provincial or city hospital	6.1	4.1	6.5	6.5	28.6	9.5	11.1	3.5	14.6
Central hospital	2.0	2.0	0.0	2.2	3.6	0.0	1.4	1.4	2.8
No visit	0.0	0.0	0.0	0.0	3.6	0.0	0.7	0.0	0.7

Source: Socio-economic survey conducted by ERM, July 2021

Out of the 144 surveyed households, 33.3% of them had their youngest members delivered/born within the past five years of 2017 - 2021. The majority of the surveyed households selected the district health center and provincial or city hospitals as the place of birth for their youngest members, accounting for 60.4% and 20.8% respectively (see Figure 9.58). For the cases that they cannot get to medical facilities in time, so they choose to give birth at home or go to the nearest birthplace (i.e. private health facilities). Around 12.5% (including four Ede households and two Kinh households) have their youngest members born at private health facilities. Less commonly, 6.3% or there households were born at at home, occupying 6.3%.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.58 Birthplaces of the Youngest Family Members Born within the Last Five Years (2017-2021)

9.6.6.3 Healthcare Treatment Practice

Traditional health treatment is not popular among the surveyed households. Only 7.6% or 11 households confirmed as having traditional medical treatment. In details, three Kinh households (one in Ea Sin and two in Chu Kbo) and eight Ede households (six in Cu Ne and two in Cu Pong) practice traditional medicine treatments such as acupuncture, worshiping spirits, visit to fortunetelling places, and drinking Amakong medicine liquor - medicinal herbs liquor discovered by AmaKong who was an expert in taming and catching wild elephants in the Central Highlands, which helps to relieve mainly bone-related pains.

9.6.7 Access to Public Infrastructure

This section analyses local evaluation of public infrastructure (electricity supply, roads, schools, health stations, water supply, waste collection, internet and telecommunication services, and local markets) on the Likert 5-point rating scale from very good to very bad based on data collected from 144 households.

9.6.8 Local Electricity Supply

The surveyed respondents generally evaluate the quality of electricity supply as very good (9%), good (54.2%), and normal (20.1%) (see Table 9.56). Notably, a remarkable proportion of respondents is displeased with electricity supply with 14.6% rating ‘bad’ and 0.7% rating ‘very bad’. Most of these households claimed that they have to pay a higher electricity price. Especially, as mentioned in Section 9.5.4.3.2, apart from the expense of electricity line installation, the households in Ea Mak area of Ea My village have to pay VND 3,500 per kWh which is much higher than that provided by the official electricity retail prices ranging from approximately VND 1,600 VND to VND 3,000 VND per kWh. This occupies a considerable amount of the surveyed households’ expenditure. In addition, as shared by the surveyed households, the electricity quality is unstable and does not meet their needs for farming, especially in the dry season. About 1.4% do not raise any opinion or evaluation on the quality of electricity supply.

Table 9.56 Evaluation of Electricity Supply by the Surveyed Household

Evaluation of Electricity Supply	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Very good	6	12.2	6	13.0	0	0.0	1	4.8	13	9.0
Good	34	69.4	25	54.3	8	28.6	11	52.4	78	54.2
Normal	7	14.3	9	19.6	7	25.0	6	28.6	29	20.1
Bad	2	4.1	5	10.9	11	39.2	3	14.2	21	14.6
Very bad	0	0.0	0	0.0	1	3.6	0	0.0	1	0.7
No opinion	0	0.0	1	2.2	1	3.6	0	0.0	2	1.4

Source: Socio-economic survey conducted by ERM, July 2021

9.6.8.1 Local Roads

Solid infrastructure, specifically well-constructed and well-maintained roads, are key to the functioning of a local economy, especially farming households. However, residents in the surveyed areas are less likely to be satisfied with the rural road system when most of them evaluate it as ‘bad’ (43.1%) and ‘very bad’ (2.8%) (see Table 9.57). A large number of concreted inner village roads have been heavily degraded while some branches of roads in other villages are even still unconcreted and muddy in the rainy season, making difficulties in local mobility and accessibility of cultivation area (FGDs, vulnerable

groups, Ede and Kinh ethnicities, Cu Hriet village of Cu Pong commune and Kdro 2 of Cu Ne commune, 13 and 15 July 2021) (see Figure 9.59). However, there are a significant proportion of respondents feeling satisfied with the local rural roads system with 31.3% for 'good' and 2.8% for 'very good'. Some 19.5% considered that the conditions of local roads are 'normal'.

Table 9.57 Evaluation of Local Roads by the Surveyed Household

Evaluation of Local Road	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Very good	1	2.0	2	4.3	0	0.0	1	4.8	4	2.8
Good	21	42.9	12	26.1	4	14.3	8	38.1	45	31.3
Normal	7	14.3	8	17.4	6	21.4	7	33.3	28	19.4
Bad	20	40.8	23	50.0	14	50.0	5	23.8	62	43.1
Very bad	0	0.0	0	0.0	4	14.3	0	0.0	4	2.8
No opinion	0	0.0	1	2.2	0	0.0	0	0.0	1	0.6

Source: Socio-economic survey conducted by ERM, July 2021

A concreted road in Kdro 2 village, Cu Ne commune

A muddy road in Ea My village, Ea Sin commune

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.59 Local Roads in the Surveyed Communes

9.6.8.2 Local Schools

The quality of local schools is evaluated in terms of teaching and learning facilities, teaching quality, and the school surrounding environment. The local schools in the surveyed communes receive high satisfaction from the surveyed inhabitants when a half of the surveyed respondents (50%) rank it as 'good' and 6.9% rate 'very good' (see Table 9.58).

However, there is still a small number of the surveyed respondents ranking local schools as 'bad' and 'very bad', accounting for 12.5% and 0.7% respectively. They explained that many local schools are currently in poor conditions with obsolete and crumbling facilities and those have not been renovated or modernised due to lack of renovating funds. For example, in Drah 1 village, the community house is used as a kindergarten. This force the kindergarten to be temporarily closed whenever the community house is occupied for community meetings or events. Meanwhile, in Kdro 2 village, due to lack of

facilities, children have to bring along their own lunch meal when attending kindergarten (FGD, vulnerable group, Kinh and Ede ethnicities, Kdro 2 village, Cu Ne commune, 15 July 2021). In addition, from the household interviews in Cu Hriet village, some households are concerned about the distance to lower secondary school which is too far for children to travel safely while there is no available transport service in the localities or not all parents can afford for this service. This could impede local pupil's attendance.

Table 9.58 Evaluation of Local Schools by the Surveyed Household

Evaluation of Local Schools	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Very good	3	6.1	6	13.0	0	0.0	1	4.7	10	6.9
Good	33	67.3	19	41.3	6	21.4	14	66.7	72	50.0
Normal	8	16.3	17	37.0	8	28.6	3	14.3	36	25.0
Bad	4	8.2	1	2.2	11	39.3	2	9.5	18	12.5
Very bad	0	0.0	0	0.0	1	3.6	0	0.0	1	0.7
No opinion	1	2.1	3	6.5	2	7.1	1	4.8	7	4.9

Source: Socio-economic survey conducted by ERM, July 2021

9.6.8.3 Local Health Stations

The quality of local health stations is assessed in terms of medicine quality, staff's attitude, and medical equipment. Overall, the surveyed respondents are highly satisfied with the conditions of health stations in the surveyed communes (53.4% as 'good' and 5.6% as 'very good') (see Table 9.59). However, 11.8% of the respondents hold the opposite opinion because medical equipment and medicine resources at the communal health stations are supposed to be inadequate (FGD, vulnerable group, Kinh and Ede ethnicities, Kdro 2 village, Cu Ne commune, 15 July 2021). Other 5.5% surveyed households have no opinion on this term.

In addition, commune-level health stations only provide basic health services such as medical tests or vaccination while complicated medical issues are normally handled by high-level health establishments with adequate medical equipment (FGD, vulnerable group, Ede ethnicity, Cu Hriet village, Cu Pong commune, 13 July 2021). Local people seldom visit the communal health station but prefer to take medical examination and treatment in provincial and district hospitals or private clinics in Buon Ho district-level town, which is around 5 km away from the locality (FGD, vulnerable group, Kinh ethnicity, Kty4 village, Chu Kbo commune, 15 July 2021).

Table 9.59 Evaluation of Local Health Stations by the Surveyed Household

Evaluation of Local Health Stations	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N		N	%	N	%	N	%
Very good	1	2.0	5	10.9	0	0.0	2	9.5	8	5.6
Good	39	79.6	14	30.4	12	42.9	12	57.1	77	53.5
Normal	7	14.3	14	30.4	8	28.6	5	23.8	34	23.6

Evaluation of Local Health Stations	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N		N	%	N	%	N	%
Bad	2	4.1	8	17.4	6	21.4	0	0.0	16	11.1
Very bad	0	0.0	0	0.0	0	0.0	1	4.8	1	0.7
No opinion	0	0.0	5	10.9	2	7.1	1	4.8	8	5.5

Source: Socio-economic survey conducted by ERM, July 2021

9.6.8.4 Local Water Supply

The majority of the surveyed respondents are satisfied with their home water supply and rank it as 'good' and 'very good', accounting for 33.4% and 2.8% respectively (see Table 9.60).

However, 19.4% and 6.9% of the respondents rank the quality of water supply as 'bad' and 'very bad' respectively. From field observation, the main water source in the localities is ground water (from mainly dug wells) (see Figure 9.60). While some stated that this water source is safe for their daily use, the others are afraid that it might be alum-contaminated or polluted due to pesticide penetration. In addition, they also complained about the water shortage commonly occurring in the dry season (from August to January of the following year), which may increase risks of drought (FGD, vulnerable group, Ede ethnicity, Cu Hriet village, Cu Pong commune, 13 July 2021).

Table 9.60 Evaluation of Local Water Supply by the Surveyed Household

Evaluation of Water Supply	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Very good	0	0.0	2	4.3	0	0.0	2	9.5	4	2.8
Good	12	24.5	15	32.6	10	35.7	11	52.5	48	33.4
Normal	15	30.6	10	21.7	7	25.0	4	19.0	36	25.0
Bad	12	24.5	9	19.6	7	25.0	0	0.0	28	19.4
Very bad	3	6.1	6	13.0	1	3.6	0	0.0	10	6.9
No opinion	7	14.3	4	8.8	3	10.7	4	19.0	18	12.5

Source: Socio-economic survey conducted by ERM, July 2021

A dug well in Drah 1 village, Cu Ne commune

A dug well in Kty4 village, Chu Kbo commune

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.60 Water Supply in the Surveyed Communes

9.6.8.5 Local Waste Collection Services

Waste management practices in the surveyed villages remain relatively rudimentary with trash mostly just being collected and disposed in open dumping and burning. Among the surveyed villages, only Ea Kung village (Cu Ne commune) and Kty 4 village (Chu Kbo commune) have waste collection service. Out of the surveyed households, there are 16 households experiencing this service, of which 13 households are satisfied with 12 votes for 'good' and one vote for 'very good' while the three remaining give the neutral option (see Table 9.61). The rest of surveyed households have no opinion for this service because they do not access it.

Reportedly, due to the absence of solid waste management, the local residents in Kdro 2 village discharge their household waste in the roadside of National Road 14, which is collected around two to four times per month by the communal waste collection service (FGD, vulnerable group, Kinh and Ede ethnicity, Kdro 2 village, Cu Ne commune, 15 July 2021). Meanwhile, households living in inner village roads treat their domestic waste by burning or landfilling (FGD, vulnerable group, Ede ethnicity, Cu Hriet village, Cu Pong commune, 13 July 2021) (see Figure 9.61). Those methods have proven to be harmful to human health and the environment but local people feel they have no other options to treat their solid waste.

Local villagers in Ea Bro village stated that even when the service is available in some parts of residential areas, indiscriminate littering occurs due to limited awareness of local people on environment protection (FGD, women group, Ede ethnicity, Ea Bro village, Cu Pong commune, 13 July 2021).

Table 9.61 Evaluation of Local Waste Collection Services by the Surveyed Household

Evaluation of Local Waste Collection Services	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Very good	0	0.0	0	0.0	0	0.0	1	4.8	1	0.7
Good	4	8.2	0	0.0	0	0.0	8	38.1	12	8.3
Normal	1	2.0	0	0.0	0	0.0	2	9.5	3	2.1
Bad	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0

Evaluation of Local Waste Collection Services	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Very bad	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
No opinion	44	89.8	46	100.0	28	100.0	10	47.6	128	88.9

Source: Socio-economic survey conducted by ERM, July 2021

Waste in the sewer in Cu Hriet village, Cu Pong commune

Local households burn their daily waste in Kdro 1 village, Cu Ne commune

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.61 Waste Treatment in the Surveyed Communes

9.6.8.6 Internet and Telecommunication Services

A considerable proportion of respondents did not evaluate the local internet network and telecommunication services in the surveyed areas (69 respondents or 47.9%) as they do not use or have no opinion about them. Forty-one respondents (28.5%) rank the services as 'good' and 'very good' respectively. Some 14.6% evaluate the services as 'normal'. In addition, only 13 respondents express their dissatisfaction with the internet services (9%). As shared by the respondents in Ea My village, the mobile connection in the locality is relatively weak (see Table 9.62).

Table 9.62 Evaluation of Internet and Telecommunication Services by the Surveyed Household

Evaluation of Internet and Telecommunication	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Very good	0	0.0	1	2.3	0	0.0	1	4.7	2	1.4
Good	17	34.7	8	17.4	3	10.7	11	52.4	39	27.1
Normal	8	16.3	7	15.2	3	10.7	3	14.3	21	14.6
Bad	2	4.1	3	6.5	5	17.9	1	4.8	11	7.6

Evaluation of Internet and Telecommunication	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Very bad	0	0.0	2	4.3	0	0.0	0	0.0	2	1.4
No opinion	22	44.9	25	54.3	17	60.7	5	23.8	69	47.9

Source: Socio-economic survey conducted by ERM, July 2021

9.6.8.7 Local Markets

The findings from the household survey, KIIs, and FGDs revealed that there is no official market in the surveyed communes. Local households get food and daily stuffs in local groceries or temporary markets privately set up (see Figure 9.62). For further needs, local people have to go shopping in Buon Ho market (located in Buon Ho district-level town) or Pong Drang market (located in Pong Drang commune, Krong Buk district).

Of the 144 respondents, 73 people have negative opinion on the temporary market conditions (50.7%) in the localities due to lack of goods diversity while only eight people evaluate it as ‘good’ (5.6%) (see Table 9.63). In addition, 25.7% of the respondents give neutral opinion and the rest 18% do not give any evaluation.

Table 9.63 Evaluation of Local Markets by the Surveyed Household

Evaluation of Local Markets	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	N	%	N	%	N
Very good	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Good	2	4.1	4	8.7	0	0.0	2	9.6	8	5.6
Normal	12	24.5	13	28.3	5	17.9	7	33.3	37	25.7
Bad	20	40.8	18	39.1	14	50.0	10	47.6	62	43.1
Very bad	4	8.2	4	8.7	3	10.7	0	0.0	11	7.6
No opinion	11	22.4	7	15.2	6	21.4	2	9.5	26	18

Source: Socio-economic survey conducted by ERM, July 2021

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.62 A Local Grocery in Cu Hriet village, Cu Pong Commune

9.6.9 Community and Social Relations

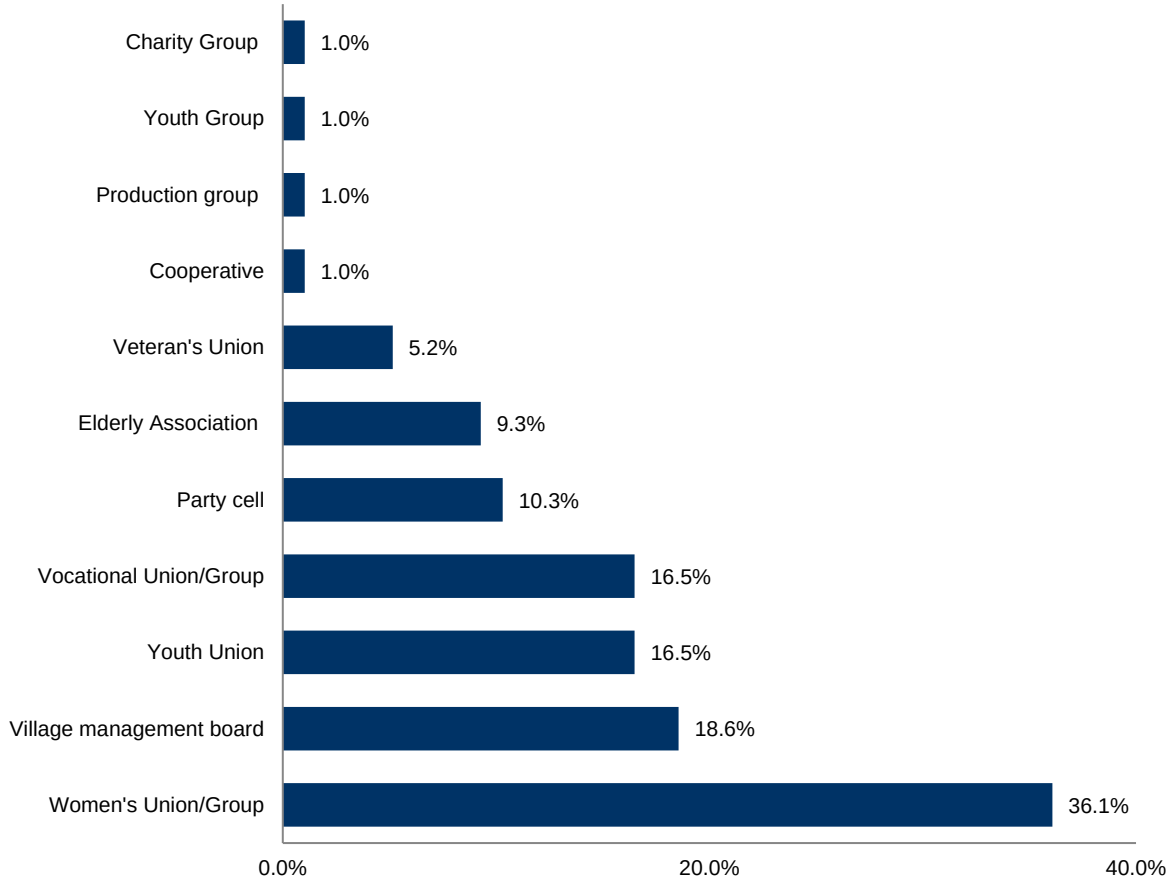
9.6.9.1 Civic Organisation Engagement

Of the 704 surveyed population, 67.3% (474 surveyed people) are eligible to participate in local social organisations while the remaining 32.7% (or 230 people) are under the age of 16 and cannot register as membership in any social organisations. By ethnicity, the number of Ede people involved in social organisations is higher than that of Kinh people (52.7% versus 47.3%). Of the 474 people eligible to join in social organisations, only 97 people (20.5%) are members of the local social groups in their locality while the majority (79.5% or 337 people) do not have any social involvement at all. By ethnicity, the number of Ede participants surpass that of Kinh participants with corresponding figures of 51 and 46 people respectively.

Reportedly, Women's Union is the most common organisation with the engagement level of 36.1% (see Figure 9.63). This is followed by Village Management Board with 18.6%. Youth Union and Vocational Union share the same number of participants at 16 people (16.5%) for each. In addition, the surveyed population also participate in the Party Cell, the Elderly Association, and Veteran's Union with 10.3%, 9.3%, and 5.2% respectively. The number of members of cooperatives, production groups, youth groups, and charity groups just occupy an insignificant proportion with 1% for each. Eight out of 97 surveyed people involved in social organisations take a leadership position (i.e. village head, deputy village head, and deputy village secretary).

Engagement in civic organization is considered a mean for developing skills and capacity, increasing tolerance among people, building community, and supporting collective action on common goals. However, the survey findings indicate a low level of local engagement in social organisations, which

may be attributed to personal decisions not to join organisations or personal commitment into informal networks. The discussions with different local groups showed that local people attribute a higher value to the informal networks such as a group of farming households for labour exchange. In Ede and Kinh communities in the surveyed areas, labour exchange is an often-seen way to strengthen community cohesion. Labour exchange is quite popular among farming households when they do not have enough money to hire casual workers. Labour exchange is usually based on close-knit groups, extended families or agricultural production groups.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.63 Civic Organisation Membership of the Surveyed Population

9.6.9.2 Local Perception of Community Cohesion and Well-being

In order to gain a comprehensive understanding about community cohesion and well-being, the surveyed respondents were invited to evaluate local villagers' reliability, mutual support, engagement and contribution to community activities, local satisfaction towards the environment quality and current living based on the Likert 5-point scale. The statements for evaluation included:

- Local villagers are basically reliable and faithful to each other;
- Local villagers live in harmony and support each other when needed;
- Local villagers are willing to make in-kind and monetary contribution to community affairs;
- Local villagers are satisfied with the local environment; and
- Local villagers' living conditions have been improved.

Most of the respondents (N=144) agree with the mentioned social statements with the corresponding figures of 86.7%, 88.8%, 88.9%, 72.2% and 51.3% (see Table 9.64). There is no conflict between Kinh and Ede groups recorded in the survey areas.

Notably, a remarkable proportion of the surveyed people (32.7%) disagreed that the living standards of people in their locality is increasingly improved. From the interviews, some of them claimed that they tend to have more difficulties in living due to difficulties in livelihood development. At the beginning of each crop (particularly coffee, pepper, durian, and avocado), they usually have to get loans with high interest from commercial banks to invest in production. However, after harvesting, the low agricultural product's prices do not cover the investment capital, making the production unprofitable. Meanwhile, the household debts are getting larger because they are incapable of paying.

Table 9.64 Local Perception of Community Cohesion and Well-being

Level of Evaluation	Local Reliability and Faithfulness	Mutual Support	Contribution to Community Affairs	Satisfaction with Local Environment	Improved Local Living
Totally agree	21.5	24.2	22.2	13.2	11.1
Agree	65.2	64.6	66.7	59.0	40.2
Neutral	4.9	4.9	6.9	9.0	15.3
Disagree	4.9	4.2	2.8	13.2	29.2
Totally disagree	0.0	0.0	0.0	0.7	3.5
No opinion	3.5	2.1	1.4	4.9	0.7

Source: Socio-economic survey conducted by ERM, July 2021

9.6.9.3 Social Support

Of these 144 surveyed households, the majority (137 households or 95.1%) claimed that they have received support from others while the remaining 4.9% or seven households (including two Kinh households and five Ede households) do not receive any help. Of the 137 households having supportive sources, the numbers of Kinh and Ede households are nearly the same with 68 and 69 households respectively.

Statistically, family, neighbours, and friends come out on top of the preferences of the surveyed households with corresponding figures of 95.6% (131 households), 83.9% (115 households), and 66.4% (91 households). This pattern of social support sources is applied for both Ede and Kinh ethnic groups. In addition, local households are supported by village leaders (19.7% or 27 households). Approximately 6.6% of the respondents asserted that village unions and groups are also their source of support. Furthermore, local businesses (5.1%), banks (3%), and support groups (0.7%) are also mentioned by local people as their financial support source (see Table 9.65). Notably, local businesses mentioned above are known as local coffee traders, fertilizer agents, and agricultural product traders. From the interviews, these businesses support local farmers to buy production materials without instant payment but they will recoup this money through collecting harvested agricultural products from these households.

Table 9.65 Support Sources

Support Sources (%)	Cu Ne Commune (N=46)		Cu Pong Commune (N=43)		Ea Sin Commune (N=27)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=137)		All Surveyed Communes (N=137)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Family	23.9	76.1	20.9	74.4	88.9	95.2	46.7	48.9	95.6
Neighbours	17.4	63.0	23.3	65.1	81.5	85.7	42.3	41.6	83.9
Friends	15.2	41.3	18.6	51.2	74.1	71.4	36.5	29.9	66.4
Village leaders	6.5	17.4	2.3	11.6	22.2	19.0	10.2	9.5	19.7
Village Unions or groups	4.3	4.3	0.0	4.7	7.4	4.8	3.6	2.9	6.6
Support groups	0.0	0.0	0.0	2.3	0.0	0.0	0.0	0.7	0.7
Local businesses	0.0	10.9	0.0	4.7	0.0	0.0	0.0	5.1	5.1
Banks	0.0	0.0	0.0	4.7	7.4	0.0	1.5	1.5	2.9

Source: Socio-economic survey conducted by ERM, July 2021

Regarding the number of support sources, 83.9% (115 out of these 137 households) have three sources of support and over. Meanwhile, the number of families has one and two sources of support just account for small proportions with 4.4% and 11.7% respectively.

9.7 Vulnerability Analysis

9.7.1 Definition of Vulnerable Households

According to the AIIB ESS2, vulnerable groups or individuals refers to people who, by virtue of factors beyond their control, (a) may be more likely to be adversely affected by the Project's environmental and social impacts; and (b) may be more limited than others in their ability to claim or take advantage of Project benefits. Such an individual or group is also more likely to be excluded from or unable to participate fully in the mainstream consultation process and may require specific measures or assistance (or both) to do so.

In addition, according to Paragraph 12 of IFC PS1, this advantaged or vulnerable status may stem from an individual's or group's race, color, sex, language, religion, political or other opinion, national or social origin, property, birth, or other status. The Client should also consider factors such as gender, age, ethnicity, culture, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources.

Lastly, under Vietnamese law[270] (i.e. Decree No. 136/2013/ND-CP, Decree No. 99/2018/ND-CP, and Decree 20/2021/ND-CP), vulnerability categorises are officially recognised and eligible for various social benefits from the Government, including:

- Orphans with ages up to 16 years old without nurture or with ages between 16 and 22 pursuing formal education, vocational education, professional secondary education, college education or first higher education degrees;

[270] The recommended categorisation of vulnerable households is specifically developed based on the Vietnamese law (ie Decree No. 136/2013/ND-CP, Decree No. 99/2018/ND-CP, and Decree 20/2021/ND-CP on specifying categories of vulnerability that are officially recognised and are eligible for various social benefits from the Government) and outcomes of the socio-economic baseline survey. Should surveyed households match these criteria, they will be classified as vulnerable.

- Individuals contracted HIV/AIDS, living in poor households and having no stable monthly income namely salary, wage, pension, social security benefit, monthly social security;
- Individuals with severe disabilities and individuals with very severe disabilities;
- Elderly of 80 years of age or older without pension, monthly social security benefits or monthly social benefits;
- Single parents of poor households with children under 16 years of age or having children from 16-22 undertaking tertiary education (undergraduate, colleges or vocational schools)
- People who devoted themselves to the National Revolution (including relatives of patriotic martyrs, war invalids, and war participants who are Orange Agent victims); and
- Poor households.

Based on the international standards, national regulations, and outcomes of socio-economic baseline survey, vulnerable households in this study are defined if they meet at least one of the following criteria:

- Poor[271] and near-poor households certified by the Government;
- Households with orphans or abandoned children under 16 years old or with ages between 16 and 18 pursuing education;
- Households including elderly over 60 years of age living alone;
- Households including elderly people over 80 years old without social welfare or insurance;
- Elderly-headed households (i.e. elderly people over 60 years old living separately from their sibling or as main labourers);
- Households with physically or mentally disabled family members without regard to the level of disability;
- Households with members infected with HIV or AIDS;
- Households with members suffering from chronic diseases, born with congenital abnormalities or limited learning ability;

[271] The poverty certificate will be given yearly to households with low income and accessibility to basic social services under national standards as described in Decree No. 07/2021/NĐ-CP which was valid from 15/3/2021.

Income norms:

- Poor line: Having a monthly per capita income of VND 700,000 or lower for rural areas and VND 900,000 or lower for urban areas; or

- Near poor line: Having a monthly per capita income of between VND 700,000 and VND 1,000,000 for rural areas and between VND 900,000 and VND 1,300,000 for urban areas, and deprived of at least 3 indicators measuring deprivation of access to basic social services.

Norms on deprivation of accessing to basic social services:

- Basic social services (five services): health; education; housing; clean water and sanitation; and information;
- Indicators measuring the level of deprivation of access to basic social services (10 indicators): accessibility to health care services; health insurance; adult education; child school attendance; housing quality; housing area per capita; drinking water supply; hygienic toilet/latrine; use of telecommunication services; and assets for information accessibility.

Poor households: Households in rural area are identified as poor households if they meet at least one of the folowing criteria
- Having an average monthly income of under 700,000 VND
- Having an average monthly income per capita of over VND 700,000 to VND 1,000,000 and lacking at least 3 indicators measuring the level of access to basic social services. Poor households in urban are identified as poor households if they meet at least one of the folowing criteria: - Having an average monthly income of under 900,000 VND
- Having an average monthly income per capita of over VND 900,000 to VND 1,300,000 and lacking at least 3 indicators measuring the level of access to basic social services.

Near-poor households: Near-poor households in rural area are identified as households having average monthly income of over 700,000 VND to 1,000,000 VND and lack at most three indicators measuring the level of access to basic social services. Near-poor households in urban area are identified as households with an average monthly income of over 900,000 VND to 1,300,000 VND and lack at most three indicators measuring the level of access to basic social services.

- Poor single parent households raising children under the age of 16 or children aged 16-18 and attending school;
- Households headed by individuals without stable jobs or long term unemployed;
- Households with an illiterate breadwinner; and
- Female-headed households.

9.7.2 Vulnerability Analysis of Project Affected Areas

9.7.2.1 Dak Lak Province

According to Decision 33/2020/QD-TTg dated 12 November 2020 by the Prime Minister, communes of ethnic minority and mountainous areas are categorised into three zones. Zone III communes[272] are the most vulnerable communes in terms of socio-economic development; Zone II communes[273] has difficulties but temporarily stable socio-economic conditions; Zone I communes[274] are the remaining.

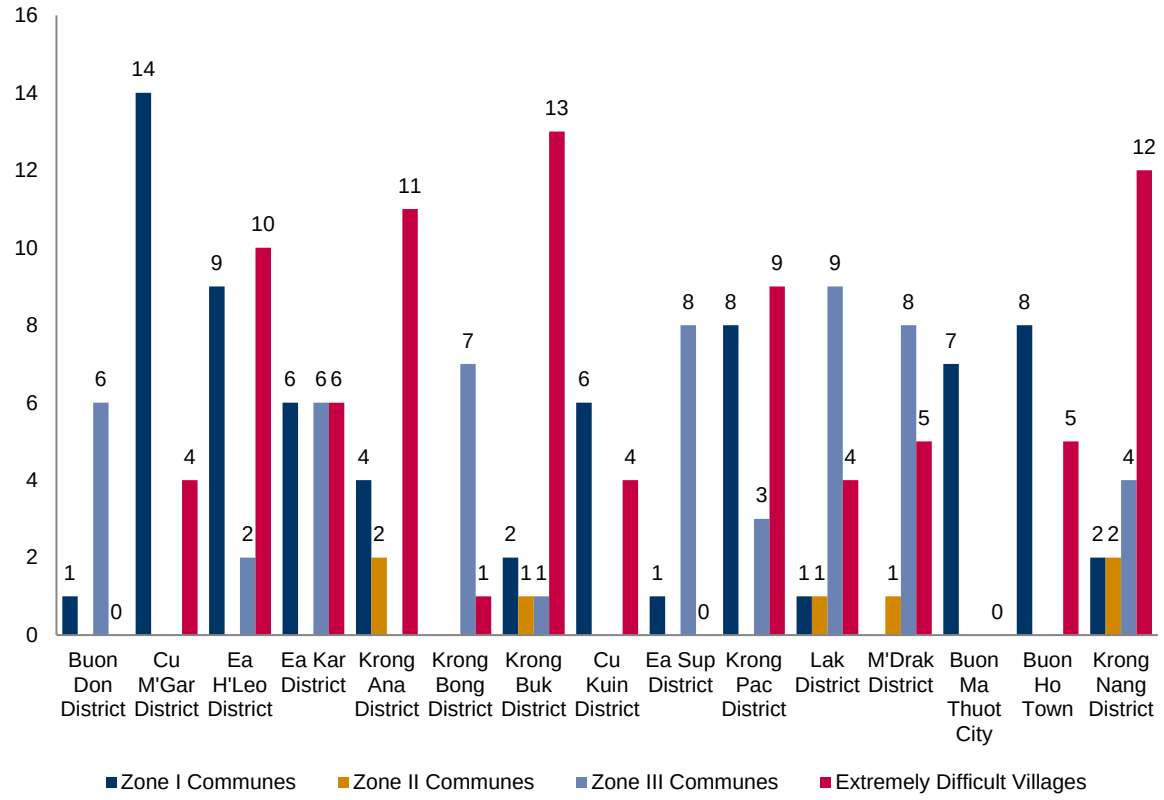
According to Decision 861/QD-TTg dated on 4 June 2021 by the Prime Minister on approving the list of zone III, II, I communes belonging to ethnic minorities and mountainous areas for the period 2021-2025, Dak Lak province has 69 Zone I communes, seven Zone II communes, and 54 Zone III communes with 84 villages categorised as “villages with special difficulties”[275] (see Figure 9.64).

[272] Zone III communes in ethnic minority and mountainous areas are communes where the percentage of ethnic minority households in the total number of households living stably in the community is 15% or more; have still not been recognised as meeting new rural standards; and have one of the following two criteria: (1) Having a poverty rate of 20% or higher (particularly in communes in the Mekong River Delta with a poverty rate of 15% or higher or more than 150 poor households are ethnic minority households); (2) Having a poverty rate of 15% to less than 20% (particularly for communes in the Mekong River Delta, the poverty rate ranges from 12% to less than 15%) and meeting one of the following criteria: (a) More than 60% of the total poor households in the commune are ethnic minority households; (b) 20% or more of ethnic minority people between the ages of 15 and 60 years can not read or write in the common language; (c) The number of employees who have jobs but have not received training for three months or more accounts for more than 80% of the total number of employed workers; or (d) The road from the district center to the commune center is more than 20 km long, of which more than 50% of the total length of the roads have not been asphalted or concreted.

[273] Zone II communes belonging to ethnic minorities and mountainous areas are the remaining communes after the Zone III and Zone I communes have been identified.

[274] Zone I communes in ethnic minority and mountainous areas are communes where the percentage of ethnic minority households in the total number of households living in a stable community is 15% or more and meets one of two requirements listed below: (1) Having a poverty rate of less than 10%; or (2) Being recognised as meeting new rural standards.

[275] CEMA (2021)



Source: The Prime Minister (2021)

Figure 9.64 Communes with Mountainous and Ethnic Minority Villages "with Special Difficulties" in Dak Lak Province 2021-2025

The rate of poor households in 2020 was 4.97%, a decrease of 4.4% compared to 2019 and the rate of ethnic minority poor households was 12.4%, a fall of 6.5%[276]. The locality with the highest poverty rate in the province was Krong Bong district (accounting for 39.3%) while the locality with the lowest poverty rate was Buon Ma Thuot city (accounting for 0.7%). In addition, the highest poverty rate of ethnic minority households was Lak district (accounting for 87.2%) while the lowest rate was recorded in Krong Ana district (making up 46.3%)[277] (see Table 9.66).

Table 9.66 Poor Households and Poor Ethnic Minority Households by District in Dak Lak 2020

District/City/Town	No. of Poor Households	Percentage of Total Households (%)	No. of Poor Ethnic Minority Households	Percentage of Poor Ethnic Minority Households (%)
Buon Don	5,031	30.29	3,287	65.33
Cu M'gar	1,450	4.25	1,046	72.14
Ea H'Leo	2,196	7.40	1,463	66.62
Ea Kar	3,241	11.46	2,309	71.24

[276] Dak Lak PPC (2020)
[277] Dak Lak PPC (2021a)

District/City/Town	No. of Poor Households	Percentage of Total Households (%)	No. of Poor Ethnic Minority Households	Percentage of Poor Ethnic Minority Households (%)
Krong Ana	1,845	10.86	855	46.34
Krong Bong	4,880	39.29	4,192	85.90
Krong Buk	1,064	9.07	758	71.24
Cu Kuin	764	3.76	583	76.31
Ea Sup	6,174	32.43	3,653	59.17
Krong Pac	2,582	7.78	2,119	82.07
Lak	5,883	31.99	5,130	87.20
M'Drak	3,977	29.00	2,855	71.79
Buon Ma Thuot	248	0.69	155	62.50
Buon Ho	600	3.31	391	65.17
Krong Nang	2,124	10.40	1,555	73.21

Source: Dak Lak PPC (2021)

In the period of 2016-2020, the total capital to implement the sustainable poverty reduction target program of Dak Lak province was more than VND 855 billion. In which, over VND 320 billion was invested to build infrastructure and train human resources for ethnic minority areas, poor districts, poor communes, border communes, and extremely difficult villages. Dak Lak had integrated the province's poverty reduction program with the national target program on new rural development and other projects sharing the same goals, such as the program on solidifying schools, classrooms and teachers' public houses in the period of 2017-2020 or the poverty reduction project of the Central Highlands region[278].

At the same time, the province had supported 251,795 turns of poor households and policy beneficiaries for accessing loans from social policy banks with a total amount of more than VND 6,985 billion. With this fund source, the local people had invested in production, contributing to increase their income and escape poverty. In addition, Dak Lak province also focused on implementing policies to support housing, production development, diversify livelihoods, and vocational training associated with job creation and income increase for poor households, especically ethnic minority ones[279].

9.7.2.2 Krong Buk District

According to Decision No. 861/QD-TTg dated on 4 June 2021 by the Prime Minister and Decision No. 433/QĐ-UBDT on approving the list of Zone III, II, I communes and the list of extremely difficult villages belonging to ethnic minorities and mountainous areas for the period 2021-2025, Krong Buk district has two Zone I communes (Cu Ne and Pong Drang commune), one Zone II commune (Cu Pong commune), and one Zone III commune (Ea Sin) with 13 villages categorised as "extremely difficult villages"[280] (see Table 9.67).

[278] Kim Bao (2020b)
[279] Kim Bao (2020b)
[280] CEMA (2021)

Table 9.67 Number of Extremely Difficult Villages in Krong Buk District 2021-2025

Communes	Zone	No. of extremely difficult villages
Pong Drang	I	1
Cu Pong	II	4
Ea Sin	III	0
Cu Ne	I	7
Chu Kbo	Not classified as Zone I, II, or III	1
Ea Ngai	Not classified as Zone I, II, or III	0
Tan Lap	Not classified as Zone I, II, or III	0

Source: The Prime Minister (2021) and CEMA (2021)

By July 2021, the number of poor households of the district is 1,056 households with 4,335 people, accounting for 6.3% of the whole district population. Of which, there are 662 ethnic minority households classified as poor, occupying 62.7% of the total number of poor households in the district. In addition, the number of near poor households in the district is 1,412 households with 5,887 people accounting for 8.4% of the whole district population. Of which, 717 near poor households are of ethnic minority groups, occupying 50.8% of the total number of near poor households of the district[281].

9.7.2.3 Cu Ne, Cu Pong, Ea Sin, and Chu Kbo Communes

According to Decision 861/QD-TTg dated on 04 June 2021 by the Prime Minister on approving the list of Zone III, II, and I communes belonging to ethnic minorities and mountainous areas for the period 2021-2025, Cu Ne commune is recognised as Zone I commune in the period 2021-2025 with seven extremely difficult villages[282] named Ea Zin, Mui 1, Mui 2, Ko, Kdro 1, Kdro 2, and Kmu. By end 2020, the poverty rate was relatively high, at 8.4%, equivalent to 289 households (27.2% of the district poor households). This high rate may be attributed to the serious COVID-19 impacts on household economic growth. In addition, ethnic minority households occupy 59.4% of the commune households and the number of poor ethnic minority households accounts for 77.2% (or 223 households) of the total number of poor households in the commune[283].

Cu Pong commune is recognised as Zone II commune in the period 2021-2025 with four extremely difficult villages[284] named Khal, Kdoh, Ea Tuk, and Cu Hiam. By end 2020, Cu Pong commune has 282 poor households accounting for 10.1% of the total number of households in the commune and 26.5% of the whole Krong Buk district's poor households. Among the total of 2,791 households in Cu Pong commune, there are 1,873 ethnic minority households (accounting for 67.1%), of which 233 households are poor household (accounting for 82.6% of the total poor households in the commune)[285].

Ea Sin commune is categorised as a Zone III commune in the period 2021-2025 of Krong Buk district. By end 2020, Ea Sin commune has 313 poor households accounting for 37.7% of households in the commune and 29.4% of the whole Krong Buk district's poor households. Among the total of 831 households in Ea Sin commune, there are 371 ethnic minority households, of which 224 households (71.6%) are classified as poor[286].

[281] Krong Buk District Ethnic Affairs Office (2021)
[282] Committee on Ethnic Minority Affairs (2021)
[283] Dak Lak PPC (2021a)
[284] CEMA (2021)
[285] Dak Lak PPC (2021a)
[286] Dak Lak PPC (2021a)

Chu Kbo commune was not categorised as the Zone I, II, or III commune in the period 2021-2025 of Krong Buk district. However, the commune has one extremely difficult village named Ea Nho[287]. By end 2020, Chu Kbo commune has 165 poor households accounting for 5.5% of households in the commune and 12.1% of the whole Krong Buk district's poor households. Among the total of 3,003 households in Chu Kbo commune, there are 134 ethnic minority households, of which 33 ethnic minority households (20% of the total poor households) are poor[288].

9.7.2.4 Affected Villages

Table 9.68 presents the number of poor and near poor households in the affected villages based on the results of interviews with village heads. The rate of poor households in ethnic minority villages is generally recorded as higher than that in Kinh dominant villages. Of the ethnic minority villages, Kmu has the highest poverty rate at 15% while in Kinh dominant villages, the highest figure recorded in Ea My village is 13.1%.

Table 9.68 Demographic Features of the Surveyed Villages

Commune	Village	Number of Households	Number of Poor Households	Number of Near Poor Households	Poverty Rate (%)
Cu Ne	Kdo 1	137	14	7	10.2
	Kdo 2	202	16	4	7.9
	Drah 1	125	14	-	11.2
	Drah 2	125	12	1	9.6
	Kmu	113	17	6	15.0
	Ea Kung	176	5	8	2.8
	Ea Siek	78	4	5	5.1
	Ea Krom	82	-	3	0.0
	Ea Nguoi	304	6	17	2.0
Cu Pong	Cu Hriet	250	12	31	4.8
	Ea Bro	170	9	27	5.3
Ea Sin	Ea My	160	21	14	13.1
Chu Kbo	Kty 4	116	2	9	1.7
	Kty 5	116	4	3	3.4

Source: Data collected from KII conducted by ERM with Village Heads, July 2021

9.7.3 Vulnerability Analysis Based on the Household Survey

9.7.3.1 Identification of Vulnerable Households

Over one-third of the 144 surveyed households (41 households or 28.5%) with a total population of 195 people including 80 Kinh people (of 17 households) and 115 Ede people (of 24 households) are identified as vulnerable (see Table 9.69). The surveyed households in the vulnerable group may match more than one vulnerable criterion. Of these 41 vulnerable households, 35 households are identified

[287] CEMA (2021)
[288] Dak Lak PPC (2021a)

with one vulnerability criteria (85.4%), four households have two vulnerabilities (9.8%), and two households suffer from three vulnerabilities (4.8%).

Table 9.69 Proportion of Households with Vulnerabilities in the Surveyed Villages

Households with Vulnerabilities	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)	Chu Kbo Commune (N=21)	All Surveyed Communes (N=144)		All Surveyed Communes (N=144)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Vulnerable households	8.2	18.4	4.3	34.8	21.4	19.0	11.1	17.4	28.5
Non-vulnerable households	16.3	57.1	15,2	45.7	78.6	81.0	37.5	34.0	71.5

Source: Socio-economic survey conducted by ERM, July 2021

Among the 41 vulnerable households, the percentage of households identified as near poor and households with physically disabled pepple are dominant with 24.4% (or ten households) for each, followed by poor households with nine households (22%) (see Table 9.70). Meanwhile, households with illiterate main labourers and those having elderly as household head share the same proportion at 14.6% (six households). In addition, the number of female-headed households and ones with mentally disabled members occupy the same figure of 7.3% (three households). Furthermore, there are two households having members incapable of working due to chronic diseases, accounting for 4.9%. The list of 41 households with vulnerabilities is provided in in Appendix B of Vol I.

Table 9.70 Proportion of Household Vulnerability by Category

Household Vulnerability	Cu Ne Commune (N=13)		Cu Pong Commune (N=18)		Ea Sin Commune (N=6)	Chu Kbo Commune (N=4)	All Surveyed Communes (N=41)		All Surveyed Communes (N=41)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Near-poor households	0.0	7.7	11.1	22.2	16.7	50.0	12.2	12.2	24.4
Households with physical disabled people	7.7	23.1	5.6	22.2	0.0	25.0	7.3	17.1	24.4
Poor households	0.0	23.1	0.0	16.7	33.3	25.0	7.3	14.6	22.0
Households with illiterate main labour	0.0	7.7	0,0	27.8	0.0	0.0	0.0	14.6	14.6
Elderly-headed households	7.7	7.7	0.0	16.7	0.0	25.0	4.9	9.8	14.6
Female-headed households	7.7	0.0	0.0	0.0	33.3	0.0	7.3	0.0	7.3
Households with mental disabled people	7.7	7.7	0.0	0.0	16.7	0.0	4.9	2.4	7.3

Household Vulnerability	Cu Ne Commune (N=13)		Cu Pong Commune (N=18)		Ea Sin Commune (N=6)	Chu Kbo Commune (N=4)	All Surveyed Communes (N=41)		All Surveyed Communes (N=41)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Households with members getting chronic disease and unable to work	0.0	7.7	0.0	0.0	0.0	25.0	2.4	2.4	4.8

Source: Socio-economic survey conducted by ERM, July 2021

9.7.3.2 Vulnerable Household Income Structure

This section is analysed with the data of 41 vulnerable households with 184 family members living in and contributing to household income - the other 11 people not living in these families are excluded from the data analysis.

Of the vulnerable group, the average monthly incomes per household and per capita are VND 8,441,341 and VND 1,880,951 respectively[289] (see Table 9.71). When disaggregating data by ethnicity, the avarage income of Ede households exceeds that of Kinh households (VND 9,129,097 versus VND 7,470,392). This patern can be found in the household income in Cu Ne commune (VND 7,557,963 versus VND 6,925,833); conversely; in Cu Pong commune the Kinh household income surpasses that of Ede household (VND 11,287,778 verse VND 10,071,778).

The lowest monthly vulnerable household income in the surveyed communes is recorded at VND 1,208,333 (of one Kinh household in Ea Sin commune relying on only agricultural cultivation). Meanwhile, the highest monthly income is VND 46,666,667 (of one Ede household in Cu Pong commune generating their household income from agriculture cultivation and wage-based works).

[289] It is regret that data about the average income of vulnerable groups in the province, district, and commune levels are not available for further comparison.

Table 9.71 Household and per Capita Incomes of Vulnerable Households

Monthly Income (VND)	Cu Ne Commune (N=13)		Cu Pong Commune (N=18)		Ea Sin Commune (N=6)	Chu Kbo Commune (N=4)	All Surveyed Communes (N=41)		All Surveyed Communes (N=41)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Average monthly income per household	6,925,833	7,557,963	11,287,778	10,071,778	4,500,000	9,607,500	7,470,392	9,129,097	8,441,341
Average monthly income per capita	1,731,458	1,545,947	2,257,556	2,289,040	1,038,462	2,260,588	1,716,171	1,991,803	1,880,951
Minimum monthly income per household	1,666,667	1,465,000	3,346,667	2,333,333	1,208,333	6,840,000	1,208,333	1,465,000	1,208,333
Maximum monthly income per household	10,000,000	17,500,000	16,766,667	46,666,667	10,000,000	15,200,000	16,766,667	46,666,667	46,666,667

Source: Socio-economic survey conducted by ERM, July 2021

Regarding the income structure, land-based livelihoods are considered the main income source of the vulnerable households, accounting for 74.2% of the average monthly household income (see Table 9.72). This is followed by wage-based sources with a smaller proportion of 15.1% of the vulnerable households' monthly income. Meanwhile, enterprise-based livelihood only contributes 8.7% to the vulnerable households' monthly income. In addition, around 2% of household income comes from other sources known as social allowance or finanical support from other family members.

By ethnicity, land-based livelihoods are still the main income source of the vulnerable households in the two ethnicity groups. Furthermore, Ede vulnerable households tend to rely more on this source compared to Kinh vulnerable households when the former's figure surpasses the latter's (81.8% versus 60.9%). While this is followed by wage-based income among Ede vulnerable households (16.7%), the second largest amount of monthly income of Kinh vulnerable households comes from enterprise-based livelihoods (22.9%).

Table 9.72 Monthly Income Structure of Vulnerable Households

Income Sources (%)	Cu Ne Commune (N=13)		Cu Pong Commune (N=18)		Ea Sin Commune (N=6)	Chu Kbo Commune (N=4)	All Surveyed Communes (N=41)		All Surveyed Communes (N=41)
	Kinh	Ede	Kinh	Ede	Kinh	Kinh	Kinh	Ede	
Land-based livelihoods	24.1	58.5	37.7	92.4	93.7	84.8	60.9	81.8	74.2
Wage-based livelihoods	0.0	40.1	31.3	6.0	6.2	9.3	12.5	16.6	15.1
Enterprise-based livelihood	68.6	0.0	29.8	0.6	0.0	0.0	22.9	0.4	8.7
Other sources	7.4	1.4	1.2	1.0	0.2	5.9	3.7	1.2	2.0

Source: Socio-economic survey conducted by ERM, July 2021

9.7.3.3 Access to Public Infrastructure and Services

During the FGDs, vulnerable households in Cu Hriet (Cu Pong commune), Kdro 2 (Cu Ne commune), and Kty 4 (Chu Kbo commune) villages were asked to rate their access to public infrastructure such as electricity, road, education, local healthcare, waste management, clean water and market on the Likert scale from one to ten points (one is the lowest and ten is the highest).

According to the participants, they are all satisfied with the electricity and school facility conditions with corresponding average scores of nine and eight respectively. Meanwhile, they tend to be dissatisfied with other public infrastructure such as rural roads (5.3 points), health stations (5.3 points), waste collection services (5 points), and clean water system (4.7 point). By ethnicity, this pattern feature is applied in the Ede vulnerable household groups in Cu Hriet and Kdro 2 villages. Specifically, their evaluation for local roads, waste collection, and clean water system is all below the average point ranging from two to four. Conversely, the Kinh vulnerable household group are highly pleased with these features and ranked those with high scores, specifically nine for rural roads and eight for waste collection service and clean water supply (see Table 9.73).

Table 9.73 Evaluation on Local Infrastructure

Public Infrastructure	Evaluation level (1-10)				Further Explanations		
	Cu Hriet Village	Kdro 2 Village	Kty 4 Village	Average score	Cu Hriet Village	Kdro 2 Village	Kty 4 Village
Electricity supply	9	8	10	9		The wood electricity pillar is degraded and unsecured.	
Rural road system	4	3	9	5.3	Some parts of the intra village roads are heavily degraded causing many troubles when traveling.	There is no drainage system, and most of the local roads are still not concreted. So the local people' mobilisation get harder in the rain season.	
School facilities	10	6	8	8		Currently, there is one kindergarten and one primary school at the locality. The kindergarten facilities are not enough for children. The local children have to bring their own lunch meal.	There is no school located in the village but children can attend schooling in the neighbouring villages
Health station	5	6	5	5.3	The commune health station only provides medical test; they do not have ultrasound service. In addition, the health station is 5 km from the village but some women have to walk to have their health checked.	The communal health station is away 4-5 km. The quality of health check-up and treatment is not good. It lacks medicine and medical equipments.	Local people seldom visit the commune health station, instead they visit Buon Ho town hospital, which is around 5 km from the village.
Waste collection	3	4	8	5	The service only operates along the national road, for inner village roads,	There is no waste collection service in the village. The villagers collect waste and put them in the roadside of National Road 14.	

Public Infrastructure	Evaluation level (1-10)				Further Explanations		
	Cu Hriet Village	Kdro 2 Village	Kty 4 Village	Average score	Cu Hriet Village	Kdro 2 Village	Kty 4 Village
					households have to burn or bury their solid waste.	The waste collection service of the commune will collect in 2-4 times per month.	
Clean water supply	2	4	8	4.7	Water shortage is a problem that many families have to bear, especially in the dry season from August to January of the following year.	Underground water is mainly used for domestic use and drinking but often in shortage.	
Market	Not applicable				The market is far from the village, about 5km.	There is no market in the village. Villagers buy daily food from food stores at the village. They come to Pong Drang market when needed.	The village does not have any market so local people have to go to Buon Ho market (15 km away) Pong Drang market (7 km away) for necessities.

Source: Socio-economic survey conducted by ERM, July 2021

9.7.3.4 Well-Being Perceptions

During the vulnerable FGDs, vulnerable households in Cu Hriet (Cu Pong commune), Kdro 2 (Cu Ne commune), and Kty 4 (Chu Kbo) villages were asked to show their satisfaction level for specific aspects of their life, on a scale of zero to ten (zero means 'totally dissatisfied' and ten means 'totally satisfied').

Participants showed high satisfaction with their 'community cohesion' (7.7 points), 'personal relations' (7.3 points), and 'time for personal hobbies' (7 points) (see Table 9.74). Meanwhile, 'health status', 'life achievement', 'local environment', 'local security', and 'current living conditions' are all rated poorly, with average scores of 6 or less.

While the Kinh vulnerable household group in Kty 4 village ranked 'local environment', 'life achievement', and 'current living conditions' at high scores above average points, the Ede groups dissatisfied with those features and ranked below the average points.

In terms of 'health status', all of the surveyed vulnerable groups polled this feature at the same point (6 points). For the 'local security' feature, the Ede group in Kdro 2 village shared that they feel insecure in their community and ranked this aspect at merely 3 points due to the increasing number of social evils (i.e. drug abuse and thieves) in whereas two other groups in Cu Hriet and Kty 4 villages scored this component at 7 and 6 points respectively.

Table 9.74 Evaluation on Specific Aspects of Personal Life

Criteria	Average Scale (From 1 to 10)			
	Cu Hriet Village	Kdro 2 Village	Kty 4 Village	Average Score
Health status	6	6	6	6
Local security	7	3	6	5.3
Community cohesion	7	7	9	7.7
Local environment	4	4	8	5.3
Life achievement	6	2	10	6
Time for personal hobbies	8	5	8	7
Personal relations	5	9	8	7.3
Current living conditions	4	4	6	4.7

Source: Socio-economic survey conducted by ERM, July 2021

Furthermore, local respondents through FGDs indicated some challenges in the locality, as presented Table 9.75 below. Regardless their ethnicities, they face a lot of difficulties in agricultural production in terms of lack of production investment such as land and financial capital, fluctuating agricultural products, unstable agricultural product price, water shortage, unfavourable climate conditions such as drought. Especially, for Ede group in Cu Hriet village, sanitation conditions are of their concerns. Most of these households do not have a toilet or a bathroom.

Table 9.75 Development Challenges Identified by Vulnerable Groups in the Surveyed Villages

Group	Current Challenges
Vulnerable Group in Cu Hriet village	■ Lack of production land; ■ Domestic water shortage; ■ No toilets and bathroom.

Group	Current Challenges
Vulnerable Group in Kdro 2 village	■ Lack of supporting financial capital for investing land-based livelihoods; ■ Unfavourable climate conditions (drought); ■ Failure of crops; ■ Unstable output of agricultural products; and ■ Lack of day labour works due to iimpacts of COVID-19 epidemic.
Vulnerable Group in Kty 4 village	■ Unstable weather pattern (drought); ■ Crop failure; ■ Agricultural products' price shrinkage; and ■ High investment in production.

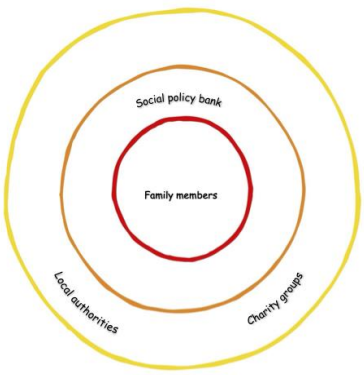
Source: Socio-economic survey conducted by ERM, July 2021

9.7.3.5 Social Support

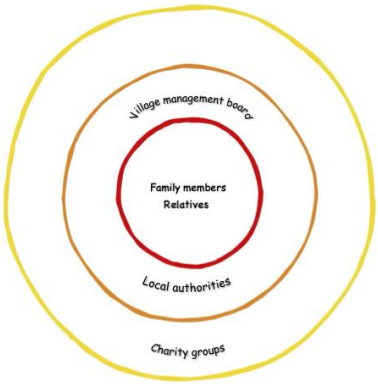
As shared by the vulnerable household groups through FGDs in Cu Hriet, Kdro 2 and Kty 4 villages, their primary source of support is their family including their family members, relatives in their extended family (see Figure 9.65).

For the Ede vulnerable household groups in Cu Hriet and Kdro 2 villages, local authorities, village management board, social policy banks, and charity groups are also identified as the secondary and third sources of support. As shared by the respondents, sometimes they receive support packages including rice, instant noodles, and other daily necessities from charity groups.

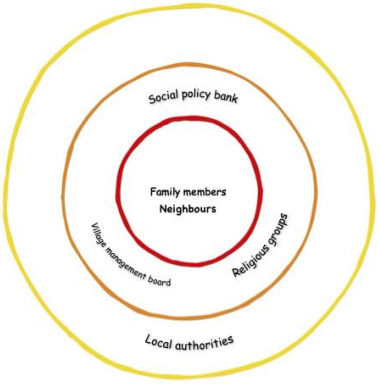
For the Kinh vulnerable household groups in Kty 4 village, the second source of support includes social policy bank, village management board, and religious groups. Charity groups are recorded as the third round of support.



Circle of support defined by Ede vulnerable group in Cu Hriet village, Cu Pong commune



Circle of support defined by Ede vulnerable group in Kdro 2 village, Cu Ne commune



Circle of support defined by Kinh vulnerable group in Kty 4 village, Chu Kbo commune

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.65 Circle of Social Support Defined by Vulnerable Groups

9.7.4 Support Schemes for Different Vulnerability Categories

As regulated by the Government, vulnerable groups are eligible for social allowance, depending on their vulnerability categories. According to governmental regulations, the amount of social allowance ranges from VND 360,000 to VND 900,000 per month. Apart from monthly social allowance, other programs,

policies, and support are launched to support vulnerable groups. Table 9.76 provide a brief sumary of existing pograms and policies for vulnerable households.

Table 9.76 Some Main Support Programs for Vulnerable Households in Vietnam

Support Program	Status	Beneficiaries	Description
167 Program	Expired on 30 December 2020	Poor households in rural areas who do not have houses (or makeshift houses or damaged houses) and are not eligible for Program 134.	With the State support and community assistance, families contribute to build a house with a minimum usable area of 24m² and the life of the house is 10 years or more.
134 Program	Expired on 30 December 2020	Poor ethnic minority households.	Support production land, residential land, housing, and domestic water for poor ethnic minority households
135 Program	Effective	Poor households, near poor households, households newly escaping from poverty, and ethnic minority households in remote and mountainous areas.	Public infrastruture improvement, livelihood development, and vocational training
Electricity price support	Effective	Poor households (according to the criteria specified in Decision No. 09/2011/QD-TTg). Social policies households (according to the Decision No. 60/2014/QD-TTg).	The current level of support for monthly electricity is VND 46,000 per household.
Tuition fee exemption policy	Effective	■ Veterans or social policies households; ■ Children attending kindergarten and students with disabilities who are classified as poor or near-poor households according to regulations; ■ Orphanage children in kindergarten and students under 16 years old with no parents or legal guardian; ■ Children in kindergarten and high school students whose households are classifed as poor households according to regulations; ■ Pupils and students studying at vocational and higher education institutions are ethnic minorities belonging to poor and near-poor households; and	100% of the tuition fee support

Support Program	Status	Beneficiaries	Description
		■ Ethnic minorities students lingving in difficult or extremely difficult socio-economic conditions.	
	Effective	■ Kindergarten pupils and pupils who are identified as ethnic minority people living in areas with extremely difficult socio-economic conditions.	70% of the tuition fee support
	Effective	■ Kindergarten pupils and pupils who are children of public servant, workers or public employees whose parents have had a work accident or have an occupational disease are entitled to regular allowances; and children from near-poor households.	50% of the tuition fee support
Social insurance provision	Effective	■ All people from eligible groups for receiving monthly social allowance.	Free social insurance card

Source: Adapted from governmental documents

Statistically, six out of 41 surveyed vulnerable households (14.6%) reported that they are eligible for monthly social allowance from the State with the amount ranging from VND 200,000 to VND 940,000. In addition, the survey findings from household interview, KIIs, and FGDs indicated that vulnerable households are receiving or have already received some support schemes and programs including:

- Support electricity bill;
- Support tuition fee for children of poor households;
- Support in building houses for disadvantaged households under the Program 134;
- Provision of preferential loan program for poor households from social policy banks or vocational unions/groups (i.e. Women's Union or Farmers' Union); and
- Provision of instant aid such as presenting money, rice, instant noodles, and other necessities in special occasions such as Tet holiday.

9.8 Ethnic Minorities Issues

9.8.1 Ethnic Minorities in Vietnam

Vietnam is a multi-ethnic country in which 54 recognised ethnic groups are living together. Among these 54 ethnic groups, 53 are ethnic minority groups. In Vietnam, the term "ethnic minorities" is commonly used instead of "indigenous peoples". The Kinh ethnic group (the Vietnamese) accounts for the largest proportion of around 82.1 million people (85.3%) while the remaining 53 ethnic minority groups take up approximately 14.1 million people (14.7% of Vietnam's total population) according to statistical data 2019[290]. Each ethnic minority group in Vietnam has its own distinct language, culture, and traditions.

Vietnamese is the official language and is spoken by around 90% of the population. Minority groups also have distinct languages including Tay, Hmong, Thai, and Khmer. The language of ethnic groups

[290] GSO (2020a)

belongs to five linguistic families, namely Austroasiatic, Austronesia, Tai-Kadai, Miao-Yao and Sino-Tibetan[291]. Some ethnic minority groups such as Tay, Thai, Nung, Hmong, Muong, Cham, Khmer, K'ho, Ede, Bahnar, and Gia Rai also have their own writing systems[292].

Mountainous areas make up nearly three-quarters of Vietnam's natural topography, which are the main residential areas of 53 ethnic minority groups. Ethnic minority and mountainous areas are recognised as significantly important geographic locations in terms of the socio-economic dimensions, national defence, security and ecological environment. However, these areas are regarded as the most disadvantaged with a poverty rate significantly higher than the national average[293].

According to the results of the 2019 Census on Population and Housing in Vietnam, ethnic minorities predominantly distribute in 56,453 villages of 5,453 ethnic minority and mountainous communes under the management of 463 districts of 51 out of 63 provinces in Vietnam. By socio-economic regions, 53 ethnic minority groups are distributed largely in the Northern Midlands and Mountains region (56.2%) and the Central Highlands region (37.7%). Only 2.1% of people living in Red River Delta are ethnic minority people (see Table 9.77).

Table 9.77 Ethnic Minority Population in Different Regions of Vietnam

Regions	Total Population (people)	Kinh Group (people)	Ethnic Minority Groups (people)	Proportion of Ethnic Minority Group (%)
Northern Midlands and Mountains	12,532,866	5,495,484	7,037,382	56.2
Red River Delta	22,543,607	22,074,819	468,788	2.1
North and South Central Coast	20,187,293	18,111,079	2,076,214	10.3
Central Highlands	5,842,681	3,642,726	2,199,955	37.7
Southeast	17,828,907	16,798,500	1,030,407	5.8
Mekong River Delta	17,273,630	15,963,218	1,310,412	7.6
Total	**96,208,984**	**82,085,826**	**14,123,158**	**14.7**

Source: GSO (2020a)

Despite significant achievements in poverty reduction and rapid economic growth in recent decades, ethnic minority communities living in mountainous and highland areas are still trapped in poverty. Ethnic minorities account for over 14% of the total population but up to over 50% of the total poor population[294]. High poverty rate among ethnic minority groups may be attributed to low returns to the production area, limited access to public services, low rates of out-migration, low levels of education, and geographical remoteness despite a series of the governmental programs implemented to address this issue.

According to statistical data 2019, the rate of poor and near-poor ethnic minority households is 3.5 times higher than the national rate. The Chut ethnic group has the highest percentage of poor and near-poor households (89.3%), and the Hoa ethnic group has the lowest percentage of poor and near-poor households (2.9%)[295]. As stated in the Decision 576/QD-LDTBXH dated on 18 May, 2021 of Ministry of Labour, Invalids and Social Affairs (MOLISA) on the results of poor and near-poor households in 2020 according to the national multidimensional poverty measurements in the 2016-2020 period, there are 761,322 poor households (equivalent to 2.8%) and 986,658 near-poor households (equivalent to 3.7%). Of which, there are 466,610 poor ethnic minority households (accounting for 61.3% of the total

[291] Michaud et al. (2016)
[292] DFAT (2017)
[293] GSO (2019)
[294] World Bank (2013)
[295] CEMA and GSO (2020)

poor households). By socio-economic region, the proportion of poor ethnic minority households is highest in Northern Midlands and Mountains (88.3%), followed by Central Highlands (76.2%). Only 685 poor households living in Red River Delta are ethnic minorities (see Table 9.78).

Table 9.78 Poor Ethnic Minority Households by Region 2020

Regions	Total Poor Households	Total Poor Ethnic Minority Households	Proportion of Poor Ethnic Minority Households (%)
Northern Midlands and Mountains	322,033	284,453	88.3
Red River Delta	57,046	685	1.2
North and South Central Coast	194,039	95,351	49.1
Central Highlands	90,082	68,607	76.2
Southeast	9,898	2,859	28.9
Mekong River Delta	88,224	14,655	16.6
Total	**761,322**	**466,610**	**61.3**

Source: MOLISA (2021)

The Vietnam government recognises 53 ethnic minority groups in the territory of Vietnam. Vietnam has one of the most complex ethnolinguistic patterns in Asia. The focus of the Vietnamese government is on “unity in diversity”. The Constitution of Vietnam recognises equity amongst all ethnic groups as a priority and as reflected in the documents issued by the 9th National Congress, the cause of ethnic groups and ethnic solidarity hold a long term strategic position in the revolutionary cause of the country. The Party and State have made substantial efforts to develop and enforce national policies which support cultural and ethnic diversity, with the aim of ensuring equal development, strengthening solidarity, promoting mutual support among ethnic groups, improving material and spiritual lives, reducing poverty, broadening people’s knowledge, and reducing socio-economic disparity between all 54 ethnic groups in Vietnam[296].

These focuses were consistently mentioned in the next four Amended Constitutions and received close attention in the 2013 Amended Constitution ratified by the National Assembly. Accordingly, Article 5 of the Constitution 2013 indicates that:

- The State of Vietnam is the united state of the various ethnic communities co-habiting on the territory of Vietnam;
- All ethnic minorities are equality, solidarity, respect and mutual assistance among all nationalities, and forbids all acts of national discrimination and division;
- National language is Vietnamese, every ethnic community has the right to use its own language and system of writing, to preserve its national identity, and to promote its fine customs, habits, traditions and culture; and
- The State applies a policy of comprehensive development and give good conditions for ethnic minorities to promote their internal force for the country development.

Articles 58 and 60 of the Constitution 2013 stipulate that:

- The State of Vietnam is in charge of preserving and developing Vietnamese culture of the various ethnic communities; and

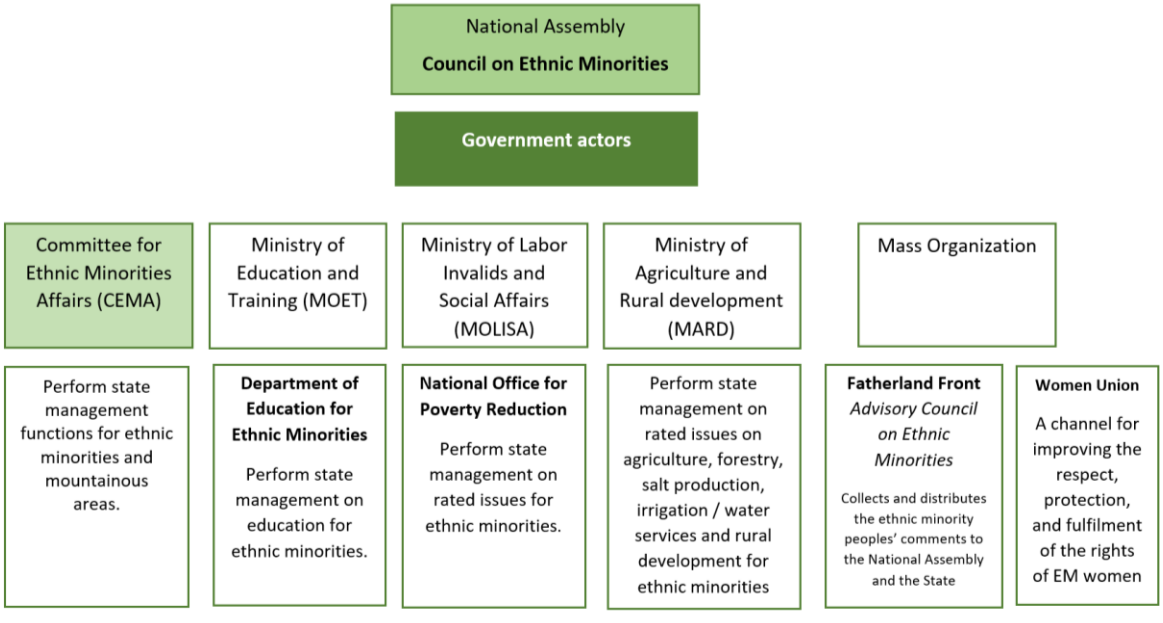
[296] UNFPA (2011)

- The State undertakes priority policies for education development in mountainous areas, ethnic community regions, particularly difficult areas and the State implements foreground programs of heath care for mountainous people and ethnic minorities.

The Government has introduced a system of policies to incorporate ethnic minorities in the national development process, amounting to over 100 legal documents enacted by more than 10 State authorities since the 1980s[297]. Five of the most important policies are:

- Program 135: Socio-economic development of extremely difficult communes in ethnic minority and mountainous areas under the Decision No. 135/1998/QD-TTg of the Prime Minister. The program was started from 1998 to present;
- The Program 134: Support agricultural land, residential land, housing and clean water for poor ethnic minority households under the Decision No. 134/2004/QD-TTg dated 20 July 2004 of the Prime Minister;
- Program 132: Distribute production land and residential land for ethnic minority households in the Central Highlands according to the Decision No. 132/2002/QD-TTg dated 8 October 2002;
- Program 167: Support housing for the poor under the Decision No. 167/2008/QĐ-TTg dated 12 December 2008. The beneficiaries of the program are poor households in rural areas who are homeless (or own temporary and damaged houses) and are not eligible for the Program 134; and
- Program 168: Youth Development of CEMA for the 2016-2020 period under the Decision No. 167/168/QD-UBDT.

In addition, Decree No. 60/2008/ND-CP of the Government is the very important organisation policy related to nationalities issues. This Decree defines the functions, tasks, powers and organisational structure of the CEMA, a ministerial level agency under the Government, performs its functions of State management on ethnic minority affairs nationwide, and on public services within its authorities as prescribed by the law. Other major actors such as Department of Education for ethnic minorities, National Office for Poverty Reduction, Fatherland Front, and Women's Union contribute to perform their tasks for ethnic minorities (see Figure 9.66).



Source: Open Development Mekong (2020)

Figure 9.66 Majors Actors for Ethnic Minority Related Works

[297] Open Development Mekong (2020)

9.8.2 Ethnic Minorities in Dak Lak Province

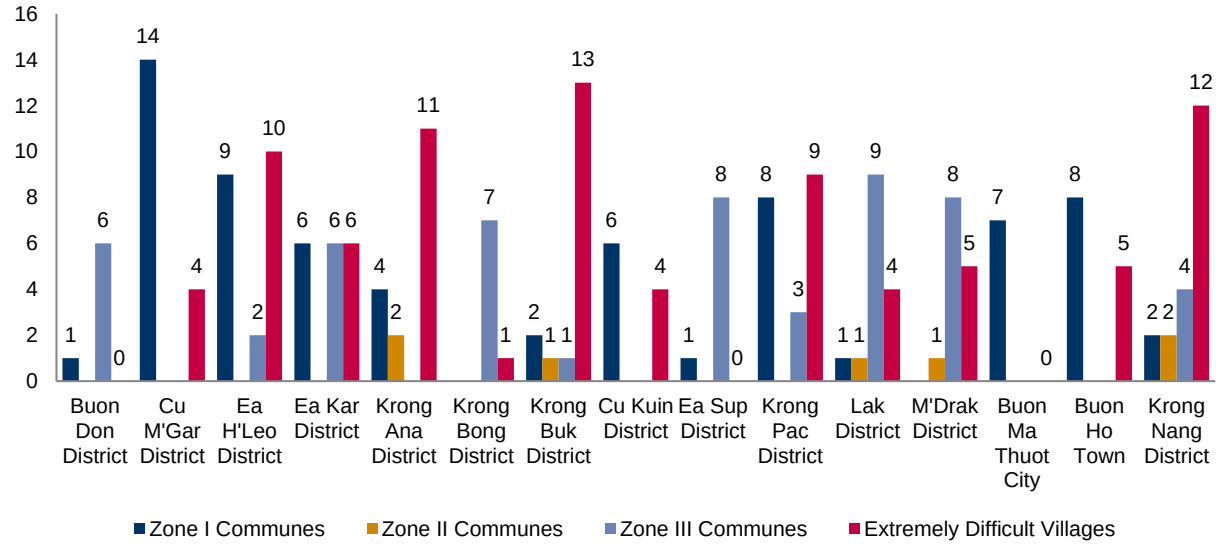
In 2019, of 667,305 ethnic minority people in Dak Lak, the male-to-female ratio is nearly equal with 333,589 males and 333,716 females. By residential area, the majority of ethnic minority people live in rural areas, accounting for 91.6% (611,084 people) while in urban areas, this figure is 8.4% (56,221 people)[298]. Of the 49 ethnic minorities, Ede, M'nong, and Gia Rai are indigenous ethnic minority groups with the total population of 420,278 people (accounting for 22.5% of the total provincial population), while other groups including Hoa, Muong, Xo Dang, Bru Van Kieu, Bahnar, Khmer, Cham, and others are migrants. Ede people outnumber the other ethnic groups, making up 52.6% of the total ethnic minority people in Dak Lak province (see Table 9.79).

Table 9.79 Ethnic Minority Groups with Population Size of More Than 20 Thousand People 2019

Ethnic Minority Groups	Total Population (people)	Male (people)	Female (people)
Ede	351,278	173,093	178,185
Nung	75,857	39,046	36,811
Tay	53,124	27,217	25,907
M'nong	48,505	23,561	24,944
Mong	39,241	19,939	19,302
Gia Rai	20,495	10,193	10,302

Source: GSO (2020)

According to Decision No. 861/QD-TTg dated on 4 June 2021 by the Prime Minister on approving the list of Zone III, II, I communes belonging to ethnic minorities and mountainous areas for the period 2021-2025, Dak Lak province has 69 Zone I communes, seven Zone II communes, and 54 Zone III communes with 84 villages categorised as "extremely difficult villages"[299] (see Figure 9.67).



Source: The Prime Minister (2021)

Figure 9.67 Communes with Mountainous and Ethnic Minority Villages "with Special Difficulties" in Dak Lak Province 2021-2025

[298] CEMA and GSO (2019)

[299] CEMA (2021)

The rate of poor households in 2020 was 4.97%, a decrease of 4.4% compared to 2019 and the rate of ethnic minority poor households was 12.4%, a fall of 6.5%[300]. The highest poverty rate of ethnic minority households was in Lak district (accounting for 87.2% of the district's total poor households) while the lowest rate was recorded in Krong Ana district (accounting for 46.3% of the district's total poor households)[301] (see Table 9.80).

Table 9.80 Poor Households and Poor Ethnic Minority Households by District in Dak Lak 2020

District/City/Town	Poor Households		Poor Ethnic Minority Households	
	N	%	N	%
Buon Don	5,031	30.29	3,287	65.33
Cu M'gar	1,450	4.25	1,046	72.14
Ea H'Leo	2,196	7.40	1,463	66.62
Ea Kar	3,241	11.46	4,030	71.24
Krong Ana	1,845	10.86	855	46.34
Krong Bong	4,880	39.29	4,192	85.90
Krong Buk	1,064	9.07	758	71.24
Cu Kuin	764	3.76	583	76.31
Ea Sup	6,174	32.43	3,653	59.17
Krong Pac	2,582	7.78	2,119	82.07
Lak	5,883	31.99	5,130	87.20
M'Drak	3,977	29.00	2,855	71.79
Buon Ma Thuot	248	0.69	155	62.50
Buon Ho	600	3.31	391	65.17
Krong Nang	2,124	10.40	1,555	73.21
Total	**42,059**	**12.8**	**32,072**	**76.60**

Source: Dak Lak PPC (2021)

In the period of 2016-2020, the total capital to implement the sustainable poverty reduction target program of Dak Lak province was more than VND 855 billion. In which, over VND 320 billion was invested to build infrastructure and train human resources for ethnic minority areas, poor districts, poor communes, border communes, and extremely difficult villages. Dak Lak had integrated the province's poverty reduction program with the National Target Program on new rural development and other projects sharing the same goals, such as the program on solidifying schools, classrooms and teachers'

[300] Dak Lak PPC (2020)
[301] Dak Lak PPC (2021)

public houses in the period of 2017-2020 or the poverty reduction project of the Central Highlands region[302].

At the same time, the province had supported 251,795 turns of poor households and policy beneficiaries for accessing loans from social policy banks with a total amount of more than VND 6,985 billion. With this fund source, the local people had invested in production, contributing to increase their income and escape poverty. In addition, Dak Lak province also focused on implementing policies to support housing, production development, diversify livelihoods, and vocational training associated with job creation and income increase for poor households, especically ethnic minority ones[303].

9.8.3 Ethnic Minorities in Krong Buk District

According to statistical data 2020, the district has 14 ethnic minority groups[304] with 24,344 people from 5,397 households, accounting for 32.2% of the total district population[305]. Of the ethnic minority population, there are 5,080 households with 23,238 indigenous people in the locality. Ede is the main ethnic minority group in the district while other ethnic minorities such as Muong, Tay, Thai, Nung, and Dao only account for a small population.

In Dak Lak province, especially in Krong Buk district, the village administrative unit is addressed by different Vietnamese terms:

- *Buôn* refers to a village of Ede indigenous peoples who lived for a long time ago.
- *Thôn* or *Làng* refers to a village of the Kinh majority, Ede indigenous people, and other people from different ethnic minorities migrating to live in this area.

The traditional society of the Ede has been built on the basis of "*Buôn*", which is similar to "*Thôn"* or "*Làng*" (a small admnistrative unit under the provision of commune level in Kinh ethnicity community). Living in a "*Buôn*" are large maternal families embracing people of several generations of the same bloodiness[306]. In every *"Buôn"* (village), the village patriarch is the most prestigious and powerful individual. This person is elected to this position by the villagers because of his reputation with the community and responsible for handling issues and disputes arising in life in accordance to customary law. In many cases, the village head must go through the patriarch's opinion on issues related to customs and traditions of Ede people. The main livelihoods of ethnic minority groups are cultivation and husbandry. There is limited income source from business and service sectors[307].

According to Decision No. 861/QD-TTg dated on 4 June 2021 by the Prime Minister and Decision No. 433/QD-UBDT on approving the list of Zone III, II, I communes and the list of extremely difficult villages belonging to ethnic minorities and mountainous areas for the period 2021-2025, Krong Buk district has two Zone I communes (Cu Ne and Pong Drang communes), one Zone II commune (Cu Pong commune), and one Zone III commune (Ea Sin commune) with 13 villages categorised as "extremely difficult villages"[308] (see Table 9.81).

Table 9.81 Number of Extremely Difficult Villages in Krong Buk District 2021-2025

Communes	Zone	No. of Extremely Difficult Villages
Pong Drang	I	1
Cu Pong	II	4

[302] Kim Bao (2020)
[303] Kim Bao (2020)
[304] Krong Buk District CEMA (2021)
[305] Krong Buk District CEMA (2021)
[306] To Dong Hai (2011)
[307] Krong Buk District CEMA (2021)
[308] CEMA (2021)

Communes	Zone	No. of Extremely Difficult Villages
Ea Sin	III	0
Cu Ne	I	7
Chu Kbo	Not classified as Zone I, II, or III	1
Ea Ngai	Not classified as Zone I, II, or III	0
Tan Lap	Not classified as Zone I, II, or III	0

Source: The Prime Minister (2021) and CEMA (2021)

By July 2021, the number of poor households of the district is 1,056 households with 4,335 people, accounting for 6.3% of the whole district population. Of which, there are 662 ethnic minority households classified as poor, occupying 62.7% of the total number of poor households in the district. In addition, the number of near poor households in the district is 1,412 households with 5,887 people accounting for 8.4% of the whole district population. Of which, 717 near poor households are of ethnic minority groups, occupying 50.8% of the total number of near poor households of the district[309].

In 2020, Krong Buk DPC fully implemented ethnic policies in the locality in all fields. The ethnic policies were implemented synchronously with the coordination among local authority at all levels. In addition, economic development policy among ethnic minorities community was also actively implemented.

- National Target Program for sustainable poverty reduction for the period of 2019-2020

In 2020, in the framework of Program 135, Krong Buk DPC implemented a small-scale project “Support for the infrastructure investment for extremely difficult communes, border communes, and villages with special difficulties” with the total capital of VND 3,635 million from the national budget. The capital was used to construct 15 road works in the district and to build one gate and fence system at the community house. Meanwhile, the total capital for maintenance of infrastructure works in the district was VND 239 million, which was used to repair six community houses in Ea Sin commune[310].

In addition, within the Program 135, there is also a small-scale project “Support for production development, livelihood diversification, and model replication” with two project components[311]:

- The component “Support for production development and livelihood diversification” had a total budget of VND 823 million, supporting for 49 households (of which, 39 families were poor and ten families were nearly poor). Specifically, seven livestock breeding projects (Sind hybrid cows) were implemented in the communes of Krong Buk district; and
- The component “Replicating the poverty reduction model” had a total budget of VND 785 million, supporting for four households (of which, 28 were poor households and 15 were near-poor households).

Furthermore, Krong Buk DPC also implemented the small-scale project “Support for production development, livelihood diversification and replication of poverty reduction model” with a total budget of VND 295 million (allocated by Dak Lak PPC), supporting for 21 households.

- Policies for prestigious people in ethnic minority areas

In 2020, the role of prestigious people was promoted, they actively participate in meetings and coordinate with the local authority in campaigning and propaganda activities. In addition, they participate in learning and visiting models on economic development to instruct local people in agricultural

[309] Krong Buk District CEMA (2021)
[310] Krong Buk DPC (2020a)
[311] Krong Buk DPC (2020b)

production. They also play an important role in promoting the spirit of self-reliance and the development process of new rural areas.

In 2020, Krong Buk DPC achieved some results in implementing policies for prestigious people in ethnic minority areas as the following[312]:

- Organising visits and presenting gifts to 41 prestigious people in the district's ethnic minority areas on the Lunar New Year 2020;
- Sending three prestigious people to visit and exchange experiences on socio-economic development, new rural development, preservation of cultural identity and national unity in some Central and South-eastern provinces, organised by Dak Lak Province CEMA; and
- Establishing a group of outstanding prestigious delegation representing the ethnic minorities in Krong Buk district and organising visits to work and exchange experiences in Krong Ana district, Buon Don district, and Buon Ma Thuot city.

- Specific policies to support socio-economic development in ethnic minority and mountainous areas in the period 2017-2020 according to Decision No. 2085/QD-TTg

In 2020, Krong Buk DPC approved the list of 680 households benefiting from the policy of domestic water support. To implement the policy, Krong Buk DPC also coordinated with Dak Lak Province CEMA to allocate water tanks to 271 households (including eight households in Tan Lap commune, 18 households in Chu Kbo commune, 18 households in Ea Ngai commune, and 227 households in Ea Sin commune)[313].

In addition, Krong Buk DPC approved a list of ethnic minority households who have been granted residential and production land under Decision 132 No. 134/QD-TTg (period 2002-2010) for issuing land use right certificates (LURCs). The list consisted of 56 households, including 22 households having homestead land, 29 households having production land, and five households owning both homestead and production land[314].

In 2020, Krong Buk DPC maintained the conservation and promotion of traditional cultural values and national identity with the following activities[315]:

- Successfully organising the restoration of traditional rituals of the Ede people (specifically, the worshiping ceremony of the water wharf in Nur village, Pong Drang commune);
- Cooperating with the Department of Culture, Sports and Tourism to organise two classes to teach gongs for young people in Cu Ne and Cu Pong communes;
- Establishing a delegation to participate in the Dak Lak Provincial Gong Culture Festival 2020; and
- Successfully organising “village full of joy and music” in Ea Sin commune.

The implementation of ethnic minority policies has achieved practical results, contributing to helping ethnic minority households to gradually stabilise their lives and develop economy. Many ethnic minority households have escaped poverty with stable annual income.

9.8.4 Characteristics of Ede Ethnic Minority Group

In the Project areas, Ede is the dominant ethnic minority group. This section provides a snapshot of Ede ethnic group based on data collected from secondary sources, KIIs, and FGDs with Ede ethnic people in terms of demographic profile, livelihoods, and community values.

[312] Krong Buk DPC (2020a)
[313] Krong Buk DPC (2020a)
[314] Krong Buk DPC (2020b)
[315] Krong Buk DPC (2020a)

9.8.4.1 Demographic Profile

9.8.4.1.1 Population

In 2019, the total Ede population in Vietnam was 398,671 people with 88,703 households. Of which, the number people residing in rural areas was 354,361 people, accounting for 88.9% while the remaining 11.1% or 44,310 people lived in urban areas. The average household size was 4.5 people per an Ede household. Specifically, most Ede households comprise from two to four members (47,154 households or 53.1%). In addition, a substantial number of households with five or six members, and over seven members were also recorded equivalent to 27,497 households (31%) and 11,473 households (13%). Furthermorre, there were about 2,579 single-member households accounted for 2.9%.

By gender, the male and female ratio recorded in 2019 was 49:51 with the equivalent population of 195,351 males and and 203,320 females. The majority of Ede ethnic people were in the 15 to 59 years bracket with 248,537 people or 62.3% and nearly one third (30.6%) or 121,987 Ede people were under 15 years old cohort. In addition, the number of over-60-year-old people in the Ede community occupied the lowest number of 28,147 people or 7.1%.

Regarding marital status, over one third of the Ede population (69.1%) were married while around 24.3% were single. In addition, an inconsiderable number of Ede people identified their marital status as widowed, divorced, and separated with the corresponding figures of 5.3%, 1%, and 0.3% respectively. Notably, early marriage was recorded in the Ede community with a relatively high rate (20.4%), according to 2018 statistical data. Especially, marriage between people of the same direct line of descent and between relatives within three generations was recorded with 6.5‰ of the total Ede population, a drop of 5% compared to 2014. However, this figure was still higher than that of the 53 ethnic minority groups whose rate were at 5.6%[316].

9.8.4.1.2 Residency

According to statistical data 2019, the Ede population distribution was mainly centralised in the Central Highlands with 359,334 people, followed by 29,760 Ede people living in the North Central and South Central Coast. In addition, Ede people was also recorded in other parts Vietnam with small population. In the Central Highlands, the Ede people mainly resided in Dak Lak province and the South of Gia Lai province, in which Dak Lak province recorded the highest Ede population (351,278 people or 18.8% the total province's population in 2019) [317].

9.8.4.1.3 Language

Ede language belongs to Malayo-Polynesien linguistic family. The Ede language is the main dialect that being used in Central Highlands area, whose writing system with Latin characters was recognised since 1935 (FGD, Ede ethnic minority group, Cu Hriet village, Cu Pong commune, 13 July 2021). The Ede language is now taught in primary and lower secondary schools in the locality. It is taught within 2-3 sessions per week at primary level and also included in the lower secondary education curriculum (FGD, ethnic minority group, Ede ethnicity, Kdro 1 village Cu Ne Commune, 14 July 2021).

In the past 10 years, the Ede language development in province has grown tremendously. For primary school, in the 2019-2020 school year, the province has 97 schools, 617 classes and 13,810 students participating in Ede language learning, an increase by 21 schools, 120 classes and 2,758 students. Furthermore, the number of Ede language teachers increased by 34 teachers. Currently, the number of local primary schools deployed Ede language classes is 97 out of 123 schools, reaching 79%[318].

[316] CEMA and GSO (2019)

[317] CEMA and GSO (2019)

[318] Hoang Duong and Thu Ha (2020)

For lower secondary level, in the 2019-2020 school year, there are 14 schools, 28 classes, 1,088 students participating in Ede language classes with 16 Ede language teachers. Currently, the number of ethnic minority schools teaching Ede language is 14 out 15 schools. Particularly for the lower secondary level, the implementation of teaching Ede language has only been carried out at boarding high schools for ethnic minorities according to the curriculum and teaching materials compiled by the locality[319].

From field observations, it should be noted that there is a sound difference between generations in their language competency in which the elderly primarily uses Ede language while the youth are able to comprehensively communicate using both Ede and Vietnamese.

9.8.4.1.4 Religion

The Ede practices a polytheistic religion. The Ede people believe in animism which means that everything in the surroundings has a soul or in other words, God. They also believe that land and water are both created by the Gods Ae Die and Ae Du. The village dignitaries such as Po Lan and Po Pin Ea are normal people who are selected to represent the Gods to manage the land and water of the village as the will of the Gods.

- Po Lan

Po Lan looks after the land and maintains the land fertility. When people reclaim the land, they must follow the customs, strictly avoid taboos, and perform necessary rituals for the Gods to have a bumper crop as well as their village thrive. Every year, at the beginning of the production season, the villagers have to make solemn offerings to the Land God (called Jang Lan in Ede language).

- Po Pin Ea

Po Pin Ea looks after the water source to maintain its abundance and prevent water pollution. At the end of the dry season (usually in February or March), the villagers hold a ceremony to worship the Genie of the water (called Tuk Ea or Tring Ea in Ede language) at the waterfront. The offerings are normally buffaloes or pigs. When making offerings to the Genie of the water, the villagers pray for everyone's peace, bumper crops, and livestock growth.

In addition to the God of land and Genie of the water, the Ede people also worship other Gods, specifically:

- The Wind God:

At the beginning of the shifting season (in February and March), the Ede people organise an offering to the Wind God (called Kam Angin in Ede language) and pray for favourable weather conditions.

- Aê Die (the Good God) and Jang Lie (the Evil God)

The Good God will protect the Ede from being harmed by Jang Lie (the Evil God) and the damage of wild animals, insects, birds, and mice to the crop yield.

It should be noted that from the survey, some Ede people following Protestantism are not allowed to perform any ancient rituals such as worshipping ancestors and Gods, or burning incense at funerals. They only worship Jesus.

9.8.4.2 Livelihoods

In the past, Ede people mainly rely on cultivation with upland rice and husbandry. Ede people also went hunting and fishing for food. Ede people are very skillful in basketry and weaving. The cultivation characteristic of the Ede community is the rotation regime. This means that besides the areas that are cultivated, the Ede people also have a vacant land for fertility restoration. After a period of cultivation,

[319] Hoang Duong and Thu Ha (2020)

the used areas would be left fallow for self-regeneration, which is then used for cultivation. The cultivation cycle is about five to eight years depending on the soil quality and resilience level[320].

Nowadays, cultivation is still the focal livelihood of Ede people. They grow multi-plants and each crop is mostly harvested once per year. Coffee, avocado, pepper, rubber, and durian are gradually replacing upland rice to become the main crops providing significant income for Ede people. According to local sharing, it is the French during the Vietnam colonisation that developed rubber and coffee plantations and taught local Ede people to replicate this plantation model afterwards.

9.8.4.3 Community Values

9.8.4.3.1 Customs and Festivals

Some common rituals among the Ede community are namely weddings, water wharf offerings, health offerings, graves removal ceremonies, child naming ceremonies, and twinning ceremonies that contribute to enrich cultural background of the Ede ethnic community in the Central Highlands.

- Wedding

The Ede wedding comprise of three main steps namely engagement ceremony, “paying wedding dowries”, and the wedding ceremony (see Figure 9.68). When a couple decided to get married, alike Kinh ethnic group, an engagement ceremony will be proceeded before a wedding. In the matrilineal culture, the Ede women take the initiative. After the meeting at engagement ceremony, two families meet to discuss the “wedding dowries” offered by the groom's family which includes a lot of items such as buffaloes, cows, gongs, jars, and gold. After preparing enough wedding dowries as given challenge, the bride's family will give it to the groom's family and ask for a wedding ceremony. In addition to the wedding gift, the bride's family also bring to the groom's house three compulsory dowries including one bronze cup, eight bronze rings, and one blanket to present the groom’s mother.

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.68 Bridge and Groom in Ede Culture

- Grave removal ceremony

The grave removal ceremony known as Pethi festival is the biggest festival with a significant meaning in the spiritual life of the Central Highlands ethnic minority groups, especially Ede group. According to their belief, after death, the soul of the decreased is still in presence around and has a binding relationship with the living, which would officially end after the Pethi festival. The Pethi festival is

[320] CEMA Portal (2015)

organised once the family of the dead is able to afford it, normally after one to three years. The ceremony is taken place in the area near the grave[321].

- The water wharf ceremony

The water wharf ceremony is held on March. Ede people pray the Genie of the water for expressing their gratitude for luck and prosperity they received.

- The gong festival

The gong festival begins on March to December and this is not only held solely by the Ede community but other ethnicities in the Central Highlands area (see Figure 9.69). This symbolises for the soul of the Central Highlands as well as the relationship of other ethnicities in the Central Highlands. From local people's perspectives, the gong festival bears many meaningful purposes such as spiritual meanings and community cohesion[322].

Source: The Internet

Figure 9.69 The Gong Festival in Central Highland Areas with Ede People Participation

In addition, there are many other interesting folk festivals such as the Buffalo stabbing ceremony, the new house worshiping ceremony, the health community worshiping ceremony, the ceremony of worshiping the kitchen stone (the God has helped the householder for a fulfilled year), and the ceremony of worshiping the village gate stone (the God has kept the village for a peaceful year, ensured that no one is hungry, poor or sick).

9.8.4.3.2 Costumes

Ede costume constitutes a high level of aesthetic and sensational values. Red and black dominate the Ede's costume colour. The dress of Ede women is called Ao Mnie, which is long sleeve pull-over with two lines of buttons on the waist and colourful threads knitted along the shoulder to knees (see Figure 9.70). Meanwhile, the dress of Ede men is called Ao ekei, which are loin clothes and long sleeve pull-over with V-shaped neck. In addition, a floral pattern strip is woven in front of the dress as an indication of masculine[323].

[321] Pham Duong (2019)

[322] Le Travel (n.d.)

[323] The Voice of Vietnam - VOVWORLD (2012)

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.70 Ede Woman in Traditional Costumes

Nowadays, there is a change in Ede' traditional costume compared to the original version. The Ede people wear their traditional costumes in some important occasions such as weddings, worshiping, and funerals that shows the cultural spirit and increases the value of traditional costumes. In daily life, they wear casual clothes alike Kinh group. Ede men still wear traditional shirts but the loincloth is now replaced by pants. In addition, the weaving technique is fading away and only elderly know how to weave fabrics so young Ede people tend to buy similar fabrics for traditional clothes.

9.8.4.3.3 Housing Style

The traditional long house of the Ede people is a unique complex of architectural which are not only a material embodiment of the matriarchy but also the places where the cultural and spiritual values of the Ede people are kept (see Figure 9.71).

Generally, The Ede long house is on stilts, made of timber, rattan, and bamboo and roofed with straw. A long house is normally built in a north-south orientation and resembles a boat. The length of a house is measured by its number of horizontal beams. It is believed that the longer the house is, the more prosperous the family is. It is the length of the house that set it apart from other ethnic minorities' housing pattern.

The Ede people's long house has both front and back floor yards. The front one is called Gah yard (welcoming yard). The longer the house is, the wider the welcoming yard is. In front of the floor yard, on both sides of the staircase, two main floor pillars are sculptured with images of two rice pots that stand for prosperity and peace[324].

The stairs are a highlighted feature in the house. At the top of the stairs, adjacent to the porch are carved with images of a crescent moon and full breasts that symbolise the beauty, power, and role of women in the matriarchal family of the Ede people.

The long house is made up of two main components namely the Gah and the Ok. The Gah makes up one third of the total area whose main function is for receiving guests, family gatherings, worshipping, displaying valuable items, and in some cases as a sleeping place for single men. Meanwhile, the remaining part of the house (Ok) is space for accommodation. The Gah and the Ok are separated by carved pillars called Kmeh Kpang[325].

[324] The finest magazine (2017)

[325] CNN travel (2016)

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.71 Long Stilt House of the Ede People

However, from the field observation, Ede families in the locality often have two adjacent houses including a small traditional stilt house and a concreted house built on the ground like Kinh house. Local Ede households tend to use the stilt house for worshiping activities, festivals, and meetings while daily activities are taken place in the concreted house (see Figure 9.72).

Some young Ede households build their house in Kinh housing style. According to local people, lacking of material especially wood is known as the first reason to this. Furthermore, there are not many big trees left that could be used and it always cost a huge expense to build a long house. Secondly, a stilt house is considered as inconvenient compared to normal concreted house, because there is no private room especially for women and family members after marriage. In addition, ventilation in a stilt house is insufficient especially in the dry season as well as insulation in the rain season.

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.72 New Housing Style of the Ede People

9.8.4.3.4 Matriarchy System

The Ede social system follow matrilineality organisation in which the head of the family is always a woman (usually the oldest woman with the highest position in the family) called ‘khoa sang’. ‘Khoa sang’ has the responsibility to take care of all family’s affairs such as property, family members relationships,

and interfamily relationships with other people and families in the society. Children normally take their mother's surname. All the property in the family is commonly owned and inherited according to the maternal line. Specifically, sons are not entitled to an inheritance while daughters inherit the ancestors' assets. In addition, the youngest daughter takes over the house to continue worshipping the ancestors and is responsible for taking care of her aging parents[326]. Upon the death of his wife, a man has to return to his home barehanded, and all his children and property must be left at his in-laws' family.

In many Ede households, even the matrilineal system is still preserved and maintained in the Ede community, women and men in modern society share responsibilities in household affairs. Husband and wife respect and discuss each other in the decision-making process.

9.9 Gender Analysis

9.9.1 Women's Rights and Gender Equality

Equality between men and women has been among the most fundamental guarantees of human rights since the United Nations (UN) founding[327]. The UN Charter[328], adopted in 1945, sets out as one of its goals "to reaffirm faith in fundamental human rights, in the dignity and worth of the human person, in the equal rights of men and women and of nations large and small". Moreover, Article 1 of the UN Charter stipulates that one of the UN purposes is to promote respect for human rights and fundamental freedoms "without distinction as to race, sex, language or religion". This prohibition of discrimination based on sex is repeated in its Article 13 (mandate of the General Assembly) and Article 55 (promotion of universal human rights). In 1948, the Universal Declaration of Human Rights[329] was adopted, which proclaimed the equal entitlements of women and men to the rights contained in it, "without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status".

UN Member States adopted the Declaration on the Elimination of Discrimination against Women (DEDAW) in 1967, which states that discrimination against women is an offence against human dignity and calls on States to "abolish existing laws, customs, regulations and practices which are discriminatory against women, and to establish adequate legal protection for equal rights of men and women"[330]. In 1979, the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) was adopted by the General Assembly. Its preamble explains that, despite the existence of other instruments, women still do not enjoy equal rights with men[331]. CEDAW is the most important legally binding international document concerning women's human rights, embodying the concept that rights are basic values shared by every human being, regardless of sex, race, religion, culture, or age. Up to June 2021, it has been ratified by more than 189 countries[332].

9.9.2 Gender and Sustainable Development Goals

In 2000, leaders of 189 countries met at the UN and endorsed the Millennium Declaration, a commitment to work together to build a safer, more prosperous, and equitable world. The Declaration set out eight time-bound and measurable goals to be reached by 2015, known as the Millennium Development Goals (MDGs). With respect to women's rights, MDG 3 is to promote gender equality and

[326] To Tuan (2013)
[327] United Nations (2014)
[328] United Nations (2021)
[329] United Nations (2021)
[330] Election Observation and Democracy Support (2021)
[331] Office of the United Nations High Commissioner for Human Rights (2021)
[332] Office of the United Nations High Commissioner for Human Rights (2021)

empower women and MDG 5 aims to reduce the maternal mortality ratio by three quarters, between 1990 and 2015[333].

In 2015, all United Nations Member States adopted the 2030 Agenda for Sustainable Development. With 17 Sustainable Development Goals (SDGs), the 2030 Agenda for Sustainable Development provides a shared blueprint for peace and prosperity for people and the planet, now and into the future[334] (see Figure 9.73). With gender equality reflected as both a stand-alone goal and cross-cutting priority in the SDGs, the 2030 Agenda for Sustainable Development provides a significant opportunity to accelerate progress on gender equality and the empowerment of all women and girls.

Source: United Nations, Sustainable Development Goals

Figure 9.73 Sustainable Development Goals

Goal 5 of SDGs (see Table 9.82) targets to end all forms of discrimination; eliminate violence and harmful practices against women and girls; address unpaid care and domestic work; and ensure women's effective participation at all levels of decision-making, and universal access to sexual and reproductive health and reproductive rights.

Table 9.82 Goal 5 of Sustainable Development Goals

Specific Goal 5	Main Contents
Target 5.1: End discrimination against women and girls	End all forms of discrimination against all women and girls everywhere.
Target 5.2: End all violence against and exploitation of women and girls	Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation.
Target 5.3: Eliminate forced marriages and genital mutilation	Eliminate all harmful practices, such as child, early and forced marriage and female genital mutilation.
Target 5.4: Value unpaid care and promote shared domestic responsibilities	Recognise and value unpaid care and domestic work through the provision of public services, infrastructure and social protection

[333] Office of the United Nations High Commissioner for Human Rights (2021)

[334] UN Department of Economic and Social Affairs (2021)

Specific Goal 5	Main Contents
	policies, and the promotion of shared responsibility within the household and the family as nationally appropriate.
Target 5.5: Ensure full participation in leadership and decision-making	Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic, and public life.
Target 5.6: Universal access to reproductive health and rights	Ensure universal access to sexual and reproductive health and reproductive rights as agreed in accordance with the Programme of Action of the International Conference on Population and Development and the Beijing Platform for Action and the outcome documents of their review conferences.
Target 5.A: Equal rights to economic resources, property ownership and financial services	Undertake reforms to give women equal rights to economic resources, as well as access to ownership and control over land and other forms of property, financial services, inheritance and natural resources, in accordance with national laws.
Target 5.B: Promote empowerment of women through technology	Enhance the use of enabling technology, in particular information and communications technology, to promote the empowerment of women.
Target 5.C: Adopt and strengthen policies and enforceable legislation for gender equality	Adopt and strengthen sound policies and enforceable legislation for the promotion of gender equality and the empowerment of all women and girls at all levels.

Source: The Global Goals (2021)

9.9.3 Gender and Renewable Energy Sector

Renewable energy plays an important role in providing access to energy for the approximately 1.2 billion people worldwide who do not have access to electricity or liquid fuels[335]. Renewable energy also serves as a tool to improve the energy security of countries and providing social benefits to their respective populations. As an additional key contribution, energy efficiency and renewable energy projects can contribute to the global imperative of reducing greenhouse gas emissions[336].

In places where a new renewable energy plant is being installed, residents can be benefited, such as economic opportunities created during the renewable energy farm's construction and maintenance phases or income received from the leasing of land. In the specific case of women, they can gain access to new jobs and income generation opportunities, or improved health and safety due to the improved quality of local social services such as schools and hospitals, among other examples. However, renewable energy projects may also enlarge differences within beneficiary communities and generate or deepen gender inequalities. For example, women participate very little in consultations prior to project design and have more limited access to employment than men. In turn, women typically do not participate in decisions concerning the benefits that the community receives from the company as part of the project[337].

Adopting a gender perspective to renewable energy development is critically important to ensure that women's contributions - their skills and views - represent an integral part of the growing industry. Increased women's engagement expands the talent pool for the renewables sector. Meanwhile, greater gender diversity also brings substantial co-benefits[338].

[335] IEA (2015)
[336] Sustainable Energy For All (2013)
[337] GAP & IDB (2014)
[338] IRENA (2019)

9.9.4 Gender Equality Implementation

9.9.4.1 Gender Equality Implementation in International Context

Global efforts to promote gender equality show that progress is a slow and uneven dance. While women's access to education and their share of the labour market has increased, gaps related to decision-making, prospects for advancement, access to and control over natural resources, and equal pay remain. COVID-19 has only exacerbated social stagnation, impacting women disproportionately while widening the long-existing gender pay gap[339]. Although women represent 39% of the global workforce, they accounted for 54% of pandemic-related job losses as of May 2020. "She-cession" has become a disturbing term to describe the current times. Given the multifaceted nature of the pandemic, moving towards a green recovery requires a cross-sectoral approach[340].

9.9.4.2 Gender Equality Implementation in ASEAN Context

In the past years, the ASEAN has made significant progress in terms of recognising human rights as a key principle. The ASEAN Charter adopted in 2007, the ASEAN's AICHR inaugurated in 2009, and the ASEAN Commission on the Promotion and Protection of the Rights of Women and Children (ACWC) created in 2010 stepped in the right direction of promoting democracy and respect for human rights as a new objective of the ASEAN. All the ten ASEAN member states (AMS) have ratified the CEDAW and the CRC (see Table 9.83).

Table 9.83 Year of Accession/Ratification of CEDAW and CRC of ASEAN Members[341]

Year of Accession/ Ratification	Bru-nei	Cambo-dia	Indo-nesia	Lao PDR	Malay-sia	Myan-mar	Philip-pines	Singa-pore	Thai-land	Viet-nam
CEDAW	2006	1992	1984	1981	1995	1997	1981	1995	1985	1982
CRC	1995	1992	1992	1991	1995	1991	1990	1995	1992	1990

Source: Office of the United Nations High Commissioner for Human Rights (2021)

9.9.4.3 Gender Equality Implementation in Vietnam Context

9.9.4.4 International Commitments

Vietnam is signatory to numerous international instruments addressing gender equality, women's rights, and women's empowerment, including the CEDAW in 1982 and has adopted the Beijing Platform for Action in 1994, the MDGs and the SDGs, which take gender equality and women empowerment as a separate development goal[342] (Goal 5) and are also integral to all dimensions of inclusive and sustainable development.

As a responsible member country of the UN, Vietnam has been actively participating in the implementation of the global sustainable development agendas. Sustainable development principles were mainstreamed into the 2011-2020 Social and Economic Development Strategy (SEDS) and the 2016-2020 Social and Economic Development Plan (SEDP). In 2020, Vietnam Government promulgates the Resolution No. 136/NQ-CP dated 25 September 2020 on sustainable development to enable regulatory bodies and governments at all levels to implement SDGs from now to 2030.

339 World Bank (2021)

340 International Institute for Sustainable Development (2021)

341 Office of the United Nations High Commissioner for Human Rights (2021)

342 UNFPA & MOLISA (2021)

9.9.4.5 Legal and Policy Framework on Gender Equality and Women's Empowerment

Vietnam's legal and policy framework on gender equality and women's empowerment is presented as follows (see Table 9.84).

Table 9.84 Brief Summary of Key Legislation on Gender Equality in Vietnam

Key Legislation	Brief Summary
Constitution (2013)	The Constitution confirms "Male and female citizens are equal in all fields. The State has a policy to guarantee rights to and opportunities for gender equality. The State, the society, and the family create conditions for women's comprehensive development and promotion of their role in society. Sex discrimination is strictly prohibited".
The Law on Gender Equality (2006)	The law provides for principles of gender equality in all fields and responsibilities of agencies, organisations, families, and individuals in exercising these principles.
The Law on Domestic Violence Prevention and Control (2007)	The law provides for measures to prevent and combat domestic violence, and specifies behaviours of domestic violence.
The Land Law (2013)	The law stipulates that when land-use rights, houses and other assets attached to land are common property of both husband and wife, certificates for land-use rights and ownership of houses and other assets attached to the land must bear full names of both the husband and the wife. If either name is written on the certificate, written consent from the other spouse is required.
The Marriage and Family Law (2014)	This law provides for the principle of gender equality on ownership and inheritance in cases of divorce and death. The law stipulates that marriage certificates should not be granted to partners of same-sex marriages.
Civil Code (2015)	Articles 36 and 37 of this law legalise sex change for transgender people and permit individuals who have undergone sex-change surgeries to change gender markers on their official documentation.
Law on Elections (2015)	The new Law on Elections of Deputies to the National Assembly and to the People's Councils introduces a gender quota for female candidates for elections.
Revised State Budget Law (2015)	Clause 5 of Article 8 of the law stipulates that one of the principles on state budget management is to 'prioritize allocation of budgets for achieving gender equality objectives'. Article 41 of the law also stipulates that one of the bases for annual state budgeting is the implementation of gender equality tasks.
National Strategy on Gender Equality for 2011 – 2020 (2010)	The National Strategy on Gender Equality 2011-2020 emphasises that gender equality is one of the key factors for enhancing the quality of life of individuals, families, and society. The goal of the National Strategy on Gender Equality is to ensure substantive equality between men and women in terms of opportunities, participation, and satisfaction in the fields of politics, economy, culture, and society, and contribution to the nation's rapid and sustainable development.
National Strategy on Gender Equality for 2021 – 2030 (2021)	The strategy defines a number of new goals for the country to further make progress in gender equality in various areas and fulfil its SDGs by 2030.

Source: Adapted from the governmental regulations

9.9.4.6 Chronology of Events relating to Gender Equality and Women in Vietnam

The following Table 9.85 presents events relating to gender equality and women in Vietnam in a chronologic order.

Table 9.85 Events Relating to Gender Equality and Women in Vietnam

Year	Events
1483	Under the Le Dynasty, the Hong Duc Code provided for women's equal rights to inheritance, divorce, and protection from violence.
1930	The founding of the Indochinese Communist Party and the Women's Emancipation Association (forerunner to the Women's Union).
1946	Vietnam Women's Union (VWU) was established.
1946	First Constitution stated: "Women are equal to men in all aspects" in Article 9
1950	The Women's Association for National Salvation and Vietnam Women's Union jointly held the first National Women's Congress.
1959	The Constitution stated: "In the Democratic Republic of Vietnam, women enjoy rights equal to men in all political, economic, and cultural spheres, at home and in society. Equal pay applies to equal work for both men and women. The State guarantees female employees' entitlements to fully paid maternity leave both before and after delivery."
1960	The first Marriage and Family Law emphasises the principles of free choice of marriage partners, monogamy, equality between husbands and wives, and protection of women's and children's interests.
1960	The Union of Women for Liberation of Southern Vietnam was formed.
1980	The Government of Vietnam signed the CEDAW.
1982	Vietnam ratified CEDAW.
1984	The Penal Code stated: "Every form of violating women's rights is subject to penalties" in Article 138.
1986	The new Marriage and Family Law prohibits early marriages (under 18 years of age for women and under 20 years for men) and gives spouses equal rights regarding property and inheritance.
1988	The Population and Family Planning Policy encouraged each couple to have no more than two children. The policy suggested that the age of the mother and father at the birth of their first child be between 22 and 24 in urban areas, and between 19 and 21 in rural areas, and that the interval between the two deliveries be three to five years.
1990	The Government of Vietnam ratified the CRC.
1992	The revised Constitution (1992) stated: "Male and female citizens have equal rights in all respects, including political, economic, cultural, social and family life. All acts of discrimination against women and violation of women's dignity are strictly prohibited. Men and women receive equal pay for equal work. Women workers enjoy maternity benefits. Women who are public employees are entitled to pre- and post-natal paid leave and allowances according to the law."
1994	Vietnam made a commitment to the Program of Action on Population and Development at the International Conference on Population and Development (ICPD) held in Cairo, Egypt.
1995	Vietnam made a commitment to implement the Beijing Declaration and Platform for Action on the advancement of women at the United Nations Fourth Conference on Women in Beijing, China.

Year	Events
1997	The Government approved the National Plan of Action for the Advancement of Vietnamese Women until 2000 to ensure gender equality and advancement of women in Vietnam.
1999	The Prime Minister required to integrate gender issues in planning for the implementation of ten-year 2001-2010 Socio-economic Development Strategy in Decision No.207/TB/VPCP.
2000	The revised Law on Marriage and Family provided additional provisions on ownership and inheritance in the case of divorce and death.
2001	The Government of Vietnam ratified the Convention on the Rights of the Child and the National Action Plan for Children for the 2001-2010 period.
2002	The Prime Minister approved The National Strategy for the Advancement of Women in Vietnam until 2010.
2004	The Prime Minister issued Directive 27/2004/CT-TTg, dated July 15, 2004, on strengthening activities for the advancement of women in government organisations.
2004	The Law on the Protection, Care and Education of Children was revised to strengthen the protection and care of children.
2006	The National Assembly passed the Law on Gender Equality.
2007	Ministry of Labour, Invalids, and Social Affairs (MOLISA) was assigned by the Government to be the state management agency for gender equality.
2007	The National Assembly passed the Law on Prevention and Control of Domestic Violence. The Ministry of Culture, Sports and Tourism (MOCST) was assigned to be the state management agency for family issues.
2008	MOLISA was assigned to be the standing agency of the National Committee for the Advancement of Women in Vietnam.
2008	The Law on the Promulgation of Legislative Documents was revised to include a requirement for mainstreaming gender in all laws with gender interests.
2010	The National Strategy on Gender Equality for the 2011-2020 period was approved by the Prime Minister with the overall objectives until 2020. The strategy ensures substantive equality between men and women regarding opportunities, participation and benefits in the political, economic, cultural and social fields, contributing to the rapid and sustainable national development.
2011	The National Program on Gender Equality for the 2011-2015 period was approved by the Prime Minister. This was one of the important tools to help the Government implement the tasks set out in the National Strategy for Gender Equality for the 2011-2016 period.
2011	The set of the National Statistical Indicators on Gender Development was issued by the Prime Minister. This set of statistical indicators serves as a tool to collect gender statistics to monitor and evaluate gender development, the advancement of women and gender equality in all economic and social domains, thus meeting the demand for gender statistics from the Government of Vietnam, organisations and individuals.
2013	The Constitution 2013 states “Male and female citizens are equal in all fields. The State has a policy to guarantee rights to and opportunities for gender equality. The State, society, and the family create conditions for women’s comprehensive developments and promotion of their role in the society. Sex discrimination is strictly prohibited”.
2013	The revised Land Law (2013) resolved the outstanding and emerging issues found during the implementation of the Land Law (2003). The revised law ensures that when the rights to land use, houses and other assets attached to land are the common property of the husband and wife, the

Year	Events
	full names of both the wife and the husband must be written on certificates of rights to land use, and ownership of houses and other assets attached to the land.
2014	The revised Marriage and Family Law (2014) stipulates that settlement of property relations must ensure lawful rights and interests of women and children. It states that housework and other work relating to maintaining shared life shall be regarded as income-generating work.
2015	The National Action Program on Gender Equality for the 2016-2020 period was approved by the Government to reduce gender gaps and empower women in a number of sectors, industries, regions and provinces which face gender inequality or high risks of gender inequality. The programs contributes to the successful implementation of the National Strategy on Gender Equality for the 2011-2020 period.
2016	Vietnam introduced gender equality in the criteria set of the New Rural Development Program, highlighting the criteria for ensuring gender equality and preventing and controlling domestic violence; protecting and supporting vulnerable people in family and social life.
2018	The Prime Minister issued Directive 18/CT-TTg on Enhancing Measures to Prevent Violence and sexual abuse against Children
2021	The National Action Program on Gender Equality for the 2021-2030 period was approved by the Government to further make progress in gender equality in various areas and fulfil its Sustainable Development Goals (SDGs) by 2030

Source: General Statistics Office (2018) and Reviews of governmental documents (2021)

9.9.5 Gender Policy Implementation Mechanisms

In Vietnam, there are three structural mechanisms with a specific mission to address gender equality and advancement of women[343].

- The first mechanism is the State management agency on gender equality.

At national level, MOLISA is the State management agency and it has its own organisational structure established from national to commune level. The Department for Gender Equality in MOLISA is a key factor in the implementation, monitoring, evaluation, and reporting of the Law on Gender Equality. It was established in early 2008 to advise the Minister on carrying out State management activities on gender equality.

The Law on Gender Equality (2006) also confirmed that the People's Committees are the State management agencies at provincial, district and commune levels. The implementation of these roles relies on consultation and support provided by DOLISA and the Vietnamese Women's Union at the same level.

According to the Law on Gender Equality, DOLISA at provincial level is also a State management agency on gender equality. DOLISA has established organisational structures at provincial and district levels. At the provincial and district level, DOLISA's role is to provide consultation for the People's Committee and at the same level to implement gender equality policies and legislations.

- The second structural mechanism to promote advancement of women is the Committee for Advancement of Women (NCFAW), which is established from national to district level.

The committee is an inter-sectoral body that counsels Vietnam's Prime Minister (at national level) and People's Committees (at provincial and district levels) on gender equality and women's empowerment, including economic empowerment. At national level, NCFAW also supports research and coordinates interdisciplinary research on women's equality in Vietnam, working with ministerial agencies and line ministries. In support of building gender equality into the legal framework, NCFAW promotes the

[343] Green Climate Fund (2020)

implementation of relevant law, supports the realisation of national gender equality laws, and reports on its progress to the Prime Minister.

The Minister of MOLISA serves as the president of NCFAW, with vice-chairs from the Vietnam Women's Union and the Vice Minister of MOLISA. At provincial level, the vice chairman of the provincial People's Committee serves as head of NCFAW. The members of NCFAW are heads of relevant agencies such as DOLISA, Women's Union, Agriculture and Rural Development, and other stakeholders.

- The third structural mechanism in charge of women is the Vietnam Women's Union (VWU) with its specific mission and vision to protect legitimate rights and benefits of women.

The VWU has its own organisational structure, established from national level to commune level. One of the main functions of the VWU related to gender equality is to conduct dissemination of gender policies and develop capacity on gender equality. This organisation was also assigned by the Government to implement the task of monitoring and providing feedback on the implementation of gender policy. Since the establishment, this organisation has been involved in the development of national strategies, advocating and implementing a range of poverty reduction projects and support programs for women in health care, education, economic empowerment, and ethnic minority issues. It has developed a network covering a wide range of administrative districts from central to provinces, districts, and communes.

9.9.5.1 National Budget for Gender Equality Implementation

Pursuant to Article 24 of the Law on Gender Equality stipulating the financial sources for gender equality activities, including the State budget, voluntary contributions by organisations and individuals, and other legal sources, the Ministry of Finance issued Circular 191/2009/TT-BTC that provided guidelines on the management and use of funds for the operation of activities on gender equality and women's advancement. The Circular acted as an important legal document to help ministries, sectors and localities annually allocate, plan and manage the funds for the implementation of gender equality and advancement of women[344].

The 10-year national report (drafted in 2018) states that Vietnam ministries have annually allocated funds for gender equality activities, such as since 2013 the MARD has allocated VND 50-70 million per year from its budget for the Ministry's Committee on Women's Protection and Prevention of Women; the Ministry of Education and Training (MOET) allocates VND 200 million per year for the Committee on Women's Protection and Prevention; or the MOLISA has allocated funds to State management tasks on gender equality since 2008. In addition to the State budget, Vietnam also receives international funding sources such as the United Nations Entity for Gender Equality and the Empowerment of Women (UNWOMEN), The United Nations Development Program (UNDP), The United States Agency for International Development (USAID), Embassy of Canada, or World Bank for gender equality activities and women's advancement.

The total budget for the National Program on Gender Equality for the 2011-2015 period (Decision No. 1241/QD-TTg by Prime Minister on July 22nd 2011) was VND 955 billion. Of which the State budget is VND 326 billion, the local budget is VND 464 billion, and international aid and other mobilisation is VND 165 billion. A joint Circular by the Ministry of Finance and the MOLISA was issued later on to regulate the management and use of funds for the implementation of the National program on gender equality for the 2011-2015 period. After five years of implementation, funds from international mobilisation have exceeded the set plan (VND 300 billion); while the budget on a nationwide scale to implement the projects under this program was only VND 125 billion (reaching 38.3% of the plan). Bilateral and multilateral Official Development Assistance (ODA) projects including gender equality content in the period 2007 - 2017 reached about USD 41 million with 31 projects, focusing on the prevention of human trafficking, gender-based violence, response to climate change, and women's political participation[345].

[344] UNFPA and MOLISA (2021)

[345] MOLISA (2018)

In the 10-year national report, the lack of financial resources for gender equality activities is acknowledged:

> Funding sources for gender equality activities have been arranged but at a very "modest" level that is unable to meet the requirements. Moreover, there is no separate budget for gender equality activities, so the budget is still unstable and mainly through targeted programs/supports and projects. Particularly, some localities did not arrange funds or even did not allocate funds to implement the gender equality work for the Department of Labour, Invalids and Social Affairs. The funds transferred from the Central Government (for gender equality work) were used for other activities.

The limited financial resources dedicated to gender equality results in relatively few dedicated human resource positions for gender equality and limited gender equality measures[346].

9.9.6 Gender Equality Implementation in Dak Lak Province

In order to implement the Law No. 73/2006/QH11 on Gender Equality, Dak Lak Provincial People's Committee (PPC) issued the Directive No. 12/2009/CT-UBND dated December 29, 2009 with an overall objective to promote gender equality, which drives positive changes in attitudes and behaviours among power holders, civil servants and citizens, and contributes to heightening the role and position of women in the family and society[347]. Following the Directive no.12, Dak Lak PPC issued Decision No. 2382/QD-UBND dated August 15, 2016 and Decision No. 3204/QD-UBND dated November 26, 2018 on the implementation plan of the National Program on Gender Equality in Dak Lak province for the period of 2016-2020. The overall objective is to decrease the gender gap and improve women's status in some areas, sectors, regions and localities; and by 2020, basically ensuring gender equality between men and women in terms of opportunities, participation, and benefits in the political, economic, cultural and social fields[348].

Annually, Dak Lak PPC issues the provincial Plan to implement the Gender Equality program in the province and carry out Action Month on Promoting Gender Equality and Preventing Violence against Women and Girls in Vietnam.

In order to ensure the rights of women, in 2018, the Dak Lak Women's Union established the Community Advisory Groups at all levels with the function of representing the Women's Union to protect the legitimate rights and benefits of women's members. The members of the community advisory group include leaders representing the branches of Court and Judiciary Departments, DOLISA, Department of Health, Department of Police, and Women's Union. The activities of this model aim to provide free consultations to women on gender equality, marriage and family, domestic violence prevention and control, taking care of reproductive health, and legal aid.

By 2020, the Women's Union at all levels has established 72 models of Community-level Advisory Groups, providing free counseling for nearly 1,000 women's members. In addition, the Community-level Advisory Groups also received 378 times of assisting citizens to resolve on issues related to regimes and policies, land disputes, property division after divorce, issuance of birth certificates for children, collection of criminal evidence to provide authorities. The Community-level Advisory Groups also organised 89 sharing sessions on the Law on Children, the Law on Human Trafficking, the Law on Prostitution Prevention and Control, the Law on Cybersecurity, the Black Credit, and the prevention of sexual abuse of girls for over 9,897 members who are women and girls in the province[349]. Community-level Advisory Groups have established in project affected communes, including Cu Ne.

[346] UNFPA and MOLISA (2021)

[347] Dak Lak PPC (2009)

[348] Dak Lak PPC (2016)

[349] Dak Lak Women's Union Portal (2020)

In the first six months of 2021, Dak Lak Women's Union implemented focal activities contributing to politics, economics, culture, social affairs, national defence and security as well as the development of the province in the context of COVID-19 pandemic as the following[350]:

- Implementing a number of key activities under the direction of the Central Union in association with the province's political tasks:
  - Women's Union at all levels integrated, disseminated, and propagated the Resolution of the National Party Congress at all levels for 287,397 turns of officials, members, and women.
  - On the occasion of the 111th anniversary of International Women's Day (March 8, 1910 - March 8, 2021), the Provincial Women's Union organised a special emulation launching ceremony with the participation of 200 delegates, and brought the guidelines for the implementation of the special contest to the Women's Union at all levels focusing on three contents:
    - (1) Implementing the theme of the year "Building a strong union's organisation, actively participating in the construction of the Party and the political system",
    - (2) Implementing the special emulation named "100 activities to support the livelihoods for poor ethnic minority women", and
    - (3) Actively participating and contributing to the organisation of the election deputies of the 15th National Assembly and the members of the People's Councils at all levels in the term of office 2021-2026.
  - With many solutions to attract and gather women to participate in the Women's Union activities, the province has added 3,030 members in the first six months of 2021, bringing the total number of members at all levels to 249,381 women.
  - Women's Union at all levels introduced to the Party 68 out of 343 selected elite women.
  - Organising a special emulation of "100 activities to support livelihoods for poor ethnic minority women", Women's Union at all levels in the province surveyed, appraised and awarded 88 livelihood models to women, especially local ethnic minority women with a total value of VND 828,500,000. In which, the provincial Women's Union awarded 15 models, the Women's Union of Buon Ho town awarded 29 models, the provincial police awarded 16 models, Ea H'Leo District Women's Union awarded ten models, Krong Ana District Women's Union awarded two models, Ea Kar District Women's Union awarded nine models, Krong Nang District Women's Union awarded five models, Krong Buk District Women's Union awarded one model, and Krong Pak District Women's Union awarded one model.
  - Women's Union at all levels also support livelihood development activities to 127 women of different religions and ethnic groups with extremely difficult circumstances with a total value of VND 635.5 million.
  - For the prevention of the COVID-19 epidemic, the Women's Unions at all levels in the province has propagated and mobilised 164,208 female members to implement the 5K message including "Wearing masks - Disinfection - Keep distance - Not gathering - Health declaration"; implementing epidemic prevention trainings for 9,725 women; distributing free 53,406 masks, 2,395 bottles of antiseptic gel, 1,100 splash shields, and 35 gifts for poor ethnic minority women (Cu M'gar district) with a total value of VND 204,931,000. In addition, Women's Unions at all levels have mobilised to support VND 213 million to medical staff and soldiers on epidemic prevention tasks.
- Propagandising, mobilising and supporting women for building their happy families and personal development

[350] Dak Lak Women's Union (2021)

- Women's Unions at all levels have propagated and educated political ideology, traditional moral qualities, and improved knowledge and skills for 187,397 female officials and members.
- Carrying out the campaign "Building families with five Nos, three Cleans"[351] in association with the national target program on new rural development, all of the 184 Women's Unions at all levels participated in and implemented 398 new rural development activities with the support of local authorities; launched ten environmental protection models with 325 members; mobilised the local women to contribute money and labour days costing VND 37 million to build the local roads.
- Women's Unions supported local women with preferential loans for economic development; coordinating vocational training for 412 female workers; providing job placement for 473 rural women; building 385 waste treatment pits; donating 345 baskets for female members to go to the market without using plastic bags; supporting 1,017 women to use clean water, and supporting 63 women to access loan for building sanitation works.
- Implementing the project "Propaganda, education, advocacy and support for women to participate in solving a number of social issues related to women" for the period 2017-2027 for 61,524 members and 1,982 students about gender equality, prevention of domestic violence, and gender-based violence.

- Advocacy and support for women to start up business, develop household economy, and protect the environment
  - Implementing the project "Supporting women to start up business" for the period 2017-2025, Women's Unions at all levels have propagated and raised awareness about entrepreneurship and business development for 10,232 female members. The provincial Women's Union organised a program to honor "innovative and creative female entrepreneurs" and launched the contest "Creative start-up women in 2021".
  - In addition, the Provincial Women's Union also proposed the provincial Social Policy Bank to arrange a loan of over VND 2 billion to support 40 women's start-up projects. The district unions advised the Steering Committee on the project of awarding VND 4,707,793,000 to support 372 women starting a business; supported the establishment and launch of a cashew shell processing cooperative with seven members.
- Building a strong union's organisation; participating in building the Party, building the government; carrying out social supervision and criticism; and promoting community diplomacy
  - The Women's Union has contributed to ensuring that the rate of women included in the official list of candidates for People's Council candidates at all levels reaches 35% and achieving an increase in the number of women elected to the National Assembly and People's Councils at provincial and district levels compared to the previous term. Specifically, the number of female in National Assembly deputies is five (in the total of nine comrades), reaching 55.6% (an increase of 33.4% compared to the previous term); the number of female in the Provincial People's Council is 19 (in the total of 75 comrades), reaching 25.3% (an increase of 2.9%); the number of female members in the district People's Council is 136 (in the total of 513 comrades), reaching 26.5% (an increase of 1.6%); the number of female in the commune level is 1,207 (in the total of 4,635 comrades), reaching 26%.

9.9.7 Gender Equality Implementation in Krong Buk District

The Women's Union of Krong Buk district, under the direction of the PPC and Provincial Women's Union, has developed plans and programs of activities to promote the role and position of women in the family and society. They have achieved encouraging results in recent years.

[351] Five Nos, Three Cleans: No poverty, No law violation, No gender inequality, No population policy violation, No malnourished children; Clean house, Clean Alley, Clean kitchen

The District Women's Union maintains the operation of models and clubs with the participation of thousands of members, such as "Women of four virtues" (Self-confidence, Self-respect, Faithfulness and Resourcefulness); "five NOs, three Cleans"; and "Safety for women and children". In additon, to enhance household economy, the union also focuses on maintaining the models including "Women helping each other to eliminate poverty sustainably", the "Women entrepreneurs" club, and "Helping each other with labour and animal breeding"[352].

They supported two women with a total amount of VND 20 million to start their own business. They coordinated with Social Policy Bank to disburse preferential loans to 2,295 households with the amount of over VND 72 billion by 2019[353].

Since 2018, the district has established models of "Community-level Advisory Group" in the communes with the purpose of securing the rights of women's members[354].

9.9.8 Gender Equality Implementation in Commune Level

- Cu Ne Commune

In 2019, Cu Ne Communal Women's Union (CWU) effectively implemented the year's theme named "Safety for women and children" with many achievements in projects and movements, promoting the program named "Accompanying women living in the border areas". Some of notable achievements are supporting two ethnic minority members of the CWU to start a business with an amount of nearly VND 20 million, continuing to exploit and effectively use loan sources for the CWU members to develop their economic businesses and to mobilise savings to support members in need.

At the 10th Executive Committee meeting of Cu Ne CWU in term VII, period 2016-2021, the model of "Community-level Advisory Group" was also launched with 12 members who are representatives of the Women's Union, Department of Justice, Police Department, Department of Culture, Department of Health, Cadastral Base, and DOLISA at the commune level[355].

- Cu Pong Commune

In 2020, Cu Pong CWU implemented three focus missions named propagating, encouraging and supporting women to develop comprehensively and build happy families; advocating and supporting women to start their own businesses, economic development, and environmental protection; building a strong association's organisation; participating in building the Party and government; and carrying out supervision, and promoting community dialogue.

During the implementation of the set missions, the CWU achieved some remarkable results. The women's economic development model was concerned when there were ten revolving savings groups without interest with a total amount of up to VND 255 million. The CWU also launched the model of "Women's Union with three safeties associated with new rural construction" at the Adrong Diet village women's branch with 70 members. In addition, the CWU coordinated with individuals, groups, and sponsors to distribute leaflets, posters, 2,000 free masks to the CWU members and local people, to support 300 masks and 50 bottles of hand sanitiser during the COVID-19 epidemic with a total amount of VND 3,650,000[356].

In 2020, the number of members of Cu Pong CWU was 1,612 people. In the first six months of 2021, the number of members increased by ten people (reaching 20% of the target). However, there were six

[352] Dak Lak Women's Union Portal (2019)
[353] Dak Lak Women's Union Portal (2019)
[354] Dak Lak Women's Union Portal (2018)
[355] Dak Lak Women's Union Portal (2019)
[356] Cu Pong Commune Women's Union (2020)

people transferred to the Elderly Group and 135 members working in other places. Therefore, the number of members currently is 1,481 people[357].

- Ea Sin Commune

Like other communes in Krong Buk district, Ea Sin CWU also established the model of "Community-level Advisory Group" with the launching ceremony on August 13, 2019. The group consisted of 13 members[358].

By April 2021, Ea Sin CWU has eight village branches with 492 members (in the total of 720 females over 18 years old in the commune). In which, the core membership includes 243 women. The executive committee of the WU consists of 13 women, of which there are eight people of ethnic minority groups, accounting for 61.5%[359].

Along with the development of the female workforce in all fields, women's participation in leadership and management is growing recently. Delegates of the Commune People's Council for the period 2016-2021 consist of five females, accounting for 22.7%. In the field of education, there are two female school management leaders (accounting for 40%). In the health sector, there are six out of eight doctors in the area are female, accounting for 75% of the total number of commune health station staffs.

In 2020, the Ea Sin CWU increased the total number of households meeting eight criteria of the campaign "Building Families with five NOs, three Cleans" to 455 out of 831 households, reaching 54.8%. In addition, during the term, Ea Sin CWU launched five clubs of "healthy and beautiful women" in the commune with 40 members participated, a model of "community advisory group" with 15 members, a model of "safety branch 3" and a model of "flower road" in Ea My village with 40 participating members.

In 2020, Ea Sin CWU encouraged members to maintain and replicate the revolving capital contribution group. Specifically, each participating member contributes VND 5,000 savings per month and savings at the district social policy bank with VND 50,000 per month for each household.

In the 2016-2021 term, Ea Sin CWU has completed all of eight targets set by the Congress Resolution including:

- 100% of the CWU's core membership, 95% of its members, and over 80% of women have been propagated about the guidelines of the Party, policies and laws of the State; Charter and Resolutions of the Association; knowledge of People's diplomacy; traditional education, ethics, lifestyle and four moral qualities of Vietnamese women; gender and gender equality; prevention of social evils; domestic violence; and building a happy family.
- 100% of CWU’s core membership, 85% of members registered to implement the emulation movement "Women actively study, work creatively, build a happy family", “Building a family with five NOs, three Cleans" associated with "Studying and following Ho Chi Minh's moral example", and the movement "All people unite to build cultural life in residential areas"
- 100% of members actively participated in the movement to build the fund named "Shelter of love"
- 90% of poor households received economic development with the CWU’s support, of which 100% of poor households are female-headed.
- The number of members increased by 5% or more compared to the beginning of the term.
- 100% of the CWU’s branches maintain, develop and promote the role of core members.

[357] Cu Pong Commune Women’s Union (2021)
[358] Dak Lak Newspapers Portal (2019)
[359] Ea Sin Commune Women’s Union (2021)

- 100% of the CWU's branches have built up, managed and used their social funds in accordance with regulations.

- Chu Kbo Commune

In 2020, Chu Kbo actively implemented the emulation movement[360] "Women actively study, work create and build a happy family" and carried out the campaign to practice moral qualities "Confidence, self-respect, faithfulness and resourcefulness", the campaign "Building families with five Nos three Cleans", 2020's theme "Increase strengthen the great unity bloc of the whole nation, build a clean and strong Party and political system according to Ho Chi Minh's thought, morality and style".

The CWU visited and presented 262 gifts with the total value of VND 70,800,000 to poor households, the lonely elderly, the disabled, people infected with Agent Orange, policy beneficiaries, people with meritorious services on the Lunar New Year of the Rat in 2020.

For the task of advocating and supporting women to start a business and develop the economy, the CWU directed the branches to promote saving activities to help members and poor women with financial difficulties as the following forms: VND 5,000/ member/ month, savings at the district social policy bank VND 50,000/ month/ household, and savings at the branches. At the end of 2020, the amount contributed at the branches was up to VND 700 million, supporting more than 70 women in difficult circumstances to develop economy. In 2020, the CWU considered to give start-up capital to three members with a total amount of VND 21 million from the start-up source of the commune.

In 2020, the CWU attracted more 70 members, reaching 100% of the district's target. The CWU also actively did a good job of introducing outstanding members to the Party for consideration and admission. In 2020, the CWU successfully introduced two members to join the Party[361].

9.9.9 Gender Analysis Based on the Household Survey

This section provides gender analysis in terms of demographic features, educational attainment, livelihood engagement, vulnerability status, access to public infrastructure, and social networks through FGDs with women groups, KIIs with village heads, and household interviews. Women's role, labour division, decision-making, and changes in women's social engagement are also discussed.

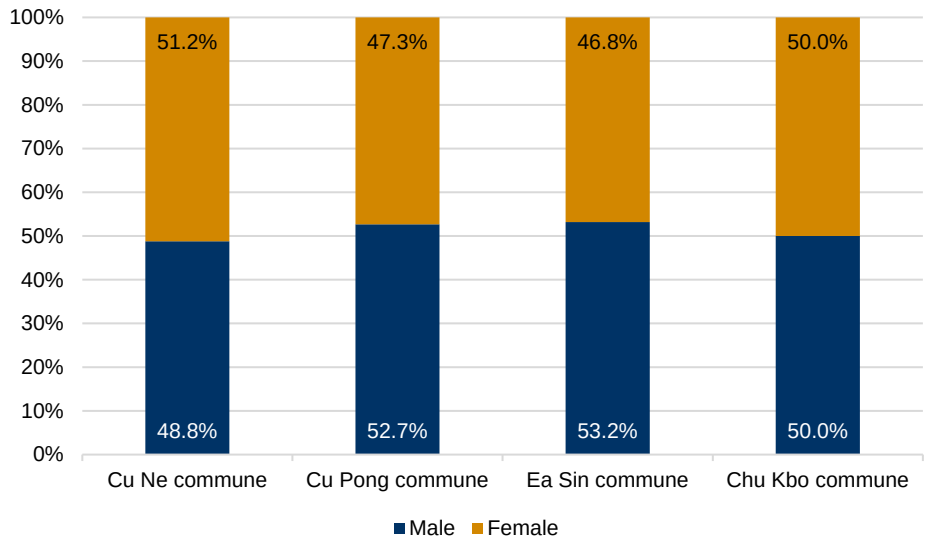
9.9.9.1 Demographic Profile

Gender split shows that male and female ratio in the 144 surveyed households is 51:49 with the equivalent figures of 359 males versus 345 females respectively. Data disaggregating by surveyed areas showed that this pattern is similar in Cu Pong and Ea Sin communes (52.7% versus 47.3% and 53.2% versus 46.8% respectively), while Cu Ne and Chu Kbo communes show an equal number of both genders (see Figure 9.74).

Women's vulnerability status is recorded during interviews to identify sources of difficulties that women might encounter in their living. Of the 41 vulnerable households, there are three female-headed households including one household from Cu Ne commune and the remaining two households residing in Ea Sin commune. They are all of Kinh ethnicity whose age ranges from 44 to 56 years old. Their household income is mostly from land-based livelihoods such as cultivation and husbandry with an average monthly income of VND 1.6 - 2.8 million.

[360] Chu Kbo Commune Women's Union (2020)

[361] Chu Kbo Commune Women's Union (2020)



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.74 Surveyed Population by Gender and Commune

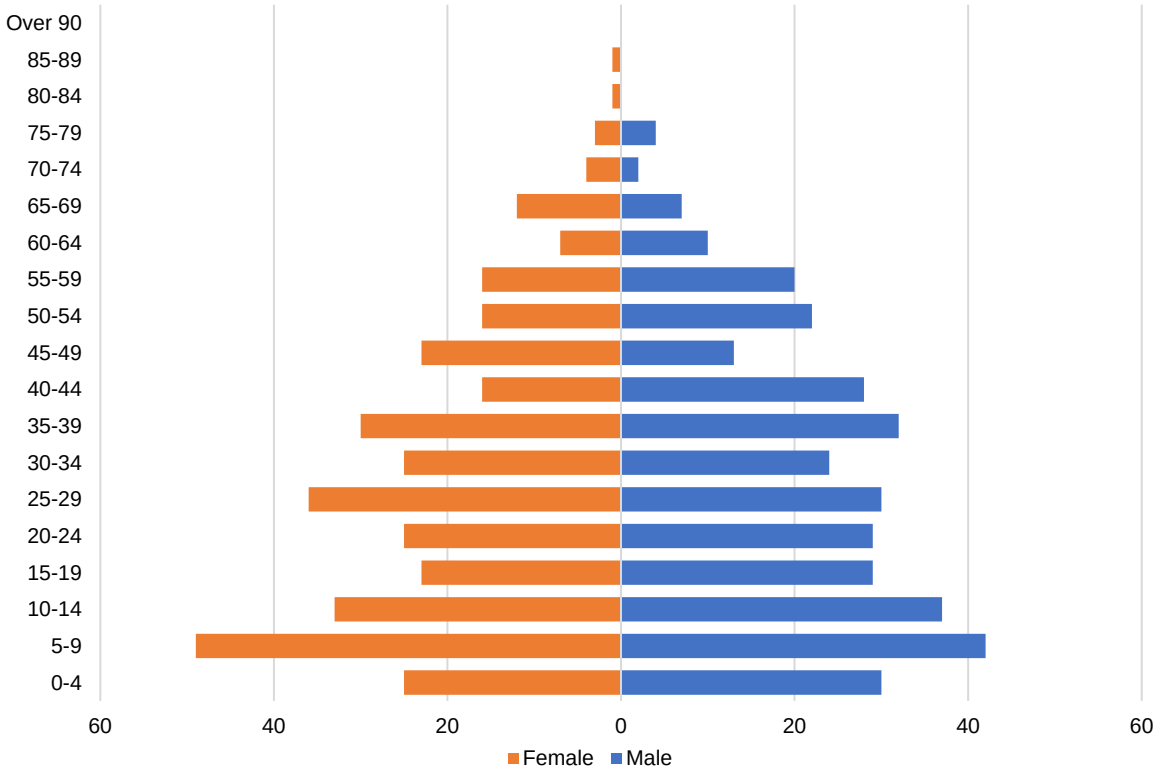
By ethnicity, the number of males surpassed those of females in the Kinh, Ede, and Gia Rai surveyed population (see Table 9.86). Meanwhile, the number of Muong males and females are equal who are living in Ede householdsand there is one Thai female residing in a Kinh household recorded during the interview.

Table 9.86 Surveyed Population by Gender and Ethnicity

Ethnicities	Male		Female	
	N	%	N	%
Kinh	169	50.4	166	49.6
Ede	187	51.5	176	48.5
Gia Rai	2	66.7	1	33.3
Muong	1	50.0	1	50.0
Thai	0	0.0	1	100.0

Source: Socio-economic survey conducted by ERM, July 2021

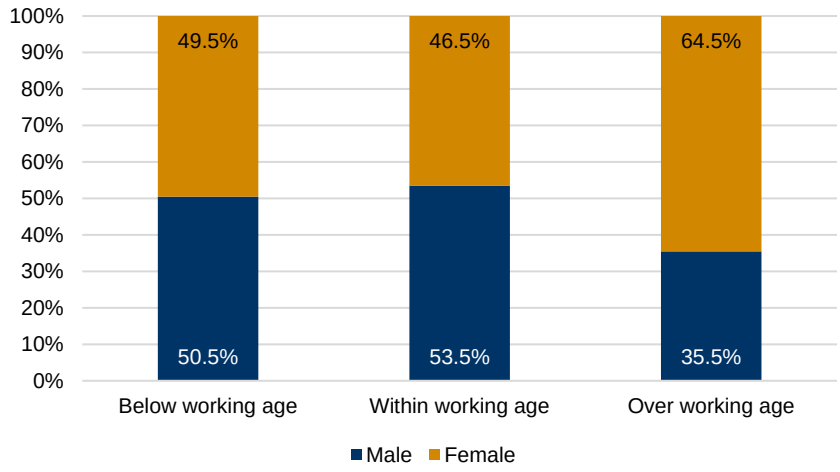
The below age pyramid shows the unmistakable pyramidal shape caused by ever-increasing number of young generations in which the male and female ratio is nearly equal in the under 15 years old cohort (50.5% to 49.5% respectively). Likewise, gender splits in the 15 to 60 years bracket also indicate a gap of 4% between the number of males and females (52.1% versus 47.9% respectively). On the other hand, number of females are predominant in the group of over 60 years old (56% versus 44% respectively) (see Figure 9.75).



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.75 Population Pyramid by Age and Gender

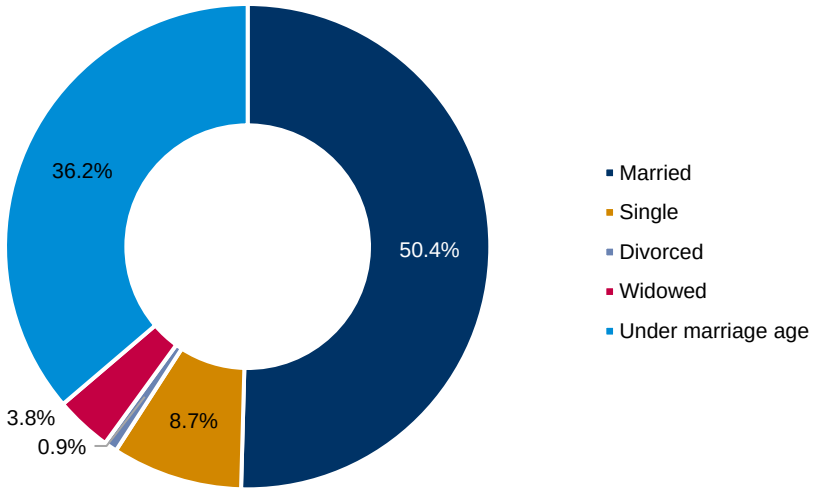
It is striking in the graph that females outnumber their male counterparts in the group of over working age population with 64.5% (see Figure 9.76). Meanwhile, males are dominant in both working and under working age groups with 53.5% and 50.5% respectively.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.76 Surveyed Population by Working Age Group and Gender

In terms of marital status of the surveyed females, half of the female population (50.4%) are married (see Figure 9.77). Meanwhile, just over one third (36.2% or 125 people) are under marriage age and 8.7% or 30 females are single. In addition, 13 females (3.8%) and three females (0.9%) identify their marital status as widowed and divorced respectively.



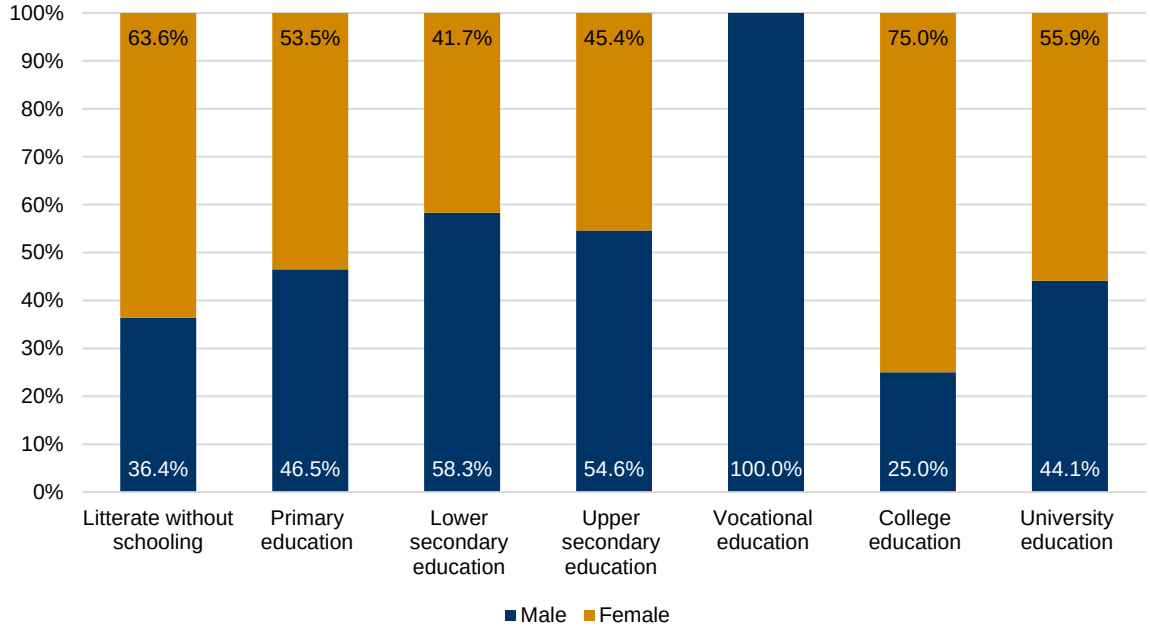
Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.77 Surveyed Female Population by Marital Status

9.9.9.2 Education

In terms of literacy, 45 people out of 623 surveyed people (7.2%) are illiterate, including 34 females and 11 males. Among the literate population, the number of males surpasses their female counterparts, with the corresponding figures of 52.8% versus 47.2% (305 males and 273 females respectively).

The number of males takes the majority in lower and upper secondary levels (with 58.3% and 54.6% of male participation) and vocational education level (with 100% of male participation) (see Figure 9.78). The remaining levels show a higher engagement rate of females such as primary level with 53.5%, college level with 75%, and university with 55.9%. In addition, nearly two thirds of the literate population without formal schooling are females, accounting for 63.6%.



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.78 Surveyed Population by Educational Attainment and Gender

9.9.9.3 Health

The percentage of surveyed people encountered with health issues by gender is 48% for male and 52% for female. Regarding the number of health issues encountered, the number of females having one to two health problems outweigh male's statistics, 50.8% and 57.8% or 131 and 48 females respectively. Meanwhile, only 47.2% (17 females) reported to have over three health issues and this figure for male is 52.8% (19 males) (see Table 9.87).

Table 9.87 Surveyed Population with Health Issues

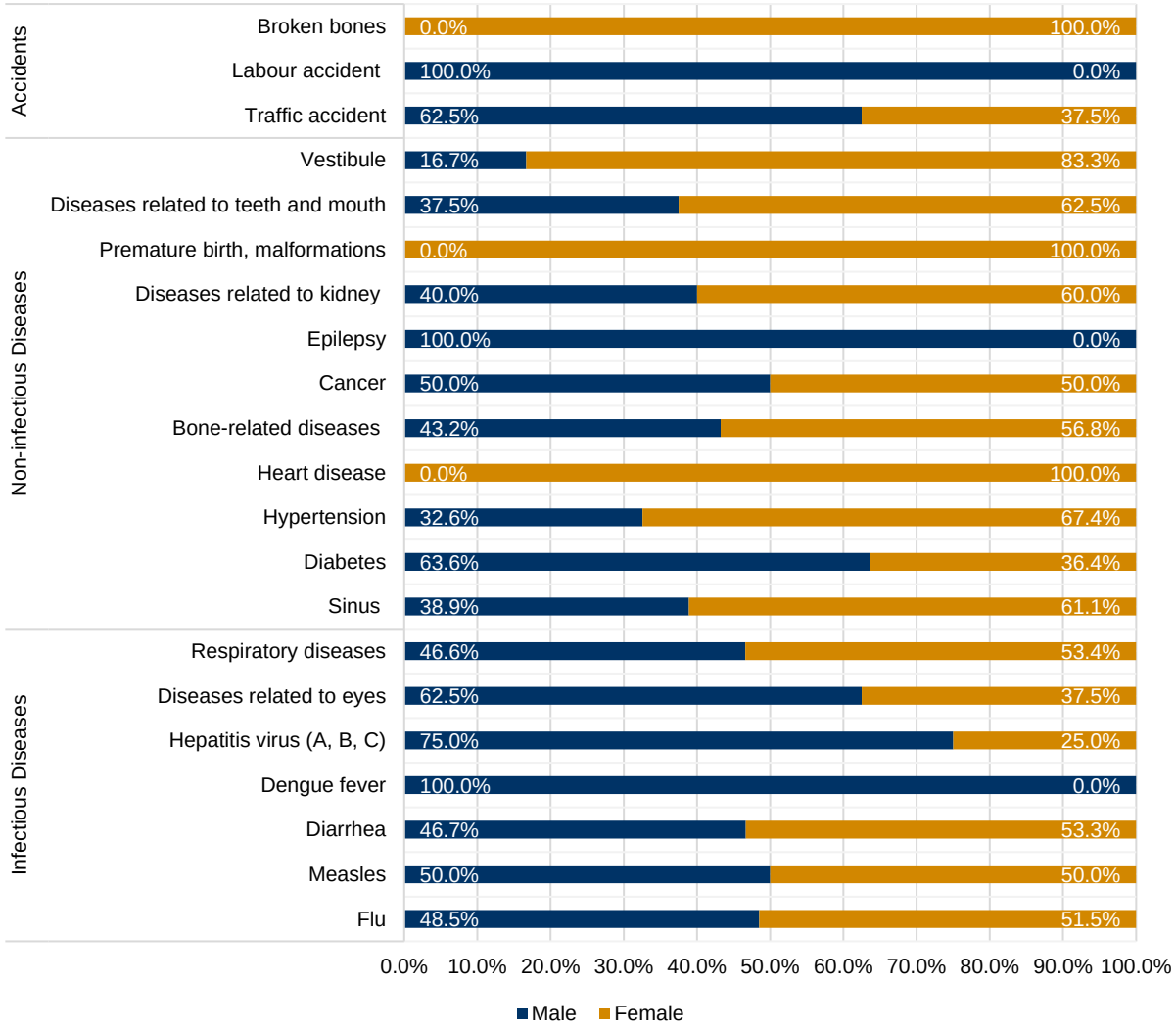
Health Issues	Surveyed Male Population (N=181)		Surveyed Female Population (N=196)	
	N	%	N	%
People with one health issue	127	49.2	131	50.8
People with two health issues	35	42.2	48	57.8
People with over three health issues	19	52.8	17	47.2

Source: Socio-economic survey conducted by ERM, July 2021

For common infectious diseases such as flu, measles, respiratory diseases, and diarrhea found an approximate balance in both genders with the corresponding figures of 48.5% versus 51.5%, 50% versus 50%, 46.6% versus 53.4%, and 46.2% versus 53.8% respectively. In addition, a large percentage of people who got hepatitis virus, dengue fever, and optical problems are male patients, accounted for 75%, 100%, and 62.5% respectively.

Regarding non-infectious diseases, women account for a higher share in the number of vestibule (83.3%), kidney related diseases (60%), teeth and mouth related diseases (62.5%), bone-related diseases (56.8%), heart diseases (100%), hypertension (67.4%), sinus (61.1%), and premature birth (100%). Meanwhile, diabetes and epilepsy showed a higher rate of male, 63.6% and 100% respectively. In addition, the numbers of males and females having cancer are identical.

For accidents, reportedly 100% of bones broken patients are women and 100% of people with labour accidents are male. In addition, a higher rate of males having traffic accidents is recorded (see Figure 9.79).



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.79 Types of Common Diseases among the Surveyed Female Population

9.9.9.4 Women's Engagement in Social Organisations

Of the 345 surveyed female population, 228 people or 32.4% are eligible to engage in social organisations however, only 21.1% or 48 females participate in social organisations. Most of them are currently members of Women's Union (34 females or 70.8%) (see Table 9.88). The remaining people are engaged in Youth Union (12.5%), Vocational Union (10.4%), Elderly Association (8.3%), village management boards (4.2%), and charity groups (2.1%).

Table 9.88 Women's Participation in Social Organisations

Community and Social Organisations	Surveyed Female Population (N=48)	
	N	%
Women's Union/Group	34	70.8
Youth Union	6	12.5
Vocational Union/Group	5	10.4

Community and Social Organisations	Surveyed Female Population (N=48)	
	N	%
Elderly Association	4	8.3
Village management board	2	4.2
Charity Group	1	2.1

Source: Socio-economic survey conducted by ERM, July 2021

9.9.9.5 Access to Public Infrastructure

Accessibility to public infrastructure is a critical factor to evaluate women's living quality. During the FGDs with two women's groups in Cu Pong and Cu Ne communes, women were requested to rate their access to public infrastructures such as electricity, water supply, road, local health stations, local schools, and markets on the Likert 5-point scale from very good to very bad (see Table 9.89).

Table 9.89 Evaluation on Local Infrastructure by FGD Participants

Infrastructures	Ede Women Group in Cu Pong commune		Ede and Kinh Women Group in Cu Ne commune	
	Evaluation	Explain	Evaluation	Explain
Local road	Bad	Some access roads in the village are damaged causing troubles for local in travelling	Bad	Road deterioration by timing used is causing troubles for local travelling
Electricity	Good	Although the power normally outages during irrigation season, local people still provide a positive evaluation	Bad	The price of this service is relatively high compared to some families' income. Some households even could not afford to pay their bills
Water supply	Normal	Some households do not have enough water for daily use due to water shortage.	Good	Groundwater source is quite stable.
Health station	Very good	Local health station is in good condition which meet the demand of local people	Very good	The respondents are fairly satisfied with local health station although it is situated relatively far from the village (5-6km)
Basic education	Very good	Local people satisfied with local school as they meet the educational demand for local children and the school facility is in good condition.	Bad	The village does not have a kindergarten. In fact, local children have to study in the community house so whenever the village have community meeting, local kids have to stay at home. In addition, local primary school is under construction but the school is relatively small and has yet had a playground.
Waste management	Bad	Some households still dispose their household solid waste inappropriately and the awareness of	Bad	There is no solid waste collection service in the locality, hence local households still dispose their household solid waste

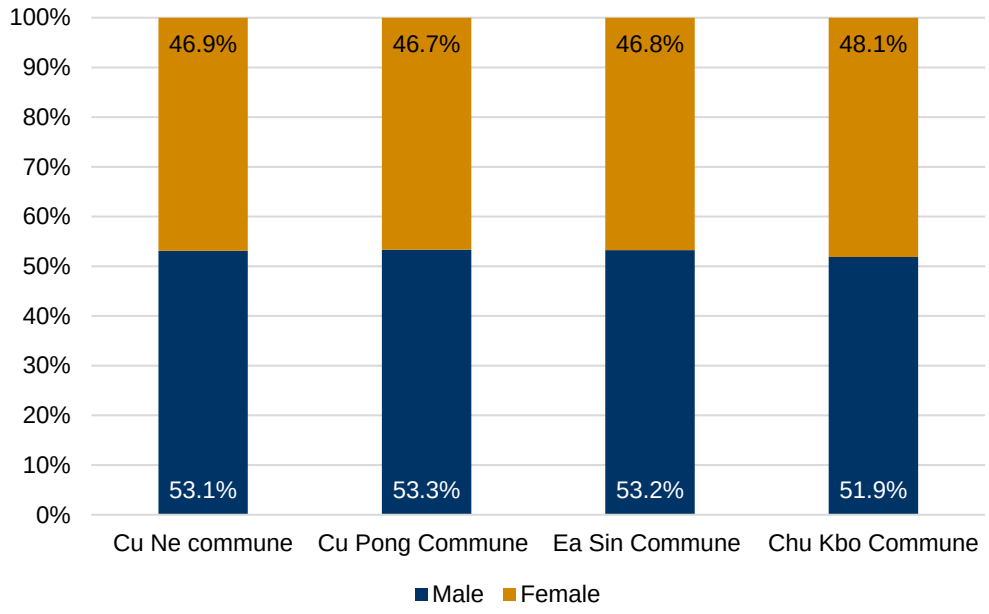
Infrastructures	Ede Women Group in Cu Pong commune		Ede and Kinh Women Group in Cu Ne commune	
	Evaluation	Explain	Evaluation	Explain
		environmental protection is still low in the community.		inappropriately. Besides, the awareness of environmental protection is still low in the community.
Market	Although the villages in thes communes does not have market yet, they complained that they have to travel from 5 to 20 km to Pong Drang to buy goods.			

Source: Socio-economic survey conducted by ERM, July 2021

The household interview results showed that women in Ea Sin and Chu Kbo, mostly Kinh people, are satisfied about water supply, health care, and school facilities. However, women in Ea Sin complained about high price of electricity supply and poor road conditions. Access to market is a bit challenge to local surveyed women due to a long distance from their residence to big markets.

9.9.9.6 Livelihood Engagement

This section analyses employment of 411 people (218 males and 193 females) who are currently engaged in land-based, enterprise-based, and wage-based livelihoods. This includes 218 males (53%) and 193 females (47%). Furthermore, male takes the major proportion in the surveyed communes (see Figure 9.80).



Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.80 Surveyed Labour Force by Gender and the Surveyed Commune

Regarding male and female engagement level in household's livelihoods, male occupies a larger part in most employments such as cultivation (52.3%), working for company (77.3%), and day labour (87.5%). This could be explained that these occupations normally require physical strength while women are more active in enterprise-based occupation such as running small businesses (55.6%) or public employments such as teachers and office worker (71.4%) (see further Table 9.90)

Table 9.90 Livelihood Engagement by Gender

Livelihoods		Male Working Population (N=218)		Female Working Population (N=193)	
		N	%	N	%
Land-based	Cultivation	182	52.3	166	47.7
	Husbandry	0	0.0	1	100.0
Enterprise-based	Small business	8	44.4	10	55.6
Wage-based	Public servant	4	28.6	10	71.4
	Company worker	17	77.3	5	22.7
	Day labourer	7	87.5	1	12.5

Source: Socio-economic survey conducted by ERM, July 2021

Notably, a further 53 females generate their household income from one supplementary occupation and three women are engaged in two secondary occupations simultaneously. Specifically, besides cultivation, 44 women are also engaged in day labour works to gain more income, ten raising cattles and poultry, and three running businesses. Furthermore, one woman working as day labour and another one working as a public servant are having cultivation as their secondary occupation (see Table 9.91).

Table 9.91 Supplementary Occupations of Surveyed Female Population

Surveyed Female Working Population with Supplementary Livelihoods (N=56)		Description of Supplementary and Main Occupations	
N	%	Supplementary occupation	Main occupation
2	3.6	Cultivation	Day labour (1), public servant (1)
10	17.9	Husbandry	Cultivation (10)
3	5.4	Small business	Cultivation (3)
44	78.6	Day labour	Cultivation (44)

Source: Socio-economic survey conducted by ERM, July 2021

9.9.9.7 Labour Division

Gender differences are also reflected in engagement level in reproduction activities, production activities, and community activities.

Regarding reproduction activities women usually hold a larger share compared to males in the surveyed communes with 95.1% on average (see Table 9.92). Specifically, women are relatively active in taking care of children and the elderly (65.7%), preparing food and catering (81.7%), collecting food and feeding livestock (60.3%), and doing household chores such as washing clothes and cleaning house (83.6%). Meanwhile, men are actively engaged in collecting firewood and taking water compared to women as they are physically suitable for the work with assistant with agricultural machinery such as tractors to transport. This tendency is also found in individually surveyed communes.

Table 9.92 Labour Division in Reproduction Activities among the Surveyed Households

Labour Division (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Reproduction activities	6.1	93.9	4.7	95.3	2.3	97.7	6.0	94.0	4.9	95.1
Taking care of children and the elderly	30.9	69.1	40.7	59.3	31.6	68.4	32.0	68.0	34.3	65.7
Preparing food and cooking	15.5	84.5	19.9	80.1	16.1	83.9	24.5	75.5	18.3	81.7
Taking water and collecting firewood	52.6	47.4	55.7	44.3	46.2	53.8	55.0	45.0	52.7	47.3
Collecting food and feeding livestock	38.9	61.1	40.9	59.1	40.0	60.0	38.2	61.8	39.7	60.3
Washing clothings and cleaning house	16.3	83.7	19.1	80.9	13.2	86.8	14.5	85.5	16.4	83.6

Source: Socio-economic survey conducted by ERM, July 2021

Regarding gender roles in production activities, although females are generally engaged in production activities to generate household income (see Figure 9.81), males still hold the predominant role in most of household's livelihoods (60.4% versus 39.6% respectively) such as cultivation (68.8% versus 31.2%), stable wage-based employments (55.2% versus 44.8%), and unstable wage-based employments (62% versus 38%) (see Table 9.93). However, for enterprise-based livelihoods, this shows an opposite pattern in which women take the leading position with corresponding figures of 61.2% for female and 38.8% for male. For individual communes, male and female responsibilities and engagement levels follow the same tendency.

Table 9.93 Labour Division in Production Activities among the Surveyed Households

Labour Division (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Production activities	60.9	39.1	63.6	36.4	54.6	45.4	60.0	40.0	60.4	39.6
Cultivation	68.7	31.3	72.2	27.8	62.8	37.2	68.4	31.6	68.8	31.2
Business	43.8	56.3	40.4	59.6	36.0	64.0	24.5	75.5	38.8	61.2
Permanent wage-based works	54.3	45.7	60.3	39.7	54.3	45.7	50.0	50.0	55.2	44.8

Labour Division (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Seasonal wage-based works	61.5	38.5	66.7	33.3	67.1	32.9	46.4	53.6	62.0	38.0

Source: Socio-economic survey conducted by ERM, July 2021

Source: Socio-economic survey conducted by ERM, July 2021

Figure 9.81 Women in Agricultural Production

It is highlighted that male holds an absolute responsibility for community engagement. Specifically, just over a quarter of surveyed women (26.5%) contribute to public infrastructure maintenance and moderate level of local women engaged in community-related affairs such as community meetings and events with corresponding figures of 38.7% and 39.8% respectively (see Table 9.94).

Table 9.94 Labour Division in Community Activities among the Surveyed Households

Labour Division (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Maintain local public infrastructure	74.3	25.7	76.6	23.4	72.9	27.1	66.5	33.5	73.5	26.5
Participate in community meetings	58.6	41.4	69.6	30.4	60.7	39.3	49.5	50.5	61.3	38.7
Organising community events	56.2	43.8	64.0	36.0	66.1	33.9	54.2	45.8	60.2	39.8

Source: Socio-economic survey conducted by ERM, July 2021

9.9.9.8 Access to and Control of Resources

This section develops the access and control profile with consideration to which women and men have access to and control of the resources and benefits identified because the differences between women's and men's access to and control of resources may be a potential indicator of the power imbalances between them. Access to a resource is ability to use that resource and control of a resource is the power to decide how a resource is used and who can use it. The survey findings showed that there are no differences between women's and men's access to resources but a remarkable gap in the control of resources between them.

In this study, gender access to and control over household resources had been recorded by using different parameters such as access to household assets, household finance, public services, and learning opportunities. Survey results show male domination in gaining access to household assets such as production land and household water supply (55% and 52% respectively), public services including social services and legal services (52.5% and 55.8% respectively), and education opportunities (54.5%).

In terms of household finance, there was no strong gender domination in accessing and using household expenses for both essentials and other kinds, cash, and bank accounts regardless of an insignificant gap in cash utilising (see Table 9.95). Similarly, no gender difference in accessing household facilities is observed in the surveyed households. Variations may occur in individual communes; however, they also reflect this overall tendency.

Table 9.95 Access to Resources by Gender

Access to Resources (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Production land	55.0	45.0	58.0	42.0	48.5	51.5	57.0	43.0	55.0	45.0
Water	51.5	48.5	53.3	46.7	49.6	50.4	53.3	46.7	52.0	48.0
Housing facilities	48.8	51.2	51.6	48.4	48.2	51.8	53.5	46.5	50.2	49.8
Cash	48.8	51.3	46.4	53.6	47.1	52.9	51.0	49.0	48.0	52.0
Bank account	52.4	47.6	50.0	50.0	50.0	50.0	42.5	57.5	49.8	50.2
Household expense for essential needs	52.9	47.1	55.7	44.3	47.9	52.1	52.9	47.1	52.9	47.1
Household expense for other needs	52.8	47.2	52.0	48.0	50.0	50.0	53.6	46.4	52.1	47.9
Social services	49.2	50.8	58.4	41.6	47.3	52.7	54.5	45.5	52.5	47.5
Legal services	50.9	49.1	62.0	38.0	50.7	49.3	60.0	40.0	55.8	44.2
Education opportunities	53.8	46.3	58.6	41.4	50.0	50.0	53.9	46.1	54.5	45.5

Source: Socio-economic survey conducted by ERM, July 2021

Similarly, survey results indicated a strong gender domination in control over resources. Specifically, male overwhelmingly dominates in managing production land (70.2%) as well as water and household facilities (68.6% and 61.2% respectively) (see Table 9.96). Furthermore, men also hold a leading role in representing the family for social and legal services, accounting for 73.7% and 75.2% respectively. Meanwhile little control was given to men in managing household cash in which women account for over 70%. The remaining parameters show a slight male domination in managing household bank account (54.4% for male and 45.6% for female), household expenses for essential purposes (53% for male and 47% for female), and education opportunity (54% for male and 46% for female), except control over expenses for other needs (47.3% for male versus 52.7% for female).

Table 9.96 Control over Resources among the Surveyed Households

Control over Resources (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Production land	73.8	26.2	68.6	31.4	63.3	36.7	75.0	25.0	70.2	29.8
Water	65.7	34.3	75.5	24.5	63.5	36.5	66.7	33.3	68.6	31.4
Housing facilities	62.1	37.9	66.8	33.2	49.3	50.7	62.5	37.5	61.2	38.8
Cash	23.2	76.8	34.5	65.5	27.5	72.5	32.9	67.1	29.1	70.9
Bank account	56.0	44.0	67.9	32.1	50.0	50.0	33.3	66.7	54.4	45.6
Household expense for essential needs	56.0	44.0	57.3	42.7	44.2	55.8	47.6	52.4	53.0	47.0
Household expense for other needs	45.9	54.1	54.8	45.2	44.4	55.6	37.1	62.9	47.3	52.7
Social services	70.2	29.8	84.3	15.7	64.2	35.8	70.0	30.0	73.7	26.3
Legal services	77.2	22.8	78.2	21.8	65.2	34.8	77.5	22.5	75.2	24.8
Education opportunities	54.2	45.8	58.6	41.4	47.8	52.2	52.2	47.8	54.0	46.0

Source: Socio-economic survey conducted by ERM, July 2021

9.9.9.9 Decision Making

Perception of surveyed respondents on household's decision-making process had been accumulated and presented to better understand power dynamics in the home. As discussed above, men uphold a dominant part in social, legal, and community related decisions; however, the finance-related decision making process may take both men and women participation.

Of 144 respondents, it is common to see that husband and wife are given an equal right for managing household's decisions, accounting for 61.8% (see Table 9.97). However, despite the discussion between husband and wife, one third of the survey respondents said that their husband remains the decision maker in their family while 13.2% stated the opposite. In addition, according to some respondents, monopoly in making decisions is recorded in which 10 household representatives

asserted that the husband is solely responsible for household financial decisions while only four respondents stated the opposite equivalent to 6.9% and 2.8% respectively.

Table 9.97 Decision Making on Financial Issues in the Surveyed Households

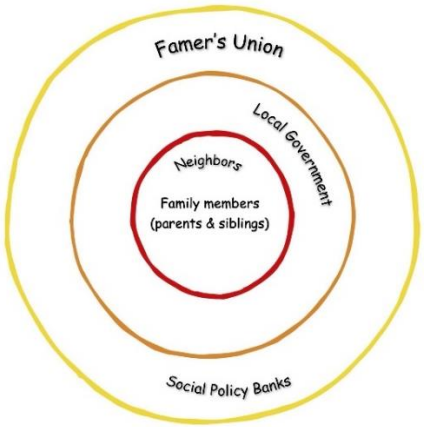
Decision Making on Financial Issues	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Husband and wife discuss and make decisions	28	57.1	28	60.9	20	71.4	13	61.9	89	61.8
Husband and wife discuss but husband makes decisions	18	36.7	17	37.0	7	25.0	6	28.6	48	33.3
Husband and wife discuss but wife makes decisions	9	18.4	6	13.0	1	3.6	3	14.3	19	13.2
Husband makes decision	4	8.2	4	8.7	0	0.0	2	9.5	10	6.9
Wife makes decisions	0	0.0	2	4.3	2	7.1	0	0.0	4	2.8

Source: Socio-economic survey conducted by ERM, July 2021

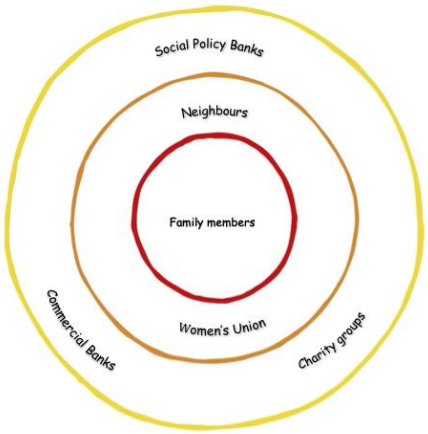
9.9.9.10 Social Support

The study in Cu Ne and Cu Pong communes show how different groups (i.e. families, relatives, acquaintances, neighbours, organisations, banks, and others sources) support women in terms of financial and emotional support. Three women groups were requested to rate the support level from different groups using a three-order circle of support in terms of importance for their needs (see Figure 9.82).

Both Ede women group and the Kinh women group indicated that their primary source of support comes from their closest one, which is family members such as parents or siblings. Secondly, their neighbours and local authorities or mass organisation such as Women's Union are also identified as the secondary source of support. Specifically, as shared by the Kinh women, the local Women's Union has a financial support fund which is mobilised by the Union's members with an amount of VND 500,000 per member. This fund will sponsor disadvantaged women in the village and the interest from this debt will be saved and support to other women (FGD, women group, Kinh ethnicity, Ea Kung village, Cu Ne commune , 14 July 2021). While Ede women's final layer of support is social policy banks, Kinh group has more opportunities besides social policy banks such as charity groups or commercial banks.



Circle of the Ede Women Group in Ea Bro Village, Cu Pong commune

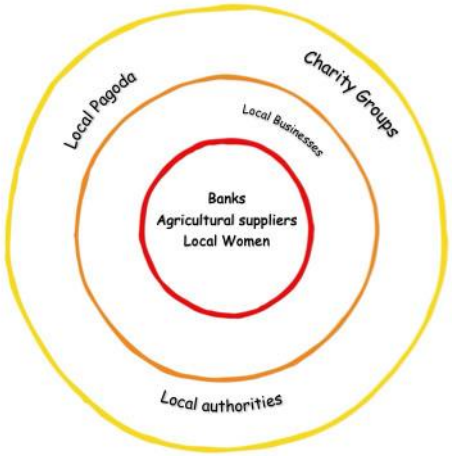


Circle of the Kinh Women in Ea Kung Village, Cu Ne commune

Source: FGDs conducted by ERM, July 2021

Figure 9.82 Circle of Support by Ede and Kinh Women Groups

The ethnicity-mixed women group in Drah 2 village shows different responses in which their primary source of support is banks, local agricultural suppliers, and local women as they are going to count on each other (see Figure 9.83). Secondly, local businesses support local women by allowing women to buying goods in debt. In addition, local authorities are recorded as the final round of support as they provide prompt assistance to local households when droughts or natural disasters occurred. Furthermore, local pagodas and charity groups are also given credit to as local people often receive monetary and in-kind supports (i.e. money and clothes) from them (FGD, women group, Kinh and Ede ethnicity, Drah 2 village, Cu Ne commune, 14 July 2021).



Source: FGD conducted by ERM, July 2021

Figure 9.83 Circle of Support by the Ethnicity-Mixed Women Group

9.9.9.11 Social Changes in Gender Relations

Around 32% of the respondents admitted that women role in the community had been enhanced to some extent (see Table 9.98). This is thanks to an increase in women people perception about gender, they are self-aware of their social positions and their rights. Reportedly, the well-operated local Women's Unions should be also taken into account. In particular, women nowadays are able to be responsible for many positions that once primarily in charge or responsible by men. In addition, women and men are now engaged in family income generation activities.

Meanwhile, just over one third of the surveyed respondents (49 people or 34%) assumed that women's role remains unchanged for the past years due to their burden in taking care of their families. In addition, local difficulties in living curb the development of women.

> "For long time women in our village have to worry about taking care of their family. Hence little do they have time for social activities or other similar forms" (ES23, male respondent, Kinh ethnicity, Ea My village, Ea Sin commune, 14 July 2021)

In addition, only five respondents (3.5%) see the limited women's engagement in community affairs while the rest of the surveyed respondents (30.5%) do not have any opinion on this issue.

Table 9.98 Changes in Women's Engagement in Community and Social Activities

Women's Engagement in Community and Social Activities (%)	Cu Ne Commune (N=49)		Cu Pong Commune (N=46)		Ea Sin Commune (N=28)		Chu Kbo Commune (N=21)		All Surveyed Communes (N=144)	
	N	%	N	%	N	%	N	%	N	%
Increased significantly	2	4.1	1	2.2	2	7.1	2	9.5	7	4.9
Increased	12	24.5	11	23.9	9	32.1	7	33.3	39	27.1
No change	16	32.7	22	47.8	6	21.4	5	23.8	49	34.0
Reduced	2	4.1	2	4.3	0	0.0	0	0.0	4	2.8
Reduced significantly	0	0.0	1	2.2	0	0.0	0	0.0	1	0.7
No opinion	17	34.6	9	19.6	11	39.4	7	33.4	44	30.5

Source: Socio-economic survey conducted by ERM, July 2021

9.10 Human Rights Considerations

9.10.1 Human Rights in International Context

9.10.1.1 Definition of Human Rights

Human rights are rights inherent to all human beings. They are the sum of individual and collective rights laid down in State constitutions and international laws that protect individuals and groups against actions interfering with fundamental freedoms and human dignity. Human rights are manifold, pertaining to all aspects of life. Human rights encompass civil and political rights, economic, social, and cultural rights, as well as the collective rights of peoples[362] (see Table 9.99).

Table 9.99 Examples of Human Rights

Civil and Political Rights	Economic, Social, and Cultural Rights	Collective Rights
■ Right to life; ■ Freedom from torture and cruel, inhuman or degrading treatment or punishment;	■ Right to work;	■ Right of people to self-determination, free use of their wealth and natural

[362] Inter-Parliamentary Union and the United Nations (2016)

Civil and Political Rights	Economic, Social, and Cultural Rights	Collective Rights
■ Freedom from slavery, servitude and forced labour; ■ Right to liberty and security of person; ■ Right of detained persons to be treated with humanity; ■ Freedom of movement; ■ Right to a fair trial; ■ Prohibition of retroactive criminal laws; ■ Right to recognition as a person before the law; ■ Right to privacy; ■ Freedom of thought, conscience and religion; ■ Freedom of opinion and expression; ■ Prohibition of propaganda for war and of incitement to national, racial or religious hatred; ■ Freedom of assembly; ■ Freedom of association; ■ Right to marry and to found a family; and ■ Right to take part in the conduct of public affairs, vote, be elected and have access to public office.	■ Right to just and favourable conditions of work; ■ Right to form and join trade unions; ■ Right to social security; ■ Protection of the family; ■ Right to an adequate standard of living, including adequate food, clothing and housing; ■ Right to health; and ■ Right to education.	resources, peace, and a healthy environment; and ■ Other collective rights of national, ethnic, religious and linguistic minorities and rights of indigenous peoples

Source: Inter-Parliamentary Union and the United Nations (2016)

9.10.1.2 Basic Human Rights Principles

The international community affirmed the holistic concept of human rights at the World Conference on Human Rights, held in Vienna in 1993.

> "All human rights are universal, indivisible and interdependent and interrelated. The international community must treat human rights globally in a fair and equal manner, on the same footing, and with the same emphasis. While the significance of national and regional particularities and various historical, cultural and religious backgrounds must be borne in mind, it is the duty of States, regardless of their political, economic and cultural systems, to promote and protect all human rights and fundamental freedoms."[363]

[363] Office of the High Commissioner for Human Rights (2021)

Here are basic human rights principles[364]:

- Human rights are universal and inalienable: they apply to every person and are the same for everyone everywhere.
- Human rights are indivisible and interdependent: there is no hierarchy between human rights. The improvement of one right facilitates advancement of the others, and likewise the deprivation of one right adversely affects the others. Respect for all rights is a prerequisite to sustainable peace and development; and
- Human rights are equal and non-discriminatory: they are enjoyed by everyone equally, irrespective of sex, race, colour, language, religion, political or other opinion, national, ethnic or social origin, membership of a national minority, property, birth, age, disability, sexual orientation and social or other status.

9.10.1.3 Core International Human Rights Treaties

The full body of international human rights instruments consists of more than 100 treaties, declarations, guidelines, recommendations, and principles which together set out international human rights standards. The core treaties are mentioned in Table 9.100. However, many other international human rights instruments adopted by, or under the aegis of the United Nations, define specific rights, set out the rights of particular groups and regulate conduct to protect human rights[365].

Table 9.100 Core Human Rights Treaties

Core Human Rights Treaties	Abbreviation	Year of adoption	Year of entry into force
International Convention on the Elimination of All Forms of Racial Discrimination	ICERD	1965	1969
International Covenant on Civil and Political Rights	ICCPR	1966	1976
Optional Protocol to the International Covenant on Civil and Political Rights	ICCPR-OP1	1966	1976
Second Optional Protocol to the International Covenant on Civil and Political Rights, aiming at the abolition of the death penalty	ICCPR-OP2	1989	
International Covenant on Economic, Social and Cultural Rights	ICESCR	1966	1976
Optional Protocol to the Covenant on Economic, Social and Cultural Rights	ICESCR - OP	2008	2013
Convention on the Elimination of All Forms of Discrimination against Women	CEDAW	1979	1981
Optional Protocol to the Convention on the Elimination of Discrimination against Women	OP-CEDAW	1999	2000
Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment	CAT	1984	1987

[364] Office of the High Commissioner for Human Rights (2021)

[365] Office of the High Commissioner for Human Rights and United Nations Staff College Project (2000)

Core Human Rights Treaties	Abbreviation	Year of adoption	Year of entry into force
Optional Protocol to the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment	OP-CAT	2002	2006
Convention on the Rights of the Child	CRC	1989	1990
Optional Protocols to CRC on the involvement of children in armed conflict and on the sale of children, child prostitution and child pornography	OP-CRC-SC	2000	2002
Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict	OP-CRC-AC	2000	2002
Optional Protocol to the Convention on the Rights of the Child on a communications procedure	OP-CRC-IC	2011	2014
International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (known as the Migrant Workers Convention)	ICMW	1990	2003
International Convention for the Protection of All Persons from Enforced Disappearance	CPED	2006	2010
Convention on the Rights of Persons with Disabilities	CRPD	2006	2008
Optional Protocol to the Convention on the Rights of Persons with Disabilities	OP-CRPD	2006	2008

Source: Office of the High Commissioner for Human Rights (2021)

9.10.1.4 Human Rights Treaty Monitoring Bodies

9.10.1.4.1 United Nations Human Rights Treaties and Monitoring

Compliance of States Parties with their respective obligations under the nine United Nations core human rights treaties and their optional protocols (see Table 9.100) is monitored by expert organs, which are known as treaty-monitoring bodies or treaty bodies (see Table 9.101):

Table 9.101 Treaty Bodies, Membership, and Functioning

Treaty Bodies	No. of Members	Functioning
Human Rights Committee	18	It monitors the implementation of the International Covenant on Civil and Political Rights by its State parties.
Committee on Economic, Social and Cultural Rights (CESCR-Committee)	18	It monitors the implementation of the International Covenant on Economic, Social and Cultural Rights by its States parties.
Committee on the Elimination of Racial Discrimination (CERD-Committee)	18	It monitors the implementation of the Convention on the Elimination of All Forms of Racial Discrimination by its State parties.

Treaty Bodies	No. of Members	Functioning
Committee against Torture (CAT-Committee)	10	It monitors the implementation of the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment by its State parties.
Subcommittee on the Prevention of Torture and other Cruel, Inhuman or Degrading Treatment or Punishment (SPT)	25	SPT is a new kind of treaty body in the United Nations human rights system. It has a preventive mandate focused on an innovative, sustained and proactive approach to the prevention of torture and ill treatment.
Committee on the Rights of the Child (CRC-Committee)	18	It monitors the implementation of the Convention on the Rights of the Child by its State parties. It also monitors implementation of two Optional Protocols to the Convention, on involvement of children in armed conflict and on sale of children, child prostitution and child pornography.
Committee on the Protection of the Rights of All Migrant Workers and Members of Their Families (CMW-Committee)	14	It monitors implementation of the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families by its State parties.
Committee on the Rights of Persons with Disabilities (CRPD-Committee)	18	It monitors implementation of the Convention by the States Parties.
Committee on Enforced Disappearances (CED-Committee	10	It monitors the implementation of the Convention for the Protection of all Persons against Enforced Disappearance by the States parties.

Source: Office of the High Commissioner for Human Rights (2021)

With the exception of the CESCR-Committee, which was created by a resolution of the Economic and Social Council in 1985, the above bodies were established by their respective instruments, and were set up as soon as the respective treaties had entered into force. Their members are elected by the States Parties to the respective treaties (with the exception of the CESCR-Committee, which is elected by the Economic and Social Council), with due regard for equitable geographic distribution. The Human Rights Committee, CESCR-Committee, CERD-Committee, CEDAW-Committee, CAT-Committee and CRC-Committee and the SPT meet ***three*** (03) times a year, and the other treaty bodies (CED-Committee, CMW-Committee and CRPD-Committee) meet ***two*** (02) times a year. Office of the United Nations High Commissioner for Human Rights (OHCHR) provides support to all treaty bodies[366].

9.10.1.4.2 Asia and the Pacific Human Rights Treaties and Monitoring

Besides the UN charter-based system of human rights protection, applying to all States, and the UN treaty-based system, applying only to States Parties, many States in Africa, the Americas, the Arab region, and Europe have also assumed binding human rights obligations at the regional level and have accepted international monitoring of these obligations. Regionally, Asian and Pacific region has not adopted a territorial human rights treaty and monitoring mechanism. However, the Association of Southeast Asian Nations (ASEAN) have been in process to institutionalize a regional approach to human rights. Over the past 20 years, Asian and Pacific countries have focused on strengthening regional cooperation, including through OHCHR, to promote respect for human rights [367].

[366] Inter-Parliamentary Union and the United Nations (2016)

[367] Inter-Parliamentary Union and the United Nations (2016)

As for ASEAN, the ASEAN Intergovernmental Commission on Human Rights (AICHR) was established in October 2009. The Commission was mandated to develop the ASEAN Human Rights Declaration (AHRD), which was adopted at the 21st ASEAN Summit in Phnom Penh, Cambodia, in November 2012. Other regional instruments with human rights components have also been adopted, such as the Convention against Trafficking in Persons, especially Women and Children, adopted in Kuala Lumpur, Malaysia, in November 2015 and entered into force in March 2017[368]. The South Asian Association for Regional Cooperation (SAARC) has adopted a number of conventions that deal with human rights issues, including trafficking in women and children, child welfare and the suppression of terrorism[369].

In summary, there is no sub-regional human rights instrument or body as yet in the Pacific, but the topic has been discussed in recent years. The Asia Pacific Forum of National Human Rights Institutions (APF) is a key regional organisation. Its membership consists of National Human Rights Institutions (NHRIs) in the region that comply with international standards set out in the Paris Principles[370].

9.10.1.5 UN Human Rights Practice

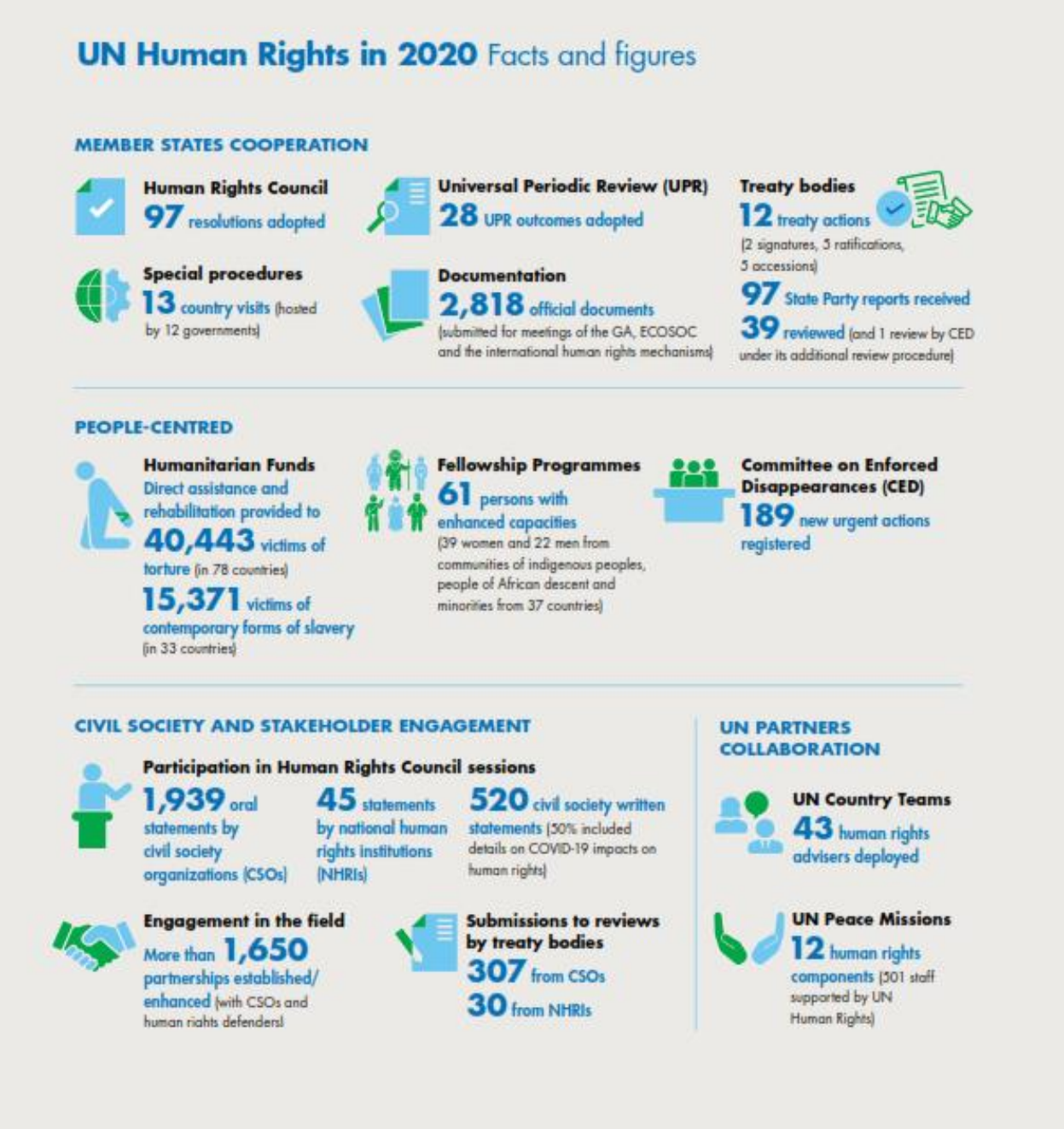
The UN Human Rights Report 2020[371] presents the progress achieved in 2020 against the targets set out in the OHCHR Management Plan 2018-2021. It shows how UN addressed the many challenges highlighted and reinforced by the COVID-19 pandemic with respect to human rights. Here are facts and figures of UN Human Rights in 2020 (see Figure 9.84).

[368] Alistair Cook and Tamara Nair (2021)

[369] Inter-Parliamentary Union and the United Nations (2016)

[370] Inter-Parliamentary Union and the United Nations (2016)

[371] Office of the High Commissioner for Human Rights (2021)



Source: Office of the High Commissioner for Human Rights. United Nations Human Rights Report 2020 (2021)

Figure 9.84 Facts and Figures of UN Human Rights in 2020

9.10.1.6 Potential Human Right Impacts in Energy Industry

This section provides information of potential human rights impacts in the power generation sector in general and in the wind energy industry in particular.

9.10.1.6.1 Human Rights Related Risks to Power Generation

According to United Nations Environment Programme (UNEP), the implementation of power generation (i.e. power stations and the use of fossil fuels; nuclear power; renewable energy sources such as

hydroelectric power, wind farms, geothermal energy, photovoltaics; and energy generation from biomass and waste) may put key human rights related risks[372] (see Table 9.102), specifically:

- The impact on the workforce, particularly health and safety issues;
- Fuel sourcing, particularly coal (the sector is the largest purchaser of coal worldwide) and increasingly bio-fuels (both their production and disposal);
- Community impact, including the health and safety of communities and the environmental impact on them;
- Use of security contractors; and
- The threat of terrorism and sabotage, which has implications for security and also a potentially significant impact on workforces and local communities.

Table 9.102 Human Rights Related Risks to Communities

Topic Areas	Main Issues for the Power Generation Sector
Community Health and Safety	■ Risk of accident and death due to lack of insufficient security arrangements and warnings around facilities and assets; ■ Environmental and human rights risks due to decommissioning of nuclear power stations; ■ Long term health risks associated with exposure to nuclear radiation; ■ Air quality adversely affected by emissions; ■ Contamination of local water supply; ■ Risk to communities due to electro-magnetic and electric radiation; and ■ Health and safety of local communities at risk due to the impact of natural disasters and severe weather events on facilities.
Property rights and land acquisition	■ Governments may take responsibility for consulting with communities on relocation and ensuring compensation payment; ■ Lack of free, prior and informed consent of local and indigenous populations and/or lack of process to explore this can lead to arbitrary destruction of identity and livelihood; ■ Forced removal of indigenous groups from lands. This may be carried out by host governments which do not recognise indigenous groups or their rights; ■ Lack of, or unfair, compensation, or lack of adequate and appropriate alternative provision; ■ Damage to or loss of cultural/historical sites which form the basis of indigenous groups and/or national identity; ■ Communities may also be split or separated from neighbouring communities by the development; and ■ Economic depression after facility closure, particularly in remote areas, due to lack of alternative sources of employment.
Access to resources	■ Demand for energy is growing strongly in China, India and the middle East, leading to potential conflicts over resource use;

[372] United Nations Environment Programme Finance Initiative (2014)

Topic Areas	Main Issues for the Power Generation Sector
	■ Non-conventional power generation can be a particularly heavy user of water which may reduce water available for local agriculture and small scale industry; ■ There may also be conflicts about the use of other resources, including land; and ■ Non-conventional power generation, including from tar sands, fracking and biomass can lead to public protest over environmental and safety issues.
Controls and mitigants	■ A stakeholder engagement plan to ensure full and effective consultation with all stakeholders; ■ A community awareness and education plan as part of health and safety measures; ■ Rehabilitation of land disturbed or occupied by operations in accordance with appropriate post-operation land uses; ■ Recognition of existing communities' rights; ■ Assessment to evaluate a project's positive and adverse effects on indigenous peoples; ■ Emergency response plan to protect affected communities in the event of a major incident; ■ Clearly defined procedures on the use of indigenous peoples' knowledge and resources; ■ Policies and procedures on conservation and sustainable use of finite resources; ■ Policies and procedures to ensure free, prior and informed consent of local and indigenous communities, especially vulnerable groups; ■ Policy and procedures on the relocation of communities; and ■ Economic development plan for full-life cycle of facility including after closure.

Source: United Nations Environment Programme Finance Initiative (2014)

9.10.1.6.2 Potential Human Rights Related Risks to Wind Energy Industry

In a report by the Business and Human Rights Resource Centre[373], companies involved in wind energy projects are particularly at risk for abuses of indigenous peoples' rights, including lacking free, prior, and informed consent (FPIC), and causing or contributing to displacement and loss of livelihoods; causing or contributing to violence, intimidation, and threats up to and including death threats. Table 9.103 provides a listing of potential human rights related risks in wind energy industry.

Table 9.103 Potential Human Rights Related Risks to Wind Energy Industry

Topic Areas	Potential Human Rights Related Risks	Relevance to Wind Energy Industry
Land and property	■ Right to own property; ■ Right to adequate housing; ■ Right to a standard of living adequate for the health and wellbeing of the individual and his/her family; and	The project may acquire land, permanently or temporarily for use during construction or operations. Communities or individuals may live on the land and use it for housing. They may use the land for agriculture, water collection, foraging or other

[373] The Business & Human Rights Resource Centre (2019)

Topic Areas	Potential Human Rights Related Risks	Relevance to Wind Energy Industry
	■ Right to participate freely in the cultural life of community.	livelihood-securing purposes. The land may also be of cultural, religious or spiritual value to communities or individuals.
Livelihood	■ Right to a standard of living adequate for the health and wellbeing of the individual and his/her family; ■ Right to food; ■ Right to work and to just and favourable conditions of work; ■ Right to education; ■ Right to freedom of expression and access to information; and ■ Right to the highest attainable standard of physical and mental health.	Projects and operations may impact both positively and negatively upon the livelihood-sustaining activities of local communities and individuals. People may be dependent upon natural resources for commercial or subsistence income. For example, the project may require land acquisition for buffer zones could impact upon local agricultural activities.
Community health and access to public services	■ Right to the highest attainable standard of physical and mental health; ■ Right to education; ■ Right to participate freely in the cultural life of the community; and ■ Right to equal access to public service in own country	Projects and operations may have an impact on community health and access to public services in a variety of ways. For example, the project may: ■ open access to previously remote inhabited areas; ■ increase migrant/foreign workers, leading to an increase in infectious diseases or STDs; ■ put pressure on local health resources and infrastructure, reducing access to these services; ■ physically inhibit peoples' access to, or use of, public services such as education; and ■ lead to distortion of local food prices and basic necessities.
Water	■ Right to water and sanitation; ■ Right to the highest attainable standard of physical and mental health; ■ Right to a standard of living adequate for the health and wellbeing of the individual and his/her family; and ■ Right to work.	Projects or operations may have an impact on the availability or quality of water (constant or seasonal) for use by local communities and individuals (for domestic or commercial activities). This may affect employment and livelihoods.
Indigenous Peoples	■ Right to self-determination; ■ Right to own property;	The project may acquire, either permanently or temporarily, land for project construction or operations. Indigenous Peoples or indigenous

Topic Areas	Potential Human Rights Related Risks	Relevance to Wind Energy Industry
	■ Right to adequate housing; ■ Right to a standard of living adequate for the health and wellbeing of the individual and his/her family; ■ Right to the highest attainable standard of physical and mental health; ■ Right to participate freely in the cultural life of the community; ■ Right to equal recognition and protection under the law; ■ Right to non-discrimination; and ■ Right to an effective remedy.	groups may be using that land for cultural purposes, subsistence, livelihoods or for shelter/housing. Projects may have a potential impact on natural resources, or on access to these resources upon which Indigenous Peoples rely for food, water, health and other aspects of their livelihoods.
Vulnerable groups or individuals	■ Right to non-discrimination; ■ Right to self-determination; ■ Right to own property; ■ Right to adequate housing; ■ Right to a standard of living adequate for the health and wellbeing of the individual and his/her family; ■ Right to the highest attainable standard of physical and mental health; ■ Right to participate freely in the cultural life of the community; ■ Right to equal recognition and protection under the law; and ■ Right to an effective remedy Specific right of minorities.	Vulnerable groups or individuals may be subjected to discriminatory actions by the government, local businesses, educational system, health-care services and others in the community. Potential impacts from projects may disproportionally affect vulnerable populations within the local community. This may include ethnic or religious minorities, people with certain political views, women or children, elderly populations, people with a physical or mental disability, economically disadvantaged populations or people in poverty, or others who, for whatever reason, are at a disadvantage with respect to the mainstream, discriminated against or unable to advocate for their rights.

Source: The Business & Human Rights Resource Centre (2017), IPIECA & The Danish Institute for Human Rights (2013)

9.10.2 Human Rights in National Context

9.10.2.1 National Legal Framework on Human Rights Protection

Human rights are recognised in the Constitution as the document with the highest legal jurisdiction in Vietnam's system of legal documents. The current Constitution of Vietnam was adopted by the National Assembly on 28 November 2013 and came into effect from 01 January 2014, whose entire Chapter II clearly stipulates "Human Rights, Fundamental Rights and Obligations of Citizens", including the rights of ethnic minorities, in 36 articles. According to the 2013 Constitution, human rights and the citizen's

rights may only be restricted in accordance with the law in case of necessity for reasons of national defence, national security, social order and safety, social morality and community well-being.

In order to implement the 2013 Constitution and the Judicial Reform Strategy to 2020, from 2013 to the end of June 2019, Vietnam has reviewed, supplemented, amended and issued over 100 legal documents and ordinances directly or indirectly related to guaranteeing human rights and citizens' rights. Vietnam's outstanding achievements in legislation and law enforcement over 30 years of Doi Moi constitutes an important legal foundation to enable its people to enjoy human rights[374].

9.10.2.2 The Implementation of International Commitments on Human Rights

Vietnam commits to international treaties to which Vietnam is a party. This is well reflected in the Constitution, the 2016 Law on Treaties, and the 2015 Law on Promulgation of Legal Documents. As a matter of principle, the drafting and issuance of legal documents in Vietnam must not obstruct the implementation of international treaties to which Vietnam is a signatory. If a domestic legal document (except for the Constitution) and an international treaty to which Vietnam is a signatory set different rules for the same issue, the treaty shall prevail. This is an important legal basis for courts and competent authorities to refer to the Convention in the settlement of disputes, complaints and denunciations.

To 2018, Vietnam has become a party to seven out of nine fundamental UN international conventions on human rights (see Table 9.104). Vietnam is considering the signing of the remaining Conventions: International Convention for the Protection of All Persons from Enforced Disappearance (CPED) and International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (ICRMW), as well as Optional Protocols of the Conventions. Vietnam has also ratified a number of the International Labour Organisation (ILO) Conventions related to human rights such as Convention No. 187 on Promotional Framework for Occupational Safety and Health (May 2014) and Convention No. 98 on Right to Organise and Collective Bargaining (June 2019), thereby raising the total number of ILO Conventions to which Vietnam is a party to 24. In addition, Vietnam is completing the application dossier for Convention No. 88 on Employment Service and Convention No. 159 on Vocational Rehabilitation and Employment (Disabled Persons) [375].

Table 9.104 Human Rights Treaties Ratified by Vietnam

Human Rights Treaties	Brief Summary	Signature date	Ratification Date, Accession(a), Succession(d) Date
International Covenant on Civil and Political Rights (ICCPR)	The covenant defines civil and political rights. This includes: right to life; freedom of religion; freedom of speech; freedom of assembly; electoral rights; and rights to due process and a fair trial.		24 Sep 1982 (a)
International Convention on the Elimination of All Forms of Racial Discrimination (ICERD)	The convention is focused on eliminating racial discrimination in all its forms - including the right to equal treatment, security, and other economic, social, and cultural rights, without distinction as to race, colour, or national or ethnic origin.		09 Jun 1982 (a)

[374] Ministry of Foreign Affairs (2018)
[375] UN Treaty Body Database (2021)

Human Rights Treaties	Brief Summary	Signature date	Ratification Date, Accession(a), Succession(d) Date
International Covenant on Economic, Social and Cultural Rights (ICESCR)	The covenant defines social, economic and cultural rights. This includes: the equal right of men and women to the enjoyment of all economic, social and cultural rights; the right to work, which includes the right of everyone to the opportunity to gain a living by work that is freely selected; favourable working conditions, including equal remuneration, safe and healthy working conditions, and equal opportunity for everyone to be promoted; the right to form trade unions and join the trade union of their choice; the right to social security, including social insurance; protection and assistance to families; the right to the enjoyment of the highest attainable standard of physical and mental health; the right to education; and the right to take part in cultural life.		24 Sep 1982 (a)
Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)	The convention requires all signatories to take steps to eliminate discrimination against women in political and public life. In relation to political life, women have the right to: vote in all elections and public referenda and to be eligible for election to all publicly elected bodies; participate in the formulation of government policy and the implementation thereof and to hold public office and perform all public functions at all levels of government; and participate in non-governmental organisations and associations concerned with the public and political life of the country.	29 Jul 1980	17 Feb 1982
Convention on the Rights of the Child (CRC)	The CRC protects the rights of children, which is defined as any human being below the age of eighteen years, unless the age of majority is attained earlier under national legislation. The CRC was the first	26 Jan 1990	28 Feb 1990

Human Rights Treaties	Brief Summary	Signature date	Ratification Date, Accession(a), Succession(d) Date
	international legally binding text recognising all the fundamental rights of the child, including civil, political, economic, social, health and cultural rights.		
Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict (OP-CRC-AC)	The OP-CRC-AC, which entered into force on 12 February 2002, serves to strengthen the legal safeguards against the exposure of children to protracted violence and, in particular, the manipulation and recruitment of children below the age of eighteen as soldiers in situations of hostility and armed conflicts either by state or non-state armed forces.	08 Sep 2000	20 Dec 2001
Optional Protocol to the Convention on the Rights of the Child on the sale of children child prostitution and child pornography (OP-CRC-SC)	The OP-CRC-SC was adopted in 2000, in order to reinforce and complement the provisions of the CRC, particularly with regard to children's right to special protection from commercial sexual exploitation.	08 Sep 2000	20 Dec 2001
Convention on the Rights of Persons with Disabilities (CRPD)	The CRPD aims to change attitudes and approaches to persons with disabilities, by changing the view of persons with disabilities as "objects" of charity, medical treatment and social protection towards viewing persons with disabilities as "subjects" with rights, who are capable of claiming those rights and making decisions for their lives based on their free and informed consent as well as being active members of society. The Convention clarifies and qualifies how all categories of rights apply to persons with disabilities and identifies areas where adaptations have to be made for persons with disabilities to effectively exercise their rights and areas where their rights have been violated, and where protection of rights must be reinforced.	22 Oct 2007	05 Feb 2015
Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment (CAT)	The CAT aims to prevent torture and other acts of cruel, inhuman, or degrading treatment or punishment around the world. Most of the provisions of the CAT deal with the obligations of the States parties. These	07 Nov 2013	05 Feb 2015

Human Rights Treaties	Brief Summary	Signature date	Ratification Date, Accession(a), Succession(d) Date
	obligations include State parties shall take effective legislative, administrative, judicial or other measures to prevent acts of torture, and prohibition against torture shall be absolute and shall be upheld also in a state of war and in other exceptional circumstances.		

Source: Office of the High Commissioner for Human Rights (2021)

However, there are some human rights treaties that have not been ratified by Vietnam[376], including:

- Optional Protocol of the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (OP-CAT);
- Second Optional Protocol to the International Covenant on Civil and Political Rights aiming to the abolition of the death penalty (ICCPR-OP2);
- International Convention for the Protection of All Persons from Enforced Disappearance (CPED);
- Interstate communication procedure under the International Convention for the Protection of All Persons from Enforced Disappearance (CED, Art.32); and
- International Covenant on Economic, Social and Cultural Rights (ICESCR).

Since 2013, Vietnam has submitted national reports on the implementation of the ICESCR (2nd - 4th, 2014), CEDAW (7th - 8th, 2015), ICCPR (3rd - 6th, 2017), CAT (1st Report, 2017), and CRC (5th - 6th, 2018).

At the regional level, Vietnam and fellow ASEAN member states are actively incorporating human rights into all pillars of the ASEAN Community in a “inclusive, people-oriented and people-cantered” spirit, and implementing the ASEAN Human Rights Declaration (AHRD), the 2015-2020 Five-Year Work Plan of the ASEAN Intergovernmental Commission on Human Rights (AICHR) and specific plans and documents on human rights protection and promotion such as:

- The 2016 - 2020 Work Plan of the ASEAN Commission on the Promotion and Protection of the Rights of Women and Children;
- The ASEAN Regional Plan of Action on the Elimination of Violence Against Women and Children (November 2015);
- The Joint Statement on Promoting Women, Peace and Security in ASEAN (2017);
- The ASEAN Consensus on the Protection and Promotion of the Rights of Migrant Workers (November 2017); and
- The ASEAN Enabling Masterplan 2025: Mainstreaming the Rights of Persons with Disabilities (November 2018).

Vietnam ratified the ASEAN Convention Against Trafficking in Persons, Especially Women and Children (ACTIP) in December 2016 (taking effect from March 2017) and has played an active role in the Bali Process on People Smuggling, Trafficking in Persons and Related Transnational Crimes, and the Coordinated Mekong Ministerial Initiative Against Trafficking (COMMIT).

[376] Office of the High Commissioner for Human Rights (2021)

On the bilateral front, Vietnam has been maintaining the annual human rights dialogues with the United States, the European Union, Norway and Australia, and signed bilateral cooperation agreements on human rights with many countries, including cooperation on the prevention of trafficking in persons with China, Laos, Thailand, Cambodia, and the U.K. In addition, Vietnam also discusses human rights issues with partner countries through various informal channels.

In terms of labour practices, the Government of Vietnam re-joined the International Labour Organisation (ILO) in 1992, and has since ratified the following fundamental conventions:

- ILO Convention No. 29 - Forced Labour Convention, 1930 (No. 29);
- ILO Convention No. 98 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98) (This Convention will enter into force in July 2020);
- ILO Convention No. 100 - Equal Remuneration Convention, 1951 (No. 100);
- ILO Convention No. 111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111)
- ILO Convention No. 138 - Minimum Age Convention, 1973 (No. 138);
- ILO Convention No. 182 - Worst Forms of Child Labour Convention, 1999 (No. 182);

However, the Government of Vietnam has not been ratifying the following yet:

- ILO Convention No. 87 - Freedom of Association and Protection of the Right to Organize Convention, 1948 (No. 87); and
- ILO Convention No. 105 - Abolition of Forced Labour Convention, 1957 (No. 105).

Since re-joining, the Government has been working in partnership with the ILO to promote rights at work, enhance social protections and strengthen dialogue on work-related issues. As part of this process the labour code has been substantially revised. This has included introduction of the following changes in 2019, which will come into effect in 2021:

- Incorporation of a definition for sexual harassment in the workplace;
- Improved protections for unions, and their members, including anti-discrimination and anti-interference measures, as well as the right for workers to join or form a representative organisation of their choosing;
- Extending legal protections to employees who do not have a written employment contract;
- Establishing clearer processes for collective bargaining;
- Improved protections against forced labour and debt bondage; and
- Clearer rules on employment of minors (ILO 2019).

In general, Vietnam has been playing an active role in bilateral cooperation activities and at multilateral forums on human rights, making substantive contributions to fostering the joint efforts of the international community in the field of human rights through dialogues and better mutual understanding[377].

9.10.2.3 Human Rights Practice in Vietnam

Over the past few years, Vietnam has seen improvement in people's living standards and a reduction in the poverty rate; however, basic rights, including freedom of speech, opinion, press, association, and religion, are still subject to restriction[378]. This is in part due to the controls on all major political and social organisations. Many of the human rights concerns raised by non-governmental organisations

[377] UN Treaty Body Database (2021)

[378] Human Right Watch (2018)

(NGOs) in Vietnam related to activism, religion and compensation for land loss due to project development (see Table 9.105).

Table 9.105 Human Rights Practice in Certain Areas in Vietnam

No.	Categories	Practice in Vietnam
I	In the area of civil and political rights	
1	Right to life	The 2013 Constitution of Vietnam recognises the right to life in Article 19 that "*Everyone has the right to life. Human life is protected by law. No one may be deprived of life in contravention of law.*" Vietnam has reduced offenses that may be subjected to the death penalty in the revised 2015 Penal Code. Vietnam is imposing the death penalty on a total of 18 offenses in the 2015 Penal Code, including eight non-violent crimes: attempting to overthrow the people's government (Article 109); espionage (Article 110); manufacturing and trading of counterfeit medicines for treatment or prevention of diseases (Article 194); illegal manufacturing, trafficking and dealing of drugs (Article 248, 250, 251); embezzlement (Article 253); and receiving bribes (Article 354). The country ended the use firing squad execution and instead uses lethal injection as of 2011. However, the lethal chemical used for execution is unknown[379].
2	Right to liberty and security of person	The Constitution and the Criminal Procedure Code (CPC) recognise the right to equality before the law, to be presumed innocent until proven guilty, and to a fair and public trial, as well as the right to freedom from arbitrary arrest or detention. However, the CPC allows for severe limitations on due process, leading in some cases to trials falling short of international standards. Persons accused of national security crimes can be detained for a prolonged period without trial. There is no provision allowing the suspect to appeal the pre-trial detention or have its legality reviewed by a court of law.
3	Freedom of movement	The 2013 Constitution of Vietnam states that "*Citizens have the right to free movement and residence within the country, and the right to leave the country and to return home from abroad. The exercise of those rights shall be prescribed by law*". In the Decree No. 136/2007/ND-CP issued on August 17, 2007 on Vietnamese Citizens' Exit and Entry by the Ministry of Public Security, there is a prohibition of Vietnamese citizens from leaving and entering the country on the grounds of "safeguarding national security and social order and safety". The Decree did not provide criteria for assessing such grounds and for determining proportionate measures.
4	Right to a fair trial	The right to a fair trial is guaranteed in the 2013 Constitution of Vietnam[380]. The Constitution prohibits arbitrary detention (Article 20: "*No one may be arrested without a decision of a People's Court, or a decision or approval of a People's Procuracy, except in case of a flagrant offense. The arrest, holding in custody, or detention, of a person shall be prescribed by a law*").

[379] Vietnam – Joint Civil Society Report by HRS – GPAR and Partners (2019)

[380] Article 31 of the 2013 Constitution of the Socialist Republic of Vietnam (2013)

No.	Categories	Practice in Vietnam
		In practice, Vietnam does not always uphold the right to a fair trial as laid down in Article 14 ICCPR[381]. Reports state that trials of human rights activists consistently failed to meet international fair standards[382]. The rights notice, to be presumed innocent, liberty and freedom from arbitrary detention, to cross-examine witnesses and timely and confidential access to counsel of choice are in many cases denied. Vietnam has faced extensive criticism by international NGOs for its failure to ensure due process within the criminal legal system and basic fair trial guarantees.
5	Right to privacy	The right to privacy has existed in Vietnam since 1946. Since the Constitution, Vietnam has recognised people's right to be secure in their persons, residences, correspondence, and telephone and telegraph communications. The Constitution also guarantees people's right against unlawful searches and seizures[383]. However, Vietnam does not have a consolidated piece of legislation on the protection of personal data. Instead, rules and regulations on personal data protection can be found in several laws, including general laws such as the Civil Code and the Law on Cyberinformation Security and sectoral laws such as the Law on Electronic Transactions and the Law on Telecommunications[384].
6	Freedom of thought, conscience and religion	Article 24 of the Constitution of 2013 protects the freedom to adopt, change or renounce a religion or belief, and freedom from coercion, but also states that this freedom should not be used to “violate the laws”, this is indicated as follows: Every one shall enjoy the freedom of belief and of religion; he or she can follow any religion or follow none. All religions are equal before the law. The state respects and protects freedom of belief and of religion. No one has the right to infringe on the freedom of belief and religion, or to take advantage of belief and religion to violate the laws. Important legal documents which regulate the practice of religious freedom in Vietnam include the Ordinance on Belief and Religion (Ordinance No. 21 of 2004 of the Standing Committee of the National Assembly) and the government’s Implementing Decree 92 of 2012 on “Specific provisions and measures for the implementation of the Ordinance on Belief and Religion,” which replaced the former 2005 Decree.
7	Freedom of opinion and expression	Freedom of opinion and expression suffers severe restrictions in the State party[385], including through vague and broadly formulated offences in the Penal Code (for example, Article 109 – activities to overthrow the people’s administration; Article 116 – undermining the unity policy; Article 117 – anti-state propaganda). The 2016 Law on the Press that prohibits any criticism of the government, and the 2018 Law on Cybersecurity that prohibits contents critical of the state are also cited as rights-violating laws.

[381] Lawyers Rights’ Watch Canada (2018)
[382] Human Rights Watch (2018).
[383] Do Hai Ha and Le Thu Hien (2010)
[384] Viet Le Ton (2021)
[385] The People in Need (2019)

No.	Categories	Practice in Vietnam
8	Freedom of assembly and Freedom of association	Article 25 of the 2013 Constitution confirms that people have freedom of assembly: "*Citizens have the right to freedom of speech and freedom of the press, and have the right of access to information, the right to assembly, the right to association, and the right to demonstrate. The exercise of those rights shall be prescribed by law*". However, in practice and policy, the freedom of peaceful assembly is tightly restricted. Organisations must apply for official permission to assemble, and security forces routinely use unnecessary or excessive force to disperse peaceful demonstrations[386].
9	Right to take part in the conduct of public affairs, vote, be elected and have access to public office	Article 27 "*Every citizen who reaches the age of eighteen has the right to vote. Every citizen who reaches the age of twenty-one has the right to stand for election to the National Assembly or People's Councils. The exercise of those rights shall be prescribed by a law*". Article 29 "*Citizens who reach the age of eighteen have the right to vote in referenda organized by the State*"
II	In the area of economic, social and cultural rights	
10	Right to work	The right to work is guaranteed in the Constitution 2013, Article 35.1: "*Citizens have the right to work and to choose their occupations, employment and workplaces*" and reassured in the Labour Code 2012, Article 10: "*A worker shall have the right to work for any employer in any location that is not prohibited by law.*"
11	Right to just and favourable conditions of work	
12	Right to form and join trade unions	In June 2019, Vietnam took an historic step toward freedom of association (FOA) and ratified ILO Convention 98, which enshrines a worker's right to organize and bargain collectively. The government followed in November with an updated version of the Labour Code. Vietnam is now on a path to end the state and employer dominance of trade unions at the company level, allowing workers to form their own labour unions. The changes to the Labour Code include provisions needed to implement Convention 98 and close loopholes and clarify provisions from the Labour Code of 2012. Notably, the revised Labour Code allows workers to form or join an Independent Worker Representative Organisation (WRO) of their choosing, which does not have to be affiliated with the Vietnam General Confederation of Labour[387].
13	Right to social security	The 2013 Constitution of Vietnam recognises citizens' rights to social security in Article 34. "*Citizens have the right to social security.*" And citizens are ensured in terms of social welfare stated in Clause 2, Article 59.

[386] CIVICUS & VOICE (2018)
[387] Fair Labor Association (2020)

No.	Categories	Practice in Vietnam
		"*The State shall create equal opportunities for citizens to enjoy social welfare, develop the social security system, and adopt policies to support elderly people, people with disabilities, poor people, and other disadvantaged people.*"
14	Right to health	Vietnam met most health-related MDG targets[388] In recent years, the Government has made substantial efforts to strengthen the health system and improve access to services.
15	Right to education	Recently, human rights were integrated into the study curriculum of the national education system with a pilot period from 2017-2020 and roll-out from 2020-2025[389].
III	In the area of collective rights	
16	Other collective rights: - Rights of national, ethnic, religious and linguistic minorities - Rights of indigenous peoples	In Vietnam, the concept of "indigenous people" is not used. Instead, "Ethnic Minorities" and "Ethnic Minorities with particularly small population" (involving ethnicities accounting for a small proportion of Vietnam's total population) are widely used. The 2013 Constitution of Vietnam stipulates that "The Socialist Republic of Vietnam is a unified nation of all ethnicities living together in the country of Vietnam", "All the ethnicities are equal and unite with, respect and assist one another for mutual development", "The State shall implement a policy of comprehensive development and provide the conditions for the ethnic minorities to fully utilize their internal strengths and develop together with the nation", and "A citizen has the right to determine his or her ethnicity, use his or her mother tongue and choose his or her language of communication". In general, the 2013 Constitution of Vietnam has 36 articles including the rights of ethnic minorities. Articles stipulating the protection and promotion of rights of people from ethnic minorities are present in 53 legal documents, including 12 new laws issued since 2012. Vietnam is working toward developing the Law on Ethnicity[390].

Source: Adapted from multiple sources

9.10.3 Human Rights in Local Context

This section will highlight some main issues threatening to the practice of human rights in the provincial, district, and communal level in terms of human trafficking, child marriage, consanguineous marriage, and child labour.

9.10.3.1 Human Trafficking

Vietnam reported 60 human trafficking cases in the first half of 2020, with 90 victims, mainly women and children, sold to foreign countries[391]. Most of the victims are women and children from poverty-stricken border areas where people are poorly educated. In remote areas of the Central Highlands, including Dak Lak province, there have been continuous cases of child abduction and trafficking of women to China. During the period 2017-2018, the provincial police[392] have discovered 14 girls who

[388] WHO (2016)
[389] The Prime Minister (2017)
[390] UN Treaty Body Database (2021)
[391] Nguyen Quy (2020)
[392] Huu Long (2018) and Van Thanh (2018)

were tricked into selling to China; of which, eight people were rescued while the remaining have been in wandering in foreign lands. From 2011 to 2020, Dak Lak province[393] received 42 trafficked persons who returned to reintegrate into the community.

In recent years, although the number of human trafficking cases has decreased; however, the authorities of Dak Lak province, especially the DOLISA continue to develop action programs to preventing the human trafficking issue in the province[394]. In 2020, the provincial DOLISA cooperated with relevant agencies to

- Organise two training courses on receiving and supporting trafficked victims returning to their localities to officials in charge of social evils prevention and control and social work teams at commune, ward and town levels with more than 200 participants;
- Organise 30 training courses to improve skills and knowledge on preventing and combating social evils and supporting trafficked victims to social work teams at commune, ward and town levels with more than 3,500 participants;
- Install two new propaganda posters on human trafficking prevention in districts recorded with the complicated human trafficking situation; and
- Organise 10 seminars on prevention and combat of social evils, including the topic of human trafficking prevention and control for more than 1,000 students.

The findings from KIIs and household interviews showed no human trafficking case recorded in the surveyed villages.

9.10.3.2 Child Marriage and Consanguineous Marriage

Child marriage and consanguineous marriage have been persistent problems among ethnic minority communities in Dak Lak province and have become a barrier to poverty reduction and social security. According to statistics, from 2015 to now, Dak Lak province had more than 2,600 cases of child marriage. According to the socio-economic survey of 53 ethnic minorities in 2019, the rate of child marriage[395] in Dak Lak reached 29%, mostly concentrated in Ea Sup, Krong Buk, Ea H'leo, Krong Bong, M'Drak, Krong Pac, Lak, and Cu M'gar districts. The province recorded 1,815 consanguineous marriages in Ede, M'nong, Mong, Tay, Nung, Dao, and Gia Rai communities in 2019. Child marriage and consanguineous marriage are more prevalent in Zone III communes and extremely difficult ethnic minority villages than in other areas due to traditional ethnic cuture and the low literacy of the ethnic minority.

The local authorities, especially Dak Lak province CEMA have made efforts to reduce child marriage and consanguineous marriage through training and propaganda activities with total disbursement of VND 3,000 million in the period 2017-2020, specifically[396]:

- Organising 30 propaganda conferences for nearly 3,900 pupils in 30 communes with high risks of child marriage and consanguineous marriage;
- Delivering 133,300 propaganda leaflets about child marriage and 133,300 propaganda leaflets about consanguineous marriage;
- Publishing 18,000 handbooks on child marriage and consanguineous marriage; and
- Installing 100 communication posters in communes with high rates of child marriage and consanguineous marriage.

[393] Hai Duong (2020)
[394] Hai Duong (2020
[395] Phuc An (2020); Vietnam Academy for Ethnic Minorities (2020)
[396] Vietnam Academy for Ethnic Minorities (2020)

The study recorded a small number of child marriages in the surveyed villages. Two Ede surveyed men in Kdro 2 village of Cu Ne commune and Cu Hriet village of Cu Pong commune were married despite of their under-marriage-age status.

9.10.3.3 Child Labour

From 2016 to 2020, in Dak Lak province, there are 701 children working illegally, mostly from Krong Bong, Lak, Cu M'Gar, and Ea Kar districts. These children are not yet of working age, most of them work without labour contracts and mainly work for textile companies or retail shops in Ho Chi Minh city and some other provinces[397]. The sad phenomenon is that parents because of difficult economic conditions accept their children to work when they are under working age and the situation of enticing children, especially ethnic minority children to work out of the province is increasing.

Although child labour has been yet recorded during the interviews, according to surveyed people child labour is an alarming and problematic issue in the community. Commonly children are going to accompany their parents to work in their family crop planting areas or move out of the province for working as day labourers or company workers in other provinces. This issue is normally associated with early drop out due to household difficulties and even child marriage. However, little information has been shown to estimate the precise number of child labour in the surveyed communities.

Local respondents proposed some solutions to alleviate these problems with possible approaches such as encouraging children to pursue their study through scholarship schemes, improving the existing education system in the locality, and raising community awareness.

[397] Vietnam News Agency (2021) and Hoai Thu (2021)

REFERENCES

Alistair Cook and Tamara Nair. 2021. Non-Traditional Security in the Asia-Pacific. Available at: https://doi.org/10.1142/11941 (Accessed on 7 August, 2021).

Anh Dung. 2020. Dak Lak planted newly around 2,400 ha of forest land (Đắk Lắk trồng mới được gần 2.400 ha rừng). Available at: https://baotintuc.vn/tay-bac-tay-nguyen-tay-nam-bo/dak-lak-trong-moi-duoc-gan-2400-ha-rung-20201217155038495.htm (Accessed on 1 June 2021).

Asian Development Bank (ADB). 2016. Promoting Ecosystem Services and Sustainable Forest Carbon Financing in the Asia Pacific. Technical Assistance Report - Project Number RETA8564. Available at: https://www.adb.org/sites/default/files/linked-documents/48189-002-sd-04.pdf (Accessed on 26 May 2021).

Bamford, M., Watkins, D., Bancroft, W., Tischler, G. & Wahl, J. 2008, Migratory Shorebirds of the East Asian - Australasian Flyway; Population Estimates and Internationally Important Sites., Wetlands International - Oceania, Canberra, Australia., viewed 20 October 2020, <https://www.environment.gov.au/system/files/resources/782ebed5-6bdd-4a41-9759-b60273b52021/files/shorebirds-east-asia.pdf>.

Bao Trung. 2020. Lack of water in clean water works in the dry season (Mùa khô, công trình nước sạch cũng thiếu nước). Available at: https://laodong.vn/ban-doc/mua-kho-cong-trinh-nuoc-sach-cung-khat-804174.ldo (Accessed on 27 May 2021).

BKE-Solar.com. No date. Development of Solar energy in Dak Lak (Phát triển điện năng lượng mặt trời tại Đắk Lắk). Available at: https://bke-solar.com/phat-trien-dien-nang-luong-mat-troi-tai-dak-lak (Accessed on 27 May 2021).

CEMA and GSO. 2019. The results of the survey to collect information on the socio-economic status of 53 ethnic minorities in 2019 (Kết quả điều tra thu thập thông tin về thực trạng kinh tế - xã hội của 53 dân tộc thiểu số năm 2019). Vietnam: General Statistics Office.

Central Population and Housing Census Steering Committee. 2019. The 2019 Vietnam Population and Housing Census (April 2019). Vietnam: The Statistical Publishing House.

Chu Kbo Commune Women's Union. 2020. Report on the results of the union and the women's movement in 2020, orientation and tasks in 2021.

Chu Kbo CPC. 2020. Report on socio-economic and national security condition in 2020 and orientation development plans in 2021 (Báo cáo kết quả thực hiện nhiệm vụ phát triển kinh tế-xã hội, đảm bảo quốc phòng an ninh năm 2020 và phương hướng, nhiệm vụ trong năm 2021).

CIVICUS & VOICE. 2018. Socialist Republic of Vietnam Joint Submission to the UN Universal Periodic Review 32nd Session of the UPR Working Group. Available at: https://www.civicus.org/documents/JointCIVICUSUPRSubmissonVietnam.pdf (Accessed on 7 August, 2021).

Cu Ne CPC. 2021a. Report on socio-economic and national security condition in the first six months of 2021 and the key tasks for the last six months of 2021 (Báo cáo tình hình thực hiện nhiệm vụ phát triển Kinh tế-Xã hội, Quốc phòng - An ninh 6 tháng đầu năm 2021 và nhiệm vụ trọng tâm 6 tháng cuối năm 2021).

Cu Ne CPC. 2021b. Report on socio-economic and national security condition in 2020 and orientation development plans in 2021 (Báo cáo tình hình thực hiện nhiệm vụ phát triển Kinh tế-Xã hội, Quốc phòng - An ninh năm 2020 và phương hướng nhiệm vụ năm 2021).

Cu Pong Commune People's Committee (Cu Pong CPC). 2021. Report on the socio-economic development plan, national defense and security protection in 2020 and orientation in 2021 (Báo cáo Kế hoạch phát triển kinh tế - xã hội, đảm bảo quốc phòng, an ninh năm 2020 và phương hướng, nhiệm vụ năm 2021).

Cu Pong Commune Women's Union. 2020. Report on the Women's Union's work and movements targets 2020 and orientation for 2021(Báo cáo Kết quả công tác Hội và phong trào phụ nữ năm 2020, phương hướng, nhiệm vụ năm 2021).

Cu Pong commune Women's Union. 2021. Report on the results of the association's activities in the first 6 months of the year. implementing orientations and tasks for the last 6 months of 2021 (Báo cáo Kết quả hoạt động công tác Hội 6 tháng đầu năm, triển khai phương hướng, nhiệm vụ 6 tháng cuối năm 2021).

Cu Pong CPC. 2020. Report on the implementation results of the national target program on new rural construction in Cu Pong commune in 2020, and the plans for 2021 (Báo cáo kết quả thực hiện Chương trình mục tiêu Quốc gia xây dựng nông thôn mới năm 2020, kế hoạch thực hiện năm 2021)

Dak Lak Department of Health. 2021. Updated statistics on the number of infected cases of Covid-19 in Dak Lak province (Thông tin cập nhật số ca mắc Covid-19 trên địa bàn tỉnh Đăk Lăk). Available at: http://yte.daklak.gov.vn/ASPX/TinTuc_ChiTiet.aspx?iDV=1&id=86110 (Accessed on 29 July 2021)

Dak lak Department of Planning and Investment (Dak Lak DPI). 2021. Report on summary of mission in 2020 and orientation in 2021 (Báo cáo tổng kết công tác năm 2020 và phương hướng nhiệm vụ năm 2021). Available at: http://khdt.daklak.gov.vn/CMS/Content/BC%20417%20cua%20So%20KHDT.PDF (Accessed on 29 May 2021).

Dak Lak Newspapers Portal. 2019. Ea Sin Commune Women's Union launches a Community Advisory Group (Hội Liên hiệp Phụ nữ xã Ea Sin ra mắt Tổ tư vấn cộng đồng). Available at: http://baodaklak.vn/channel/3484/201908/hoi-lien-hiep-phu-nu-xa-ea-sin-ra-mat-to-tu-van-cong-dong-5645546/ (Accessed on 7 August, 2021).

Dak Lak Online Newspaper. 2019. Dak Lak manages well the work of belief and religion (Đắk Lắk làm tốt công tác quản lý nhà nước về lĩnh vực tín ngưỡng, tôn giáo). Available at:

http://baodaklak.vn/channel/3482/201901/dak-lak-lam-tot-cong-tac-quan-ly-nha-nuoc-ve-linh-vuc-tin-nguong-ton-giao-5616791/ (Accessed on 27 May 2021).

Dak Lak PPC. 2009. Directive No. 12/2009/CT-UBND dated December 29, 2009 on the organization and implementation of the Law on Gender Equality (Chỉ thị số 12/2009/CT-UBND ngày 29 tháng 12 năm 2009 về Về việc tổ chức triển khai thực hiện Luật Bình đẳng giới). Aailable at: http://vbpl.vn/daklak/Pages/vbpq-toanvan.aspx?ItemID=57433 (Accessed on 8 June 2021).

Dak Lak PPC. 2016. Decision No. 2382/QD-UBND dated August 15, 2016 on issues the plan for implementation of the national strategy on gender equality in dak lak province for 2016 – 2020 (Quyết định số 2382/QD-UBND ngày 15/8/2016 về ban hành kế hoạch thực hiện chiến lược quốc gia về bình đẳng giới tỉnh Đắk Lắk giai đoạn 2016-2020). Available at: https://thuvienphapluat.vn/van-ban/Van-hoa-Xa-hoi/Quyet-dinh-2382-QD-UBND-2016-Ke-hoach-thuc-hien-Chien-luoc-Quoc-gia-ve-binh-dang-gioi-Dak-Lak-392181.aspx (Accessed on 8 June 2021).

Dak Lak Province People's Committee (Dak Lak PPC). 2019. Report on the generation and management of solid waste in Dak Lak province (Báo cáo tình hình phát sinh và quản lý chất thải rắn trên địa bàn tỉnh Đắk Lắk). Available at: https://daklak.gov.vn/documents/10181/1437501/60849-109.bc-ubnd.pdf?version=1.0 (Accessed on 1 June 2021).

Dak Lak Province People's Committee (Dak Lak PPC). 2020. Report on the socio-economic development plan, national defense and security protection in 2020 and orientation in 2021 - No. 309/BC-UBND issued on November 24th 2021) (Báo cáo Kế hoạch phát triển kinh tế - xã hội, đảm bảo quốc phòng, an ninh năm 2020 và phương hướng, nhiệm vụ năm 2021 - Số 309/BC-UBND ngày 24 tháng 12 năm 2021).

Dak Lak Province People's Committee (Dak Lak PPC). 2021a. Results and detailed list of communes belonging to III, II, I areas and extremely difficult villages in ethnic minority and mountainous areas of Dak Lak province in the period of 2021 - 2025 - No. 42/BC-UBND (Kết quả và danh sách chi tiết xác định các xã và khu vực III, II, I và thôn đặc biệt khó khăn thuộc vùng đồng bào dân tộc thiểu số và miền núi tỉnh Dak Lak giai đoạn 2021 - 2025 - Số 42/BC-UBND).

Dak Lak Province People's Committee (Dak Lak PPC). 2021b. Decision 837/QD-UBND - Decision on approving the land use plan 2021 of Krong Buk district (Quyết định 837/QD-UBND - Quyết định về việc phê duyệt Kế hoạch sử dụng đất năm 2021 của huyện Krông Búk).

Dak Lak Province Statistics Office. 2020b. Report on the implementation of the socio-economic development plan, ensuring national defense and security in 2020 and orientations and tasks in 2021 (Báo cáo Kết quả thực hiện kế hoạch phát triển kinh tế - xã hội, đảm bảo quốc phòng, an ninh năm 2020 và phương hướng, nhiệm vụ năm 2021)

Dak Lak Provincial Department of Education and Training. 2020. Implementation of educational works in the first six months of 2020 and orientation in the last 6 months of 2020 - No. 170/BC-SGDDT

(Tình hình thực hiện công tác giáo dục 6 tháng đầu năm 2020 và phương hướng nhiệm vụ 6 tháng cuối năm 2020 - Số 170/BC-SGDDT)

Dak Lak Provincial FPD 1998, Report on implementation of management and conservation plan for Glyptostrobus pensilis populations in Dak Lak province, Dak Lak Provincial People's Committee, Dak Lak.

Dak Lak Provincial Portal. 2015. Overview of Dak Lak Province (TỔNG QUAN ĐẮK LẮK). Available at: https://daklak.gov.vn/tong-quan-dak-lak (Accessed on 5 June 2021).

Dak Lak Provincial Portal. 2020. Orientation for synchronous infrastructure development for socio-economic development in the period 2020-2025 (Định hướng phát triển kết cấu hạ tầng đồng bộ phục vụ phát triển kinh tế-xã hội trong nhiệm kỳ 2020-2025). Available at: https://daklak.gov.vn/-/-inh-huong-phat-trien-ket-cau-ha-tang-ong-bo-phuc-vu-phat-trien-kinh-te-xa-hoi-trong-nhiem-ky-2020-2025 (Accessed on 6 August, 2021)

Dak Lak Provincial Portal. No Date. About Dak Lak Province. Available at: https://daklak.gov.vn/web/english/about-daklak (Accessed on 5 June 2021).

Dak Lak Provincial Statistics Office. 2020a. Statistical Yearbook in 2019 of Dak Lak Province. Dak Lak: Statistical Publishing House.

Dak Lak Provincial Women's Union. 2021. Preliminary report on the work of the union and the women's movement in the first 6 months of the year, directions and tasks for the last 6 months of 2021.

Dak Lak Women's Union Portal. 2018. The Women's Union of Krong Buk district launches the model of a community consultation group at the commune level (Hội Liên hiệp Phụ nữ huyện Krông Búk ra mắt Mô hình Tổ tư vấn cộng đồng cấp xã). Available at: http://phunu.daklak.gov.vn/-/hoi-lien-hiep-phu-nu-huyen-krong-buk-ra-mat-mo-hinh-to-tu-van-cong-ong-cap-xa (Accessed on 7 August, 2021).

Dak Lak Women's Union Portal. 2019a. The Women's Union of Krong Buk district held a conference to summarize the Women's movement and the association's work in 2019 (Hội LHPN huyện Krông Búk tổ chức Hội nghị tổng kết phong trào Phụ nữ và công tác Hội năm 2019). Available at: http://phunu.daklak.gov.vn/-/hoi-lhpn-huyen-krong-buk-to-chuc-hoi-nghi-tong-ket-phong-trao-phu-nu-va-cong-tac-hoi-nam-2019 (Accessed on 7 August, 2021).

Dak Lak Women's Union Portal. 2019b. The 10th Executive Committee meeting of the Cu Ne Commune Women's Union, term 2016-2021 (Hội nghị Ban chấp hành Hội Liên hiệp Phụ nữ xã Cư Né (mở rộng) lần thứ 10, khóa VII, nhiệm kỳ 2016-2021). Available at: http://phunu.daklak.gov.vn/-/hoi-nghi-ban-chap-hanh-hoi-lien-hiep-phu-nu-xa-cu-ne-mo-rong-lan-thu-10-khoa-vii-nhiem-ky-2016-2021 (Accessed on 7 August, 2021).

Dak Lak Women's Union Portal. 2020. Initial effectiveness of the Community Advisory Group model (Hiệu quả bước đầu của mô hình Tổ Tư vấn cộng đồng). Available at: http://phunu.daklak.gov.vn/-/hieu-qua-buoc-au-cua-mo-hinh-to-tu-van-cong-ong (Accessed on 7 August, 2021).

Decision 33/2020/QD-TTg dated 12/11/2020 by the Prime Minister on Criteria for defining ethnic minority and mountainous areas according to the level of development for the period 2021-2025 (Quyết định của Thủ tướng Chính phủ về Tiêu chí phân định vùng đồng bào dân tộc thiểu số và miền núi theo trình độ phát triển giai đoạn 2021-2025)

Department of Agriculture and Rural Development. 2020. Report on summary of the implementation of the plan in 2020 and the implementation of tasks in 2021 for the agriculture and rural development sector (Báo cáo Tổng kết thực hiện kế hoạch năm 2020 và triển khai nhiệm vụ năm 2021 ngành nông nghiệp và Phát triển nông thôn).

Department of Foreign Affairs and Trade (DFAT). 2017. Draft country information report Vietnam 2017. Australia: Department of Foreign Affairs and Trade.

Department of Labor, War Invalids and Social Affairs of Dak Lak Province (DOLISA). 2020. Report on the Implementation in 2020 and the Plan for 2021 of the Labor, Employment and Vocational Education Office (Báo cáo kết quả hoạt động năm 2020 và kế hoạch năm 2021 của Phòng Lao động, Việc làm và Giáo dục nghề nghiệp)

Do Hai Ha and Le Thu Hien. 2010. Vietnam: Privacy in Vietnam. Available at: https://www.mondaq.com/constitutional-administrative-law/106926/privacy-in-vietnam (Accessed on 7 August 2021).

Do, H., Grant, J., Bon, T., Zimmer, H. & Nichols, J. 2017, 'Diversity depends on scale in the forests of the Central Highlands of Vietnam', Journal of Asia-Pacific Biodiversity, vol. 10.

Duong Nguyen. 2021. Dak Lak has 38 ranked relics (Đắk Lắk có 38 di tích được xếp hạng). Available at: http://vhttdldaklak.gov.vn/quan-ly-di-san/ak-lak-co-38-di-tich-uoc-xep-hang-9854.html (Accessed on 5 Jun 2021).

Ea Sin Commune Women's Union. 2021. Report of the Executive Committee of the Ea Sin Commune Women's Union, term III, submitted to the Fourth Commune Women's Congress, term 2021-2026 (Báo cáo của Ban Chấp hành Hội Liên hiệp Phụ nữ xã Ea Sin khóa III, trình Đại hội đại biểu Phụ nữ xã khóa IV, nhiệm kỳ 2021-2026).

Ea Sin CPC. 2020a. Report on socio-economic and national security condition in 2020 and orientation development plans in 2021 (Báo cáo kết quả thực hiện nhiệm vụ phát triển kinh tế-xã hội, đảm bảo quốc phòng an ninh năm 2020 và phương hướng, nhiệm vụ trong năm 2021)

Ea Sin CPC. 2020b. Summary report on the operation in 2020 and the orientation in 2021 of Ea Sin communal health station (Báo cáo tổng kết tình hình hoạt động năm 2020 và định hướng hoạt động trong năm 2021 của trạm y tế xã Ea Sin)

Ea Sin CPC. 2021. Report on the operation of the health station in the first six months and the orientations for the last 6 months of 2021 (Báo cáo hoạt động trạm y tế Ea Sin 6 tháng đầu năm và phương hướng nhiệm vụ 6 tháng cuối năm 2021)

Eames, J.C. & Nguyen, D.T. 2002, An interim biodiversity report for Yok Don National Park, Dak Lak province, Vietnam., Vietnam PARC Project, Yok Don Component.

Election Observation and Democracy Support (EODS). 2021. Declaration on the Elimination of Discrimination against Women. Available at:

https://www.eods.eu/library/UNGA_Declaration%20Women_1967_en.pdf (Accessed on 7 August, 2021).

Fair Labor Association. 2020. Freedom of Association on The Nư Vietnam Labour Code. Available at https://www.fairlabor.org/report/freedom-association-new-vietnam-labor-code (Accessed on 7 August 2021).

GAP & IDB. 2014. Gender and Renewable Energy: Wind, Solar, Geothermal and Hydroelectric Energy. Available at: https://publications.iadb.org/en/gender-and-renewable-energy-wind-solar-geothermal-and-hydroelectric-energy (Accessed on 7 August, 2021).

General Statistics Office of Vietnam (GSO). 2018. Statistical Yearbook of Vietnam 2017. Vietnam: General Statistics Office (Accessed on 7 August, 2021).

General Statistics Office of Vietnam (GSO). 2019. Statistical Yearbook of Vietnam 2018. Vietnam: General Statistics Office.

General Statistics Office of Vietnam (GSO). 2020a. Statistical Yearbook of Vietnam 2019. Vietnam: General Statistics Office.

General Statistics Office of Vietnam (GSO). 2020b. Report on socio-economic development in Quarter IV and the whole year 2020. Vietnam: General Statistics Office.

General Statistics Office of Vietnam (GSO). 2020c. The 2019 Vietnam population and housing census. Statistical Publishing House.

General Statistics Office of Vietnam (GSO). 2021. Statistical Yearbook of Vietnam 2020. Vietnam: General Statistics Office.

GISD n.d., Invasive species in Vietnam, viewed 28 September 2020, <http://issg.org/database/species/search.asp?st=sss&sn=&rn=Viet%20Nam%20(Vietnam)&ri=19416&hci=-1&ei=-1&fr=1&sts=&lang=EN>.

Green Climate Fund. 2020. Gender assessment for FP125: Strengthening the resilience of smallholder agriculture to climate change-induced water insecurity in the Central Highlands and South-Central Coast regions of Vietnam. Available at: https://www.greenclimate.fund/document/gender-assessment-fp125-strengthening-resilience-smallholder-agriculture-climate-change (Accessed on 7 August, 2021).

H'Xiu. 2019. Changes in the Cu Puong revolutionary base area (Đổi thanh ở vùng căn cứ cách mạng). Available at: https://vovworld.vn/vi-VN/chuyen-cua-lang/doi-thay-o-vung-can-cu-cach-mang-cu-pong-778277.vov (Accessed on 5 June 2021).

Hai Duong. 2020a. Many difficulties in supporting trafficked victims to return to their localities in Dak Lak (Nhiều khó khăn trong việc hỗ trợ nạn nhân bị mua bán trở về địa phương ở Đắk Lắk). Infornet Magazine. Available at: https://infonet.vietnamnet.vn/chuyen-de/phong-chong-buon-ban-nguoi/nhieu-kho-khan-trong-viec-ho-tro-nan-nhan-bi-mua-ban-tro-ve-dia-phuong-o-dak-lak-268748.html (Accessed on 7 August 2021)

Hai Duong. 2020b. Dak Lak: Many forms of propaganda on the prevention and combat of human trafficking (Đắk Lắk: Nhiều hình thức tuyên truyền pháp luật phòng, chống mua bán người). Infornet Magazine. Available at: https://infonet.vietnamnet.vn/chuyen-de/phong-chong-buon-ban-nguoi/tuyen-truyen-pho-bien-phap-luat-ve-phong-chong-mua-ban-nguoi-o-dak-lak-268775.html (Accessed on 7 August 2021)

Hoai Thu. 2021. Protecting and caring Dak Lak's children (Post: 1) (Bảo vệ và chăm sóc trẻ em ở Đắk Lắk (Bài 1). Ethnic and Mountainous Magazine. Available at: https://dantocmiennui.vn/bao-ve-va-cham-soc-tre-em-o-dak-lak-bai-1/304596.html (Accessed on 7 August 2021)

Hoang Vy. 2018. Cu Pong Commune celebrates its 40th anniversary (Xã Cư Pơng kỷ niệm 40 năm ngày thành lập). Available at: http://krongbuk.daklak.gov.vn/index.php?option=com_content&amp%3Bview=article&amp%3Bid=1601:xa-cu-pong-k-ni-m-40-nam-ngay-thanh-l-p&amp%3Bcatid=79:tin-chinh (Accessed on 31 July 2021)

Hoang, V.C., Tao, T.N., Hoa, T.N., Anh, M.L., Cuong, T.P., Truong, Q.N., Nikolai, L.O., Youhua, C., Bin, W., Thomas, Z. & Jianping, J. 2021, 'Two new cryptic species of Microhyla Tschudi, 1838 (Amphibia, Anura, Microhylidae) related to the M. heymonsi group from central Vietnam', ZooKeys, no. 1036, pp. 47–74.

Hong Mong. 2020. Krong Buk promotes the local image to call for investment in tourism development (Krông Búk quảng bá hình ảnh của địa phương để kêu gọi đầu tư phát triển du lịch). Available at: https://daklak.gov.vn/-/krong-buk-quang-ba-hinh-anh-cua-ia-phuong-e-keu-goi-au-tu-phat-trien-du-lich- (Accessed on 28 May 2021).

HRS–GPAR and Partners. 2019. VIETNAM – Joint Civil Society Report. Available at: https://tbinternet.ohchr.org/Treaties/CCPR/Shared%20Documents/VNM/INT_CCPR_CSS_VNM_34096_E.pdf (Accessed on 7 August, 2021).

Human Rights Indicators Work. 2020. Ratification of 18 International Human Rights Treaties. United Nations. Available at https://indicators.ohchr.org/ (Accessed on 7 August 2021).

Human Rights Watch. 2018. World Report: Vietnam Events of 2017. Available at: https://www.hrw.org/world-report/2018/country-chapters/vietnam (Accessed on 7 August 2021).

Huu Long. 2018. Beware of human trafficking in the Central Highlands (Cảnh giác với nạn buôn người ở Tây Nguyên). Labour Magazine. Available at: https://laodong.vn/phong-su/canh-giac-voi-nan-buon-nguoi-o-tay-nguyen-619252.ldo (Accessed on 7 August 2021)

Huynh Chien Thang. 2020. Krong Buk district: Positive results in socio-economic development in 2019 (Huyện Krông Búk: Những kết quả tích cực trong phát triển kinh tế - xã hội năm 2019). Available at: http://baodaklak.vn/channel/3483/202001/huyen-krong-buk-nhung-ket-qua-tich-cuc-trong-phat-trien-kinh-te-xa-hoi-nam-2019-5666986 (Accessed on 26 May 2021)

IEA. 2015. World Energy Outlook 2015. Available at https://www.iea.org/reports/world-energy-outlook-2015 (Accessed on 7 August, 2021).

IFC 2019, International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources, viewed 27 October 2020, <https://www.ifc.org/wps/wcm/connect/5e0f3c0c-0aa4-4290-a0f8-4490b61de245/GN6_English_June-27-2019.pdf?MOD=AJPERES&CVID=mRQjZva>.

International Institute for Sustainable Development. 2021. Gender Equality: The Formula to Accelerate Implementation of the 2030 Agenda for Sustainable Development. Available at: https://www.iisd.org/system/files/2021-03/still-one-earth-gender.pdf (Accessed on 7 August 2021)

Inter-Parliamentary Union and the United Nations. 2016. Handbook for Parliamentarians Available at: https://www.ohchr.org/documents/publications/handbookparliamentarians.pdf (Accessed on 7 August, 2021).

IPIECA & The Danish Institute for Human Rights. 2013. Integrating human rights into environmental, social and health impact assessments. Available at: https://www.ipieca.org/news/integrating-human-rights-into-environmental-social-and-health-impact-assessments/ (Accessed on 7 August, 2021).

IRENA. 2019. Renewable Energy: A Gender Perspective. Available at: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jan/IRENA_Gender_perspective_2019.pdf (Accessed on 7 August, 2021).

Kim Bao. 2020a. Potential and orientation for renewable energy development in Dak Lak province to 2030, with vision to 2045 (Tiềm năng và định hướng phát triển năng lượng tái tạo tỉnh Đắk Lắk đến năm 2030, tầm nhìn đến năm 2045). Available at: https://daklak.gov.vn/-/tiem-nang-va-inh-huong-phat-trien-nang-luong-tai-tao-tinh-ak-lak-en-nam-2030-tam-nhin-en-nam-2045 (Accessed on 29 May 2021).

Kim Bao. 2020b. Over VND 855 billion to implement the sustainable poverty reduction target program in the period of 2016-2020 (Hơn 855 tỷ đồng thực hiện Chương trình mục tiêu giảm nghèo bền vững giai đoạn 2016-2020). Available at: https://daklak.gov.vn/-/hon-855-ty-ong-thuc-hien-chuong-trinh-muc-tieu-giam-ngheo-ben-vung-giai-oan-2016-2020 (Accessed on 5 June 2021).

Kim Hoang and Trang Tran. 2020. The impact of free migration on socio-economic development in the Central Highlands nowadays (Tác động của di cư tự do đến sự phát triển kinh tế – xã hội ở khu vực Tây Nguyên hiện nay). Available at: https://www.quanlynhanuoc.vn/2020/11/24/tac-dong-cua-di-cu-tu-do-den-su-phat-trien-kinh-te-xa-hoi-o-khu-vuc-tay-nguyen-hien-nay/ (Accessed on 31 July 2021)

Krong Buk District Ethnic Minority Affairs Office. 2021. Report on commenting on the social survey for the environmental and social impact assessment of the wind power projects (Báo cáo về việc

tham gia ý kiến đối với khảo sát xã hội phục vụ cho đánh giá tác động môi trường và xã hội của các dự án điện gió)

Krong Buk District Portal. 2021a. Geographical location, natural and social conditions (Vị trí địa lý và điều kiện tự nhiên, xã hội). Available at: http://krongbuk.daklak.gov.vn/index.php?option=com_content&view=article&id=247&Itemid=616 (Accessed on 25 May 2021)

Krong Buk District Portal. 2021b. Cu Pong commune (Xã Cư Pơng). Available at: http://krongbuk.daklak.gov.vn/index.php?option=com_content&view=article&id=975&Itemid=2 (Accessed on 5 June 2021).

Krong Buk District Portal. No date a. Monuments, famous sites (Di tích, danh lam thắng cảnh). Available at: http://krongbuk.daklak.gov.vn/index.php?option=com_content&view=article&id=874&Itemid=622 (Accessed on 29 May 2021).

Krong Buk District Portal. No date b. Cu Ne commune (Xã Cư Né). Available at: http://krongbuk.daklak.gov.vn/index.php?option=com_content&view=article&id=980&Itemid=2 (Accessed on 5 June 2021).

Krong Buk District Portal. No date c. Ea Sin commune (Xã Ea Sin). Available at: http://krongbuk.daklak.gov.vn/index.php?option=com_content&view=article&id=989&Itemid=2 (Accessed on 31 May 2021).

Krong Buk District Statistics Office. 2020. Statistical Yearbook of Krong Buk district 2019. Dak Lak: Krong Buk Statistics Office.

Krong Buk DPC. 2020. Report on socio-economic and national security condition in 2020 and orientation development plans in 2021 (Báo cáo kết quả thực hiện nhiệm vụ phát triển kinh tế xã hội, đảm bảo quốc phòng an ninh năm 2020 và phương hướng, nhiệm vụ năm 2021)

Krong Buk DPC. 2021. Report on the implementation results of the national target program on new rural construction in Krong Buk district in the first 6 months of 2021, orientation and tasks for the last 6 months of 2021 (Báo cáo kết quả thực hiện Chương trình mục tiêu Quốc gia xây dựng nông thôn mới trên địa bàn huyện Krông Búk 6 tháng đầu năm 2021, phương hướng nhiệm vụ 6 tháng cuối năm 2021)

Lawyers Rights' Watch Canada. 2018. Human Rights Committee Consideration of the Implementation of the International Covenant on Civil and Political Rights by Vietnam. Available at: https://lawyersforlawyers.org/wp-content/uploads/ICCPR-Vietnam-Submission-List-of-Issues-30Apr18-FINAL.pdf (Accessed on 7 August, 2021).

Le Huong. 2020. Village changed from building a new rural area (Buôn làng đổi thay từ xây dựng Nông thôn mới). Available at: https://baodantoc.vn/buon-lang-doi-thay-tu-xay-dung-nong-thon-moi-1586188547732.htm (Accessed on 5 June 2021).

Le Thanh. 2018. Cu Ne commune focuses on innovation in Party building (Xã Cư Né chú trọng đổi mới trong công tác xây dựng Đảng). Available at: http://baodaklak.vn/channel/3482/201806/xa-cu-ne-chu-trong-doi-moi-trong-cong-tac-xay-dung-dang-5588505/ (Accessed on 31 July 2021)

Le Thanh. 2019. Krong Buk district faces the risk of drought on a large scale (Huyện Krông Búk đối diện nguy cơ hạn hán trên diện rộng). Available at: http://baodaklak.vn/channel/3483/201903/huyen-krong-buk-doi-dien-nguy-co-han-han-tren-dien-rong-5623426/ (Accessed on 27 May 2021).

Le Thanh. 2020. Efficiency of waste treatment model in Cu Pong commune (Hiệu quả mô hình xử lý rác thải ở xã Cư Pơng). Available at: http://baodaklak.vn/channel/3684/202009/hieu-qua-mo-hinh-xu-ly-rac-thai-o-xa-cu-pong-5698346/ (Accessed on 5 June 2021).

Le Thanh. 2021a. Announcement of Tan Lap commune (Krong Buk district) meeting new rural standards (Công bố xã Tân Lập (huyện Krông Búk) đạt chuẩn nông thôn mới). Available at: http://baodaklak.vn/channel/3481/202104/cong-bo-xa-tan-lap-huyen-krong-buk-dat-chuan-nong-thon-moi-5731983/ (Accessed on 28 May 2021).

Le Thanh. 2021b. Krong Buk district: The industrial production value is estimated at 25.56 billion VND (Huyện Krông Búk: Giá trị sản xuất ngành công nghiệp ước đạt 25,56 tỷ đồng). Available at: http://baodaklak.vn/channel/3482/202104/huyen-krong-buk-gia-tri-san-xuat-nganh-cong-nghiep-uoc-dat-2556-ty-dong-5730080/ (Accessed on 31 July 2021)

Le Thanh. 2021c. Ea Sin changed from Resolution 04-NQ/HU (Ea Sin đổi thay từ Nghị quyết 04-NQ/HU). Available at: http://baodaklak.vn/channel/3482/202105/ea-sin-doi-thay-tu-nghi-quyet-04-5736866/ (Accessed on 31 July 2021)

Mai Duc Ngoc. 2015. Key Communal Human Resources in Contemporary Rural Vietnam (Can bo lanh dao chu chot cap xa o nong thon Vietnam hien nay). Khoa hoc Xa hoi Vietnam 12(2015): 19-27.

Mai Thanh. 2019. Dak Lak: Main export items (Đắk Lắk: Sản phẩm xuất khẩu chủ yếu). Available at: https://socongthuong.daklak.gov.vn/news/tin-cong-thuong/dak-lak-san-pham-xuat-khau-chu-yeu-1292.html (Accessed on 5 June 2021).

Minh Thong. 2020. Setting up a wind power investment project in Krong Buk district (Lập dự án đầu tư điện gió tại huyện Krông Búk). Available at: http://baodaklak.vn/channel/3483/202007/lap-du-an-dau-tu-dien-gio-tai-huyen-krong-buk-5691920/ (Accessed on 31 July 2021)

Minh Thuan. 2020. Krong Buk district: Resilience from the movement of good production and business (Huyện Krông Búk: Sức bật từ phong trào sản xuất kinh doanh giỏi). Available at: http://baodaklak.vn/channel/3483/202003/huyen-krong-buk-suc-bat-tu-phong-trao-san-xuat-kinh-doanh-gioi-5675741/ (Accessed on 28 May 2021).

Ministry of Foreign Affairs. 2018. Country Report on the protection and promotion of Human Rights in Vietnam under the third cycle of the universal periodic review (UPR).

Ministry of Industry and Trade (MOIT). 2020. Document No: 1931/BCT-DL on supplementing wind power projects (Công văn số 1931/BCT-DL về việc xem xét bổ sung quy hoạch các dự án điện gió). Available at: https://thukyluat.vn/cv/cong-van-1931-bct-dl-2020-bo-sung-quy-hoach-du-an-dien-gio-6b17e.html (Accessed on 7 August 2021).

Ministry of Planning and Investment (MPI). 2021. Dak Lak's natural conditions. Available at: http://www.mpi.gov.vn/Pages/tinhthanhchitiet.aspx?idTinhThanh=29# (Accessed on 25 May 2021).

Ngoc Linh. 2019. Dak Lak: Dak Lak: A commune has five clean water works worth hundreds of billions, waiting for selling scraps (Đắk Lắk: Một xã có 5 công trình nước sạch trăm tỷ "đắp chiếu", chờ bán phế liệu). Available at: https://moitruong.net.vn/dak-lak-mot-xa-co-5-cong-trinh-nuoc-sach-tram-ty-dap-chieu-cho-ban-phe-lieu/ (Accessed on 1 June 2021).

Nguoi lao dong. 2019. The Central Highlands lacks labour (Tây Nguyên thiếu lao động). Available at: https://nld.com.vn/thoi-su/tay-nguyen-thieu-lao-dong-20190530221146115.htm (Accessed on 7 August 2021).

Nguyen Quy. 2020. Human trafficking cases down but not out in Vietnam. Available at: https://e.vnexpress.net/news/news/human-trafficking-cases-down-but-not-out-in-vietnam-4139200.html (Accessed on 7 August 2021)

Nguyen The Anh. 2003. Village versus State: The Evolution of State-Local Relations in Vietnam until 1945. Southeast Asian Studies 41(1): 101-123.

Nguyen, H., Dieu, M., Doan, T., Nguyen, T. & Nguyen, M.K. 2020, NGHIÊN CỨU THÀNH PHẦN LOÀI VÀ MỨC ĐỘ XÂM HẠI CỦA SINH VẬT NGOẠI LAI Ở THÀNH PHỐ PLEIKU, TỈNH GIA LAI.

Nhu Quynh. 2018. People in Ea Sin commune are tired of waiting for electricity (Người dân xã Ea Sin mòn mỏi chờ điện). Available at: http://baodaklak.vn/channel/3484/201811/nguoi-dan-xa-ea-sin-mon-moi-cho-dien-5609319/ (Accessed on 27 May 2021).

Nhu Quynh. 2019a. Krong Buk district: Many innovations in state management of beliefs and religions (Huyện Krông Búk: Nhiều đổi mới trong quản lý nhà nước về tín ngưỡng, tôn giáo). Available at: http://baodaklak.vn/channel/3482/201904/huyen-krong-buk-nhieu-doi-moi-trong-quan-ly-nha-nuoc-ve-tin-nguong-ton-giao-5630359/ (Accessed on 26 May 2021).

Nhu Quynh. 2019b. Various forms of security and order maintenance in Ea Sin commune (Đa dạng các hình thức giữ gìn an ninh trật tự ở Ea Sin). Available at: http://baodaklak.vn/channel/3485/201908/da-dang-cac-hinh-thuc-giu-gin-an-ninh-trat-tu-o-ea-sin-5645890/ (Accessed on 31 July 2021)

Nhu Quynh. 2020a. Krong Buk district: Mobilizing all resources for rural transport development (Huyện Krông Búk: Huy động mọi nguồn lực phát triển giao thông nông thôn). Available at: http://baodaklak.vn/channel/3483/202012/huyen-krong-buk-huy-dong-moi-nguon-luc-phat-trien-giao-thong-nong-thon-5713141/ (Accessed on 26 May 2021).

Nhu Quynh. 2020b. Krong Buk district: Achieved 11 socio-economic development targets in 2020 and exceeded the plan (Huyện Krông Búk: 11 chỉ tiêu phát triển kinh tế - xã hội năm 2020 đạt và vượt kế hoạch). Available at: http://www.baodaklak.vn/channel/3482/202012/huyen-krong-buk-11-chi-tieu-phat-trien-kinh-te-xa-hoi-nam-2020-dat-va-vuot-ke-hoach-5716777/ (Accessed on 28 May 2021).

Nhu Quynh. 2021. The people of Krong Buk district benefit of the VssID application (Người dân huyện Krông Búk hưởng tiện ích từ ứng dụng VssID). Available at: http://baodaklak.vn/channel/3484/202105/nguoi-dan-huyen-krong-buk-huong-tien-ich-tu-ung-dung-vssid-5737552/ (Accessed on 29 May 2021).

Office of the High Commissioner for Human Rights (OHCHR). 2021. United Nations Human Rights Report 2020. Available at: https://www2.ohchr.org/english/OHCHRreport2020/ (Accessed on 7 August, 2021).

Office of the High Commissioner for Human Rights (OHCHR). 2021a. Vienna Declaration and Programme of Action. Available at: https://www.ohchr.org/EN/ProfessionalInterest/Pages/Vienna.aspx (Accessed on 7 August, 2021).

Office of the High Commissioner for Human Rights (OHCHR). 2021b. Your Human Rights. Available at: https://www.ohchr.org/en/issues/pages/whatarehumanrights.aspx (Accessed on 7 August, 2021).

Office of the High Commissioner for Human Rights (OHCHR). 2021c. The Core International Human Rights Instruments and their monitoring bodies. Available at: https://www.ohchr.org/en/professionalinterest/pages/coreinstruments.aspx (Accessed on 7 August, 2021).

Office of the High Commissioner for Human Rights (OHCHR). 2021d. Human Rights Bodies. Available at: https://www.ohchr.org/EN/HRBodies/Pages/HumanRightsBodies.aspx (Accessed on 7 August, 2021).

Office of the High Commissioner for Human Rights and United Nations Staff College Project. 2000. Human Rights: A Basic Handbook for UN Staff. Available at: https://www.ohchr.org/Documents/Publications/HRhandbooken.pdf (Accessed on 7 August, 2021).

Office of the United Nations High Commissioner for Human Rights. 2021a. Convention on the Elimination of All Forms of Discrimination against Women New York, 18 December 1979. Available at: https://www.ohchr.org/en/professionalinterest/pages/cedaw.aspx (Accessed on 7 August, 2021).

Office of the United Nations High Commissioner for Human Rights. 2021b. United Nations Millennium Declaration. Available at:

https://www.ohchr.org/EN/ProfessionalInterest/Pages/Millennium.aspx (Accessed on 7 August, 2021).

Phuc An. 2020. Dak Lak: Child marriage and consanguineous marriage have no end (Đắk Lắk: Tảo hôn và hôn nhân cận huyết thống chưa có hồi kết). Ethnic Magazine. Available at: https://baodantoc.vn/dak-lak-tao-hon-va-hon-nhan-can-huyet-thong-chua-co-hoi-ket-1608713719263.htm (Accessed on 7 August 2021)

Phuong Anh (2020). What are the plans for 2021, 2021-2025 and the results in 2020 in the Central Highlands? (Dự kiến kế hoạch 2021, 2021-2025 và những kết quả năm 2020 vùng Tây Nguyên thế nào?). Available at: https://kinhtevadubao.vn/du-kien-ke-hoach-2021-2021-2025-va-nhung-ket-qua-nam-2020-vung-tay-nguyen-the-nao-15843.html (Accessed on 7 August 2021)

Sustainable Energy For All. 2013. Global tracking framework. Available at: https://openknowledge.worldbank.org/bitstream/handle/10986/16537/EnergyforAllfinal.pdf?sequence=5&isAllowed=y (Accessed on 7 August, 2021).

The Business & Human Rights Resource Centre. 2017. Investor briefing: Renewable energy impacts on communities. Available at: https://media.business-humanrights.org/media/documents/files/Investor_briefing_-_Renewable_energy_-_Apr_2017.pdf (Accessed on 7 August, 2021).

The Business & Human Rights Resource Centre. 2019. Fast & Fair - Renewable Energy Investments. Available at: https://old.business-humanrights.org/sites/default/files/Renewable%20Energy%20Investor%20Briefing_0.pdf (Accessed on 7 August, 2021).

The Constitution of the Socialist Republic of Vietnam. 2013. Available at: https://vietnamlawmagazine.vn/the-2013-constitution-of-the-socialist-republic-of-vietnam-4847.html (Accessed on 7 August, 2021).

The Global Goals. 2021. Global goals for Sustainable development. Available at: https://www.globalgoals.org/5-gender-equality (Accessed on 7 August, 2021).

The Hung. 2019. Dak Lak was the leading province in the Central Highlands and the 10th in the whole country (Đắk Lắk là tỉnh đứng đầu khu vực Tây Nguyên và thứ 10 toàn quốc về quy mô dân số). Available at: http://baodaklak.vn/channel/3481/201910/dak-lak-la-tinh-dung-dau-khu-vuc-tay-nguyen-va-thu-10-toan-quoc-ve-quy-mo-dan-so-5655123/ (Accessed on 5 June 2021).

The Ministry of Labour - Invalids and Social Affairs **(**MOLISA). 2018. Review of ten years of implementing the Law on Gender Equality (Đánh giá 10 năm thi hành luật bình đẳng giới - English summary). Available at: http://duthaovanban.molisa.gov.vn/detail.aspx?tab=2&vid=576 (Accessed on 7 August, 2021).

The People in Need. 2019. Death Penalty and Freedom of Expression among Most Pressing Human Rights Issues in Vietnam. Available at: https://www.clovekvtisni.cz/en/death-penalty-and-

freedom-of-expression-among-most-pressing-human-rights-issues-in-vietnam-5744gp (Accessed on 7 August 2021).

The Prime Minister. 2017. Decision No. 1309/QD-TTg dated on 5 September, 2017 on the approval of a project that aims integrate human rights into subjects in education nationwide by 2025 (Quyết định số 1309/QĐ-TTg của Thủ tướng Chính phủ : Phê duyệt Đề án đưa nội dung quyền con người vào chương trình giáo dục trong hệ thống giáo dục quốc dân). Available at: http://vanban.chinhphu.vn/portal/page/portal/chinhphu/hethongvanban?class_id=2&_page=1&mode=detail&document_id=191021 (Accessed on 7 August, 2021).

Thuan Nguyen. 2020. Dak Lak: Aquaculture area is shrinking due to drought (Dak Lak: Diện tích nuôi trồng thuỷ sản bị thu hẹp do nắng hạn). Available at: https://thuysanvietnam.com.vn/dak-lak-dien-tich-nuoi-trong-thuy-san-bi-thu-hep-do-nang-han/ (Accessed on 28 May 2021).

Tran, M.H., Le, T.T., Le, V.C., Dang, T.L. & Nguyen, V.S. 2001, Feasibility study for the establishment of Chu Prong Nature Reserve, Gia Lai province, BirdLife International Vietnam Programme and the Forest Inventory and Planning Institute., Hanoi.

Tuan Anh. 2018. Cu Pong heroic land "blooms" (Vùng đất anh hùng Cư Pơng “Nở hoa”). Available at: https://dantocmiennui.vn/vung-dat-anh-hung-cu-pong-no-hoa/178378.html (Accessed on 5 June 2021).

UN Department of Economic and Social Affairs. 2021. Available at: https://sdgs.un.org/goals (Accessed on 7 August 2021).

UN Treaty Body Database. 2021. Committee on the Elimination of Racial Discrimination. Combined fifteenth to seventeenth reports submitted by Vietnam under article 9 of the Convention. Available at: https://tbinternet.ohchr.org/Treaties/CERD/Shared%20Documents/VNM/CERD_C_VNM_15-17_6595_E.docx (Accessed on 7 August, 2021).

UNFPA & MOLISA. 2021. Review of ten years of implementing the Law on Gender Equality. Available at: https://vietnam.unfpa.org/en/publications/review-ten-years-implementing-law-gender-equality (Accessed on 7 August, 2021).

United Nations Environment Programme Finance Initiative. 2014. The Human Rights Guidance Tool. Available at: https://www.unepfi.org/humanrightstoolkit/index.php (Accessed on 7 August, 2021).

United Nations. 2014. Women’s Rights are Human Rights. Available at: https://www.ohchr.org/documents/events/whrd/womenrightsarehr.pdf (Accessed on 7 August, 2021).

United Nations. 2021a. Available at: https://www.un.org/en/about-us/un-charter/full-text (Accessed on 7 August, 2021).

United Nations. 2021b. Universal Declaration of Human Rights. Available at: https://www.un.org/en/about-us/universal-declaration-of-human-rights (Accessed on 7 August, 2021)

Van Thanh. 2018a. (WARNING) Many women in the Central Highlands are tricked into being sold to China (CẢNH GIÁC) Nhiều phụ nữ ở Tây Nguyên bị lừa bán sang Trung Quốc). People's Public Security Magazine. Available at: https://cand.com.vn/Lan-theo-dau-vet-toi-pham/Canh-giac-voi-nan-buon-ban-nguoi-o-Tay-Nguyen-i486775/ (Accessed on 7 August 2021)

Van Thanh. 2018b. Announcement of the wind development planning in Dak Lak province for the period up to 2020, with a vision to 2030 (Công bố quy hoạch phát triển điện gió tỉnh Đắk Lắk giai đoạn đến năm 2020, có xét đến năm 2030). Available at: https://socongthuong.daklak.gov.vn/news/tin-cong-thuong/cong-bo-quy-hoach-phat-trien-gio-tinh-dak-lak-giai-doan-den-2020-co-xet-den-nam-2030-402.html (Accessed on 1 June 2021).

Viet Le Ton. 2021. Vietnam - Data Protection Overview. Available at: https://www.dataguidance.com/notes/vietnam-data-protection-overview (Accessed on 7 August 2021).

Vietnam Academy for Ethnic Minorities. 2020. Dak Lak: Various forms of propaganda to repel child marriage and inbreeding (Đắk Lắk: Đa dạng hình thức tuyên truyền đẩy lùi tảo hôn và hôn nhân cận huyết). Available at: https://hvdt.edu.vn/tin-tuc/tin-tong-hop/dak-lak-da-dang-hinh-thuc-tuyen-truyen-day-lui-tao-hon-va-hon-nhan-can-huyet (Accessed on 7 August 2021)

Vietnam Briefing. 2020. Renewables in Vietnam: Current Opportunities and Future Outlook. https://www.vietnam-briefing.com/news/vietnams-push-for-renewable-energy.html/. (Accessed 22 July 2019).

Vietnam Gorvenment. 2007. Decree 137/2007/ND-CP on adjustment of administrative geography to establish communes in districts: Krong Ana, Ea Kar, Krong Buk, M'Drắk, Ea H'Leo; adjustment of Kong Ana district administrative unit to establish Cu Kuin district, Dak Lak province (Nghị định 137/2007/ND-CP về việc điều chỉnh địa giới hành chính xã để thành lập xã thuộc các huyện: Krông Ana, Ea Kar, Krông Búk, M'Drắk, Ea H'Leo; điều chỉnh địa giới hành chính huyện Krông Ana để thành lập huyện Cư Kuin, tỉnh Đắk Lắk). Available at: https://thuvienphapluat.vn/van-ban/Bo-may-hanh-chinh/Nghi-dinh-137-2007-ND-CP-dieu-chinh-dia-gioi-hanh-chinh-xa-de-thanh-lap-xa-thuoc-huyen-Krong-Ana-Ea-Kar-Krong-Buk-M-Drak-Ea-H-Leo-54828.aspx (Accessed on 31 May 2021).

Vietnam News Agency. 2021. Need to prevent illegal child labor in Dak Lak (Cần ngăn ngừa tình trạng trẻ em lao động trái phép ở Đắk Lắk). Available at: https://vnanet.vn/vi/anh/anh-thoi-su-trong-nuoc-1014/can-ngan-ngua-tinh-trang-tre-em-lao-dong-trai-phap-luat-o-dak-lak-5533636.html (Accessed on 7 August 2021)

WHO. 2016. Achievement of the Health-related Millennium Development Goals in the Western Pacific Region. Available at: https://iris.wpro.who.int/bitstream/handle/10665.1/13441/WPR-2016-DHS-011-en.pdf (Accessed on 7 August, 2021).

World Bank. 2021. Women, Business and the Law 2021. Available at: https://doi.org/10.1596/978-1-4648-1652-9 (Accessed on 7 August, 2021).

WWF no date, Southeastern Asia: Vietnam, Cambodia, Laos, and Thailand, viewed 6 August 2021, <https://www.worldwildlife.org/ecoregions/im0210>.

APPENDIX C DETAILS NOISE MONITORING REPORT

Noise Baseline Study

HUADIAN Dak Lak Wind Power Project,
Dak Lak Province

1 July 2021

Prepared for ERM Vietnam

Document details	
Document title	Noise Baseline Study
Document subtitle	HUADIAN Dak Lak Wind Power Project, Dak Lak Province
Date	1 July 2021
Version	1.0
Author	ERM's Subcontractor
Client Name	ERM Vietnam

Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
Draft	1.0	ERM's Subcontractor	ERM Vietnam	ERM Vietnam	01.07.2021	

CONTENTS

1. INTRODUCTION 4

2. METHODOLOGY 5

2.1 Site Selection 5
2.1.1 Noise Monitoring Site N1 5
2.1.2 Noise Monitoring Site N2 8
2.1.3 Noise Monitoring Site N3 11
2.1.4 Noise Monitoring Site N4 13
2.1.5 Noise Monitoring Site N5 15
2.1.6 Noise Monitoring Site N6 18
2.2 Noise Monitoring Schedule 20
2.3 Sampling Method 21
2.4 Sound Level Meter 21
2.5 QA/QC 22

3. RESULTS AND DISCUSSION 24

3.1 Noise Level of Each Site 24
3.1.1 Noise Monitoring Site N1 24
3.1.2 Noise Monitoring Site N2 24
3.1.3 Noise Monitoring Site N3 25
3.1.4 Noise Monitoring Site N4 26
3.1.5 Noise Monitoring Site N5 27
3.1.6 Noise Monitoring Site N6 28
3.2 Noise Level of Monitoring Sites 29
3.2.1 $L_{eq,1h}$: 29
3.2.2 L_{eq} Day and Night 31
3.2.3 Average Noise Level of 24 Hours 33

4. CONCLUSION 34

ATTACHMENT A DETAILS OF NOISE LEVEL (LEQ,10MIN, LMAX, LMIN, L90, L10, L1, LEQ OCTAVE) AT MONITORING SITES

ATTACHMENT B DAILY LOG

ATTACHMENT C SOME PICTURES

ATTACHMENT D CERTIFICATE OF CALIBRATION

List of Tables

Table 2.1 Summary of Noise Measurement Locations 20
Table 2.2 Calibration Results 22
Table 3.1 Average $L_{eq,1h}$ of Monitoring Sites 29

List of Figures

Figure 1.1 Geography of Noise Measurement Sites for Dak Lak Wind Power Projects 4
Figure 2.1 Geographical Location of Noise Monitoring Sites for Dele Wind Project 5
Figure 2.2 The Surrounding Areas of the N1 Noise Survey Site 6
Figure 2.3 The Noise Survey Site N1 6
Figure 2.4 The Nearest Residential House from the Noise Measurement Site N1 7
Figure 2.5 The Road is 7m from Site N1 7
Figure 2.6 Agricultural Vehicles around the Project Area 8

Figure 2.7 The Surrounding Areas of N2 Noise Survey Site 9
Figure 2.8 The Noise Survey Site N2 9
Figure 2.9 Residential Houses around Site N2 10
Figure 2.10 The Road is about 19m from the Noise Measuring Point N2 10
Figure 2.11 The Surrounding Areas of the N3 Noise Survey Site 11
Figure 2.12 The Noise Survey Site N3 11
Figure 2.13 The Main Road is about 50m to the Southeast 12
Figure 2.14 Residential Houses around N3 Location 12
Figure 2.15 The Road is about 20m to the South from the Noise Measuring Point N3 13
Figure 2.16 The Surrounding Areas of the N4 Noise Survey Site 14
Figure 2.17 The Noise Survey Site N4 14
Figure 2.18 The Red Dirt Roads at the Noise Measuring Point N4. 15
Figure 2.19 The Outside Main Road Leads to the Measuring Point Area 15
Figure 2.20 The Surrounding Areas of the N5 Noise Survey Site 16
Figure 2.21 The Noise Survey N5 16
Figure 2.22 The Main Road is 46m from the Noise Measuring Point N5 17
Figure 2.23 The Roads is at the Noise Measuring Point N5 17
Figure 2.24 Residential Houses near the N5 Location 18
Figure 2.25 The Surrounding Areas of the N6 Noise Survey Site 18
Figure 2.26 The Noise Survey Site N6 19
Figure 2.27 View of the Noise Measurement Area N6 19
Figure 2.28 The Road at the Noise Measuring Point N6. 19
Figure 2.29 Residential Houses around N6 Location 20
Figure 2.30 3M Sound Pro DL 2/1-1 Sound Level Meter & Calibrator 22
Figure 2.31 Rion NL-52EX Sound Level Meter (with NX-42RT sofware) & Calibrator 22
Figure 3.1 Diagram of $L_{eq\ ,10min}$ (dBA) at Location N1 24
Figure 3.2 Diagram of $L_{eq,\ 10min}$ (dBA) at Location N2 25
Figure 3.3 Diagram of $L_{eq,10min}$ (dBA) at Location N3 26
Figure 3.4 Diagram of $L_{eq,\ 10min}$ (dBA) at Location N4 27
Figure 3.5 Diagram of $L_{eq,10min}$ (dBA) at Location N5 28
Figure 3.6 Diagram of $L_{eq,10min}$ (dBA) at Location N6 29
Figure 3.7 Plot Box Charts of Leq,10min 31
Figure 3.8 Plot Box Charts of $L_{eq,\ 1h}$ 31
Figure 3.9 Average Day/ night Leq of all Noise Monitoring Sites 32
Figure 3.10 $L_{eq,\ 24h}$ (dBA) at all Monitoring Sites 33

Acronyms and Abbreviations

Name	Description
ESIA	Environmental and Social Impact Assessment
IER	Institute for Environment and Resources
IFC	International Finance Corporation
Leq	Equivalent continuous sound level

1. INTRODUCTION

As an essential part of developing the Environmental and Social Impact Assessment (ESIA) for Dak Lak Wind Farm Projects, subcontractor IER under the request of ERM conducted the noise baseline survey in four affected communes in Dak Lak Province.

The noise baseline monitoring was carried out from 20 to 27 May 2021 in Cư Né, Cơ Pơng, Ea Sin, Chư Kbô Commune, Krong Buk District, Dak Lak Province, where the Dak Lak Wind Farm Project will be developed. The survey aims to serve the preparation of Environmental and Social Impact Assessment (ESIA) report for Dak Lak Wind Farm Project.

The objective of the noise baseline study is to evaluate the noise baseline levels at selected noise monitoring locations based on methods outlined in IFC standard noise. The results of the survey are expected to provide information on daily variability in noise levels as well as an expected typical or average daily condition.

The investment for the construction of Dak Lak Wind Power Plants plays an important role to supplementing the electricity supply for not only the local demand of Dak Lak Province but also the National Grid. Meanwhile, it also contributes to ensure the energy security, mitigate greenhouse gas emissions and environmental pollution by using renewable energy sources.

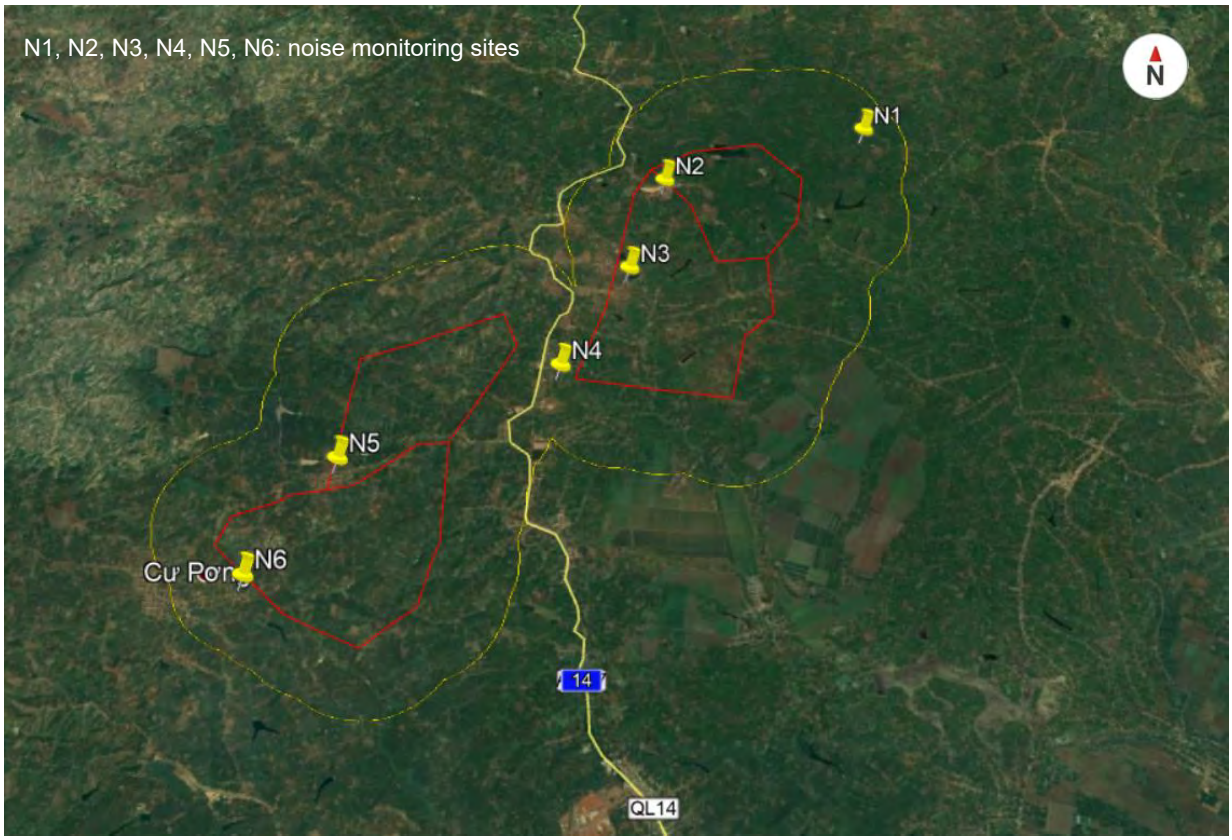
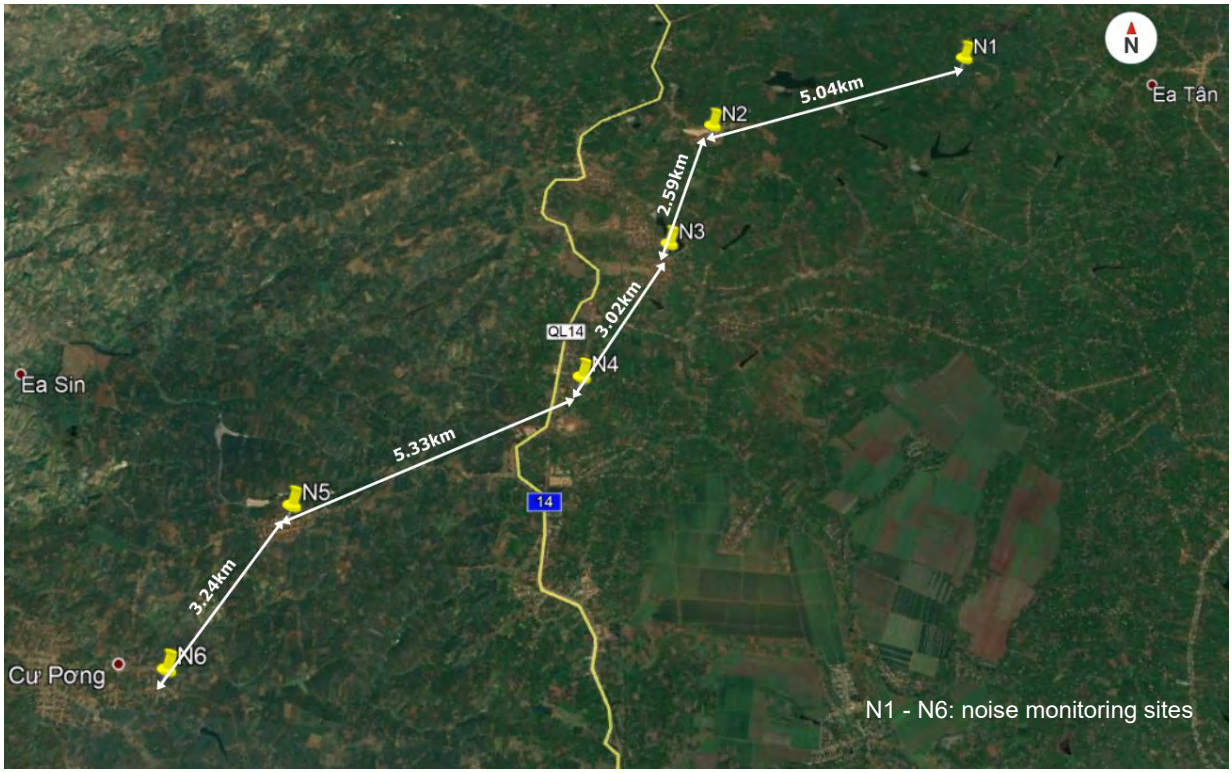


Figure 1.1 Geography of Noise Measurement Sites for Dak Lak Wind Power Projects

2. METHODOLOGY

2.1 Site Selection

Six noise monitoring sites in the communes of Cu Ne, Cu Pong, Ea Sin, Chu Kbo, Krong Buk District, Dak Lak Province were selected by ERM (See Figure 2.1).



Source: IER

Figure 2.1 Geographical Location of Noise Monitoring Sites for Dele Wind Project

2.1.1 Noise Monitoring Site N1

The noise monitoring N1 with coordinates 13°06'58.6"N, 108°17'14.9"E is located in Quang Trung Hamlet, EA Tan commune, Krong Nang District, Dak Lak Province. Location N1 is in Mr. Tran Van Minh's yard, about 10m from his house to the Southeast. The location of N1 site is:

- Approximately seven metres to the North-Northwest of the road.
- Approximately 95 m to the Southeast, and 120 m to the South of the residential area,
- It is surrounded by the coffee gardens.

Figure 2.2 The Surrounding Areas of the N1 Noise Survey Site

Figure 2.3 The Noise Survey Site N1

Figure 2.4 The Nearest Residential House from the Noise Measurement Site N1

Figure 2.5 The Road is 7m from Site N1

Figure 2.6 Agricultural Vehicles around the Project Area

Noise sources at the N1 site include:

- Motorbikes passing on the road located approximately 7m away from N1 location.
- Wagons[1] (occasionally passing by) (see Figure 2.6)
- Sound of cicadas (1PM to 6:30PM)
- Other insects (6:30PM to 4AM), and
- Birds, roosters, dogs.

2.1.2 Noise Monitoring Site N2

The noise monitoring site N2 with coordinates of 13°6'10.5"N; 108°14'34.7"E is located in Ea Nguoi village, Cu Ne commune, Krong Buk District, Dak Lak Province. This area is densely populated. The nearest household is Ms. Phan Thi Hang's house, which is about 30m to the Northeast.

The location of N2 noise measurement is on the land where grass is planted for cows. The location of N2 site is:

- Approximately 38m to the East of the main road
- Approximately 19m to the South and about 45m to the East of two side roads.
- Approximately 9m to the West of the coffee garden, and
- Approximately 33m to the South, 48m to the West- Northwest, 62m to the East –Northeast, and 65m to the East – Southeast of the residential areas.

[1] Wagon or any agricultural activities related vehicles area popular means of transportation in the area, and suitable for muddy and hilly road conditions. This is an improved vehicle consisting of a tractor combined with a trailer that can carry people and agricultural products.

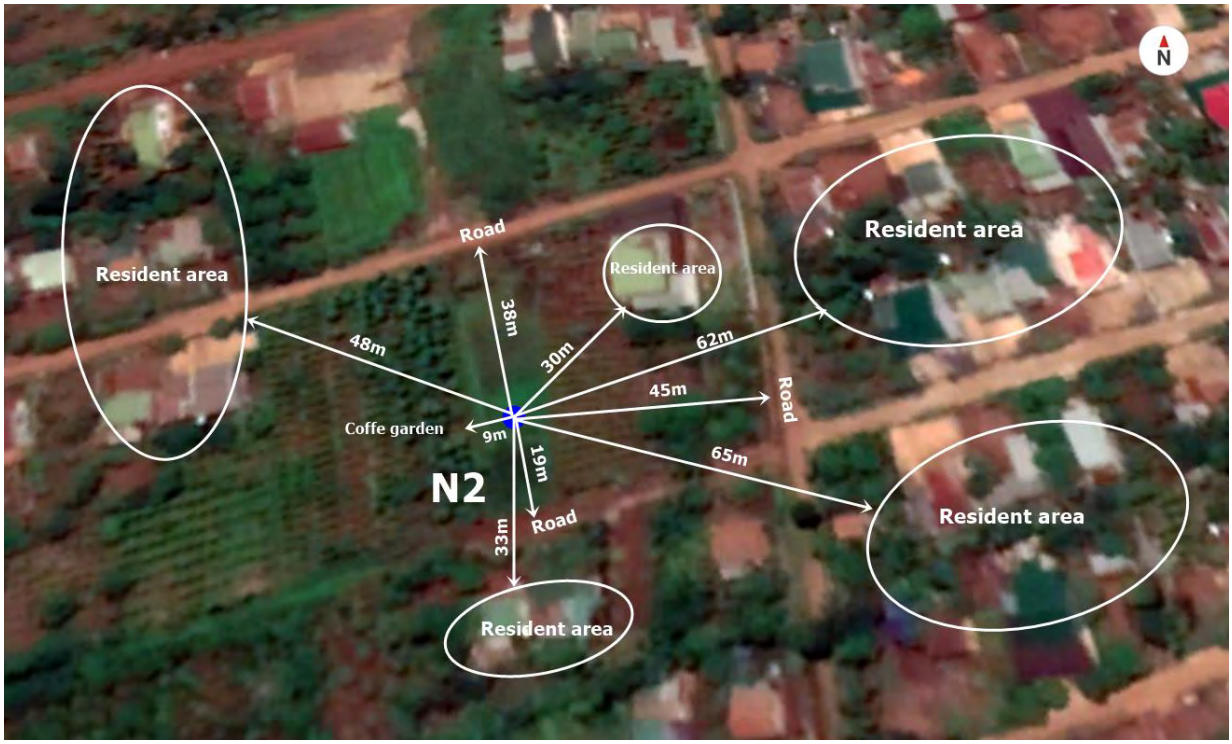


Figure 2.7 The Surrounding Areas of N2 Noise Survey Site

Figure 2.8 The Noise Survey Site N2

Figure 2.9 Residential Houses around Site N2

Figure 2.10 The Road is about 19m from the Noise Measuring Point N2

Main noise sources at position N2 were as follows:

- Wagons[1] traveling on the main road (frequently).
- Motorbikes travelling on the main road (occasionally).
- Sound of Insects at night (6PM to 4AM), cicadas in particular.
- Karaoke noise 70m away (1:30 AM to 4AM), and
- Dogs, and roosters.

2.1.3 Noise Monitoring Site N3

The N3 noise survey site with the coordinates 13°04'50.4"N; 108°14'08.3"E is located in Buon Dhia 1 Village, Cu Ne Commune, Krong Buk District, Dak Lak Province.

The location of N3 noise measurement is on a newly coffee plantation. There are more than 30 households within 100 m radius of this area. The nearest household is Mr. Y Dipnie's house. N3 site is described as follows:

- Approximately 20m to the South.of the main road.
- Approximately 50m to the Southeast of the main road.
- Approximately 18m to the East, 45m to the West – Northwest, 63m to the Southeast, 75m to the North – Northeast of the residential areas

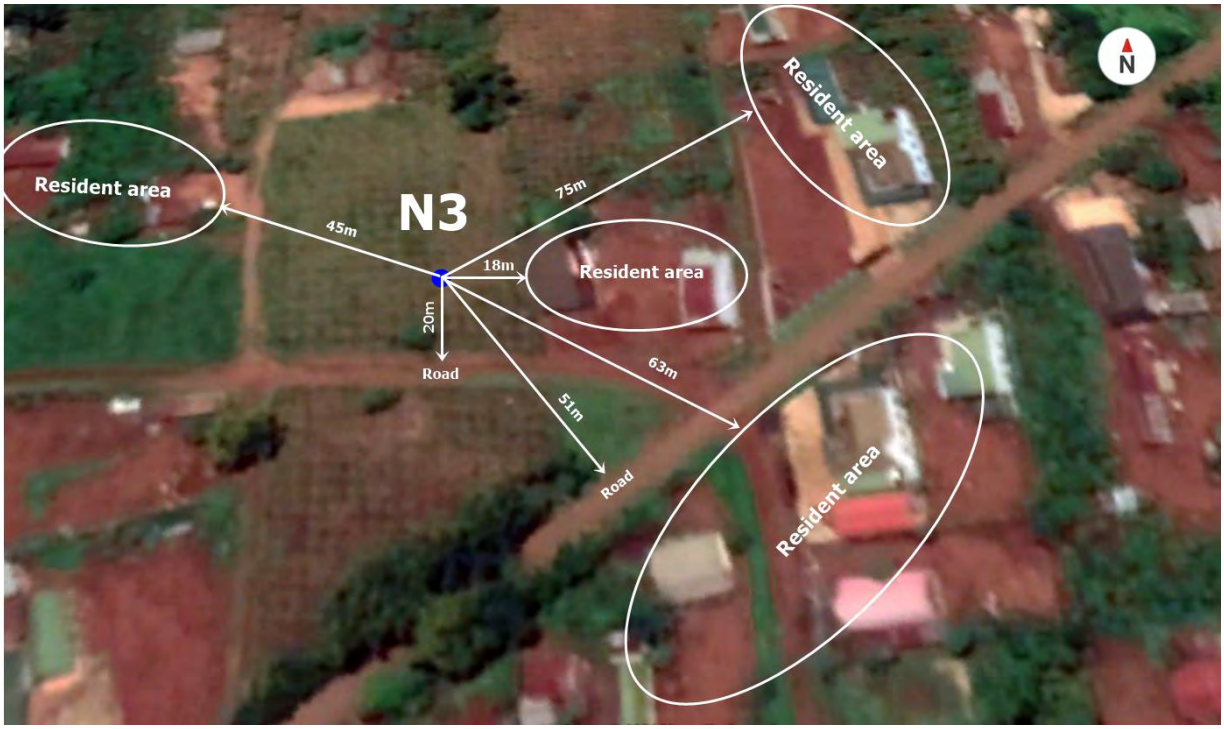


Figure 2.11 The Surrounding Areas of the N3 Noise Survey Site

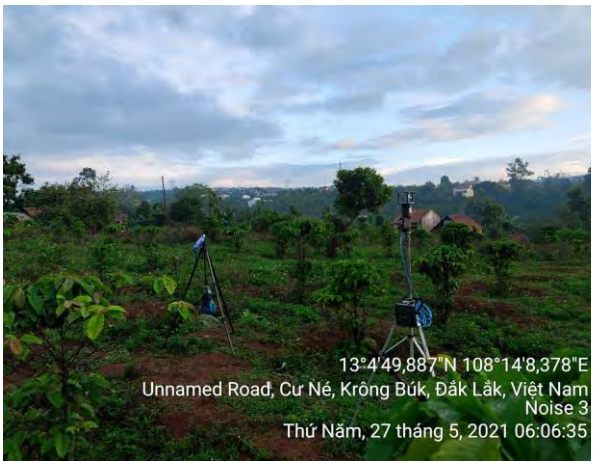


Figure 2.12 The Noise Survey Site N3

Figure 2.13 The Main Road is about 50m to the Southeast

Figure 2.14 Residential Houses around N3 Location

Figure 2.15 The Road is about 20m to the South from the Noise Measuring Point N3

Main noise sources at position N3 were as follows:

- Loudspeakers from the National Assembly Election 2021: all day (from 9AM to 4:30PM on May 22, 2021 and from 4:15AM to 2:50PM on May 22, 2021).
- Agricultural vehicles[1] and motorbikes were traveling quite often
- Sound of cicadas (5:30PM-7:30PM)
- Sound of other Insects (6PM to 4AM)
- Crowing rooster (from 4AM – 6AM), and
- Trucks, dogs and birds

2.1.4 Noise Monitoring Site N4

The N4 noise measurement site with coordinates 13°03'25.0"N; 108°13'18.4"E is located in Buon Kdro 2 village, Cu Ne commune, Krong Buk, Dak Lak. The location of N4 monitoring noise is on the newly planted coffee garden. The nearest household is Mr. Kuenh's house. N4 has some description as follows:

- About 92m to the West of the main road
- About 12 to the East of the coffee garden
- About 38m to the Northwest of the nearest house
- About 80m to the West - Northwest and 75m to the West - Southwest of residential cluster with scattered houses

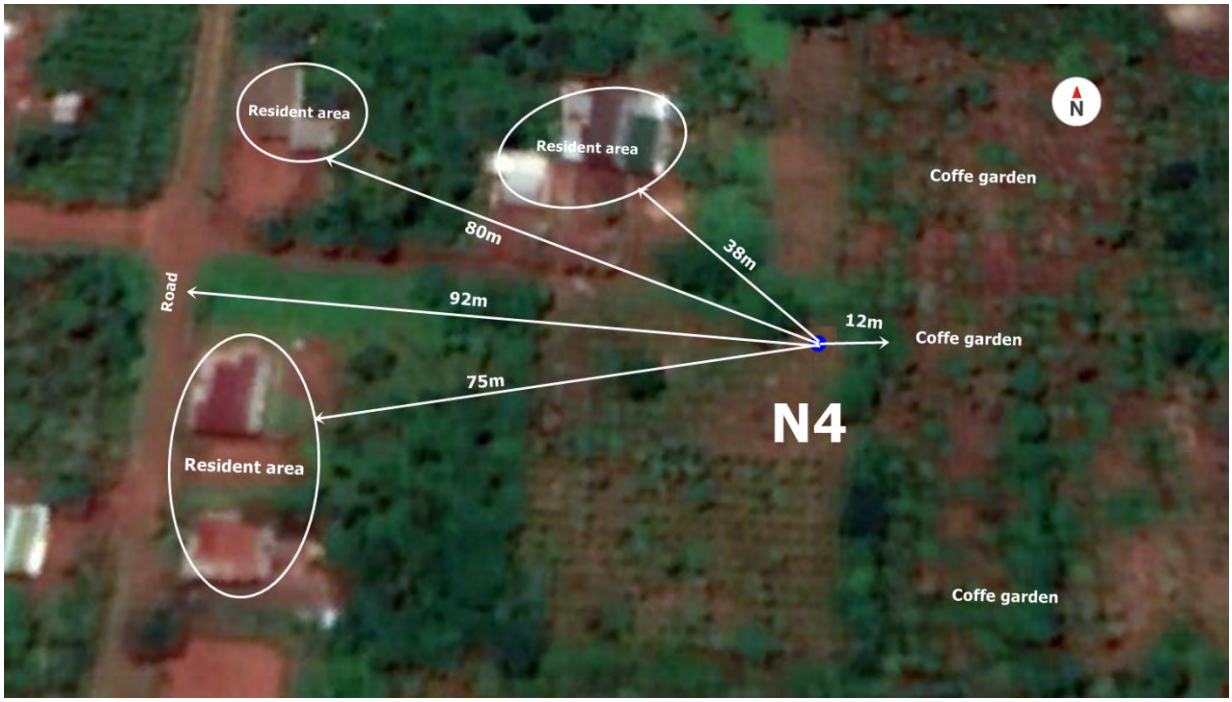


Figure 2.16 The Surrounding Areas of the N4 Noise Survey Site

Figure 2.17 The Noise Survey Site N4

Figure 2.18 The Red Dirt Roads at the Noise Measuring Point N4.

Figure 2.19 The Outside Main Road Leads to the Measuring Point Area

Main noise sources at position N4 were as follows:

- Agricultural vehicles[1] was travelling on the road every so often
- Karaoke noise which is about 40m away (3:40PM-9PM on May 26, 2021)
- Local resident's voice and children playing, which are about 40m away.
- Sound of insects at night (6:15PM-3AM), and
- Dogs, roosters, birds, cicadas.

2.1.5 Noise Monitoring Site N5

The noise measurement site N5 with the coordinates of 13°02'10.4"N, 108°10'39.2"E is located at Buon Moi Village, Cu Pong Commune, Krong Buk District, Dak Lak Province.

The location of N5 noise measurement is on vacant land. The nearest household is Mr Y Hetnie's house, which is about 9m to the northwest. The location of N5 site is:

- About 46m to the South of the main road.

- About 36m to the North and 18m to the of two side roads.
- About 12m to the South, 21m to the West-Northwest and 26m to the East – Southeast of the residential areas..

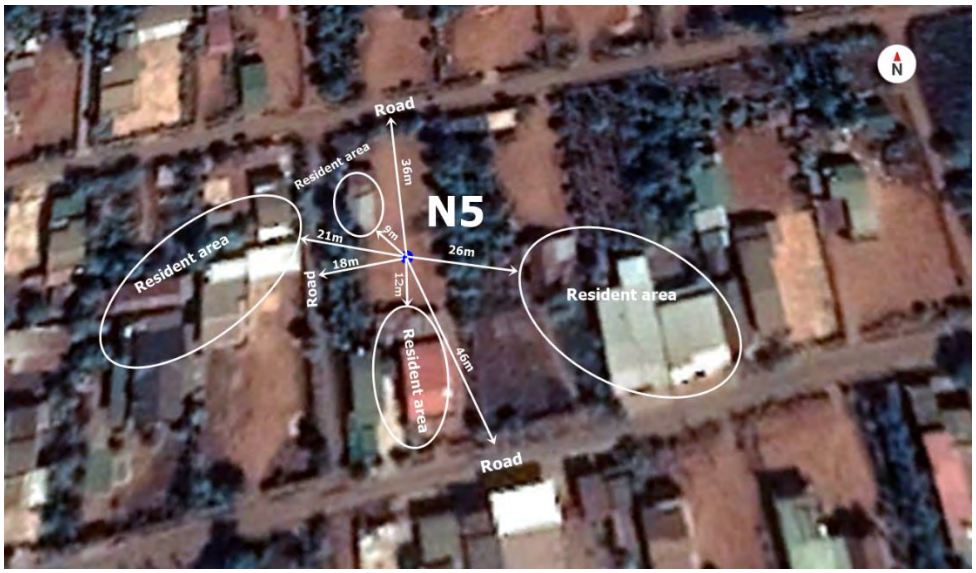


Figure 2.20 The Surrounding Areas of the N5 Noise Survey Site

Figure 2.21 The Noise Survey N5

Figure 2.22 The Main Road is 46m from the Noise Measuring Point N5

Figure 2.23 The Roads is at the Noise Measuring Point N5

Figure 2.24 Residential Houses near the N5 Location

Main noise sources at position N5 were as follows:

- Agricultural vehicles[1] and motorbikes were traveling on regular basis
- Karaoke noise which is about 40m away from 6:30PM-8PM on May 21, 2021.
- Frequent sounds of children playing
- Dogs, roosters, birds, cicadas and insects.

2.1.6 Noise Monitoring Site N6

The noise measurement site N6 with coordinates 13°00'42.5"N, 108°09'41.8"E is located at 38 Drương village, Cu Pong commune, Krong Buk District, Dak Lak Province

The location of N6 noise measurement is located within an avocado plantation and is described as follows:

- Approximately 26m from to the South and 70m to the Northeast of two roads.
- Approximately 27m to the North of the coffee garden.
- Approximately 27 m to the West, 30m to the East, 37m to the South – Southwest, 43m to the Southeast and 75m to the Southwest of scattered residential areas.

Figure 2.25 The Surrounding Areas of the N6 Noise Survey Site

Figure 2.26 The Noise Survey Site N6

Figure 2.27 View of the Noise Measurement Area N6

Figure 2.28 The Road at the Noise Measuring Point N6.


Figure 2.29 Residential Houses around N6 Location

Main noise sources at position N6 were as follows:

- Agricultural vehicles[1] were traveling constantly on the road
- Motorbikes travelling on the road (sometimes).
- Sound of insects (from 7PM to 3AM).
- Sounds from children's playing and residents' voices which are about 27m away.
- Thunder sounds on the evening of May 21, 2021, and
- Dogs, roosters, birds, cicadas.

2.2 Noise Monitoring Schedule

With six selected noise measurement sites, each site will be measured continuously for 48 hours. The noise measurement plan was performed from May 20, 2021 to May 27, 2021 and in turn two sites simultaneously. Due to heavy rain and thunder on the night of May 23, 2021, the measurement was suspended and compensated from May 26, 2021 to the morning of May 27, 2021 (additional 14 hours 30 minutes).

Details of noise measurement time at six locations are summarised in Table 2.1.

Table 2.1 Summary of Noise Measurement Locations

No.	Site	Address	Coordinates	Duration	Equipment
1	N1	67 Quang Trung Hamlet, EA Tan commune, Krong Nang District, Dak Lak Province	13°06'58.6"N, 108°17'14.9"E	24-26 May 2021	RION 52EX-RT
2	N2	Ea Nguoi Hamlet, Cu Ne commune, Krong Buk District, Dak Lak Province	13°6'10.5"N; 108°14'34.7"E	24-26 May 2021	3M SoundPro DL 2/1
3	N3	Buon Dhia 1 village, Cu Ne commune, Krong Buk District, Dak Lak Province	13°04'50.4"N; 108°14'08.3"E	22-23 May 2021 & 26-27 May 2021 (*)	RION 52EX-RT
4	N4	Buon Kdro 2 village, Cư Né commune, Krong Buk, Đak Lak	13°03'25.0"N; 108°13'18.4"E	22-23 and 26-27 May 2021 (*)	3M SoundPro DL 2/1

No.	Site	Address	Coordinates	Duration	Equipment
5	N5	29, Buon Moi villaget, Cu Pong commune, Krong Buk District, Dak Lak Province	13°02'10.4"N, 108°10'39.2"E	20-22 May 2021	RION 52EX-RT
6	N6	38 Buon Druong village, Cu Pong commune, Krong Buk District, Đak Lak Province	13°00'42.5"N, 108°09'41.8"E	20-22 May 2021	3M SoundPro DL 2/1

Note: (*)The measurement was interrupted due to heavy rain, thunder and lightning on the night of May 23, 2021 and be resumed after completing the measurement of 2 points N1 and N2 on May 26, 2021 (compensation time was 14 hours 30 minutes).

2.3 Sampling Method

The noise monitoring method is specified in the Environmental Noise Survey guidelines under the ISO 1996 – 2:2007 where relating parameters are described:

- L_{eq}: Equivalent continuous sound level (A-weighted sound level);
- L_{max}, L_{min}: Maximum, minimum A-weighted sound level;
- The n-percent exceeded level, Ln, is the sound pressure level exceeded for n percent of the time. In other words, for n percent of the time, the fluctuating sound pressure levels are higher than the Ln level. Specific examples are as follows:
  - L_{90}: the level exceeded for 90% of the time; 90% of the time, the noise level is above this level.
  - L_{10}: the level exceeded for 10% of the time.
  - L_{1}: the level exceeded for 1% of the time.

Each sampling point was measured continuously for 48 hours with 10-mins interval. Measuring equipment was mounted on a tripod with the height of approximately from 1.2-1.5 m. The tripod was placed at sampling points to its distance to surrounding walls were over 3.5 m (in accordance with ISO 1996 – 2:2007). Windscreen was also used to reduce the effects of windy weather.

2.4 Sound Level Meter

- One of two following Sound Level meter will be used during the survey 3M Sound Pro (DL 2-1/1)
- Rion NL-52 EX-RT
  - Some characteristics of the sound level meter as following: ANSI and IEC standards compliant
  - Class/ Type 2 or 1
  - A, C and Z (flat) frequency weighting
  - Fast, slow, and IEC impulse time response
  - Selectable thresholds 10 dB – 140 dB
  - 3, 4, 5, 6 dB exchange rates
  - SD memory card slot
  - Time history data logging with 1 second to 60 minute intervals
  - Full octave band real-time analysis

Both 3M Sound Pro DL 2/1-1 and Rion NL-52 conform to legal requirements for quantity measurements ANSI and IEC standards.

3M Sound Pro DL 2/1-1 unit supports real-time octave band analysis in the range from 16 Hz to 16 kHz. Logged data is automatically saved to the instrument's memory card.

Figure 2.30 3M Sound Pro DL 2/1-1 Sound Level Meter & Calibrator

Instrument is the Rion NL-52 sound level meter incorporating a 42EX extension program to store data and NX-42RT software for function as an octave and 1/3 octave band real-time analyzer. Logged data is automatically saved to SD card.

Figure 2.31 Rion NL-52EX Sound Level Meter (with NX-42RT sofware) & Calibrator

2.5 QA/QC

Calibration was carried out using an external sound calibrator – Sound Calibrator 0554.0009 (Sound-calibration) at 94 dB and 104dB at 1KHz. Sound level meter equipment was calibrated before and after each sampling point. Calibration uncertainty ranged within ± 0.2 dBA. Calibration results are presented in Table 2.2. Pictures of calibration are attached in Attachment C.

Table 2.2 Calibration Results

Monitoring location	Date	Reference (dB)	Calibration result (dB)	
At Lab	May 13, 2021	93.9	94.0	
		104.0	104.0	
	May 13, 2021	93.9	93.9	

Monitoring location	Date	Reference (dB)	Calibration result (dB)	
		104.0	103.9	
N1	May 22, 2021	104	103.9	
		93.9	93.9	
N2	May 24, 2021	113.7	113.9	
N3	May 22, 2021	104	103.9	
		93.9	94.0	
N4	May 22, 2021	113.7	113.9	
N5	May 20, 2021	104	103.9	
		93.9	93.9	
N6	May 20, 2021	113.7	114.0	

Source: IER

3. RESULTS AND DISCUSSION

3.1 Noise Level of Each Site

3.1.1 Noise Monitoring Site N1

- The noise level (L_{eq}, 10 minutes) measured during the day was in the range of 38.5- 72.4dBA. 30% of the measured values were higher than the limit regulated in the IFC. On May 25th, 2021, Noise level (L_{eq}, 10 min) reached 72.4dBA in the period of 6PM-6:10PM due to the noise from cicadas. The sound of cicadas leveraged the noise levels to around 70 dBA between 5:20PM-6:20PM.
- 62% of the noise values measured during the night were higher than IFC's allowable limit (45dBA). The highest noise level reached 57.3 dBA, recorded at 5AM-5:10AM on May 26th, 2021 due to rooster crowing. The lowest noise level was recorded at 35.6 dBA in the period of 0:50-1AM on May 26th, 2021.
- Noise at location N1 was caused by agricultural vehicles[1] and motorbikes frequently passing by; however, it was mostly affected by the sound of cicadas (from 1PM to 6:30PM). There were other arising noise sources at N1 point caused by the sound of other insects (from 6:30pm to 4am), and occasional birds and roosters.

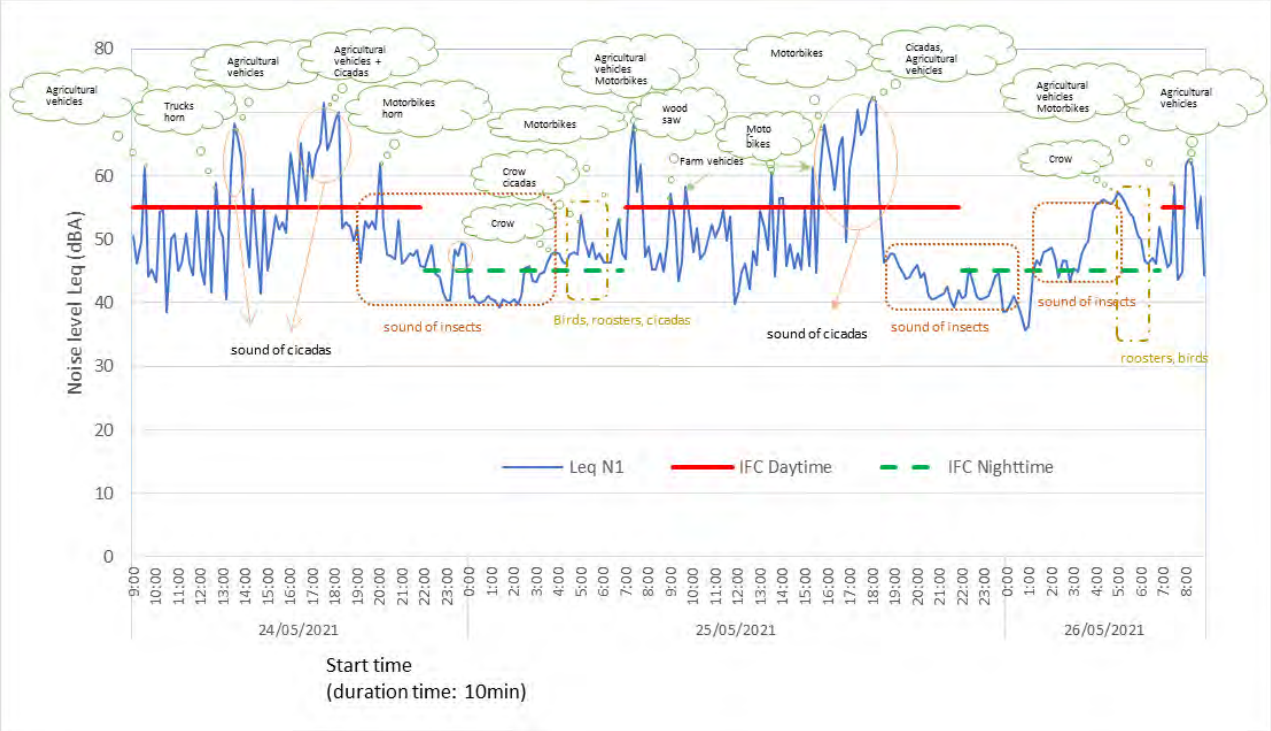


Figure 3.1 Diagram of $L_{eq\ ,10min}$ (dBA) at Location N1

3.1.2 Noise Monitoring Site N2

- 94.44% of noise level monitored during daytime was lower than IFC's limitation. The highest noise level measured was 63 dBA in the period of 9:37PM- 9:47PM on May 25th, 2021 due to the sound of insects. The lowest noise level was recorded at 40.1 dBA in the period of 2:31PM – 2:41PM on May 26th, 2021.
- 49.07% of noise value at night (10PM-7AM) was higher than IFC's limitation (45dBA). The highest measured noise level was 65.5 dBA in the period of 10:07PM- 10:17PM on May 25th, 2021 because of the sounds from motorbikes and insects. The lowest noise level measured was 37.9dBA in the period of 2:53AM – 3:03AM on May 25th, 2021.

- The noise at N2 was mainly affected by agricultural vehicles[1] often traveling and motorbikes occasionally traveling, insects at night (6PM to 4AM). In addition, there were other noise sources such as cicadas, karaoke 70m away (from 1:30 AM to 4AM), loudspeakers, dogs barking, rooster crowing.

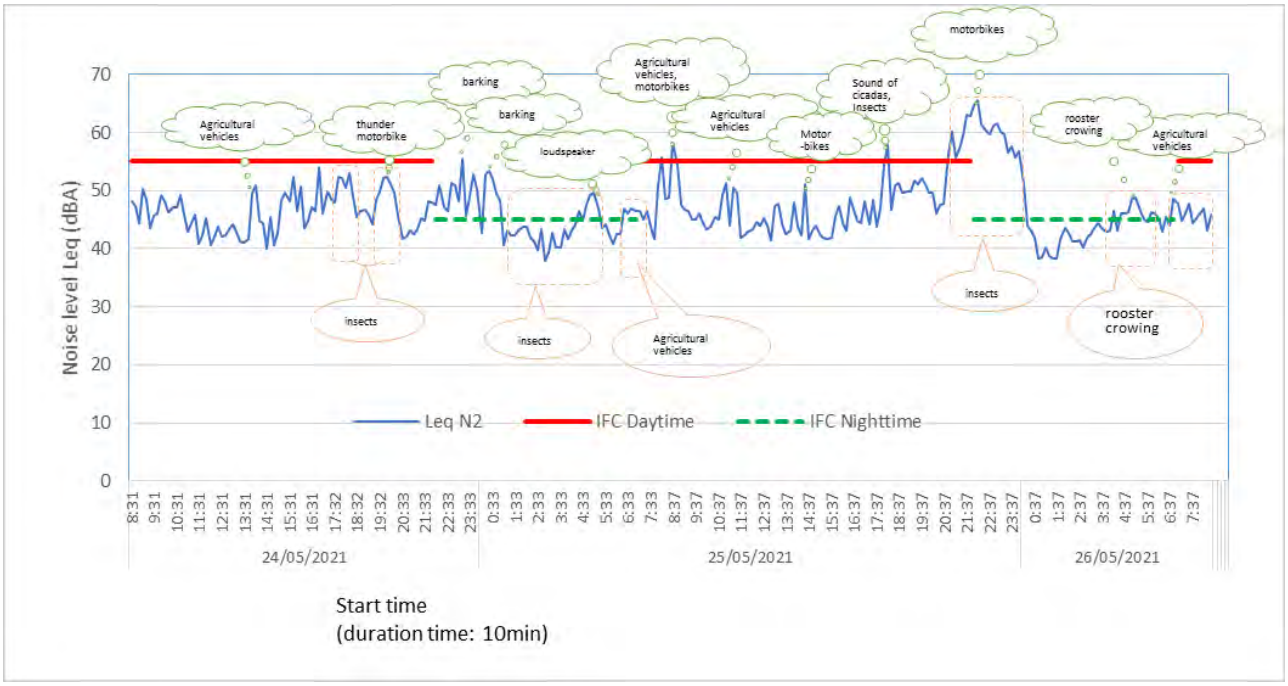


Figure 3.2 Diagram of $L_{eq,\ 10min}$ (dBA) at Location N2

3.1.3 Noise Monitoring Site N3

- 25.67% daytime noise levels were above the IFC's limitation. The highest noise level measured was 63.3dBA during the period of 10 minutes from 9:05AM to 9:15AM on May 26th, 2021 due to barking dogs and insects. The lowest noise level was measured at 42.4 dBA during the period 3:41PM-3:51PM on May 23rd, 2021.
- Most of night noise value (94.34%) exceeded the IFC's limitation for night-time (45dBA), mainly due to insects, occasional barking dogs, and crowing roosters. The highest measured noise level was 62.3 dBA at 2:15 and 2:25 on May 27th, 2021 due to insects. The lowest noise level measured was 42.9 dBA in the period of 22:41-22:51 on May 22nd, 2021.
- In short, N3 was often affected by the noise sources from agricultural vehicles[1], loudspeakers from the National Assembly Election 2021, and other insects at night. There were also occasional noise sources such as motorbikes, trucks, dogs and roosters.

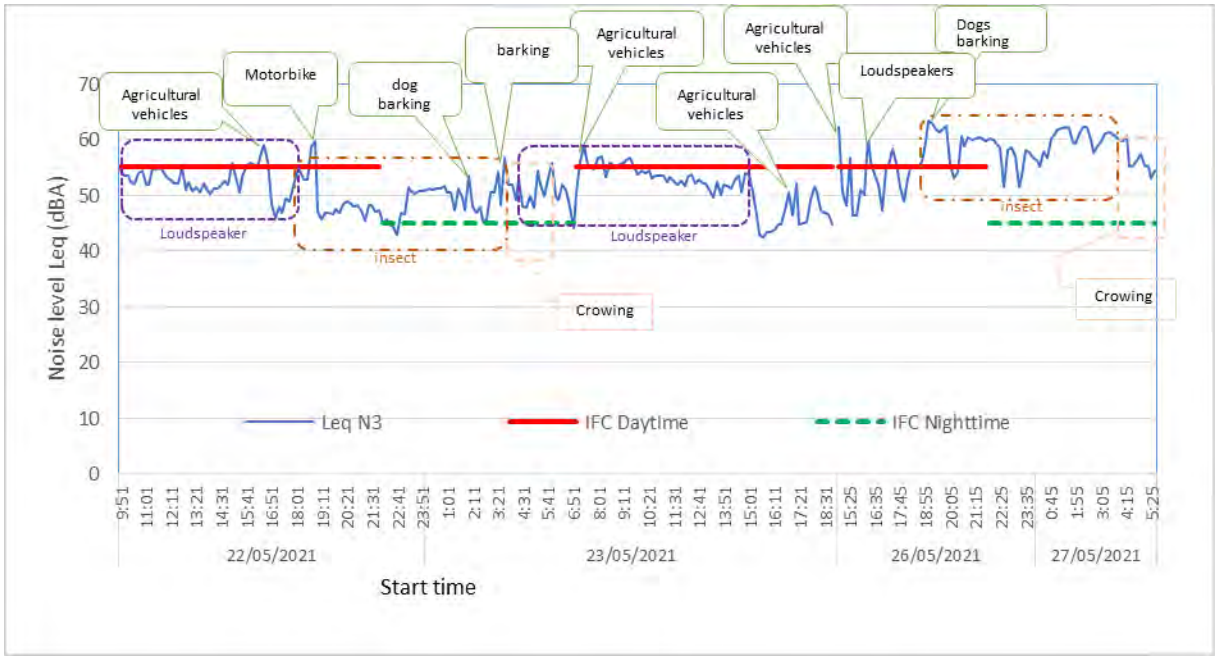


Figure 3.3 Diagram of $L_{eq,10min}$ (dBA) at Location N3

3.1.4 Noise Monitoring Site N4

- 4.79% of $L_{eq,10min}$ in daytime was higher than the IFC's limitation. The highest noise level measured was 58.5 dBA in the period of 15:42-15:52 on May 23rd, 2021 due to karaoke nosie which is about 40m away. The lowest noise level measured was 39.9 dBA at 15:54 on May 23rd, 2021.
- 100% noise level in the night time exceeded the IFC's limitation (45dBA) mainly due to the sound of insects and dog barking. The highest noise level was measured at 57.8 dBA in the period of 5:21-5:31 on May 23rd, 2021 due to the sound of insects and dog barking. The lowest noise level measured was 49.2 dBA at 10PM -10:10PM of March 22nd, 2021.
- N4 was not only affected by the noise sources from agricultural vehicles[1] and motorbikes, but also by other noise sources such as insects at night (6:15PM to 3AM), cicadas, dogs, roosters and birds. In addition, because N4 location was about 40m away from the residential areas, it was often affected by residents' activities consisting of talking, children playing, and karaoke singing.

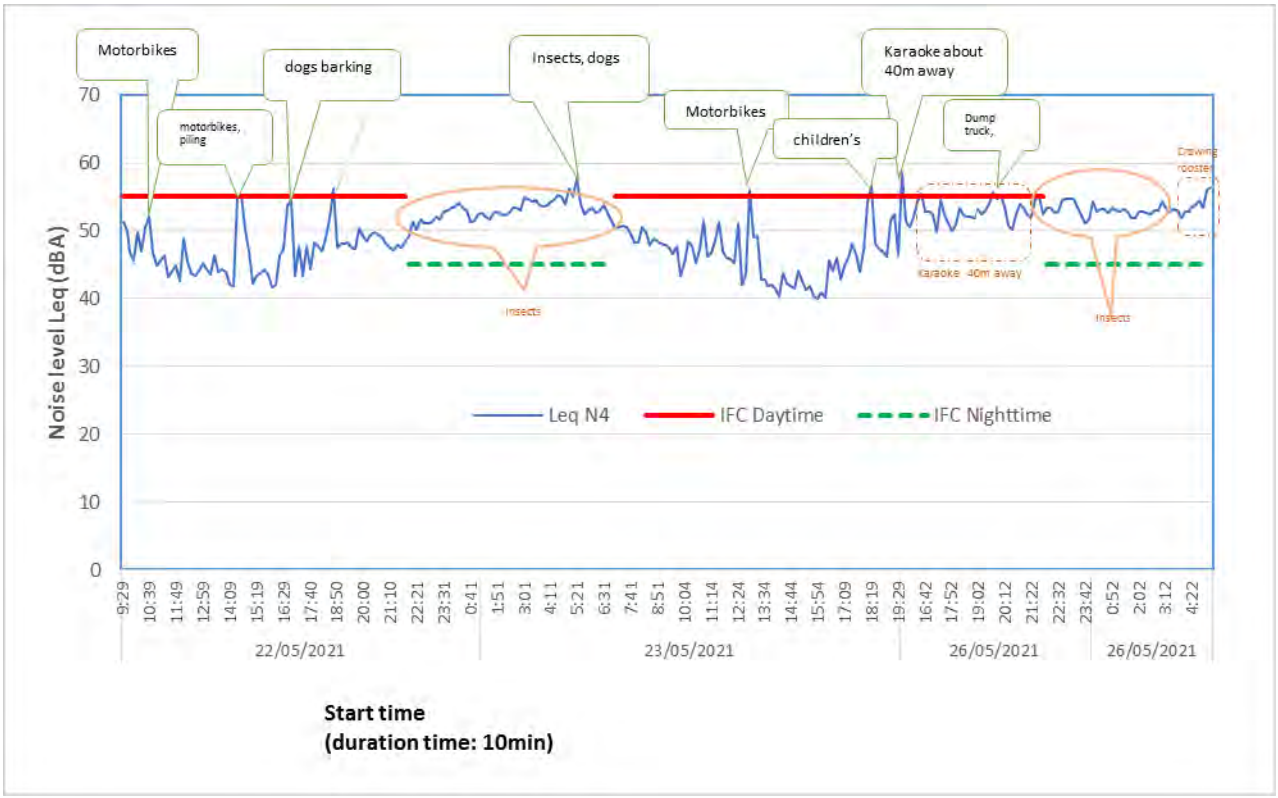


Figure 3.4 Diagram of $L_{eq,\ 10min}$ (dBA) at Location N4

3.1.5 Noise Monitoring Site N5

- $L_{eq,10min}$ noise level measured at site N5 fluctuated between 33.3dBA and 70.5 dBA.
- 39.44% of the $L_{eq,10min}$ measured in daytime was higher than IFC noise standards. The highest noise level in daytime was 70.5dBA during the period 7:52-8:02 on May 22nd, 2021 due to the traveling of agricultural vehicles[1] and motorbikes. The lowest noise level measured was 34.6 dBA at 9:52PM-10:02PM on May 21st, 2021.
- 53.7% of $L_{eq,10min}$ in night time was higher than IFC noise standards. The highest noise level in night time was recorded at 70 dBA during the period 6:32-6:42 on May 21st, 2021 due to agricultural vehicles[1] and motorbikes. The lowest noise level was measured at 33.3 dBA in the period of 11:52PM on May 21st, 2021.
- At N5 monitoring point, there were interference noise sources affecting to the noise baseline which could be recorded as agricultural vehicles[1] and motorbikes frequently passing by. During night time, there were other sounds from the insects, dogs barking, roosters crowing, cicadas chirping, children's voices and even karaoke singing.

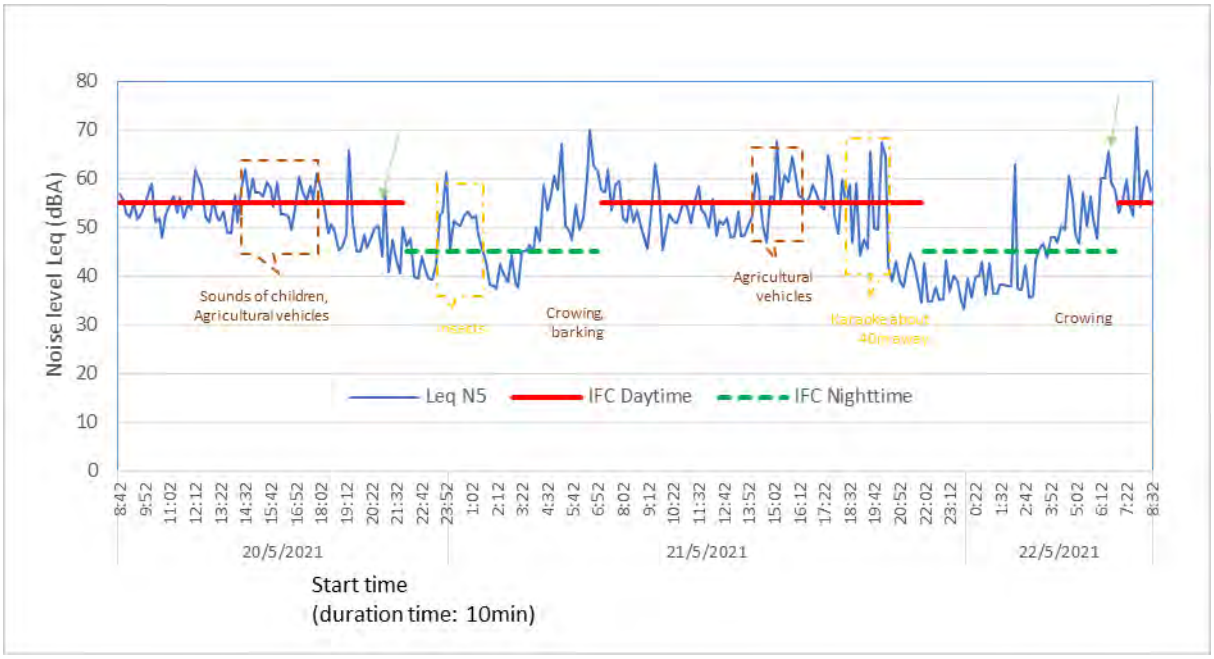


Figure 3.5 Diagram of $L_{eq,10min}$ (dBA) at Location N5

3.1.6 Noise Monitoring Site N6

- Noise level ($L_{eq,\ 10\ minutes}$) at the N6 position ranged from 36.5 to 65.5 dBA
- 6.08% of the noise level measured in daytime was higher than the IFC noise standard. The highest noise level in daytime was 65.5 dBA from 6:12PM to 6:22PM on May 20th, 2021 due to motorbikes. The lowest noise level measured was 36.5 dBA durwing the period 8:59PM-9:09PM on May 21st, 2021.
- 56.3% of noise level measured during night time was higher than the IFC noise standards. The highest noise level in night time was recorded at 57.5 dBA in the period of 6:32AM – 6:42AM on May 21st, 2021 due to agricultural vehicles[1]. The lowest noise level as measured at 36.7 dBA in period of 10:59PM – 11:09PM on May 21st, 2021.
- At N6 monitoring point, there were interference noise sources affecting to the noise baseline which could be recorded as agricultural vehicles[1] and motorbikes frequently passing by. During night time, there were other sounds from the insects, dogs barking, roosters crowing, cicadas chirping, children's voices and even karaoke singing.

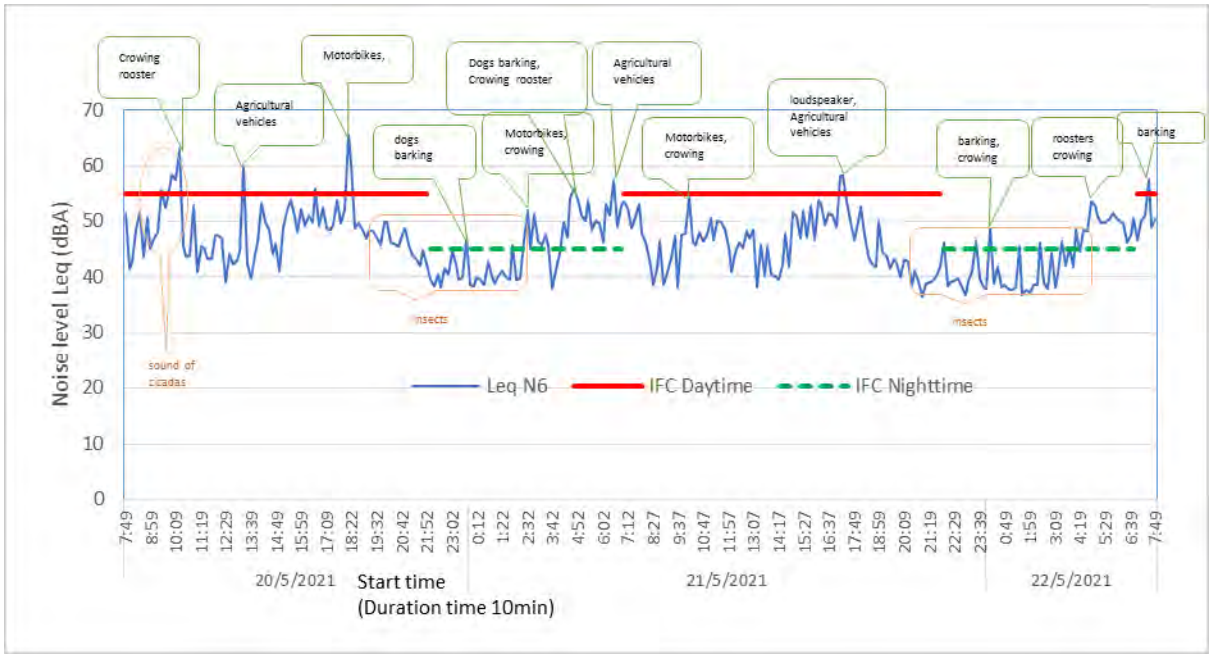


Figure 3.6 Diagram of $L_{eq,10min}$ (dBA) at Location N6

3.2 Noise Level of Monitoring Sites

3.2.1 $L_{eq,1h}$:

Table 3.1 Average $L_{eq,1h}$ of Monitoring Sites

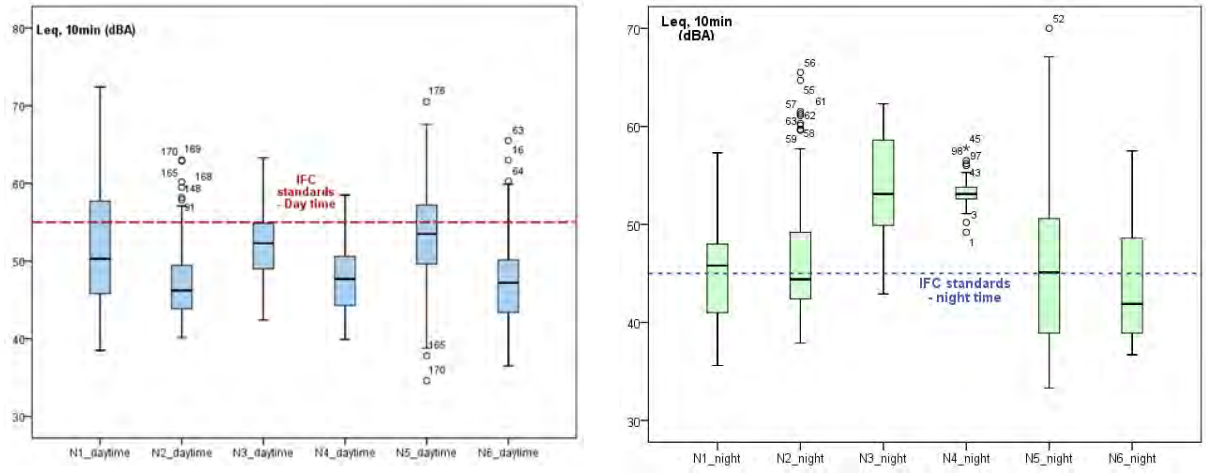
Time duration	Noise level $L_{eq,\ 1h}$ (dBA)											
	Day 1						Day 2					
	N1	N2	N3	N4	N5	N6	N1	N2	N3	N4	N5	N6
8-9						48.2						43.6
9-10	54.7	47.8		52.9	53.4	52.1	54.4	46.2			56.8	45.6
10-11	51.3	47.5	53.4	49.2	54.8	57.4	50.0	45.7	53.8	48.2	52.5	49.3
11-12	49.6	43.9	53.9	45.0	54.7	47.2	51.7	48.2	52.4	48.1	55.0	48.9
12-13	53.2	42.5	52.9	45.2	58.0	45.5	45.4	44.0	52.7	50.3	52.1	45.8
13-14	63.6	44.7	51.4	44.7	52.4	52.6	55.4	45.1	51.3	46.0	50.0	44.6
14-15	51.2	45.9	51.5	51.3	58.5	49.1	50.6	46.5	52.4	42.0	56.5	46.4
15-16	62.0	49.2	54.3	44.3	57.3	50.5	61.8	43.2	48.8	41.9	62.8	50.1
16-17	66.5	49.3	56.0	50.3	54.5	52.0	63.0	46.4	46.5	44.0	58.1	51.6
17-18	64.8	50.0	48.8	46.3	58.6	51.0	68.2	46.4	48.1	45.7	59.5	55.3
18-19	64.8	49.3	56.4	51.4	52.9	59.2	67.3	53.3	48.6	52.0	56.8	48.2
19-20	51.7	49.8	46.8	48.3	58.4	47.9	45.4	51.1	*62.0*	*54.0*	58.1	45.4
20-21	55.4	47.2	48.2	49.3	48.2	47.7	43.3	51.1	*58.8*	*53.0*	61.4	41.2

Time duration	Noise level $L_{eq, 1h}$ (dBA)											
	Day 1						Day 2					
	N1	N2	N3	N4	N5	N6	N1	N2	N3	N4	N5	N6
21-22	47.1	45.9	47.4	47.8	51.2	43.9	41.3	60.5	*60.1*	*53.5*	41.0	39.6
22-23	46.0	49.5	45.1	50.8	44.3	39.9	42.3	62.7	*57.8*	*53.6*	37.9	41.3
23-24	47.2	51.4	50.3	52.5	54.8	43.0	42.5	59.0	*56.7*	*53.2*	39.1	41.5
0-1	40.6	50.9	51.1	53.0	51.2	40.1	39.1	50.5	*57.4*	*53.3*	39.7	43.0
1-2	40.2	42.7	49.7	52.4	48.9	41.7	46.3	39.5	*61.5*	*52.6*	39.0	40.3
2-3	43.3	41.7	49.0	52.9	41.0	48.1	46.4	41.9	*60.7*	*52.8*	55.2	40.9
3-4	46.1	41.5	53.0	54.3	44.1	45.1	49.8	43.2	*60.5*	*53.2*	45.1	43.6
4-5	47.3	46.4	50.4	54.5	56.6	52.6	55.8	45.4	*58.4*	*53.5*	54.8	49.0
5-6	49.9	45.7	52.9	55.2	60.2	50.9	55.1	46.9	*54.9*	*54.7*	53.4	51.0
6-7	49.4	45.7	49.5	52.9	63.9	53.1	48.6	45.7	*51.4*		60.9	49.5
7-8	62.8	46.8	55.7	50.1	58.8	51.6	52.5	46.2			63.4	52.3
8-9	47.2	54.7	55.7	49.1	52.6		59.5	46.5			58.5	
9-10			55.7									
15-16									*56.1*			
16-17									*55.7*	*53.2*		
17-18									*55.1*	*53.3*		
18-19									*54.4*	*52.0*		
7h-22h	**60.7**	**48.7**	**53.6**	**49.1**	**55.9**	**52.5**	**60.7**	**51.3**	**55.7**	**50.6**	**58.5**	**49.1**
22h-7h	**46.6**	**47.6**	**50.6**	**53.3**	**57.0**	**48.7**	**50.5**	**55.1**	**58.6**	**52.9**	**53.8**	**46.3**
24h	**58.8**	**48.3**	**52.7**	**51.2**	**56.4**	**51.4**	**58.9**	**53.2**	**57.0**	**51.5**	**57.2**	**48.2**
min	40.2	41.5	45.1	44.3	41.0	39.9	39.1	39.5	46.5	41.9	37.9	39.6
max	66.5	54.7	56.4	55.2	63.9	59.2	68.2	62.7	62.0	54.7	63.4	55.3

Note: Numbers in italics are noise levels measured on compensation measurement date

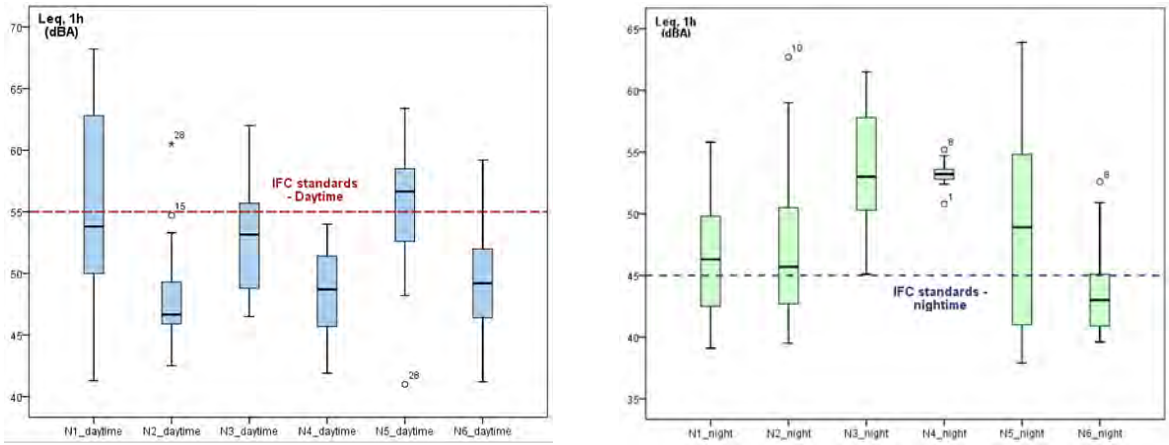
3.2.2 L_{eq} Day and Night

3.2.2.1 Statistics of Noise Levels Day and Night



(a) Day time (7AM-10PM) (b) Night time (10PM-7AM)

Figure 3.7 Plot Box Charts of Leq,10min



(a) Day time (7AM-10PM) (b) Night time (10PM-7AM)

Figure 3.8 Plot Box Charts of $L_{eq,\ 1h}$

Noise statistics at all monitoring locations as plot boxes show that:

- In daytime:

  Based on Figure 3.7a and Figure 3.8a for six noise monitoring points, the noise recorded at N2 location was the lowest and experienced the least fluctuation, the noise at N5 was the highest, and the noise at N1 fluctuated the most.

  - N1: 70% of $L_{eq,10min}$ and 56.67% of $L_{eq,1h}$ were lower than the IFC's noise standard for daytime (55dBA).
  - N2: 94.44% of $L_{eq,10min}$ and 96.67% of $L_{eq,1h}$ were lower than the IFC's noise standard for daytime (55dBA).
  - N3: 74.33% of $L_{eq,10min}$ and 62.52% $L_{eq,1h}$ were lower than the IFC's noise standard (55dBA)

- N4: 95.21% of $L_{eq,10min}$ and 100% $L_{eq,1h}$ were lower than the IFC's noise standard (55dBA).
- N5: 60.56% of $L_{eq,10min}$ and 46.67% $L_{eq,1h}$ were lower than the IFC's noise standard (55dBA).
- N6: 93.92% of $L_{eq,10min}$ and 90% $L_{eq,1h}$ were lower than the IFC's noise standard (55dBA).

- In night time:

  Based on Figure 3.7b and Figure 3.8b , the noise level recorded at N3 and N4 locations was the highest, while the noise fluctuated the least at point N4 and the most at point N5.

  - N1: 57.41% of $L_{eq,10min}$ and 66.7% of $L_{eq,1h}$ were higher than the IFC's noise standard for night time (45dBA).
  - N2: 49.07% of $L_{eq,10min}$ and 66.7% $L_{eq,1h}$ were higher than the IFC's noise standard (45dBA)
  - N3: 94.31% of $L_{eq,10min}$ and 100% $L_{eq,1h}$ were higher than the IFC's noise standard (45dBA).
  - N4: 100% of $L_{eq,10min}$ and 100% $L_{eq,1h}$ were higher than the IFC's noise standard.
  - N5: 53.7% of $L_{eq,10min}$ and 61.1% $L_{eq,1h}$ were higher than the IFC's noise standard.
  - N6: 46.3% of $L_{eq,10min}$ and 33.3% $L_{eq,1h}$ were higher than the IFC's noise standard.

3.2.2.2 Average Noise Value of Day and Night

Figure 3.9 shows the average L_{eq} of day and night values for the measurement days.

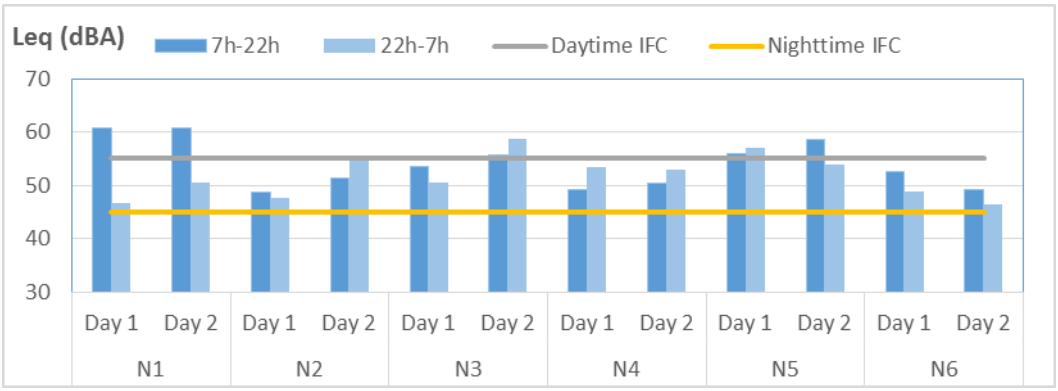


Figure 3.9 Average Day/ night Leq of all Noise Monitoring Sites

- At site N1:
  - The noise level at daytime was higher than night time (10.2dBA and 14.1dBA respectively for two measurement days).
  - The noise level of the second night was 3.9dBA higher than the first day, while the daytime noise level was the same.
- At site N2:
  - The difference between day and night noise: in the first day, daytime noise was 1.1 dBA higher than night noise, but on the second day, night noise was 3.8 dBA higher than daytime noise.
  - The noise level of the second day was higher than that of the first day, 2.6dBA and 7.3dBA for day and night, respectively.
- At site N3:
  - The difference between day and night noise: in the first day, daytime noise was 3dBA higher than night noise, but on the second day, night noise was 2.9dBA higher than daytime noise.
  - The noise level on the second day was higher than the first day, the difference was 2.1dBA and 8 dB for day and night, respectively.

- At site N4:
  - Night noise was higher than daytime noise, the difference was 4.2 dBA for the first day and 2.3dBA for the second day.
  - The daytime noise level of the second day was 1.5 dBA higher than the first day, in contrast, the noise level of the second night is 0.4 dBA lower than the first night.
- At site N5:
  - Night noise was lower than daytime noise, the difference was 3.8 dBA for the first day and 2.8dBA for the second day.
  - The daytime noise level of the second day was 2.6 dBA higher than the first day, in contrast, the noise level of the second night is 3.2dBA lower than the first night.
- At site N6:
  - Night-time noise was lower than daytime noise, the difference was recorded at 3.8 dBA for the first day and 2.8dBA for the second day.
  - The noise level of the second day was lower than the first day, the difference recorded was 3.4dBA in the day and 2.4dBA at night.

3.2.3 Average Noise Level of 24 Hours

The results presented in Figure 3.10 show that the L_{eq} for 24 hours at the six noise monitoring locations of project.

The average noise level measured in 24 hours in 2 days of locations N1 and N4 was almost the same while N5 did not change significantly. The 24-hour average noise at N2 and N3 site of the second day was 4.9 and 4.3 dBA higher than that of the first day, respectively. In contrast, at the N6 site, the noise on the second day was recorded at 3.2 dBA lower than the first day.

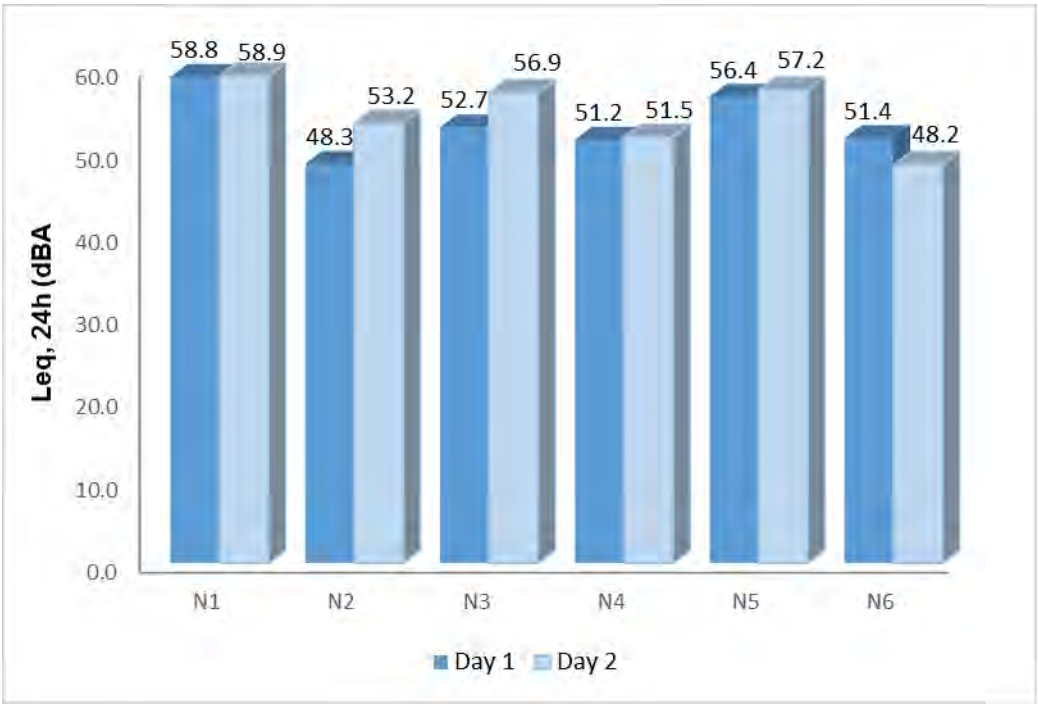


Figure 3.10 $L_{eq, 24h}$ (dBA) at all Monitoring Sites

4. CONCLUSION

With six (06) noise monitoring points, there are some general conclusions as follows:

- At N1 point: The interfering noise sources recorded during the monitoring time consist of motorcycles, agricultural vehicles[1], the sound of cicadas (from 1:30PM to 6:30PM) and other insects (from 6:30AM to 4AM), the sounds of birds, roosters and dogs. The noise level was higher during the day than at night. The equivalent sound level per hour ($L_{eq,1h}$) ranged from 39.1 dBA to 68.2dBA, which was 43.3% and 66.7% higher than the IFC standard for day and night, respectively.
- At N2 point: The interfering noise sources were mainly from agricultural vehicles[1], motorbikes, other insects (6PM to 4AM), cicadas, karaoke, dogs, and roosters. The noise level measured in N2 monitoring point was the lowest. The equivalent sound level for one hour ($L_{eq,1h}$) was from 39.5 dBA to 62.7dBA, most of the daytime noise measured at N2 met the IFC standard, which was 96.67% for the day and 33.3% for night.
- At N3 point: The main sources of noise were agricultural vehicles[1] and motorcycles, the sound of cicadas, insects, roosters, dogs and birds, especially the loudspeakers from the National Assembly Election 2021. The equivalent sound level per hour ($L_{eq,1h}$) was between 45.1 dBA and 62 dBA, which was 35% and 100% respectively higher than the IFC standard for day and night.
- N4 has many interfering noise sources, but the prevailing sources were motorcycles, agricultural vehicles[1], other insects, dogs, roosters, birds, cicadas, karaoke, sounds from children's voices and people's voices (40m away). The equivalent sound level for one hour ($L_{eq,1h}$) ranged from 41.9 to 55.2 dBA. Noise of night was higher than of daytime, 100% daytime noise was lower than IFC standard, but 100% night noise was higher than IFC standard.
- At N5 point: The main sources of interfering noise at N5 were motorcycles, agricultural vehicles, karaoke (40m away), children, dogs, roosters, birds, cicadas. The equivalent sound level for one hour (Leq, 1hLeq, 1h) was between 37.9 and 63.9dBA, which was 53.3% and 61.1% higher than the IFC standard for day and night, respectively.
- N6 also had many interfering noise sources such as motorcycles, agricultural vehicles[1] (quite often), dogs, chickens, and radio speakers. The equivalent sound level for one hour ($L_{eq,1h}$) was between 39.6 and 59.2dBA, which was 10% and 33.3% higher than the IFC standard for day and night, respectively. Noise in daytime was higher than night time.

ATTACHMENT A DETAILS OF NOISE LEVEL (LEQ,10MIN, LMAX, LMIN, L90, L10, L1, LEQ OCTAVE) AT MONITORING SITES

Table A1: Details of noise level at monitoring site N1

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	9:00	9:00	50.5	77.8	31.9	62.3	51.9	37.5	-0.9	11.1	24.7	36.2	40	44.9	42.8	42.5	44.1	36.6	25.5
24/05/2021	9:10	9:10	46.2	69.9	34.9	56.8	47.8	38.3	-1.9	11.8	22.6	31.7	34	37	39.1	40.7	39.9	34.2	22.6
24/05/2021	9:20	9:20	49.7	71.8	33.8	60.8	52.9	37.3	2.2	12.4	25.7	37.8	37.8	38.3	39.8	43.2	45.4	39.1	28.2
24/05/2021	9:30	9:30	61.6	85.9	32.3	75.1	48.8	35.4	6.3	25.3	42.4	49.3	51.4	51.3	58.1	55.1	49.2	41.6	27.7
24/05/2021	9:40	9:40	44.1	67.8	31.3	56	46.1	34.5	3.8	11.5	25.4	31.2	33.9	36.9	38.6	37.2	35.8	28	13.3
24/05/2021	9:50	9:50	45.2	64.9	29.9	59.9	45.8	33.4	-2.6	6.4	25.3	38.3	37.8	36.9	35.6	38	35.8	29	25.7
24/05/2021	10:00	10:00	43.3	61.1	31.8	57.4	44.3	34.4	-2.1	7	24.4	35.8	33.6	35	33.4	34.6	37.5	29.2	22.1
24/05/2021	10:10	10:10	54.3	70.9	31	69.6	46.3	33.7	-2.8	6	21.9	30.8	26	27.9	30.8	38.8	49.8	52.1	34.8
24/05/2021	10:20	10:20	54.7	83.9	30.6	64.8	42.7	33.4	-2.5	8.2	28.6	40.4	45.8	47.5	49.2	49.6	41.3	34	24.2
24/05/2021	10:30	10:30	38.5	55.5	30.1	49.8	38.1	32.4	-2.8	4	18.2	25.6	19.6	23.1	28.5	25.7	35.1	33.1	14.1
24/05/2021	10:40	10:40	50.2	75.6	29.5	63.4	49.3	34.3	-2.4	12.2	30.9	44.2	43.6	40.1	40	41.1	42.8	30.1	29
24/05/2021	10:50	10:50	50.8	79.5	31.2	62.5	44.7	35.1	-2.1	11.8	28.5	43.2	44.9	41.4	41.8	42.4	42.6	36.4	20.4
24/05/2021	11:00	11:00	45.1	61.4	30.1	56.1	48.8	35.2	-2.6	6.2	22.3	32.8	34.2	34.6	36.2	38.6	38.3	32.9	36.8
24/05/2021	11:10	11:10	46.2	63.7	26.8	59.8	47.5	32.6	-2.8	6.8	23.7	36.5	36.2	38.2	36.5	38.5	41.2	28.9	29.5
24/05/2021	11:20	11:20	50.8	72.9	29	65	49	33.5	-1.6	11	25.5	41.3	43.9	43.8	42.8	44	41.1	33	21.1
24/05/2021	11:30	11:30	46.2	65.4	27.8	59.7	45.3	31.9	-1.9	10.6	25.8	39.3	37.2	36.8	39.8	40.2	34.4	26	10.6
24/05/2021	11:40	11:40	44.3	62.8	26.2	59	43.3	31.1	-2.5	5.9	21.7	38.2	35.7	37.5	35.5	36.3	34.6	25.5	20.1
24/05/2021	11:50	11:50	54.5	77.4	28.8	69.5	50.1	34.8	-1.6	12	30.6	45.1	47.6	49	45.4	46.9	43	37.8	25.8
24/05/2021	12:00	12:00	45.2	66.9	29.8	57.3	43.4	33.6	-0.3	10.9	24.1	33	34.5	38.2	40.7	38.7	32.7	23.8	10.5
24/05/2021	12:10	12:10	42.9	65.3	29.7	55.3	41.6	33.2	-2.7	6	21	30.3	31.5	31.7	36	38.4	36.5	23.2	11.6

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	12:20	12:20	54.4	77.4	29.6	68.3	49.7	34.3	-2.1	21.8	28.5	36.2	37.2	50.5	50.5	45.2	39.7	28.5	26.8
24/05/2021	12:30	12:30	41.7	63.1	23.3	55.7	43	27.1	-2.9	8	22.9	32.3	33.1	31.7	33.5	33.8	35.2	28.1	29
24/05/2021	12:40	12:40	58.8	83.3	26.3	72.6	46	31.4	-2.1	21.8	27.9	31.8	35.5	52.1	56.5	51.5	37.6	29.2	30.5
24/05/2021	12:50	12:50	51.7	69.9	28.2	65.2	53	31.2	-1.8	11.5	31.3	44.8	42.1	43.6	42.5	43.3	45.6	27.9	15.8
24/05/2021	13:00	13:00	50.3	80.9	28.3	61.9	46.5	31.5	-2.1	7.1	29.7	36.2	37.4	40.7	45.4	46.2	39.7	26	15.3
24/05/2021	13:10	13:10	40.6	60.7	30	48.5	42.8	33	-1.7	13.2	26.2	30.1	27.9	31	35.5	34.2	32.7	22.1	9.6
24/05/2021	13:20	13:20	60.3	76.6	31	72.4	64.3	38.2	-1.6	12.4	25.2	35.5	42.6	50.8	56.3	55.4	51.3	43.3	36.7
24/05/2021	13:30	13:30	68.2	82.6	49.6	75.3	71.7	58.9	4.6	21.9	39.7	47.8	52.6	59	64.1	63	59.1	51.2	40
24/05/2021	13:40	13:40	65.9	75.2	52.8	72.3	69.2	56.5	1.4	17	33.6	42.4	49.8	56.1	61.8	61	57.1	50	41.2
24/05/2021	13:50	13:50	63	70.4	52.5	67.3	65.6	58.2	-2.5	8.1	28.1	33.5	46.1	53.1	57.6	58.4	55.8	50.2	41.8
24/05/2021	14:00	14:00	51.3	65.8	31.9	60.9	56.8	36.5	-3.4	8.5	27	31.5	38.3	41.6	44.7	46.3	44.5	40.3	30.4
24/05/2021	14:10	14:10	45.6	60.4	31.2	57.6	50.8	35	-3.1	8.8	24	31.4	27.7	29.4	32.2	41	42.3	33.7	17
24/05/2021	14:20	14:20	57.9	79.7	27.2	73	54.5	32.1	2	19.4	36.9	47	49.3	48.9	53.5	50.8	46.9	38	22
24/05/2021	14:30	14:30	50.4	70.6	28.1	62.7	50.9	31.8	-2.6	12.5	27.4	39.5	42.4	42.1	42.3	43.5	43.5	36.3	23
24/05/2021	14:40	14:40	41.4	62.1	30.6	49.8	44	35	-3.2	3.4	16	18	23.6	27.5	29.1	35.3	38.9	29.9	13.4
24/05/2021	14:50	14:50	55.1	77.9	28.3	70.6	46.2	31.3	1.5	17.7	37.7	43.9	44	45.9	51.3	47.3	45	38.5	23.9
24/05/2021	15:00	15:00	45.1	64.1	30.6	58.8	46	33.4	-2.3	9.7	26	36.5	33.6	33.5	34	37.3	40.8	32.8	30.5
24/05/2021	15:10	15:10	48.5	65.3	32.1	59.2	51.6	36.3	-0.8	8.9	23	31.5	32.1	35.5	34.1	41	45.6	38.4	37.4
24/05/2021	15:20	15:20	53.7	71.1	35	63.8	57.6	37.6	5.6	23.9	36.4	41.3	38.4	37.7	37.2	47	51.1	42.5	34.2
24/05/2021	15:30	15:30	51.6	76.8	32.6	64.2	50.2	35.6	6.5	27.3	39.9	44.9	45.8	42.8	40.4	41.7	41.9	36.3	23.9
24/05/2021	15:40	15:40	52.6	73.1	33	64.6	54.8	39.1	8.1	28.3	40.3	44.2	43.3	42.1	39.4	42.1	48.7	39.5	13.4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	15:50	15:50	51	64.3	31.3	61.1	56.4	36.6	0.4	14.1	28.2	37.9	36.2	46.4	47.7	38.3	37.8	29.1	10.9
24/05/2021	16:00	16:00	63.5	86.4	35.2	77.6	58.2	37.3	4.8	21.7	39.7	49.2	52.9	54.5	60.9	55.2	50.3	40.1	30.4
24/05/2021	16:10	16:10	59.3	71.2	43.1	69.2	63.9	46.5	-1.2	9.4	21.5	30.9	27.1	29.6	32	51.2	58	49.3	22.6
24/05/2021	16:20	16:20	55.6	68.1	34.1	66.7	59.4	38.3	-0.4	12	23.2	33.8	32.1	33.8	34.4	47.4	54.1	45.6	27.9
24/05/2021	16:30	16:30	65.2	78.9	35.3	77.3	68	44.6	6.1	21.8	29.5	32.1	34	31	32.6	56.6	64	55.8	26.9
24/05/2021	16:40	16:40	56.1	73.9	37.5	71.5	57.6	41.4	5.8	24.3	35.8	39.8	36.8	37.8	41	48.8	54.2	45.4	29.3
24/05/2021	16:50	16:50	63.7	77.2	42.8	76.1	67.1	47.9	10.7	27.2	37.9	42.1	42.6	43.7	45.6	54.8	62.2	54.4	28.2
24/05/2021	17:00	17:00	59.8	72.7	44.3	70	63.5	50.5	-0.6	14.3	27.4	38.5	40.3	48.9	48.5	51.2	57.6	49.2	30.3
24/05/2021	17:10	17:10	63.4	76.7	51.4	74.7	66.3	54.7	-2.3	6.4	16.5	27.8	37.9	45	49.2	55.2	61.9	53	30.6
24/05/2021	17:20	17:20	65.1	78.4	50.9	76.8	67.7	53.8	0.3	11.5	20.8	27.6	37.4	43.4	47.5	55.9	63.9	55.5	31.4
24/05/2021	17:30	17:30	71.5	83.7	54.5	81.2	75.9	59.2	-0.1	11.8	20.5	27.7	36.7	42.1	45.9	60.2	70.6	62.1	31.3
24/05/2021	17:40	17:40	64.1	75.1	50.4	73.7	68	54.9	0.8	14	24	33.9	35	38.3	41.7	54.4	63	54.9	30.5
24/05/2021	17:50	17:50	65.5	78.3	51.3	77.2	68.3	54.9	3.5	15.1	23.4	29.8	35	38.7	40.2	55.4	64.4	55.7	28.5
24/05/2021	18:00	18:00	68.7	78	51.1	75.9	73.1	58.8		12.3	20.3	27.4	32.4	34.8	37.7	58.4	67.8	58.8	28.1
24/05/2021	18:10	18:10	70	80.3	46.7	78.1	74.6	53.2	-1.6	14.7	30.8	45.3	47.4	44.2	43.8	59.4	69	60.2	31.8
24/05/2021	18:20	18:20	51.8	64.2	43.4	62.6	52.9	47.3	-1.9	8.3	17.3	29.4	34.5	35.6	40.1	45	48.7	44.5	22
24/05/2021	18:30	18:30	52.6	67	43.3	63.5	53.2	48	-2.6	7.1	15.3	30.5	36	36.5	36.5	35	51.5	43.7	21.5
24/05/2021	18:40	18:40	52	62.1	45.3	57	55.1	49.3	-2.3	8.1	14.9	29.8	35.1	35.6	33.4	35	51	43.3	21.5
24/05/2021	18:50	18:50	49.8	60.8	44.2	53.1	50.9	48.2	-4.1	0.6	10.5	27.4	31.8	34.8	33.6	35.7	48.1	43	19.9
24/05/2021	19:00	19:00	51.9	63.6	46.8	56.3	53.9	49.3	-3.6	3.6	13.5	29	35.9	41.4	45.4	46.9	46.1	41	24.8
24/05/2021	19:10	19:10	46.3	54.6	39.6	51.5	48.9	42.3	-3.2	5.2	12.5	26.6	32.6	34	35.3	38.5	44	32.5	20.5

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	19:20	19:20	52.9	75.6	40.1	62.1	54.9	44.1	6.2	23.5	31.7	42.6	44.6	43.9	45.7	46.5	45.9	35.9	23.4
24/05/2021	19:30	19:30	51.7	68.9	43.5	61.6	52.8	46.7	-2.5	9	22.2	42.5	42.6	43.2	44.6	45.6	43.2	35.4	23.7
24/05/2021	19:40	19:40	52.9	72.9	42.8	60.4	55.1	47	-3.4	5.2	14.2	30.3	37.7	43.5	47.4	48.2	45.7	37.8	25.5
24/05/2021	19:50	19:50	51.6	66.2	46.3	57.7	53.4	48.7	-3.4	3.4	16.3	26.3	35.1	42	45.9	47	44.9	37.6	25.6
24/05/2021	20:00	20:00	61.9	86	48	73.1	55.4	50	-3.2	14.5	32.9	49.1	57.4	56.3	53.6	51.6	49.8	43.1	30
24/05/2021	20:10	20:10	52.2	67.5	44	58.8	54.3	48	-2.9	4.7	16.7	26.7	35.5	42.1	46.5	47.4	45.9	37.3	25.8
24/05/2021	20:20	20:20	47.6	63.6	41.3	54.8	49.6	44.2	-3.6	1.4	12.7	22.9	30.4	35.8	40.9	42.6	42.7	35.3	21.7
24/05/2021	20:30	20:30	47.5	53.9	39.5	50.3	49.2	44.6	-4.4	1.4	9.9	19.6	27.6	28.9	32.6	35.9	45.8	40.2	21.2
24/05/2021	20:40	20:40	46.8	66.7	37.8	55.1	47.5	42.9	-4.2	0.9	9.5	16.3	24.3	32.1	37.7	39.3	43.8	38.8	20.8
24/05/2021	20:50	20:50	53	69.2	39	62.4	56.2	44.4	-3.3	6.7	22	34.9	36.2	42.8	47.6	48.6	45.5	38.4	24.8
24/05/2021	21:00	21:00	46.1	61.3	37.7	51.6	49	41.7	-4.4	0.3	11.1	19	26.2	31.5	35.5	38	39.5	43	20.4
24/05/2021	21:10	21:10	46.7	55.3	37.8	50	49.1	42.3	-5.4	-0.3	9	16.1	22.8	25.3	30.9	34.2	42.4	44	18.2
24/05/2021	21:20	21:20	47.7	52	38.1	50.8	49.7	44.7	-5.1	-1.1	9.1	13.7	15.9	19.5	29.6	33.2	45.6	43	17.9
24/05/2021	21:30	21:30	47.4	51.7	37.3	50.2	49.1	44.7	-6.6	0.1	12.9	22.1	19.6	19.8	29.1	32.9	45.4	42.4	18.3
24/05/2021	21:40	21:40	48.4	65.8	36.7	56.5	49.4	43.9	-5	5.2	23	39.3	36.2	35	31.7	35.1	45.2	42	19
24/05/2021	21:50	21:50	45.8	50.6	37.3	49.3	48.1	41.4	-4	-0.1	10.7	13.8	14.8	18.4	29.2	32.3	42.9	42.2	19
24/05/2021	22:00	22:00	45.6	53.2	36.4	50.8	48.4	39.9	-5.6	-1.1	7.9	9.8	13.1	17.3	30.3	33.2	42.6	41.7	18.5
24/05/2021	22:10	22:10	47.5	54.1	35.6	53.1	51.8	39.9	-2.9	-0.3	8.8	11.1	18.9	16.4	28.8	32	46.1	41.3	18.5
24/05/2021	22:20	22:20	49	54.4	36.5	53.5	52.6	41.7	-2.4	-1.6	9.1	11.2	14.2	17.5	28.9	31.9	47.8	42.2	18.4
24/05/2021	22:30	22:30	44.7	49.3	34.2	48.6	47.8	39	-4.1	-0.8	8.2	12	14.4	18.6	28.3	31.1	36.8	43.5	18.1
24/05/2021	22:40	22:40	43.9	52.8	36.2	47.8	45.7	39.8	-3.3	2.7	12.8	26.9	32.8	21.9	27.9	30.8	37.7	41.5	18.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	22:50	22:50	41.7	49.3	34.5	46.4	44.7	36.5	-4	0.8	9.2	11.4	13.1	24.2	31.6	30.4	38.6	36.7	14.3
24/05/2021	23:00	23:00	40.4	47.6	34.4	45.3	43.1	36.4	-4.5	-0.7	5.8	9.6	11.9	16.5	27.7	31	39.3	28.1	9.7
24/05/2021	23:10	23:10	40.4	51.4	33.7	45.2	43	36.2	-4.7	0.1	7.2	10.7	12.2	15	27	30	39	31.4	13.8
24/05/2021	23:20	23:20	48.4	65.8	36.7	56.5	49.4	43.9	-5	5.2	23	39.3	36.2	35	31.7	35.1	45.2	42	19
24/05/2021	23:30	23:30	47.5	54.1	35.6	53.1	51.8	39.9	-2.9	-0.3	8.8	11.1	18.9	16.4	28.8	32	46.1	41.3	18.5
24/05/2021	23:40	23:40	49.4	61.3	38.8	55.3	53.6	42.3	-4.4	0.3	10.7	20.9	34.8	39.8	42.7	44.9	42.8	37.5	26.9
24/05/2021	23:50	23:50	49	54.4	36.5	53.5	52.6	41.7	-2.4	-1.6	9.1	11.2	14.2	17.5	28.9	31.9	47.8	42.2	18.4
25/05/2021	0:00	0:00	40.8	51.6	34.2	45.7	43.6	37.5	-5.8	0.4	11.5	13.1	24.1	28.1	29.4	32.1	38.6	31.2	16.5
25/05/2021	0:10	0:10	41	53.2	33.6	46.1	44.1	36.3	-4.2		9.3	9.3	16.5	20.9	24.8	28.9	39.6	33.6	13.6
25/05/2021	0:20	0:20	40.1	50.9	33.3	45.1	43.3	35.9	-4.5	0.4	9.8	13.1	16.5	20.1	23.1	26.3	39	31.7	11.5
25/05/2021	0:30	0:30	40	48.5	32.4	45.2	43.4	35.8	-3.7	1.4	9.6	13.2	15.1	19	21.3	24.9	39.1	31.6	11.1
25/05/2021	0:40	0:40	40.4	50.9	31.8	45.5	43.3	34.9	-4.3	2.4	9.5	9.8	14.8	18.3	22.1	25.4	39.6	31.2	12
25/05/2021	0:50	0:50	41.1	49.2	31.5	45.9	44.1	35.1	-3.8	0.5	8.4	9.5	14.1	17.6	21.6	24.5	40.5	30.8	10.7
25/05/2021	1:00	1:00	40.5	47.1	31.4	45.5	43.7	34.6	-3.8	-0.1	9.2	9.5	13.6	16.5	18.9	23.1	40	29.3	10.2
25/05/2021	1:10	1:10	40.3	49.4	31.9	46	43.6	35.3	-6	-0.3	9.7	10.1	15.8	20.3	20.4	24.1	39.6	29.7	10.2
25/05/2021	1:20	1:20	39.3	46.5	30.9	44.6	42.7	34.8	-5.6		9.3	8.8	13	16.8	17.8	23.9	38.7	29.3	10
25/05/2021	1:30	1:30	40.5	48.5	32.7	45.5	43.4	36	-5.6	-0.4	10	9.7	13.4	18.4	18.1	24.7	39.9	29.6	10.3
25/05/2021	1:40	1:40	40.2	48	33.6	44.1	43	36.3	-7.2	-0.8	9.5	9.1	12.7	19.7	20.1	26.3	39.6	28.8	9.8
25/05/2021	1:50	1:50	40	47.8	33.6	44.2	42.8	36.5	-5.2	1.3	13	9.6	12.3	16.3	18	26.1	39.3	29.4	9.9
25/05/2021	2:00	2:00	40.5	47.7	33.8	44.5	43.1	37	-.-	-1.1	9.1	7.9	13	16.9	17.3	25.8	39	34.3	14.3
25/05/2021	2:10	2:10	39.8	46	33.8	43.9	42.6	36.7	-4.2	1.3	9.7	9.1	12.7	15.6	16.5	25.6	38.6	32.5	12.8

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	2:20	2:20	41.1	53.9	32.8	47.8	43.9	36.3	-4.6	0.3	7.2	8.6	15.5	22.6	27.8	32.1	39.7	31.2	11.8
25/05/2021	2:30	2:30	45.4	53.2	34.8	51.7	49.4	39.3	-4.5	-0.7	6.9	6.8	13	16.8	20.3	38.2	44.2	31.8	11.5
25/05/2021	2:40	2:40	45.8	53.7	36.9	51.7	49.5	40.3	-4.8	-0.2	8.1	7.2	12.7	15.8	18.9	37.8	44.9	31.3	10.8
25/05/2021	2:50	2:50	43.5	51.8	36.2	47.8	45.8	38.7	-5.3	-0.6	7.4	8.8	12.7	15.2	18	29.8	43.1	30.9	10.7
25/05/2021	3:00	3:00	43.2	48.6	34.7	46.9	45.6	38.5	-5.7	1.1	8.8	10.1	13	17.4	18.1	27.7	42.9	29.5	9.6
25/05/2021	3:10	3:10	44.5	49.4	36.4	48.1	46.6	40.7	-5.4	1	10.1	9.6	15	17.6	18.5	29.5	44.1	32.1	11.2
25/05/2021	3:20	3:20	44.8	50.9	37	48.5	47	41.8	-4	1.1	9.1	16.9	19.1	19.5	18.9	33.6	44.2	32	11.8
25/05/2021	3:30	3:30	46.6	51.6	38.9	49.9	48.6	43.5	-4.3	1.6	10.8	18.5	18.4	18	19.7	35.9	46.1	30.8	10
25/05/2021	3:40	3:40	47.6	51.7	40.4	50.5	49.3	45.1	-6.6	0.1	10.7	13	15.5	18.8	20	37	47.1	30.5	10.7
25/05/2021	3:50	3:50	48	52.1	41.8	50.9	49.7	45.9	-4.3	0.8	7.7	7	12	15	19.4	37.1	47.6	30.7	11.5
25/05/2021	4:00	4:00	47.7	51.6	40.9	50.4	49.3	45.7	-2.1	-0.8	7.8	7.2	11.7	20	26	35.3	47.4	29.6	10.3
25/05/2021	4:10	4:10	46.6	51.1	40.4	49.5	48.2	44.2	-2.8	2.1	5.3	8.1	15.4	18.3	21.5	31.4	46.4	28.7	9.3
25/05/2021	4:20	4:20	46.2	49.6	42	48.3	47.5	44.8	-5.5	0.2	6.4	9.3	14.8	18.8	22.2	27.4	46.1	28.8	9.6
25/05/2021	4:30	4:30	47.6	50.1	43.6	49.3	48.7	46.2	-.-	-2.4	5	5.9	11.7	19.8	22	28.8	47.5	29.4	9.5
25/05/2021	4:40	4:40	48	52.1	44.5	49.7	49	46.4	-1.9	-2	4.5	7.5	13.4	22.6	24	31.6	47.8	29.5	9.8
25/05/2021	4:50	4:50	47.6	61.4	44.8	49	48.3	46.4	-2.1	-2	7.6	9.1	14.8	20.7	28.7	34.2	47.2	29.4	10.2
25/05/2021	5:00	5:00	53.8	65.3	45.1	60	57.2	48.3	-3.4	2.3	8.6	17.5	24	26.6	26.7	45.1	52.8	38.9	39
25/05/2021	5:10	5:10	49.9	65.6	44.6	58.9	51.5	46.7	-2.7	6.9	8.4	10.6	15.4	21.3	23.4	40.9	49	34.3	35.5
25/05/2021	5:20	5:20	47.2	63.8	44.1	51.9	47.8	45.9	-4.6		11.6	12.5	14.8	18.3	19.6	35.4	46.8	31.2	9.4
25/05/2021	5:30	5:30	49.4	64.8	39.3	61.3	47.9	44.9	-4.1	3.8	17.4	36.4	36.6	34.8	33.1	36.1	48.3	34.2	11.2
25/05/2021	5:40	5:40	46.8	60.4	43.2	53.4	47.8	44.9	-5.3	-0.2	12.2	13.6	14.7	30.2	30.6	34.2	46.2	31.7	9.5

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	5:50	5:50	47.7	68.3	42.2	57.8	47.6	44.8	-6.1	2.9	19.1	27.7	25.6	29.1	26.1	38.3	46.9	32.3	10.7
25/05/2021	6:00	6:00	46.4	61.1	43	53.5	46.9	44.6	-4.5	0.7	10.6	15.3	20.7	25.9	26.8	29.3	45.9	33.9	14.8
25/05/2021	6:10	6:10	46.3	64.6	42.2	53	46.8	44.5	-5.5	2.6	20.3	26.2	25.2	29.3	30.2	35.7	45.4	33.3	14.2
25/05/2021	6:20	6:20	46.3	57.2	42	50.1	47.7	44.8	-2.9	5.2	17.9	24.6	25.2	30.4	30.4	31.6	45.5	34.6	17
25/05/2021	6:30	6:30	50.8	75.9	42.3	62.7	51.2	44.7	-2.8	11.4	27.1	40.2	42.3	40.6	42.2	40.8	46	40.3	29.2
25/05/2021	6:40	6:40	53.3	76.8	43.1	64.5	48.7	44.5	-4.2	7	24.2	38.4	46.3	46.9	44.6	43.6	47.4	40.1	25.8
25/05/2021	6:50	6:50	47.8	62.9	42	59.3	49.4	43.9	-3.5	6.4	21.2	36.2	34.3	36.4	34.9	37.5	45.9	33	12.8
25/05/2021	7:00	7:00	46.8	63.7	41.5	57.3	46.8	43.7	-2	12.8	27.5	35.3	33.6	35	36.5	37	44.3	33.3	11.5
25/05/2021	7:10	7:10	64.1	86.7	41.1	76.9	55.8	43.9	4.6	26.5	41.3	52.9	57.4	55	59.2	56.1	53.3	44.8	29.8
25/05/2021	7:20	7:20	68.2	86.5	41.8	84	63.5	43.6	2.6	26.4	41.2	52.7	56.2	58.8	63.4	63.4	59.1	50.2	36.3
25/05/2021	7:30	7:30	57.6	77	40.2	72.8	58.2	43.2	4.7	21	35.7	45.8	46.3	48.8	53.4	50.6	48.4	42.6	32.8
25/05/2021	7:40	7:40	61.7	81.7	42.2	76.4	60.1	44.7	5.7	21	38.4	48.4	51.9	53.4	57.8	54.5	51	41.7	27.5
25/05/2021	7:50	7:50	47.2	66.3	41.5	56.7	48.5	44.3	-0.9	10	26.8	33.2	35.3	38.6	38.4	36.5	44.2	33.6	17.3
25/05/2021	8:00	8:00	48.8	62.7	41.5	59.9	51	43.9	-2.6	7.4	28	39.8	38.2	40.1	37.4	38.3	45.4	32	12.3
25/05/2021	8:10	8:10	45.2	60.2	38.4	50.9	45.5	43.5	-2.3	6.2	25.4	32.7	33	34.3	34.9	33	43	31.6	10.8
25/05/2021	8:20	8:20	45.3	62.1	41	54.3	45.4	43.3	0.2	9.1	24.9	32.9	32.4	33.1	34.9	34	43	33	10.8
25/05/2021	8:30	8:30	47.8	65.7	39.6	61.1	46.3	42.5	-1.6	7.4	25.3	38.8	39.2	40	37.9	38	42.9	32.8	12.7
25/05/2021	8:40	8:40	44.9	60.6	40.7	52.7	45.5	42.9	-2.8	8.2	23.1	31.2	29.8	31	30.7	33.2	43.4	33.6	10.6
25/05/2021	8:50	8:50	49.1	64.5	41.1	61.3	51.6	43.3	-2	9.4	27.6	41.7	39.9	40.3	38.2	39.4	44.3	35.8	15.9
25/05/2021	9:00	9:00	57.2	80	38.7	70.8	50.5	42.1	-0.5	16.4	35.6	43.7	47.2	47.6	53.4	50.3	47.6	38	35.8
25/05/2021	9:10	9:10	52.7	68	38.6	66.7	48.8	41.8	-2.6	8	27	36	36.8	42.4	38.1	41.9	48.6	48	28.2

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	9:20	9:20	43.5	59.5	39.1	50	44.3	41.4	-2.9	2.9	22.2	23.4	28.4	28.8	28.3	32	42.2	32.1	10.7
25/05/2021	9:30	9:30	46.5	69.3	38.8	56.6	44.4	41.4	-2.8	11.5	19.7	27.7	32.3	37	39	37.9	43.3	32.3	10.7
25/05/2021	9:40	9:40	58.3	79.7	39.2	71.6	52.8	42.2	5.3	21.5	36.5	44.1	47.3	48.6	54.7	51.6	48.3	38.8	37.2
25/05/2021	9:50	9:50	52.9	81.5	36.1	57.1	46.8	40.5	-2.3	11.8	29.2	34.4	42.3	45.2	46.4	48	44.6	35.3	20
25/05/2021	10:00	10:00	48	64.9	36.4	59.6	50.1	40	-2.9	8.2	27.7	39	36.6	39.2	37.4	38.5	42.5	40.5	22.5
25/05/2021	10:10	10:10	51.8	66.4	35.1	65.2	51.1	41.3	-2	10.3	27.3	37.3	36.8	39.3	38.2	42	47.6	46.8	36.8
25/05/2021	10:20	10:20	46.9	66	34.6	58.3	46.2	40	-2.6	9.6	24.7	36.2	35.3	40.8	37.1	38.4	41.8	31.7	28.5
25/05/2021	10:30	10:30	47.9	70.9	33.3	59.9	46.4	39.4	1.3	16.1	28.4	37.2	38.2	38	41	39.4	43	30.7	10.8
25/05/2021	10:40	10:40	50.1	69.1	32.8	62.4	51.9	38.6	0.6	16.4	26.5	38	39.4	41.3	43.4	44.7	42.6	34.3	21.2
25/05/2021	10:50	10:50	52.3	70.6	45.7	58.5	53.1	50.1	0.8	13.4	28.6	37.7	39.9	42.3	44.8	47.7	45.9	39	34.2
25/05/2021	11:00	11:00	50.3	64.8	43.5	56.8	52.2	47.4	-0.6	12.6	23.3	35.3	38.1	39.3	42.1	45.3	44.2	37.5	38.7
25/05/2021	11:10	11:10	52.2	64.6	42.3	55.9	54.2	45.8	-2	9.2	21.5	26.4	36.4	41.4	45.2	47.9	46.4	39.5	30.7
25/05/2021	11:20	11:20	54.6	63.2	50.2	57.5	56.2	52.4	-1.7	9.2	23	26.6	38.6	43.9	48	50.4	48.4	42	31.4
25/05/2021	11:30	11:30	49.7	61.5	43.4	55.2	52.2	45.5	-2.5	8.4	25	32.4	36.7	39.5	42.5	45.2	43.5	36.9	26.7
25/05/2021	11:40	11:40	53.5	74.1	33.8	66.4	50.4	38.6	-3.4	11.6	28.9	44	49.3	46.6	44.1	43.1	42.3	34.7	22.5
25/05/2021	11:50	11:50	39.8	58.3	27.8	48.7	42.2	32.2	-3.2	2.6	16.1	19.3	24.7	30.1	31	34.6	35.4	26.4	15.6
25/05/2021	12:00	12:00	41.7	61.8	28.5	52.9	41.2	34.2	-2.3	9.5	21.6	31.3	30.4	30.8	31.4	33.4	37.9	29.5	26.1
25/05/2021	12:10	12:10	44.8	59.9	34.1	51.6	48.5	38.6	-2.2	5.6	13.4	17.6	20.4	27.9	31	36.3	41.7	35.6	37.5
25/05/2021	12:20	12:20	46.1	64.2	34.8	59	46.9	39.1	-2.6	5.7	15.3	29.1	30.8	30.8	33.7	40.9	43.3	32.5	23.7
25/05/2021	12:30	12:30	42.1	62.4	34.5	51.1	43.1	39	-2.2	6.8	17.4	22.4	20.9	22.1	26.2	31.7	41	31.3	9.2
25/05/2021	12:40	12:40	48.1	68.1	33.4	60.9	48.8	38.2	-2.7	6.7	21.5	30.9	31.6	29.1	29.8	44.4	45.1	27.8	13.2

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	12:50	12:50	46	62.1	34.1	55.5	48	39.6	-2.7	2.8	10.1	17.2	24.3	32.6	38.4	41.6	41.7	30.8	18.7
25/05/2021	13:00	13:00	54.5	72.4	44.2	67.5	55.1	47.1	1.2	14.3	32.3	42.4	45.6	45.1	49.5	47.9	45.4	37.9	37.4
25/05/2021	13:10	13:10	51.7	65.7	46.6	56.3	53.7	48.9	-2.5	4.5	12.4	21.8	35.4	40.7	45.4	47.3	45.1	38.1	36.2
25/05/2021	13:20	13:20	48.4	63.9	38.2	58.2	50.1	42.6	-2.2	11.5	25.5	34.8	35.8	37.1	41.3	43.2	41.5	34.7	37.1
25/05/2021	13:30	13:30	60.5	86.5	34.3	71.6	49	38.6		15.3	36	44.2	45.1	46.7	58.7	52.2	49.4	38.1	32.9
25/05/2021	13:40	13:40	44.1	64	30.6	57.5	44.7	34.2	-1.7	12.8	29	36.7	35.3	33.9	35.1	36.4	37.3	30.3	18
25/05/2021	13:50	13:50	56.5	79.9	27.7	68.6	52.4	32.3	4.2	17.5	33.9	43.6	44.9	45.3	52.6	50.1	48.3	35.7	17.6
25/05/2021	14:00	14:00	56.4	86.5	30.2	65.3	50.6	34.3	-0.4	10	26.3	32.1	33.1	39.1	47.2	52.2	51.6	47.9	37.6
25/05/2021	14:10	14:10	45.8	62.7	36.6	54.6	48.3	39.7	0.7	8.8	27.4	29.1	29	33.5	39.3	41.4	39.8	32.5	21.6
25/05/2021	14:20	14:20	49.3	61	42.6	56.2	51.7	45.6	8.7	15.3	27.3	28.9	32.9	37.7	43.3	45.2	42.7	35.3	23.1
25/05/2021	14:30	14:30	45.5	60.5	38.2	53.1	47.4	41.4	3.2	9.3	25.6	30.9	33.8	33.9	38.8	41	38.7	31.2	19.9
25/05/2021	14:40	14:40	47.8	64.7	39.4	58.2	48.8	42.8	0.7	10	28.2	32.6	36.5	40.7	41.4	42.3	39.7	31.9	20.1
25/05/2021	14:50	14:50	45.3	62.2	38.7	54	47.6	41.3	-1.3	10.3	25.5	29.3	31.1	33.7	38.6	40.4	39.7	31	28.1
25/05/2021	15:00	15:00	54.6	76.5	37.8	68	49.4	40.8	0.4	17.6	32.9	39.9	43.9	45.9	50.4	47.6	45.4	39	26.9
25/05/2021	15:10	15:10	45.8	62.5	36	55.9	49.1	38.4	-1.9	10.5	27.5	32.2	32.2	33.6	37.4	39.1	40.9	36.1	32.4
25/05/2021	15:20	15:20	61.3	85.2	36.5	72	52.2	38.9	2.7	23.5	40	49.8	52.7	51.5	56.4	53.3	53.7	47	35.1
25/05/2021	15:30	15:30	44.7	63.8	35.9	54.8	46.9	38.7	-1.4	11	27.3	31.8	31.9	33	35.4	38.6	40.2	33.6	27.9
25/05/2021	15:40	15:40	60	83.5	35.2	72.4	54	38.5	-2.6	17.4	32.7	45.8	55.8	50.8	48.9	51.9	51.9	48.7	35.9
25/05/2021	15:50	15:50	68	77.5	47	75	72.3	57.4	-2.6	6.6	24.8	23.5	26.4	27.9	32.9	57.2	67.1	58	27.6
25/05/2021	16:00	16:00	64.9	74.6	45.1	72.6	69.1	52.2	-2.4	10.8	25.6	35.9	36.2	32.3	35.9	54	64	55.5	29.6
25/05/2021	16:10	16:10	62	72.8	37.2	70.6	67.1	45	-2.9	9.5	27.2	39	43.1	45.4	40.9	51.3	60.9	51.4	33.2

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	16:20	16:20	57.8	75.1	37.6	69.8	61.2	43.9		13.3	31	42.4	43.8	43.6	49.4	49.5	54.9	47.8	32.3
25/05/2021	16:30	16:30	64.4	74	45	72.1	68.7	51.9	-3	8.3	25.4	36.4	36	35	36.1	52.9	63.5	55.1	30.3
25/05/2021	16:40	16:40	66	76.7	40.2	75.1	70.3	50.1	-3.5	7.9	23.8	29.4	30.3	28.8	34.1	55.4	65	56.8	26.2
25/05/2021	16:50	16:50	49.6	64.1	38	58.4	53.5	42.5	-2.8	8.5	23.5	35.5	34.2	33.6	33.6	41.5	46.7	41.7	37.1
25/05/2021	17:00	17:00	61.1	75.9	43.5	74.6	63.6	46.1	-2.1	27.5	37.9	42.5	42.3	42.9	42.5	51.8	59.6	51.1	33.5
25/05/2021	17:10	17:10	65.5	78.9	42	76.9	69.8	47.8	-3	7.3	22.3	32.2	30.3	30.6	32.9	55.6	64.6	54.6	37.2
25/05/2021	17:20	17:20	70.4	80.8	54	79.2	74.6	59.4	-1	17.7	32	41.1	37.8	45.7	46.7	59.4	69.4	60.9	30.4
25/05/2021	17:30	17:30	66.5	77.5	50.1	75.9	69.4	58.1	-3.6	4.9	20.2	37.7	31	31.9	33	55.8	65.7	56	29.1
25/05/2021	17:40	17:40	67.6	78.6	49.8	77.5	72.5	54.6	-3.2	5.5	21.5	30.6	32.8	29.7	32.8	56	66.8	57.9	33
25/05/2021	17:50	17:50	71.3	81.5	55.7	79.6	75	62.5	2.1	21.2	36.6	41.6	44.6	48.3	54.3	61.2	70.1	62.1	31.8
25/05/2021	18:00	18:00	72.4	81	58.7	79.9	76.3	62.9	-3.6	2.2	12.4	17	19.1	21.6	34.8	61.9	71.4	63.3	31.9
25/05/2021	18:10	18:10	71.6	82.6	50	79.8	75.8	59.8	5.8	25.7	43.1	50.2	50.5	51.8	55.9	61	70.4	61.9	31.4
25/05/2021	18:20	18:20	56.5	78.4	40.9	69.3	52.4	43	-1	18.3	33.7	39.7	43.3	47.4	51.8	50.7	48.1	43.6	23.1
25/05/2021	18:30	18:30	46.4	61.7	41.9	51.9	47.7	44.4	-3.8	3.1	13.7	22.7	28	32.8	37.4	36.8	41.4	42.2	16.9
25/05/2021	18:40	18:40	46.9	72.2	41.6	51.7	47.4	44.5	-3.6	2.9	13	24.9	29.3	31.9	36.2	34.8	43.4	42.3	18.6
25/05/2021	18:50	18:50	47.7	63	42.9	50.8	48.9	45.8	-5.4	-0.1	8.8	27	32.5	31.2	27.2	36	45.4	42	22.5
25/05/2021	19:00	19:00	47.6	69.2	41.5	53.3	48.7	45.1	-3.4	2.8	17.5	29.9	33.5	33.1	31	37.6	44.9	41.3	23.5
25/05/2021	19:10	19:10	45.8	55.4	38.7	50.3	47.4	43.4	-3	-0.2	8.4	30.5	34.5	34.1	30.6	31.1	42.9	40.1	15.4
25/05/2021	19:20	19:20	44.8	66.6	37.8	50.6	46.5	41.7	-2.9	-0.1	9.4	29.9	34.1	32.6	29.5	30.9	42.8	35.9	18.5
25/05/2021	19:30	19:30	43.8	56.4	37.2	50	45.4	41	-3.6	0.2	8.7	28.5	33.3	32.1	29.8	30.2	42	32.3	18
25/05/2021	19:40	19:40	44	64.8	36.6	49.8	45.8	40.5	-4.3	0.5	11.3	29.2	32.6	32.3	33	29.5	42	33.4	13.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	19:50	19:50	45.2	64.3	37.5	50.1	47.1	41.9	-5.8	-0.4	10.9	30.5	34	34.5	32.6	31.3	42.9	36	15.2
25/05/2021	20:00	20:00	46	60.3	35.9	57.2	47.7	40	-4	4.9	28.6	38.1	37.1	33.4	33.4	34.2	42.1	35.8	14.4
25/05/2021	20:10	20:10	43.9	59	36.2	51.6	46.1	39.2	-4.9	6.8	18.1	32.2	33.7	33.2	32.2	31.6	41.5	31.8	12.5
25/05/2021	20:20	20:20	44.7	63.2	35.2	55.8	46.5	38.6	-3.3	3.4	18.6	35.2	33.2	33.4	34.2	36.3	41.1	32.9	17.2
25/05/2021	20:30	20:30	41	56.9	34.3	47.1	43.7	37.5	-3.3	2.2	11.6	20.8	25.2	30.2	31.2	29.6	39	29	11.8
25/05/2021	20:40	20:40	40.5	52.7	34	45.2	43.3	37.4	-3.2	-0.7	8.4	21.3	23.4	26.5	26.8	28.2	39.3	29	12.4
25/05/2021	20:50	20:50	40.7	54.5	34.3	46.6	43.3	37.4	-4.6	-1.2	5.4	19.3	24.2	26.9	27.8	30.6	38.7	32.4	13.9
25/05/2021	21:00	21:00	41.1	54.5	32.4	48.4	44	36.5	-4.5	-0.9	6.8	21.2	28.5	35.5	28.6	28.4	38	30	11.2
25/05/2021	21:10	21:10	41.4	52.7	32.8	48.2	44.3	37	-6.5	-0.7	7.9	20.7	27.6	34.5	31.1	28.9	38.7	29.2	11.1
25/05/2021	21:20	21:20	42.6	60.2	32.6	51.7	44.2	37	-5	1.9	18.4	31.8	34.5	35.9	30.9	31.2	38.4	28.4	11.8
25/05/2021	21:30	21:30	40.6	62.9	33.7	45.7	42.9	37.1	-6.1	-0.5	8.6	18.8	21.3	27.3	29.5	31.8	38.5	30.7	14
25/05/2021	21:40	21:40	39.3	51.5	32.4	44.5	41.6	36.3	-3.5	-0.9	8.6	20.6	24.5	26.5	27.7	29.5	37.6	27	13.3
25/05/2021	21:50	21:50	41.9	51	33.6	49.2	46	36.9	-3.9	-0.4	8.8	14.8	19.8	22	25.4	27.8	41.4	26	10
25/05/2021	22:00	22:00	40.7	50.5	33.8	48.7	43.3	36.6	-6	-1	8.5	7.8	8.4	12.8	23.8	26.1	40.1	29	9.7
25/05/2021	22:10	22:10	41	51.8	33.9	48.9	43.1	37.2	-4.4	-0.1	10.5	9.2	16.5	13.8	21.7	25	40.5	28.2	9.6
25/05/2021	22:20	22:20	45.5	56.2	32.8	53.8	51.1	37.2	-6.4	-0.7	8.5	9.6	17.9	20	23.3	26	45.3	28	9.8
25/05/2021	22:30	22:30	42.9	55	33.5	51.5	46.4	37.2	-7.3	-1.4	10.5	10.5	14.3	19.9	21.1	25.4	42.7	27.6	9.4
25/05/2021	22:40	22:40	40.9	52.6	32.9	47.8	45.1	35.4	-3.4	6.1	15.6	28.5	32.3	19.1	19.6	25.5	39.5	27.5	9.3
25/05/2021	22:50	22:50	40.5	52.6	31.5	48.6	45.2	35.3	-4.2	-1.8	2.5	7.2	11.1	15.7	20.6	26.5	39.9	28.6	9.3
25/05/2021	23:00	23:00	40.7	52.2	31.2	50.4	43.5	34.6	-1.6	-2.1	2.5	8.8	12.2	16.1	20.5	26	40.2	28.2	8.8
25/05/2021	23:10	23:10	41.1	52.8	31.4	51.1	45.3	34.1	-1.7	-2.3	2.6	6	9.4	15	20.1	25.6	40.7	28.1	9.1

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	23:20	23:20	42.6	53.5	30.5	52	47.9	33.8	-5	-2.2	3.8	9	12.5	17.9	20.4	24.9	42.3	28	9.4
25/05/2021	23:30	23:30	44.2	54.5	28.8	53.1	50.4	32.8	-9.9	-2.8	1.8	4.6	8.7	12.6	17.9	23.9	44.1	27.5	9.4
25/05/2021	23:40	23:40	44.7	55.9	29.4	53.6	50.8	33.2	-7.4	-3	2.6	4.8	9.1	13.8	17.1	23.9	44.6	29.1	9.6
25/05/2021	23:50	23:50	38.5	51.9	30.3	47.7	39	34.2	-4.8	-2	4.7	11.6	13.3	20.2	17.1	25.1	37.4	30.2	8.8
26/05/2021	0:00	0:00	38.8	52.6	32.4	48.5	39.1	35.1	-4.7	-1.3	8	16.9	15.5	21.3	20.7	27.3	37.6	29.7	9.2
26/05/2021	0:10	0:10	39.9	54.8	32.7	50.8	40.4	35.2	-4.3	2.5	15	17.4	19.8	20.9	20.7	26.3	39.1	28.6	9.3
26/05/2021	0:20	0:20	41.1	49.3	33.8	48.1	45.7	36.5	-6.1	0.2	14.9	18.9	17.3	24.2	20.3	26.4	40	33.3	11.6
26/05/2021	0:30	0:30	39.4	50.5	32.4	47.1	40.4	36.5	-5.7	0.8	11.6	14.2	14	19.4	16.8	24.4	37.1	34.9	10.7
26/05/2021	0:40	0:40	37.8	50.7	33.2	44.3	39.4	35.4	-3.5	4.4	13.1	21.9	30	20.8	16	25.4	35.1	30.7	9.7
26/05/2021	0:50	0:50	35.6	44.7	29.9	39.5	37.1	33.3	-4	-0.9	5	9.6	12.7	18.1	18.7	25.6	33.7	28.5	9
26/05/2021	1:00	1:00	36.4	41	31.8	39.2	38	34.7	-6.8	-0.5	6.7	9.5	10.5	15.3	15.7	23.8	35.2	28.7	8.5
26/05/2021	1:10	1:10	45	55.5	31.7	54.1	51.3	35.4	-5.5	0.1	7.1	10.6	11.8	16.8	14.8	24.6	44.9	29.2	9.8
26/05/2021	1:20	1:20	46.7	57.2	30.3	55.4	52.8	34.8	-3.7	-0.9	6.2	10.8	12.5	19.2	18.5	25.5	46.6	29.1	10.2
26/05/2021	1:30	1:30	46	55.7	32.6	54.4	51.3	36	-4	-1.1	6.9	7.7	8.2	10.6	13.2	25.4	45.8	31	9.7
26/05/2021	1:40	1:40	47.9	56.2	32.4	55	52.9	36	-4.9	-0.5	7.3	9.4	9.3	11.7	14.1	26.8	47.8	30.8	9.9
26/05/2021	1:50	1:50	48.4	56.4	32.2	55.4	53.8	36.4	-5.5	0.2	11.1	9.2	9.3	15	15.8	27.1	48.2	30.6	10.8
26/05/2021	2:00	2:00	48.7	56.6	33.4	55.6	54.2	37	-4.8	-0.9	8.1	7.4	9.8	15.5	15.2	26.8	48.6	31.2	11.1
26/05/2021	2:10	2:10	47.1	56.8	35.4	55.4	52.8	37.7	-3.4	-1	7.3	8.9	11.1	17.4	15.9	25.2	47	30.3	10.2
26/05/2021	2:20	2:20	44	57.3	34.3	55.6	42.5	36.8	-4.5	-0.8	7.8	10.6	11.8	17.4	16.9	25.4	43.8	27.8	11.7
26/05/2021	2:30	2:30	46.7	57.8	33.5	56.4	53	36.6	-5.4	1	9.9	9.2	10.3	14.6	15.6	26.4	46.6	27.7	8.7
26/05/2021	2:40	2:40	46.5	58.7	33.8	56.6	52.7	36.3	-3.6	1.9	10.1	10.2	10.9	21.3	19	27	46.4	27.9	9.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	2:50	2:50	43.2	60.3	33	56.7	40.3	35.9	-4.6	1.1	8.2	17.9	23.6	16.3	17.2	25.9	42.9	27.8	8.6
26/05/2021	3:00	3:00	45.4	60	34	57.4	43.1	37.1	-3.4	0.7	8.4	8.2	10.5	13.3	16.8	25.7	45.2	27.5	8.6
26/05/2021	3:10	3:10	44.9	59.7	34.7	55.6	48.4	38.7	-4.7	0.8	8.1	6.7	8.7	17.3	17.7	26.7	44.8	27.7	9
26/05/2021	3:20	3:20	47.6	59.3	36.4	57.4	53	39.9	-4.5	-0.1	7.9	9	9.9	15.8	16.8	28.6	47.5	29	8.9
26/05/2021	3:30	3:30	48.9	58.8	35.4	57.2	54.6	40	-4.1		11.5	9.4	13.3	19.7	22.2	30	48.8	27.9	11.1
26/05/2021	3:40	3:40	49.7	58.4	37.5	57.3	54.9	41.5	-3.3	-0.7	7.7	8.3	11.3	13	17.4	30.6	49.6	27.5	9.7
26/05/2021	3:50	3:50	54.5	59.6	36.5	58.7	57.7	41.9	-3	-0.4	8.3	11	14.3	18.4	21.1	30.9	54.4	28.1	11.2
26/05/2021	4:00	4:00	55.5	59.5	38.8	58.8	57.9	46.5	-3.8	-0.9	5.1	6.4	10	13.5	17.3	30.7	55.5	28.9	10.7
26/05/2021	4:10	4:10	55.7	59.9	39.8	59	58.1	46.7	-4.2	-0.4	5.7	6	8.4	12.4	16.8	26.8	55.7	28.3	10.8
26/05/2021	4:20	4:20	56.3	60.1	41.5	59	58.3	48.6	-5.1	-0.4	8.7	10.8	17.6	21.7	21	27.9	56.3	28.8	11.5
26/05/2021	4:30	4:30	55.7	59.9	40.8	58.9	58.1	46.5	-4.8	-0.8	10.2	14.9	23.8	27.6	27.6	31.4	55.6	28.8	14.4
26/05/2021	4:40	4:40	55.5	59.6	42	58.8	57.9	47.6	-4.4	-1	8.2	12.4	24.3	27.8	27.3	32.3	55.5	29.4	15.1
26/05/2021	4:50	4:50	56.2	60.1	42.6	59	58.3	49.3	-7.2	-0.4	9.9	11.5	17.9	23.7	24.9	30	56.2	29.1	12.6
26/05/2021	5:00	5:00	57.3	64.6	43.8	61.4	59.2	53.5	-3.7	0.6	10.6	10.6	15.6	23.4	25.3	43.3	56.9	37.2	41.4
26/05/2021	5:10	5:10	56.4	63.7	43.4	60.8	58.7	48.4	-5.1	-0.8	8.5	11.5	15	23	25.2	40.3	56	38.4	41.9
26/05/2021	5:20	5:20	55.4	77.5	42.3	58.7	57.7	45.2	-7.6	-1.2	7.3	12.1	16.1	21.5	24.3	44.9	54.9	30.3	12.3
26/05/2021	5:30	5:30	54.2	59.9	42.9	58.4	57.4	44.8	-5.8	-0.7	10.1	12.7	14.9	20.8	23.9	31.6	54.1	29.2	10.9
26/05/2021	5:40	5:40	53.5	62	41.1	58.5	57.2	43.9	-5.1	0.1	12	14.8	15.2	23.6	23.4	33.7	53.3	34.7	10.7
26/05/2021	5:50	5:50	50.7	60.2	40.4	58.1	56.1	42.5	-3.7	4.7	20	29	29.6	29	30.2	31	50.5	29.3	12
26/05/2021	6:00	6:00	50	81.6	41.8	58.3	50.1	43.6	-2.6	5.1	20.9	32.6	36.6	34.8	33.2	36.3	47.5	44.2	34.1
26/05/2021	6:10	6:10	46.7	66.3	41.5	58.3	45.5	43.3	-3.7	5.1	21.9	33.5	34.6	37.1	32.5	33.7	45	29.3	10

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16z	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	6:20	6:20	46.2	65.8	41	55.8	45.8	43.4	-3.5	1.9	15.6	22.4	25.5	31	32.6	39.9	44.3	30.4	14.1
26/05/2021	6:30	6:30	47	64.3	40.9	55.9	48.7	43.1	-3.1	8.5	20.9	33.9	32.1	35.5	36.9	38.5	44.6	32.4	15.7
26/05/2021	6:40	6:40	46.1	63.8	40.5	55.8	45.9	42.7	-3.2	6.6	21.7	34.3	30.4	35.9	36.5	37	43.5	31.2	13.2
26/05/2021	6:50	6:50	52	75.9	41	63.6	51.3	42.9	-2.6	11.2	29.2	41.7	46.5	45.6	42.5	41.1	44.9	34.6	18
26/05/2021	7:00	7:00	49.1	69.2	41.3	62	48.8	42.9	-2.8	7	24.4	39.8	41.9	41.4	39.1	39.6	43.5	32.8	14.9
26/05/2021	7:10	7:10	45.6	62.4	40	57.4	45.5	42.2	-2.4	8.1	21	35.1	33.4	34.4	34.5	36	42.9	33	13.9
26/05/2021	7:20	7:20	46.4	65	40.4	57.2	45.7	42.3	-2.1	7.3	23.7	32.9	35.6	39.6	37.2	35.8	42.6	33	11
26/05/2021	7:30	7:30	58.5	78.9	39.6	72.7	56.6	42.3	2.3	19.5	33.4	44.8	47.6	51.3	54	52.2	48.1	38.9	22.7
26/05/2021	7:40	7:40	43.6	60.8	39.2	53	43.7	41.5	-2.7	7.1	20.5	27.1	24.4	28.5	33.1	33.6	41.8	33.4	12.5
26/05/2021	7:50	7:50	44.8	60.9	39.2	53.3	46.1	41.4	-2.1	12.8	26	34	32.1	33	35.4	35.5	41.8	32.3	13.9
26/05/2021	8:00	8:00	61.8	80.2	38.4	77.7	55.7	41.1	5.5	24.3	37.7	51.4	56.2	49	56.8	53.8	51	42.4	27.7
26/05/2021	8:10	8:10	62.7	84.6	39.8	76.2	54.8	41.9	1.3	24.5	38.2	50.4	51.8	52.8	59.5	55.8	51.2	43.2	37.2
26/05/2021	8:20	8:20	61.4	77.1	39.6	75.1	60.9	41.8	6.5	23.6	36.9	49.2	53	49.8	56	56.2	52.1	42.7	41.9
26/05/2021	8:30	8:30	51.8	68.7	38.4	65.8	50.9	41	-1.5	8.5	22.4	30.3	29.8	31.8	36	39.6	48.2	48.3	31.3
26/05/2021	8:40	8:40	56.6	76	36.8	70.5	55.4	40.2	1.1	17.1	32.9	43.2	45.3	44.4	50.6	50.9	50.8	42	24.7
26/05/2021	8:50	8:50	44.3	71	37.3	53.8	44	39.7	-2.5	3.6	17.5	24.7	27.1	31.4	33.1	37.7	41.7	33.6	17.9
24/05/2021	9:00	9:00	50.5	77.8	31.9	62.3	51.9	37.5	-0.9	11.1	24.7	36.2	40	44.9	42.8	42.5	44.1	36.6	25.5

Table A2: Details of noise level at monitoring site N2

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	08:31	08:41	48.2	61.1	37.0	56.8	52.5	39.1	4.5	15.0	25.5	35.1	37.0	42.2	43.0	41.7	35.8	30.3	25.3
24/05/2021	08:41	08:51	47.4	63.7	37.4	57.3	50.9	39.6	4.3	15.0	27.5	36.0	32.7	38.6	41.5	40.8	40.6	33.7	26.3
24/05/2021	08:51	09:01	44.4	59.1	35.8	53.3	47.5	38.2	3.3	11.5	26.1	33.9	29.7	36.8	39.5	36.3	36.6	27.9	25.4
24/05/2021	09:01	09:11	50.3	62.3	36.9	58.5	54.7	40.4	3.0	13.3	25.1	33.3	30.9	44.4	46.7	43.6	37.2	28.6	25.3
24/05/2021	09:11	09:21	48.4	61.6	35.5	57.0	52.4	38.4	4.4	13.7	26.2	34.0	32.1	42.2	43.5	42.0	38.5	30.6	25.3
24/05/2021	09:21	09:31	43.5	55.8	35.4	51.4	47.0	37.2	3.9	10.8	22.5	31.0	27.0	36.3	39.5	36.2	34.1	25.9	25.3
24/05/2021	09:31	09:41	45.7	58.4	35.5	54.1	49.7	38.0	5.0	13.0	26.4	32.3	29.0	36.3	40.0	38.5	39.5	35.1	25.5
24/05/2021	09:41	09:51	46.1	57.5	35.7	54.1	50.6	37.1	3.6	11.0	26.1	32.6	30.2	38.4	42.2	39.4	35.1	30.1	25.3
24/05/2021	09:51	10:01	49.3	59.7	38.5	56.3	52.9	42.7	4.4	16.2	32.5	37.3	36.2	42.7	45.1	41.7	37.6	29.1	26.9
24/05/2021	10:01	10:11	48.1	64.9	36.9	58.5	52.0	40.1	5.4	15.0	30.2	36.1	34.5	39.4	41.6	38.4	41.2	40.2	32.3
24/05/2021	10:11	10:21	46.3	55.7	43.4	51.8	47.9	44.7	5.7	17.3	36.1	37.4	33.5	36.3	42.7	35.8	34.0	28.0	27.5
24/05/2021	10:21	10:31	47.2	59.2	43.8	53.3	47.3	45.0	5.3	17.9	36.2	37.5	34.1	36.3	43.9	38.6	32.3	25.9	27.5
24/05/2021	10:31	10:41	47.2	56.7	43.3	52.9	49.0	45.1	4.7	17.1	35.5	36.4	32.4	38.4	44.3	36.5	32.9	29.9	28.7
24/05/2021	10:41	10:51	49.2	63.1	43.3	56.3	49.5	44.8	3.6	16.0	35.7	39.1	39.0	40.3	44.6	39.1	39.8	37.0	28.1
24/05/2021	10:51	11:01	45.9	54.6	34.7	50.9	47.2	43.1	4.2	16.3	35.1	35.7	29.4	35.0	42.2	33.8	36.3	35.7	26.0
24/05/2021	11:01	11:11	43.0	53.9	33.4	49.9	45.8	37.7	5.6	14.9	32.1	35.8	33.4	34.0	36.9	31.3	33.4	30.0	26.8
24/05/2021	11:11	11:21	44.3	54.6	35.1	51.3	47.9	38.1	3.8	10.3	29.2	35.1	32.6	34.7	39.5	38.3	31.8	26.7	26.9
24/05/2021	11:21	11:31	45.9	59.3	31.3	54.8	50.3	35.2	3.5	11.8	29.4	31.6	32.6	37.3	38.5	38.7	40.8	32.9	26.2

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	11:31	11:41	40.8	51.8	31.7	48.4	44.9	34.3	3.5	8.9	25.8	29.2	29.7	32.6	33.2	31.6	35.2	28.1	27.0
24/05/2021	11:41	11:51	42.2	55.9	31.8	50.5	45.1	35.7	4.0	10.0	30.5	32.4	33.0	31.7	32.9	32.4	37.7	26.9	26.6
24/05/2021	11:51	12:01	45.2	59.3	35.0	53.0	46.7	37.3	4.5	15.8	33.3	37.1	34.5	35.1	40.6	37.8	31.9	26.5	25.3
24/05/2021	12:01	12:11	40.7	55.2	33.1	50.1	44.9	35.4	4.7	12.2	26.9	31.1	28.8	29.9	35.7	33.7	31.5	27.6	25.7
24/05/2021	12:11	12:21	42.0	55.2	32.9	49.6	44.0	35.2	4.5	12.3	24.9	32.6	32.5	33.2	36.7	33.2	32.6	29.3	27.2
24/05/2021	12:21	12:31	43.7	55.3	33.1	50.8	46.3	36.1	4.1	11.0	23.1	29.9	29.7	31.3	37.5	37.9	38.0	30.6	26.7
24/05/2021	12:31	12:41	42.0	55.8	33.4	50.1	44.4	36.2	9.3	16.4	21.7	30.2	28.4	31.8	35.5	37.2	33.9	30.9	25.5
24/05/2021	12:41	12:51	42.3	55.2	33.7	49.7	44.1	36.9	3.5	6.6	19.3	29.4	28.0	35.9	35.4	32.7	35.6	33.1	25.3
24/05/2021	12:51	13:01	43.4	54.8	33.2	50.6	46.4	36.8	8.0	15.3	26.2	33.7	34.5	33.2	34.9	34.8	38.0	32.1	25.3
24/05/2021	13:01	13:11	44.1	55.1	36.4	51.2	47.2	38.1	12.1	20.2	27.8	34.1	32.2	31.6	37.6	36.2	38.3	33.4	25.3
24/05/2021	13:11	13:21	42.9	51.6	37.1	48.8	45.9	38.7	5.7	14.9	26.8	34.3	32.6	32.5	36.7	35.7	34.2	31.0	25.3
24/05/2021	13:21	13:31	41.2	52.8	34.8	48.7	44.6	37.2	5.2	12.6	25.9	33.1	30.1	32.9	34.7	33.9	32.3	27.4	25.3
24/05/2021	13:31	13:41	41.1	55.8	34.2	49.7	43.5	35.8	3.6	10.0	22.1	32.1	28.7	33.1	34.2	32.8	35.0	27.6	25.3
24/05/2021	13:41	13:51	41.6	54.7	34.1	50.0	45.3	35.5	3.8	11.6	25.1	34.0	34.3	32.1	35.1	33.7	30.9	26.3	25.3
24/05/2021	13:51	14:01	49.7	56.4	34.3	55.4	54.3	36.8	3.7	11.6	25.4	32.4	31.1	37.8	44.6	45.6	41.4	34.6	26.3
24/05/2021	14:01	14:11	50.8	58.9	44.0	56.2	53.5	47.0	3.2	8.5	23.2	30.5	30.5	39.3	45.5	46.7	43.0	36.6	26.3
24/05/2021	14:11	14:21	44.9	53.5	36.4	51.2	48.8	38.8	4.1	12.0	22.0	29.8	28.4	33.2	39.2	40.5	37.4	30.8	25.4
24/05/2021	14:21	14:31	44.3	60.1	35.7	52.9	45.7	37.6	3.5	12.4	25.0	35.7	40.0	34.5	35.3	35.4	33.5	28.4	26.5

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	14:31	14:41	40.1	52.7	34.5	47.6	42.5	36.4	4.1	10.8	22.9	32.3	28.9	32.1	34.6	31.9	28.9	25.9	26.4
24/05/2021	14:41	14:51	45.4	59.4	36.3	54.2	48.9	38.6	5.1	15.7	29.3	37.4	38.2	35.4	39.8	37.4	33.8	27.7	25.8
24/05/2021	14:51	15:01	40.7	50.2	34.9	47.0	43.7	36.6	3.7	12.0	24.8	32.2	29.7	31.3	35.4	33.5	30.8	26.6	25.4
24/05/2021	15:01	15:11	42.7	56.8	35.6	50.8	44.8	38.0	9.4	16.4	24.6	32.3	30.2	31.5	37.0	37.9	33.1	28.9	25.6
24/05/2021	15:11	15:21	48.4	60.4	35.9	55.9	51.4	39.2	6.8	22.1	35.2	42.3	38.3	37.4	43.5	39.8	35.6	30.3	25.9
24/05/2021	15:21	15:31	49.7	69.5	35.6	59.9	50.3	37.8	9.9	27.4	41.3	44.8	43.7	39.0	38.9	37.1	33.4	28.3	27.8
24/05/2021	15:31	15:41	48.1	70.3	35.0	58.8	47.2	37.4	9.2	27.6	39.6	43.8	41.8	35.9	36.5	35.9	32.7	27.1	27.1
24/05/2021	15:41	15:51	52.3	70.9	34.3	61.2	51.5	37.4	7.8	25.1	39.7	44.8	45.3	40.4	46.3	44.9	39.7	32.2	26.4
24/05/2021	15:51	16:01	46.5	60.6	36.4	55.3	50.0	39.5	7.8	18.9	31.6	37.3	36.3	35.9	41.2	40.1	36.3	29.6	25.4
24/05/2021	16:01	16:11	50.6	68.6	34.5	60.5	52.3	38.3	5.6	20.7	34.5	40.4	39.2	40.0	45.1	46.0	39.0	29.7	27.7
24/05/2021	16:11	16:21	43.6	51.3	37.0	49.0	46.6	39.4	4.8	16.4	28.5	35.1	33.4	33.7	38.4	35.9	33.8	27.9	27.9
24/05/2021	16:21	16:31	44.8	55.7	38.2	51.7	47.7	41.0	6.1	17.5	27.6	36.5	34.3	36.5	38.9	35.7	36.4	31.4	26.4
24/05/2021	16:31	16:41	47.2	62.8	38.3	56.3	49.7	41.6	6.9	20.5	32.9	39.7	38.5	38.1	41.5	38.8	36.1	28.4	25.4
24/05/2021	16:41	16:51	46.5	62.8	37.8	56.4	49.9	39.8	7.6	25.1	37.3	40.8	36.5	35.3	40.1	37.7	34.4	25.8	25.3
24/05/2021	16:51	17:01	54.0	61.1	38.0	59.0	56.9	42.4	7.2	23.3	34.6	38.5	39.6	43.8	49.6	49.0	44.7	36.8	26.6
24/05/2021	17:01	17:12	46.0	56.2	37.6	52.9	49.6	40.9	3.3	11.5	31.1	32.2	30.5	34.7	38.8	40.7	40.3	31.6	25.8
24/05/2021	17:12	17:22	49.9	55.3	41.8	53.8	52.3	46.4	3.1	10.7	27.8	34.0	32.0	38.2	44.9	45.6	41.6	34.3	25.3
24/05/2021	17:22	17:32	48.5	51.7	44.9	50.8	49.9	46.8	3.2	10.4	27.1	32.7	30.4	36.9	43.0	44.0	41.0	34.4	25.3

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	17:32	17:42	47.9	59.7	44.1	55.1	50.4	45.2	3.0	11.7	32.6	32.5	30.7	34.2	40.3	42.3	43.2	36.0	25.5
24/05/2021	17:42	17:52	52.3	64.5	44.9	59.7	54.8	46.4	3.6	13.1	31.9	32.6	32.2	36.9	42.2	45.5	49.7	40.6	25.6
24/05/2021	17:52	18:02	52.1	57.7	46.6	55.9	54.0	50.0	3.9	14.1	30.2	32.6	33.1	39.9	46.2	47.2	46.4	38.1	26.7
24/05/2021	18:02	18:12	50.4	56.4	42.3	54.9	53.3	44.8	4.1	13.2	29.0	33.5	31.9	36.4	42.5	44.7	46.7	36.7	25.5
24/05/2021	18:12	18:22	52.9	62.2	46.7	58.9	55.6	49.5	3.1	9.6	22.7	37.4	39.5	37.8	46.9	47.8	47.7	37.1	25.4
24/05/2021	18:22	18:32	49.1	56.8	38.2	55.0	53.1	40.8	2.8	8.1	21.2	30.9	29.9	29.7	44.2	46.1	39.1	27.0	25.3
24/05/2021	18:32	18:42	45.4	54.6	38.1	50.8	46.9	41.8	3.3	9.9	21.5	30.8	35.1	28.8	32.9	40.4	41.6	31.8	25.3
24/05/2021	18:42	18:52	46.6	55.2	43.3	51.8	48.4	45.1	2.7	7.3	20.8	33.3	32.1	30.6	31.5	41.4	42.9	36.2	25.3
24/05/2021	18:52	19:02	46.7	55.8	43.9	52.0	48.2	45.1	2.7	3.7	19.8	25.5	24.6	35.3	37.9	41.2	43.1	31.3	25.3
24/05/2021	19:02	19:12	45.8	54.7	42.2	51.2	47.6	44.0	2.8	5.0	19.8	28.7	27.4	33.4	39.0	41.2	40.7	31.2	25.3
24/05/2021	19:12	19:22	44.2	49.6	41.7	47.7	45.7	42.9	2.8	5.9	20.8	28.7	28.4	29.7	34.8	38.1	40.9	31.2	25.3
24/05/2021	19:22	19:32	48.3	61.4	40.6	56.6	51.7	43.3	6.0	20.9	30.8	35.6	39.2	37.3	41.5	41.6	42.4	33.2	25.4
24/05/2021	19:32	19:42	49.8	55.9	41.8	54.1	52.3	44.0	2.8	7.9	22.5	28.9	31.4	39.7	45.0	44.7	42.4	34.9	25.8
24/05/2021	19:42	19:52	52.2	63.4	43.2	59.6	55.7	46.0	2.9	4.7	21.0	27.1	33.3	42.2	47.5	47.3	44.6	37.6	27.3
24/05/2021	19:52	20:03	52.4	61.5	46.5	58.9	56.2	48.2	2.8	4.5	22.0	28.8	32.6	41.5	47.5	47.7	45.0	38.5	28.4
24/05/2021	20:03	20:13	51.2	56.6	47.4	54.6	52.6	49.7	2.8	3.7	22.7	26.5	31.5	39.7	46.1	46.6	44.2	37.4	27.3
24/05/2021	20:13	20:23	49.7	56.2	44.5	54.2	52.1	46.5	2.8	3.2	17.4	22.2	29.9	38.3	44.6	45.1	42.8	35.8	26.3
24/05/2021	20:23	20:33	45.6	55.1	40.5	51.3	47.5	42.6	2.8	4.4	19.7	29.8	34.1	33.7	39.3	40.2	39.5	31.6	25.4

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	20:33	20:43	41.7	48.3	36.4	46.0	43.7	39.4	2.7	5.4	19.0	24.0	28.5	29.7	32.8	34.9	38.3	28.9	25.4
24/05/2021	20:43	20:53	42.1	46.6	38.0	45.1	43.5	40.4	2.8	6.6	20.0	22.7	22.1	24.2	26.1	37.6	39.1	26.6	25.3
24/05/2021	20:53	21:03	43.2	51.5	40.8	47.9	44.3	42.2	2.8	6.2	19.3	21.1	21.3	27.5	30.8	38.9	39.8	27.5	25.3
24/05/2021	21:03	21:13	42.6	45.7	40.4	44.7	43.7	41.6	2.8	4.2	18.6	20.4	22.2	25.0	26.2	38.6	39.3	29.2	25.3
24/05/2021	21:13	21:23	43.3	51.2	39.7	47.9	44.5	42.0	2.8	6.4	18.6	23.7	23.2	25.8	25.7	39.3	40.1	28.2	25.5
24/05/2021	21:23	21:33	45.2	55.5	40.0	51.9	48.3	42.2	2.7	5.5	20.1	27.8	24.4	32.2	30.9	39.0	42.8	28.9	26.1
24/05/2021	21:33	21:43	44.9	54.2	40.6	51.0	47.7	42.0	2.8	5.9	17.7	20.4	22.7	28.3	28.1	38.9	42.9	30.3	26.9
24/05/2021	21:43	21:53	48.1	53.6	40.7	52.9	52.1	42.5	2.8	5.0	20.8	25.4	23.6	25.8	26.9	38.2	47.3	31.2	28.2
24/05/2021	21:53	22:03	48.0	55.2	41.5	53.7	52.1	43.1	2.8	3.8	18.5	20.7	20.2	24.6	32.8	39.3	46.9	30.4	28.3
24/05/2021	22:03	22:13	47.6	57.0	38.2	54.4	51.8	41.8	2.8	2.9	15.9	29.9	27.4	29.4	37.5	38.6	45.9	31.9	28.2
24/05/2021	22:13	22:23	50.8	59.7	39.3	58.5	57.3	41.0	2.9	1.7	12.6	15.8	18.6	21.9	20.5	37.5	50.3	36.1	27.2
24/05/2021	22:23	22:33	47.2	54.4	40.3	53.2	51.9	41.3	2.8	2.8	12.9	14.1	17.0	26.6	38.0	37.9	45.8	30.4	26.0
24/05/2021	22:33	22:43	46.6	59.5	37.7	54.7	49.8	40.0	2.8	1.8	11.3	12.6	15.8	21.4	27.8	37.0	45.8	31.5	25.6
24/05/2021	22:43	22:53	51.4	59.6	35.9	58.2	56.8	38.9	2.8	3.1	11.8	18.9	28.0	27.8	38.5	35.9	50.9	33.8	25.3
24/05/2021	22:53	23:03	51.0	59.3	40.9	57.5	55.6	43.5	2.9	2.1	11.8	23.6	25.7	33.3	40.1	41.7	49.8	33.7	25.4
24/05/2021	23:03	23:13	48.1	53.6	40.7	52.9	52.1	42.5	2.8	5.0	20.8	25.4	23.6	25.8	26.9	38.2	47.3	31.2	28.2
24/05/2021	23:13	23:23	55.5	63.5	40.2	62.8	62.1	43.7	2.8	5.0	16.2	25.4	35.1	43.8	50.2	51.0	48.5	42.9	34.2
24/05/2021	23:23	23:33	45.7	58.1	36.5	54.2	50.3	37.7	2.5	1.7	11.3	17.5	21.2	24.3	30.9	32.9	44.7	35.7	25.5

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
24/05/2021	23:33	23:43	49.1	58.8	36.2	56.6	54.3	38.6	2.5	3.5	16.2	20.5	21.5	24.1	28.8	32.5	48.8	34.5	25.3
24/05/2021	23:43	23:53	52.8	58.9	34.2	58.2	57.5	37.4	2.6	1.7	14.0	17.8	22.4	24.4	30.4	32.4	52.7	33.9	25.4
25/05/2021	23:53	00:03	50.3	58.8	34.8	57.4	55.9	37.7	2.7	4.0	21.0	17.1	20.6	24.7	25.8	33.6	50.1	32.6	25.5
25/05/2021	00:03	00:13	42.8	57.3	36.9	49.9	42.4	38.6	2.8	2.9	19.6	13.5	17.3	18.8	21.8	35.4	41.1	32.8	25.3
25/05/2021	00:13	00:23	52.8	59.5	38.1	58.6	57.7	40.7	2.8	5.8	17.7	16.2	18.9	20.4	21.8	36.3	52.6	35.1	25.4
25/05/2021	00:23	00:33	53.4	59.7	37.7	58.8	57.8	40.5	2.8	2.6	16.7	20.3	23.2	20.5	21.4	35.8	53.2	35.2	25.6
25/05/2021	00:33	00:43	52.0	59.1	36.4	58.0	56.9	39.0	2.7	2.8	14.3	13.3	18.1	17.5	20.4	33.9	51.8	33.4	25.3
25/05/2021	00:43	00:53	49.4	58.6	36.7	56.8	55.0	39.0	2.9	2.9	10.4	12.2	18.7	26.7	34.0	36.9	48.9	32.6	25.6
25/05/2021	00:53	01:03	48.3	57.0	34.3	55.6	54.2	36.4	2.6	1.7	8.1	10.9	14.8	19.4	25.2	27.8	48.1	33.2	25.8
25/05/2021	01:03	01:13	40.7	51.3	35.1	47.2	43.1	37.4	2.7	1.4	10.8	9.8	14.8	16.6	20.4	27.0	38.2	36.2	25.4
25/05/2021	01:13	01:23	43.1	53.6	35.0	50.2	46.7	37.4	2.7	2.0	9.4	11.5	13.9	26.7	35.1	36.5	37.1	37.9	25.5
25/05/2021	01:23	01:33	42.4	48.1	34.7	47.3	46.5	37.6	2.8	3.2	9.3	9.3	13.9	15.3	19.0	29.3	41.7	31.2	25.3
25/05/2021	01:33	01:43	42.3	48.4	33.9	47.5	46.6	35.9	2.5	1.8	12.1	13.8	15.3	16.2	19.5	29.0	41.8	28.3	26.1
25/05/2021	01:43	01:53	43.4	48.2	34.0	47.6	47.0	37.0	2.8	2.6	12.7	12.2	14.4	14.8	18.3	29.0	43.0	29.8	25.8
25/05/2021	01:53	02:03	43.8	49.0	34.8	48.3	47.5	37.1	2.7	3.1	15.6	13.8	15.2	14.8	17.9	27.5	42.8	35.6	25.8
25/05/2021	02:03	02:13	43.8	48.9	33.8	48.1	47.3	36.8	2.6	1.7	13.0	13.1	15.1	14.6	17.1	25.5	43.1	34.2	25.7
25/05/2021	02:13	02:23	41.9	48.9	32.6	47.4	45.9	35.4	2.5	6.4	12.4	13.1	17.8	21.8	30.8	26.5	41.0	28.0	26.7
25/05/2021	02:23	02:33	41.2	47.4	33.5	46.4	45.3	35.7	2.6	1.4	6.7	8.4	13.6	22.6	25.4	28.1	40.5	27.9	25.8

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	02:33	02:43	39.8	47.6	31.5	45.7	43.8	34.4	2.8	7.1	14.8	9.5	12.2	16.7	20.4	25.3	39.0	29.2	25.6
25/05/2021	02:43	02:53	43.3	54.3	33.9	50.5	46.7	36.6	2.7	1.5	10.3	10.7	13.4	27.4	34.4	35.3	41.2	31.1	25.7
25/05/2021	02:53	03:03	37.9	45.5	33.2	42.9	40.2	34.9	2.8	6.5	16.7	12.1	14.4	16.2	18.7	26.2	36.3	30.1	25.5
25/05/2021	03:03	03:13	39.3	45.1	34.4	43.5	41.8	36.4	2.7	5.8	16.7	14.3	17.7	18.6	18.9	29.0	38.0	29.1	25.5
25/05/2021	03:13	03:23	42.7	56.0	35.9	50.6	45.1	37.8	2.6	2.1	9.7	10.9	13.8	27.1	35.5	36.0	39.5	31.2	25.6
25/05/2021	03:23	03:33	40.2	46.2	36.4	44.2	42.1	37.9	2.6	2.8	10.6	21.0	21.4	19.0	23.0	26.4	38.6	32.5	25.6
25/05/2021	03:33	03:43	40.2	47.7	36.3	44.9	42.0	37.9	2.6	1.3	7.1	9.0	13.3	18.7	23.0	26.4	38.8	32.6	25.5
25/05/2021	03:43	03:53	43.3	52.4	35.9	49.7	46.9	38.1	2.7	3.5	9.8	11.4	13.8	28.0	35.9	36.3	40.2	32.3	25.4
25/05/2021	03:53	04:03	41.6	47.7	36.1	45.9	44.0	38.1	2.6	1.5	7.3	8.3	11.9	24.2	30.2	29.0	40.3	31.4	25.5
25/05/2021	04:03	04:13	43.2	54.9	36.7	49.6	44.3	39.4	2.6	2.0	5.6	8.1	11.6	28.0	35.6	35.4	40.4	31.9	25.9
25/05/2021	04:13	04:23	44.1	54.5	37.0	50.5	46.4	41.1	2.8	5.0	10.8	17.4	16.4	26.5	32.9	32.5	42.9	32.0	25.9
25/05/2021	04:23	04:33	46.4	53.9	38.8	51.7	49.5	42.1	2.6	2.1	9.2	16.3	14.0	29.8	38.2	39.1	44.0	32.5	26.0
25/05/2021	04:33	04:43	44.8	54.2	38.5	50.8	47.3	41.3	2.6	2.7	11.1	16.2	14.1	28.1	36.8	37.7	42.2	31.2	25.6
25/05/2021	04:43	04:53	47.6	56.0	40.2	52.8	49.6	43.9	2.6	1.2	4.8	8.3	12.7	30.2	38.3	39.3	45.9	30.9	25.3
25/05/2021	04:53	05:03	49.2	59.1	39.8	55.6	52.1	44.6	2.8	1.4	6.7	10.5	16.2	34.3	42.2	43.2	45.7	33.2	34.3
25/05/2021	05:03	05:13	49.7	58.4	43.3	55.3	52.2	46.9	2.8	1.6	6.9	14.9	19.0	33.5	38.6	42.6	47.9	35.8	25.6
25/05/2021	05:13	05:23	47.0	53.9	38.7	51.9	49.9	43.2	2.7	6.1	14.2	23.1	20.6	27.9	35.7	39.6	44.7	37.7	25.3
25/05/2021	05:23	05:33	43.6	52.1	38.1	48.8	45.5	40.7	2.6	6.5	15.7	24.4	21.4	26.5	33.7	35.6	41.4	32.4	25.3

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	05:33	05:43	44.2	52.8	38.4	49.7	46.5	41.5	2.6	5.2	18.0	31.6	28.3	29.9	34.3	34.9	41.4	34.4	25.3
25/05/2021	05:43	05:53	42.4	54.7	36.3	49.7	44.7	38.8	2.6	8.0	20.8	32.6	28.8	29.3	33.7	31.8	39.1	31.2	25.3
25/05/2021	05:53	06:03	40.9	50.3	35.7	47.0	43.6	37.6	2.6	6.4	22.2	29.4	25.3	30.0	33.6	32.5	36.8	29.1	25.3
25/05/2021	06:03	06:13	42.6	56.1	35.7	50.6	45.0	38.5	2.6	6.5	21.8	28.1	24.1	31.8	37.2	35.8	37.3	28.6	25.3
25/05/2021	06:13	06:23	42.6	54.6	35.9	49.8	44.9	37.7	2.8	6.7	17.8	29.9	27.4	30.9	36.6	37.9	36.0	27.4	25.3
25/05/2021	06:23	06:33	47.0	57.2	36.7	54.2	51.2	39.0	2.9	8.7	22.2	32.4	29.0	35.3	42.9	38.2	42.1	30.2	25.3
25/05/2021	06:33	06:43	46.1	58.2	36.8	54.1	49.9	39.5	3.9	16.3	30.8	39.4	36.5	36.9	39.4	38.0	37.2	26.8	25.3
25/05/2021	06:43	06:53	46.9	57.0	37.2	54.0	51.0	40.6	4.5	17.0	32.5	39.1	36.8	34.5	39.3	40.5	40.1	30.5	25.3
25/05/2021	06:53	07:03	46.6	59.4	37.0	54.8	50.1	39.5	4.4	18.9	31.1	39.2	37.5	34.3	39.8	38.8	39.9	27.3	25.3
25/05/2021	07:03	07:13	46.6	60.4	36.4	55.1	49.7	38.8	4.2	17.7	31.4	39.6	39.0	33.6	39.3	39.9	37.7	28.3	25.3
25/05/2021	07:13	07:23	45.1	59.1	35.1	53.9	48.7	37.4	3.5	14.9	29.3	37.2	37.1	34.1	36.9	37.0	38.8	27.4	25.3
25/05/2021	07:23	07:33	46.6	61.0	35.7	54.4	47.7	38.0	4.4	16.7	34.5	41.0	37.9	34.0	39.7	37.7	36.6	28.3	25.3
25/05/2021	07:33	07:43	43.7	53.1	35.0	50.2	47.3	37.3	3.4	12.6	25.8	34.3	30.6	30.5	35.4	36.9	39.3	30.3	25.3
25/05/2021	07:43	07:53	41.6	51.1	34.5	47.9	44.6	36.3	3.2	11.3	26.5	33.8	31.3	29.9	35.5	34.8	33.7	25.7	25.3
25/05/2021	07:53	08:03	50.9	72.2	38.3	62.2	52.2	41.0	4.0	15.1	30.6	37.1	38.4	42.6	44.2	45.9	42.5	37.6	29.2
25/05/2021	08:03	08:17	55.8	63.0	51.0	60.8	58.5	52.4	3.4	12.7	26.9	33.7	38.7	45.3	49.9	51.1	49.1	43.4	34.0
25/05/2021	08:17	08:27	48.5	55.6	41.9	53.6	51.5	45.4	2.7	1.8	10.6	13.5	17.2	32.4	40.6	42.8	45.6	33.1	25.3
25/05/2021	08:27	08:37	48.8	59.5	41.9	55.3	51.1	45.3	2.8	2.9	13.6	21.0	20.1	33.1	39.7	43.9	45.1	35.4	32.1

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	08:37	08:47	58.2	61.2	52.8	60.9	60.6	54.3	3.8	16.1	28.1	35.6	39.1	46.7	52.3	53.6	51.8	46.2	36.8
25/05/2021	08:47	08:57	54.4	64.6	41.2	61.0	57.4	46.9	4.2	14.7	27.4	38.1	40.2	42.9	47.9	49.2	48.6	42.6	33.1
25/05/2021	08:57	09:07	47.5	67.2	39.0	58.1	49.0	41.5	3.5	10.7	25.4	34.9	32.7	33.3	39.8	40.2	42.8	39.1	28.8
25/05/2021	09:07	09:17	46.7	63.5	37.5	56.5	49.5	40.6	4.1	11.7	24.1	33.1	33.4	34.1	39.4	40.5	41.8	36.1	26.1
25/05/2021	09:17	09:27	46.4	63.5	37.7	56.2	48.9	40.3	3.7	12.0	24.6	32.9	30.8	35.9	40.6	39.8	40.6	34.5	25.8
25/05/2021	09:27	09:37	45.1	54.9	37.8	51.5	48.1	40.0	3.4	11.7	24.8	30.7	30.6	33.6	39.5	38.5	38.3	35.4	26.6
25/05/2021	09:37	09:47	45.1	57.5	37.5	52.3	47.0	40.1	3.8	14.5	26.5	34.8	34.2	34.7	40.1	37.9	36.1	32.4	27.3
25/05/2021	09:47	09:57	46.0	60.5	36.4	53.9	47.3	39.4	4.0	17.0	30.8	38.2	37.5	33.2	39.4	39.1	36.8	32.1	27.6
25/05/2021	09:57	10:07	44.5	54.8	36.8	50.7	46.6	39.8	3.3	10.7	25.1	32.7	29.6	31.3	34.0	34.9	40.2	38.1	28.7
25/05/2021	10:07	10:17	43.4	54.8	37.0	50.5	46.1	39.0	3.2	11.2	23.5	33.1	33.1	33.5	36.4	37.1	36.7	26.5	27.7
25/05/2021	10:17	10:27	43.7	58.9	37.3	52.5	46.0	39.1	3.4	12.3	25.8	33.5	31.0	31.4	37.2	36.3	38.8	26.8	27.0
25/05/2021	10:27	10:37	45.4	57.6	36.4	53.0	48.4	39.9	4.3	15.5	28.2	33.7	32.0	33.4	38.8	37.5	41.0	30.1	26.1
25/05/2021	10:37	10:47	45.0	62.2	32.7	55.5	48.8	37.0	4.7	15.3	25.6	33.5	31.8	33.3	39.9	39.0	38.5	27.2	25.4
25/05/2021	10:47	10:57	49.2	64.1	33.7	58.1	52.1	41.3	6.2	16.4	27.3	38.5	37.8	36.5	43.0	43.2	42.0	37.8	32.4
25/05/2021	10:57	11:07	51.3	67.9	41.1	59.1	50.2	43.0	5.4	20.5	32.2	43.9	44.0	37.5	44.7	45.3	40.6	32.3	25.3
25/05/2021	11:07	11:17	43.9	52.7	36.4	49.9	47.0	38.6	3.3	9.1	19.9	31.9	30.1	31.9	37.6	38.7	37.4	30.7	25.3
25/05/2021	11:17	11:27	50.4	59.9	43.4	56.3	52.6	45.2	3.6	12.2	24.8	31.7	32.9	39.2	45.2	45.6	43.2	36.5	26.4
25/05/2021	11:27	11:37	49.7	57.4	38.5	55.4	53.3	41.7	3.8	12.7	24.3	30.7	32.4	38.9	44.7	44.8	42.4	35.8	26.2

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	11:37	11:47	41.8	55.1	31.8	50.2	45.3	34.7	3.3	11.8	25.2	29.3	29.8	30.7	37.5	33.9	34.9	28.6	25.3
25/05/2021	11:47	11:57	42.2	58.7	30.9	52.2	45.6	34.2	3.2	12.4	27.2	33.7	33.8	30.5	33.9	33.8	36.9	25.8	25.3
25/05/2021	11:57	12:07	42.9	56.7	30.2	51.3	45.8	34.2	3.0	8.6	23.6	30.2	28.2	28.3	35.9	37.1	38.1	30.2	25.3
25/05/2021	12:07	12:17	43.4	57.9	32.3	51.1	44.3	34.7	3.1	10.5	26.6	31.9	32.7	30.9	37.9	36.7	36.1	31.3	25.3
25/05/2021	12:17	12:27	44.6	56.6	32.1	52.6	48.6	34.8	3.3	13.0	29.6	37.6	35.4	35.9	37.5	36.2	36.2	28.9	25.3
25/05/2021	12:27	12:37	43.9	51.0	33.6	49.5	47.9	36.7	3.1	9.3	20.7	28.8	28.2	32.9	38.9	38.6	36.5	30.3	25.3
25/05/2021	12:37	12:47	45.2	54.9	34.6	52.2	49.5	37.4	3.0	6.9	19.6	28.0	29.3	37.6	40.1	39.1	37.4	31.9	25.3
25/05/2021	12:47	12:57	43.9	56.4	33.3	52.0	47.6	35.8	3.4	12.5	30.7	36.0	32.7	32.3	38.2	38.6	32.3	26.2	25.3
25/05/2021	12:57	13:07	41.4	52.0	34.1	48.4	44.7	36.6	3.3	10.1	24.6	30.9	28.1	30.7	36.1	35.8	32.8	26.6	25.3
25/05/2021	13:07	13:17	47.4	53.5	39.0	51.8	50.0	42.2	3.1	7.1	20.2	27.5	28.8	36.1	42.2	42.5	40.9	33.9	25.3
25/05/2021	13:17	13:27	47.7	55.6	42.8	52.6	49.5	45.4	3.6	13.1	27.1	33.6	32.0	35.8	41.7	42.6	41.6	34.1	25.3
25/05/2021	13:27	13:37	44.4	53.7	34.7	50.9	48.0	37.2	4.2	15.1	31.1	34.9	31.7	33.9	39.2	38.2	35.4	28.0	25.3
25/05/2021	13:37	13:47	42.6	56.8	33.1	51.8	46.7	35.3	3.0	9.3	24.8	30.0	27.8	29.1	34.6	35.8	37.4	34.6	25.3
25/05/2021	13:47	13:57	43.1	56.0	33.4	51.6	47.2	35.5	3.2	11.7	24.9	31.1	28.3	30.7	34.9	34.3	39.4	33.1	25.3
25/05/2021	13:57	14:07	47.9	69.9	33.2	59.7	49.4	36.4	6.4	14.1	28.7	34.4	33.4	34.6	38.2	39.1	43.1	42.0	31.5
25/05/2021	14:07	14:17	43.7	56.9	35.1	52.0	47.0	37.0	3.6	10.9	30.2	32.8	30.7	35.5	37.5	36.7	35.6	31.7	26.0
25/05/2021	14:17	14:27	42.2	48.7	37.9	46.4	44.1	39.9	5.3	12.8	26.9	31.2	29.7	33.5	36.8	35.4	33.6	27.6	25.3
25/05/2021	14:27	14:37	51.1	68.6	36.8	60.0	51.3	38.8	8.1	22.1	37.9	43.3	39.1	41.3	47.1	43.1	36.5	28.8	25.3

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	14:37	14:47	41.7	51.3	35.5	47.7	44.0	38.0	3.0	8.1	27.1	29.9	28.6	33.2	36.4	35.6	32.5	26.6	25.8
25/05/2021	14:47	14:57	43.1	51.8	36.4	48.8	45.7	39.1	3.2	9.6	25.4	33.7	33.3	35.5	36.9	35.3	34.2	28.0	25.3
25/05/2021	14:57	15:07	43.9	51.0	38.5	48.7	46.4	41.1	3.3	11.8	28.5	35.9	30.5	34.2	38.5	37.1	34.8	28.5	25.3
25/05/2021	15:07	15:17	42.6	48.9	36.9	46.9	44.8	39.8	3.6	11.3	29.2	33.2	31.2	32.1	36.7	36.0	34.0	28.6	25.3
25/05/2021	15:17	15:27	41.9	52.5	36.9	48.2	43.9	39.1	3.1	10.5	29.2	30.9	30.5	30.8	34.8	35.0	35.4	30.7	25.3
25/05/2021	15:27	15:37	41.6	50.9	37.5	47.2	43.5	39.3	3.0	10.0	29.0	32.6	30.1	32.5	34.6	34.3	34.1	26.3	25.3
25/05/2021	15:37	15:47	41.9	55.5	37.0	49.7	43.8	38.8	3.3	12.4	29.6	32.1	29.4	34.2	35.3	33.5	34.2	29.4	25.3
25/05/2021	15:47	15:57	45.7	56.1	37.7	52.1	48.1	41.7	3.2	11.6	31.7	34.3	32.0	35.8	40.1	39.7	37.8	30.7	25.3
25/05/2021	15:57	16:07	47.4	53.9	43.8	51.5	49.0	45.8	3.0	9.7	30.0	33.0	31.0	37.3	42.3	42.0	39.9	33.1	25.3
25/05/2021	16:07	16:17	44.5	49.9	39.5	48.4	46.9	41.6	3.0	10.7	29.7	33.9	33.7	33.7	38.5	38.3	36.5	30.1	25.3
25/05/2021	16:17	16:27	43.2	52.1	38.6	48.6	45.0	40.9	2.9	10.6	29.9	33.2	36.9	34.3	36.5	34.8	32.6	25.8	25.3
25/05/2021	16:27	16:37	48.9	67.2	36.1	58.9	50.5	41.0	3.6	14.3	33.2	36.5	38.5	35.6	40.0	38.5	46.3	25.9	25.3
25/05/2021	16:37	16:47	46.7	58.0	38.0	53.9	49.8	42.4	3.8	16.0	34.4	35.6	37.7	41.1	41.4	37.4	32.3	26.8	25.3
25/05/2021	16:47	16:57	44.9	56.6	39.1	51.9	47.2	41.4	3.3	14.8	33.4	34.7	38.3	36.9	39.0	35.9	30.9	25.7	25.3
25/05/2021	16:57	17:07	44.4	56.7	36.1	51.8	46.8	40.0	3.0	11.1	29.9	35.0	38.4	36.6	37.7	33.5	34.7	25.8	25.4
25/05/2021	17:07	17:17	48.2	63.4	36.6	56.7	50.0	40.7	3.0	11.3	29.9	34.5	38.3	41.0	43.7	41.6	36.0	28.4	25.3
25/05/2021	17:17	17:27	44.2	49.7	38.1	48.1	46.5	41.3	3.1	13.7	30.7	33.7	38.2	35.3	37.5	34.4	34.3	31.0	25.3
25/05/2021	17:27	17:37	48.4	66.3	36.7	58.0	49.7	41.8	3.0	12.4	30.1	36.2	38.3	39.3	44.6	40.6	37.4	32.1	25.4

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	17:37	17:47	43.8	55.1	37.9	50.8	46.5	39.8	3.0	10.7	27.3	33.8	31.7	32.5	37.6	37.2	36.0	34.1	25.3
25/05/2021	17:47	17:57	47.1	57.2	38.8	54.0	50.7	41.0	3.0	8.8	27.1	34.5	37.1	31.7	35.3	38.6	44.0	36.7	25.3
25/05/2021	17:57	18:07	54.4	63.1	44.6	60.9	58.7	47.8	3.1	8.0	28.8	34.6	33.5	32.1	34.7	44.6	53.2	44.2	25.3
25/05/2021	18:07	18:17	57.9	68.1	43.7	65.1	62.1	47.9	3.0	9.0	30.2	31.0	29.9	30.7	35.1	46.9	56.9	48.0	25.3
25/05/2021	18:17	18:27	46.8	56.0	39.7	53.2	50.3	41.3	3.0	8.4	27.1	29.7	28.6	29.9	37.6	38.2	44.5	35.7	25.3
25/05/2021	18:27	18:37	50.8	56.9	39.5	54.9	52.9	44.8	2.8	9.8	26.9	31.9	33.2	30.9	37.0	34.8	50.1	35.0	25.3
25/05/2021	18:37	18:47	51.4	59.5	41.4	56.2	52.8	48.3	3.0	8.0	24.2	36.0	38.6	32.6	33.8	35.9	50.7	35.1	25.4
25/05/2021	18:47	18:57	49.6	54.8	40.2	54.2	53.5	41.8	2.8	7.0	21.0	31.6	33.1	30.8	33.2	35.8	48.9	34.3	25.3
25/05/2021	18:57	19:07	49.9	55.1	41.2	54.0	52.9	44.5	2.8	6.6	20.1	26.3	24.6	29.1	33.3	35.1	49.3	37.1	25.3
25/05/2021	19:07	19:17	49.9	52.8	40.3	52.4	51.9	44.2	2.8	2.5	15.0	18.9	22.2	29.7	32.2	35.8	49.4	35.5	25.3
25/05/2021	19:17	19:27	51.8	55.0	40.6	54.6	54.1	43.9	2.8	3.8	15.1	23.6	23.0	30.5	34.6	35.7	51.5	35.3	25.3
25/05/2021	19:27	19:37	51.2	54.7	40.0	54.3	53.8	42.5	2.8	2.3	16.1	22.4	22.5	29.6	33.4	34.3	50.9	34.8	25.3
25/05/2021	19:37	19:47	52.1	55.5	40.1	54.8	54.1	46.4	2.8	8.3	21.4	27.2	25.2	31.8	33.2	34.7	51.7	37.4	25.3
25/05/2021	19:47	19:57	51.1	55.6	42.3	54.8	53.9	45.1	2.9	16.1	25.8	30.0	25.4	33.4	35.9	36.5	50.5	38.0	25.3
25/05/2021	19:57	20:07	49.6	55.2	42.3	53.8	52.4	44.1	2.8	13.2	27.8	32.5	26.0	29.7	28.9	33.1	48.9	37.8	25.3
25/05/2021	20:07	20:17	49.6	56.0	39.9	54.3	52.6	43.9	2.8	15.6	29.4	34.4	24.9	29.0	28.5	31.1	49.0	37.3	25.3
25/05/2021	20:17	20:27	46.1	55.8	36.9	52.7	49.5	40.5	3.0	12.9	28.6	33.3	26.2	31.0	33.9	32.3	44.9	30.8	25.3
25/05/2021	20:27	20:37	47.6	54.2	37.8	52.9	51.6	40.7	2.8	14.0	28.1	32.1	25.6	27.4	27.1	25.6	47.0	34.3	25.3

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	20:37	20:47	47.7	53.8	38.0	52.3	50.8	40.7	2.7	7.3	27.2	30.9	23.6	27.0	27.3	27.1	47.3	32.4	25.3
25/05/2021	20:47	20:57	56.3	65.3	36.6	63.7	62.1	43.5	2.8	9.3	28.1	31.6	25.4	29.6	29.1	29.2	56.2	37.0	25.6
25/05/2021	20:57	21:07	60.2	67.0	36.4	66.2	65.3	43.1	3.0	6.4	24.9	31.9	23.8	29.0	30.5	32.5	60.2	39.7	25.9
25/05/2021	21:07	21:17	55.7	66.0	39.3	63.5	61.0	41.2	2.8	4.5	22.2	28.5	24.1	30.7	34.1	35.0	55.5	36.8	26.4
25/05/2021	21:17	21:27	57.1	67.9	38.2	64.7	61.5	39.5	2.7	5.3	16.1	18.6	20.6	27.0	29.7	34.7	57.1	37.8	26.5
25/05/2021	21:27	21:37	59.5	67.3	37.9	66.3	65.2	39.6	3.2	8.9	21.0	27.9	28.0	26.8	27.4	33.3	59.4	39.1	26.0
25/05/2021	21:37	21:47	63.0	67.6	37.0	67.3	66.9	42.6	2.7	2.8	15.3	19.9	19.8	29.7	27.9	31.5	62.9	42.2	26.7
25/05/2021	21:47	21:57	62.9	68.3	36.1	67.9	67.5	39.1	2.7	2.7	13.9	18.7	18.2	21.4	21.9	29.6	62.9	42.1	26.5
25/05/2021	21:57	22:07	64.7	68.3	36.5	68.1	67.9	41.2	2.7	2.0	13.8	16.8	19.2	21.7	24.8	27.5	64.7	43.8	26.8
25/05/2021	22:07	22:17	65.5	68.3	34.1	68.1	67.9	46.6	2.8	5.6	20.4	27.9	24.3	24.6	26.8	25.8	65.5	44.4	27.1
25/05/2021	22:17	22:27	61.3	68.0	35.2	67.5	67.0	38.2	2.7	4.9	18.2	19.3	19.4	22.8	23.6	28.3	61.3	40.6	26.1
25/05/2021	22:27	22:37	60.3	67.8	36.1	67.0	66.2	38.0	2.7	3.4	15.7	24.4	22.2	22.6	23.8	30.0	60.3	40.0	25.6
25/05/2021	22:37	22:47	59.7	67.5	35.9	66.5	65.4	41.6	2.8	5.1	15.6	24.8	28.9	20.2	25.8	29.7	59.4	46.8	25.9
25/05/2021	22:47	22:57	61.1	67.6	37.8	66.9	66.2	46.8	2.7	2.1	7.0	11.6	17.2	20.5	22.2	27.7	60.9	48.5	26.2
25/05/2021	22:57	23:07	61.5	67.1	44.8	66.6	66.0	52.1	2.8	1.4	8.3	11.2	15.2	17.7	19.5	25.4	61.0	51.7	26.2
25/05/2021	23:07	23:17	60.1	66.5	35.2	65.8	65.1	47.6	2.7	2.0	9.6	11.5	14.3	17.4	19.2	27.2	59.7	49.1	26.2
25/05/2021	23:17	23:27	59.6	66.2	34.3	65.6	64.9	44.8	2.7	2.6	10.3	12.9	15.9	17.5	18.0	27.7	59.3	46.9	26.1
25/05/2021	23:27	23:37	56.5	66.0	33.7	64.3	62.6	36.2	2.6	1.6	12.9	14.1	15.3	28.4	34.7	35.1	56.4	37.5	25.9

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
25/05/2021	23:37	23:47	57.7	65.8	35.3	64.7	63.5	37.6	2.6	1.3	10.4	11.4	14.4	21.7	26.8	32.1	57.6	36.2	25.6
25/05/2021	23:47	23:57	55.8	65.5	36.1	63.7	61.8	37.3	2.7	1.8	9.0	9.8	12.8	22.3	22.7	29.3	55.8	34.9	25.4
26/05/2021	23:57	00:07	56.7	67.8	36.3	65.3	62.7	38.3	2.6	2.2	15.6	13.4	16.5	24.3	26.5	30.8	56.6	35.5	26.0
26/05/2021	00:07	00:17	51.2	68.0	37.0	60.7	53.3	38.0	2.6	2.8	17.5	16.1	21.9	23.7	22.8	31.8	51.1	31.8	26.5
26/05/2021	00:17	00:27	44.0	58.7	35.7	51.5	44.2	37.6	2.6	2.7	16.8	19.6	20.0	28.8	28.8	30.1	43.2	30.2	25.5
26/05/2021	00:27	00:37	43.2	57.7	35.5	52.0	46.3	37.9	2.8	8.6	17.7	18.0	21.6	28.6	28.5	30.7	42.1	30.6	25.5
26/05/2021	00:37	00:47	41.8	50.6	35.7	48.5	46.3	37.4	2.6	4.0	13.4	16.7	25.2	22.8	22.8	29.9	40.8	30.6	25.4
26/05/2021	00:47	00:57	38.4	46.8	36.1	43.4	40.0	37.2	2.6	2.3	11.8	11.4	15.1	27.6	28.0	30.1	35.1	30.0	25.5
26/05/2021	00:57	01:07	38.6	46.1	36.4	42.9	39.6	37.4	2.6	2.1	11.4	11.9	14.5	23.5	25.5	31.2	35.9	30.1	25.6
26/05/2021	01:07	01:17	40.2	46.7	36.8	44.8	42.9	37.9	2.6	3.6	13.4	14.1	17.6	25.2	25.7	29.7	38.6	30.3	25.6
26/05/2021	01:17	01:27	38.8	41.7	36.6	40.8	39.8	38.1	2.6	2.7	13.5	14.9	18.8	24.8	24.4	31.4	36.2	30.0	25.8
26/05/2021	01:27	01:37	38.3	42.7	36.4	41.1	39.5	37.4	2.7	2.4	11.9	13.1	16.1	24.9	25.4	30.5	35.5	30.0	25.6
26/05/2021	01:37	01:47	38.3	49.1	35.4	44.3	39.5	36.7	2.6	1.3	8.1	10.9	13.9	18.5	19.9	26.6	36.6	30.4	25.8
26/05/2021	01:47	01:57	41.7	52.7	36.1	49.5	46.2	37.2	2.7	1.3	10.1	10.3	13.9	18.0	18.7	24.6	41.0	31.5	25.8
26/05/2021	01:57	02:07	43.6	64.4	36.7	52.8	41.2	37.7	2.6	1.2	9.3	9.7	14.2	17.3	18.3	25.6	43.0	32.1	25.9
26/05/2021	02:07	02:17	42.8	55.2	36.7	49.7	44.1	39.7	2.6	1.4	7.5	9.1	12.9	26.7	34.8	35.1	40.1	31.8	25.9
26/05/2021	02:17	02:27	41.3	44.8	36.4	44.2	43.6	39.5	2.6	1.3	9.9	11.0	15.8	16.7	19.3	25.9	40.6	30.2	25.7
26/05/2021	02:27	02:37	41.3	45.0	33.9	44.4	43.8	39.1	2.5	1.7	10.5	11.3	12.8	17.5	22.9	25.0	40.7	29.9	25.6

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	02:37	02:47	41.4	49.1	36.8	46.3	43.5	40.0	2.5	1.4	10.8	10.9	14.0	15.6	18.2	24.6	40.7	30.8	25.6
26/05/2021	02:47	02:57	40.2	43.0	33.1	42.3	41.5	38.8	2.8	3.0	12.5	14.2	20.2	16.2	18.7	23.8	39.5	29.1	25.3
26/05/2021	02:57	03:07	41.8	51.4	37.6	47.5	43.5	39.6	2.6	2.7	12.2	13.2	17.9	25.5	32.0	31.6	40.2	29.8	25.4
26/05/2021	03:07	03:17	42.6	52.0	37.6	47.7	43.4	41.0	2.7	2.5	11.1	12.3	16.3	22.1	32.1	33.7	40.9	31.2	25.5
26/05/2021	03:17	03:27	43.6	50.2	40.4	47.8	45.3	41.9	2.7	1.6	9.0	11.1	14.9	26.8	35.1	31.9	42.0	31.6	25.5
26/05/2021	03:27	03:37	44.4	53.1	40.4	50.0	46.8	41.9	2.6	1.6	12.6	12.1	15.9	26.1	36.5	36.3	42.1	31.3	25.6
26/05/2021	03:37	03:47	43.3	52.6	39.0	48.4	44.2	41.5	2.5	1.3	9.8	9.1	15.0	21.6	30.6	33.2	42.3	30.1	25.4
26/05/2021	03:47	03:57	43.0	48.1	39.6	46.2	44.2	41.3	2.6	2.7	11.9	10.5	13.4	22.6	27.8	29.1	42.4	28.6	25.7
26/05/2021	03:57	04:07	43.1	45.5	39.5	45.1	44.6	41.5	2.6	2.0	9.6	12.3	15.6	20.6	24.3	23.1	42.8	28.9	25.8
26/05/2021	04:07	04:17	46.5	53.6	40.5	51.5	49.3	43.3	2.7	3.2	9.6	12.2	14.1	33.6	39.2	39.1	43.9	28.8	25.8
26/05/2021	04:17	04:27	43.1	50.8	35.4	47.6	44.3	40.7	2.6	1.7	12.1	13.0	16.0	25.0	32.6	31.3	42.1	28.3	25.6
26/05/2021	04:27	04:37	46.1	54.3	39.6	51.5	48.7	42.1	2.6	1.9	13.1	14.2	15.9	30.4	37.3	38.6	44.1	29.5	25.8
26/05/2021	04:37	04:47	46.1	51.3	39.9	49.4	47.5	43.9	2.6	1.4	16.3	15.8	17.0	27.0	32.9	31.8	45.5	29.5	25.5
26/05/2021	04:47	04:57	46.2	52.0	40.1	50.0	47.9	44.4	2.6	1.4	12.6	14.0	16.9	29.5	34.9	34.6	45.2	30.6	25.4
26/05/2021	04:57	05:07	48.5	55.6	41.9	53.6	51.5	45.4	2.7	1.8	10.6	13.5	17.2	32.4	40.6	42.8	45.6	33.1	25.3
26/05/2021	05:07	05:17	48.8	59.5	41.9	55.3	51.1	45.3	2.8	2.9	13.6	21.0	20.1	33.1	39.7	43.9	45.1	35.4	32.1
26/05/2021	05:17	05:27	46.5	52.7	39.5	51.0	49.3	41.9	2.7	2.0	10.9	16.1	20.3	28.6	34.2	40.7	44.1	34.0	25.3
26/05/2021	05:27	05:37	45.1	55.8	40.2	51.8	47.8	42.0	2.7	1.8	13.3	17.7	22.9	31.8	36.2	37.8	42.4	33.9	25.3

Date	Start Time	End Time	Leq	Lmax	Lmin	L1	L10	L90	Leq Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	05:37	05:47	44.7	55.8	39.3	51.7	47.6	41.1	2.4	3.9	15.2	23.9	24.5	30.1	35.9	37.2	42.0	34.0	25.3
26/05/2021	05:47	05:57	46.2	66.1	39.3	56.9	47.7	40.9	2.9	7.1	21.2	29.3	29.5	34.4	38.1	38.8	41.7	38.3	28.6
26/05/2021	05:57	06:07	46.1	57.5	38.6	53.5	49.4	40.7	4.0	9.6	22.8	28.6	25.9	36.2	38.2	39.6	41.5	36.4	26.8
26/05/2021	06:07	06:17	45.2	55.1	38.5	51.7	48.3	40.6	2.5	5.6	20.7	30.1	25.9	33.9	36.8	36.5	41.9	35.5	25.3
26/05/2021	06:17	06:27	42.9	55.6	38.9	50.4	45.2	40.0	2.6	10.1	22.7	30.6	26.7	32.2	33.0	32.0	39.7	34.2	25.3
26/05/2021	06:27	06:37	45.4	59.9	38.8	54.5	49.0	40.4	2.8	10.4	25.7	34.6	32.8	35.7	38.1	36.5	40.9	33.1	25.3
26/05/2021	06:37	06:47	44.0	54.8	38.1	50.7	46.5	40.5	2.9	10.9	26.8	35.1	33.5	32.3	31.9	35.8	39.9	32.3	25.3
26/05/2021	06:47	06:57	48.5	67.2	37.7	57.6	47.9	40.3	3.8	17.5	30.2	37.3	36.4	36.1	43.8	42.9	40.0	32.0	25.3
26/05/2021	06:57	07:07	47.7	63.5	38.4	56.3	49.1	40.1	4.0	16.9	29.6	40.1	36.8	36.8	42.1	40.8	39.2	30.3	25.3
26/05/2021	07:07	07:17	44.8	53.5	37.4	51.0	48.4	39.6	3.8	14.9	29.8	36.6	33.5	34.3	39.1	37.1	36.9	30.1	25.3
26/05/2021	07:17	07:27	46.1	58.2	37.6	53.8	49.4	39.1	4.1	16.1	30.4	38.9	36.3	34.4	40.5	39.3	35.9	26.9	25.3
26/05/2021	07:27	07:37	47.8	63.6	37.3	56.4	49.2	39.8	4.5	17.9	31.4	39.9	38.4	34.9	40.8	41.2	40.7	30.7	25.4
26/05/2021	07:37	07:47	44.3	55.3	34.3	51.6	47.9	37.9	3.7	14.7	28.2	34.7	31.4	35.8	38.6	37.7	36.2	28.3	25.3
26/05/2021	07:47	07:57	45.3	63.3	35.8	55.4	47.5	38.7	3.0	11.6	28.8	35.8	31.1	32.2	39.9	40.4	36.2	28.9	25.3
26/05/2021	07:57	08:07	46.0	57.8	36.0	53.3	48.8	38.2	4.4	17.3	33.6	38.3	34.8	36.2	40.4	36.3	38.1	31.9	25.3
26/05/2021	08:07	08:17	46.9	60.1	38.2	55.2	50.3	40.6	3.8	14.1	27.9	33.6	31.8	36.8	42.1	41.5	38.6	32.1	25.3
26/05/2021	08:17	08:27	43.1	54.1	34.7	50.2	46.2	37.5	5.0	14.0	27.7	35.3	33.1	31.9	36.8	37.0	33.9	26.2	25.3
26/05/2021	08:27	08:37	45.8	65.6	35.6	56.6	47.5	39.4	4.2	13.0	26.5	35.4	33.0	33.0	37.0	37.9	40.7	37.8	27.6

Table A3: Details of noise level at monitoring site N3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	09:51	10:01	54.5	70.3	41.7	63.2	57.7	47.7	14.0	25.3	33.1	38.5	39.8	48.1	51.6	45.1	42.4	36.7	22.7
22/05/2021	10:01	10:11	53.6	69.9	39.6	61.8	56.9	46.9	11.9	19.5	26.2	36.6	39.8	48.6	50.9	41.9	36.8	29.9	18.7
22/05/2021	10:11	10:21	53.4	67.6	39.6	62.1	56.5	46.9	11.9	20.3	26.9	35.2	36.5	47.3	51.1	41.6	40.1	36.0	24.4
22/05/2021	10:21	10:31	52.3	64.1	40.3	59.7	55.2	47.1	10.7	19.3	24.7	32.5	34.0	46.8	50.3	40.0	33.5	24.2	12.9
22/05/2021	10:31	10:41	52.2	64.6	37.5	60.3	55.2	46.0	9.9	18.5	27.2	29.9	33.1	46.7	50.3	38.7	31.8	22.8	13.4
22/05/2021	10:41	10:51	53.9	67.7	37.6	61.9	57.0	47.1	8.3	16.1	25.2	32.7	34.3	48.0	51.7	43.9	32.4	24.0	12.2
22/05/2021	10:51	11:01	54.4	67.8	40.6	61.8	58.3	47.8	9.5	19.5	36.8	40.2	39.1	47.2	52.3	43.4	39.5	29.9	16.7
22/05/2021	11:01	11:11	51.9	63.7	37.9	58.7	55.1	46.4	11.4	20.6	30.1	38.5	37.1	46.0	49.2	40.6	36.0	28.3	15.8
22/05/2021	11:11	11:21	51.9	63.0	38.9	59.6	55.0	46.0	14.3	23.2	29.9	34.6	35.5	46.5	49.4	40.6	35.6	27.0	15.1
22/05/2021	11:21	11:31	54.8	69.0	39.9	66.2	56.9	46.4	10.4	20.8	30.3	37.9	37.4	46.4	51.0	47.8	46.9	38.9	20.7
22/05/2021	11:31	11:41	54.7	69.1	38.9	63.4	58.2	47.3	10.5	19.2	29.3	35.3	34.3	47.5	53.1	43.1	37.2	25.4	12.6
22/05/2021	11:41	11:51	55.0	70.6	37.1	63.6	58.6	47.4	8.1	15.8	25.6	33.1	33.9	48.3	53.6	41.5	32.1	23.8	14.1
22/05/2021	11:51	12:01	53.9	64.6	39.2	61.9	57.3	47.3	7.4	18.2	26.7	33.1	34.7	47.7	51.8	44.0	38.8	28.4	13.7
22/05/2021	12:01	12:11	53.1	67.0	37.3	61.8	56.1	46.9	7.2	15.4	25.4	32.9	33.3	46.7	51.5	39.5	36.2	22.9	10.9
22/05/2021	12:11	12:21	52.9	65.8	40.6	60.5	56.0	47.0	11.5	19.9	28.2	31.8	33.1	47.4	50.9	39.7	33.7	24.5	15.0
22/05/2021	12:21	12:31	52.2	63.6	38.3	59.6	55.2	46.2	5.8	14.2	25.3	31.9	33.8	46.6	50.3	39.5	33.3	24.5	12.1
22/05/2021	12:31	12:41	52.0	66.0	38.5	59.3	54.8	47.1	11.4	20.6	27.6	33.6	34.5	46.1	49.8	39.7	36.9	31.3	14.3
22/05/2021	12:41	12:51	55.1	70.9	39.4	68.0	56.4	46.0	9.4	20.4	33.2	40.2	40.2	48.4	52.2	47.2	40.0	30.1	18.0
22/05/2021	12:51	13:01	51.0	64.0	36.9	58.2	53.9	45.4	10.5	19.2	25.7	31.2	33.4	45.7	48.8	38.4	32.7	24.1	13.8
22/05/2021	13:01	13:11	52.3	67.5	41.9	59.3	55.1	47.2	12.0	20.8	26.2	31.1	34.1	46.5	50.4	37.9	34.7	28.7	14.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	13:11	13:21	50.8	65.2	38.2	58.0	53.6	45.8	13.5	21.8	26.3	30.5	33.1	45.5	48.5	38.1	33.9	27.6	14.3
22/05/2021	13:21	13:31	51.4	66.4	37.7	59.5	54.7	44.8	13.6	22.8	28.2	33.7	35.5	45.8	49.2	38.9	34.0	26.8	14.8
22/05/2021	13:31	13:41	50.6	63.0	39.6	59.0	53.6	45.0	16.4	25.5	31.0	36.0	40.1	44.5	47.1	41.2	37.1	28.9	15.2
22/05/2021	13:41	13:51	52.0	64.6	37.7	60.4	55.2	45.8	12.7	21.5	26.4	31.1	33.6	45.9	50.2	39.0	33.1	25.1	15.6
22/05/2021	13:51	14:01	51.3	64.0	38.8	58.8	54.3	45.3	13.1	22.8	27.2	32.6	33.6	45.9	49.1	38.6	32.8	24.8	13.9
22/05/2021	14:01	14:11	50.2	64.3	37.4	58.0	53.3	44.2	11.8	20.3	25.9	33.4	32.7	45.1	47.9	37.1	32.0	23.9	15.0
22/05/2021	14:11	14:21	51.1	65.5	39.3	61.1	53.8	44.4	12.1	20.7	26.9	34.8	36.4	44.9	49.0	38.7	36.2	26.9	17.5
22/05/2021	14:21	14:31	51.2	66.4	39.5	58.5	54.2	45.5	13.6	22.3	27.8	35.1	35.7	45.3	48.8	39.8	35.3	28.3	16.2
22/05/2021	14:31	14:41	51.9	64.3	37.6	59.2	55.1	45.5	7.5	15.4	25.0	30.7	32.2	46.3	50.0	38.7	32.8	24.5	12.0
22/05/2021	14:41	14:51	52.6	64.5	38.7	60.6	55.7	46.6	8.0	16.6	27.5	33.7	34.1	46.1	50.9	39.9	35.1	24.3	12.1
22/05/2021	14:51	15:01	51.9	63.5	39.0	59.3	55.4	45.6	8.2	16.2	25.0	31.8	33.3	46.3	50.0	38.7	32.1	21.2	12.0
22/05/2021	15:01	15:11	55.8	71.3	40.7	67.7	58.4	46.4	10.7	21.7	33.8	42.0	41.5	47.5	52.3	50.0	43.4	33.6	18.5
22/05/2021	15:11	15:21	53.3	64.6	39.8	60.5	56.5	47.8	9.4	19.1	28.6	33.8	36.1	46.6	51.4	42.9	36.0	26.5	14.0
22/05/2021	15:21	15:31	50.6	64.1	36.5	57.9	53.5	45.4	9.7	18.2	26.0	33.7	34.2	45.2	48.3	38.6	32.5	24.3	15.5
22/05/2021	15:31	15:41	53.3	65.1	40.1	60.5	56.6	47.1	9.5	19.6	31.8	36.7	36.5	46.8	51.2	42.7	37.5	31.7	17.9
22/05/2021	15:41	15:51	55.1	70.8	39.3	63.7	58.1	47.8	5.6	16.4	32.1	40.4	38.9	47.4	52.9	46.1	40.0	31.8	21.0
22/05/2021	15:51	16:01	55.7	72.0	36.5	65.5	59.0	47.6	5.1	14.5	27.5	35.5	35.2	47.6	54.6	42.3	36.1	26.8	17.1
22/05/2021	16:01	16:11	55.5	66.7	40.6	63.1	58.7	49.1	4.1	14.8	28.7	40.6	38.9	48.1	53.9	42.5	37.2	27.6	14.6
22/05/2021	16:11	16:21	54.8	66.6	38.9	62.9	57.9	48.3	4.2	15.4	32.7	43.4	42.6	48.3	52.2	43.7	36.9	30.0	17.6
22/05/2021	16:21	16:31	56.9	69.3	38.6	63.9	60.1	46.1	1.9	17.1	33.9	40.5	37.8	45.6	55.6	47.3	39.8	30.9	17.5
22/05/2021	16:31	16:41	58.9	70.3	35.4	66.8	62.6	48.7	3.5	18.3	32.2	39.1	37.9	48.3	58.0	46.9	39.0	30.0	16.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	16:41	16:51	56.1	67.5	35.5	63.6	59.5	42.7	0.1	13.3	27.4	34.8	34.9	45.0	55.2	45.8	35.3	25.7	14.5
22/05/2021	16:51	17:01	48.4	65.4	36.0	61.1	49.3	39.2	3.1	15.2	28.9	39.4	41.7	38.1	41.7	42.5	37.1	28.6	16.2
22/05/2021	17:01	17:11	46.0	61.6	35.7	56.0	48.8	39.4	4.0	14.0	27.8	37.7	36.0	37.6	39.5	39.5	37.1	28.3	14.4
22/05/2021	17:11	17:21	47.9	64.0	37.4	58.2	51.9	40.0	4.5	15.1	29.5	41.0	38.2	37.8	40.8	42.1	37.8	28.7	16.1
22/05/2021	17:21	17:31	46.8	58.1	37.1	54.2	50.3	40.4	2.6	13.4	26.5	34.9	32.5	36.1	38.8	40.5	42.4	33.2	13.7
22/05/2021	17:31	17:41	49.4	72.9	37.1	59.4	52.4	41.5	-1.1	12.3	28.4	40.1	37.0	40.2	41.8	43.4	43.3	33.0	14.6
22/05/2021	17:41	17:51	48.8	62.7	38.2	57.7	52.9	42.2	0.5	13.3	28.4	39.9	36.1	36.8	42.8	43.0	42.3	30.9	13.4
22/05/2021	17:51	18:01	51.6	62.1	40.3	57.7	54.9	45.6	-1.3	11.6	28.3	39.9	34.7	38.9	43.5	43.5	48.8	37.2	14.6
22/05/2021	18:01	18:11	54.1	65.0	43.0	60.1	57.5	47.5	-1.7	10.9	27.8	40.6	39.3	38.4	42.0	44.4	51.3	47.0	22.2
22/05/2021	18:11	18:21	54.5	64.2	45.8	60.5	57.0	51.2	-1.9	11.6	29.0	38.1	36.5	39.5	43.5	45.4	50.6	49.7	24.5
22/05/2021	18:21	18:31	52.8	62.8	45.2	59.1	56.0	50.4	-1.4	12.3	28.1	37.2	32.7	37.7	43.1	43.5	46.0	49.8	24.8
22/05/2021	18:31	18:41	52.7	69.3	43.3	59.7	53.7	50.8	-1.0	11.5	27.1	36.4	38.9	42.6	40.8	39.9	44.4	50.3	24.4
22/05/2021	18:41	18:51	58.7	88.1	48.4	58.4	52.4	50.9	2.8	10.2	22.6	30.2	36.2	44.3	49.6	52.5	54.3	52.3	37.2
22/05/2021	18:51	19:01	59.8	86.3	43.8	71.6	55.7	45.6	2.6	9.1	20.9	28.8	32.6	38.4	48.1	53.7	55.7	53.8	43.3
22/05/2021	19:01	19:11	47.0	61.7	41.0	56.7	48.5	43.9	-2.6	8.1	23.5	30.9	27.9	38.4	39.0	39.4	43.1	35.7	14.2
22/05/2021	19:11	19:21	45.7	57.0	40.7	52.3	47.5	43.1	-2.4	10.4	26.6	34.0	31.1	33.1	35.4	37.4	41.7	38.6	14.9
22/05/2021	19:21	19:31	46.9	54.9	42.1	51.5	49.3	44.0	-2.2	9.9	24.9	34.9	31.3	32.9	34.8	35.4	44.0	40.0	15.3
22/05/2021	19:31	19:41	46.8	53.1	42.3	50.2	47.7	45.6	-2.5	6.4	22.5	31.0	27.6	30.9	33.4	34.8	43.7	41.9	14.9
22/05/2021	19:41	19:51	46.7	60.3	41.8	50.9	47.9	44.9	-2.4	6.8	20.2	29.8	26.8	32.6	34.2	35.9	43.7	41.1	15.3
22/05/2021	19:51	20:01	47.5	61.8	43.1	55.3	48.4	45.3	-2.6	7.5	22.2	34.8	36.9	36.1	37.3	36.9	43.6	40.0	16.8
22/05/2021	20:01	20:11	46.8	56.9	41.5	51.9	48.5	44.2	-2.5	9.4	25.5	32.5	29.5	35.0	36.6	35.1	43.5	40.6	14.8

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	20:11	20:21	48.4	58.6	42.0	53.1	49.4	46.4	-2.7	8.6	24.0	33.8	32.6	34.4	35.2	35.7	45.9	41.6	17.9
22/05/2021	20:21	20:31	48.8	53.6	43.9	50.8	49.8	47.4	-2.9	6.6	21.2	28.6	28.0	33.2	33.6	35.8	47.0	42.0	16.4
22/05/2021	20:31	20:41	48.4	60.5	42.2	53.9	49.3	46.5	-2.9	7.2	19.2	25.5	25.1	33.9	36.2	35.9	46.8	39.6	16.8
22/05/2021	20:41	20:51	48.0	52.5	43.3	50.2	49.1	46.5	-3.4	6.5	20.3	24.2	28.6	32.7	33.6	33.4	46.9	37.8	16.0
22/05/2021	20:51	21:01	48.3	61.3	41.9	57.5	49.0	45.8	-2.3	9.1	22.5	36.6	39.8	36.2	35.4	35.4	45.5	37.6	15.6
22/05/2021	21:01	21:11	47.4	52.9	41.5	50.9	48.9	45.6	-3.2	5.9	18.7	30.0	30.8	31.9	32.6	34.3	45.5	40.2	16.4
22/05/2021	21:11	21:21	45.5	53.5	41.0	48.8	47.3	43.1	-3.0	5.3	20.4	28.1	25.5	32.3	32.5	33.6	43.3	38.4	13.4
22/05/2021	21:21	21:31	48.1	57.3	39.3	53.6	50.6	44.1	-3.4	7.4	26.2	35.1	33.2	32.0	33.8	33.6	46.9	35.6	12.8
22/05/2021	21:31	21:41	48.3	56.8	38.8	52.7	50.5	44.3	-3.6	5.2	21.7	30.9	26.7	32.1	32.8	34.5	47.5	36.5	12.7
22/05/2021	21:41	21:51	47.1	59.9	38.7	54.3	50.0	42.1		11.0	23.8	34.6	36.8	37.9	39.7	36.9	42.9	34.8	13.3
22/05/2021	21:51	22:01	47.3	59.0	38.6	54.9	50.5	42.6	-2.5	8.3	23.6	33.7	31.0	39.3	42.8	38.7	41.1	34.0	14.0
22/05/2021	22:01	22:11	45.0	57.0	36.7	52.5	46.7	41.5	0.1	5.2	16.9	19.7	21.9	33.5	38.7	36.0	41.9	33.0	14.7
22/05/2021	22:11	22:21	45.6	58.1	35.7	54.2	47.7	41.4	1.0	8.6	21.8	31.4	31.1	35.0	38.5	36.3	42.4	31.7	17.6
22/05/2021	22:21	22:31	44.8	60.6	36.8	52.0	47.6	40.6	5.7	12.2	29.6	27.6	26.4	35.1	39.1	35.9	40.7	30.8	13.9
22/05/2021	22:31	22:41	44.2	57.5	35.7	51.4	46.0	41.0	-0.7	3.8	20.5	26.0	23.9	34.9	36.8	34.0	41.2	32.5	13.0
22/05/2021	22:41	22:51	42.9	56.8	35.2	48.7	44.6	39.7	7.2	12.3	16.5	19.9	23.8	32.9	32.4	32.5	40.9	30.7	12.0
22/05/2021	22:51	23:01	46.9	60.1	36.8	52.4	49.1	41.5	4.6	9.8	20.3	21.6	23.6	32.4	34.4	35.4	44.2	41.6	15.9
22/05/2021	23:01	23:11	46.7	54.6	36.5	52.8	49.5	41.9	0.4	5.4	12.8	17.4	18.1	29.4	31.0	32.5	44.3	41.7	15.1
22/05/2021	23:11	23:21	51.5	62.8	41.3	54.4	53.3	48.9	-0.7	1.7	17.8	16.3	20.2	30.7	36.5	35.2	48.8	47.4	19.4
22/05/2021	23:21	23:31	50.8	64.4	39.5	58.2	51.8	47.9	-0.4	3.1	19.6	18.5	25.7	38.1	43.4	35.4	47.4	45.1	21.6
22/05/2021	23:31	23:41	50.2	62.3	39.4	53.6	51.6	47.8	3.2	7.8	15.9	14.7	19.4	32.6	37.6	33.2	47.9	45.1	18.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	23:41	23:51	50.7	57.5	39.0	53.2	52.2	48.6	0.7	4.9	15.0	22.4	19.6	30.7	33.9	33.6	48.5	46.1	19.8
22/05/2021	23:51	00:01	50.7	56.3	39.1	53.1	52.3	48.5	3.2	8.3	16.4	15.0	19.2	30.1	34.1	33.6	48.8	45.5	19.6
23/05/2021	00:01	00:11	50.9	57.8	42.5	53.7	52.3	48.7	-1.9	4.0	15.8	29.9	36.8	29.6	28.7	32.9	48.8	45.6	19.0
23/05/2021	00:11	00:21	51.1	54.2	44.9	53.0	52.5	49.2	-1.8		13.6	11.4	17.9	25.0	27.4	32.5	49.3	46.0	19.1
23/05/2021	00:21	00:31	50.9	55.0	37.4	54.0	52.7	47.4	-5.7	0.4	12.5	11.6	16.5	27.7	29.3	30.7	49.2	45.6	18.3
23/05/2021	00:31	00:41	51.1	60.6	41.6	56.3	52.5	48.7	-3.3	5.5	18.5	36.5	33.2	32.1	29.6	30.7	48.9	45.9	18.3
23/05/2021	00:41	00:51	51.1	54.0	40.3	53.1	52.6	48.9	-4.9	1.5	13.1	16.2	22.2	25.4	29.0	29.5	48.9	46.7	18.5
23/05/2021	00:51	01:01	51.7	61.7	40.8	58.7	52.8	48.6	-4.1	3.2	17.2	16.2	23.5	30.2	30.8	30.2	49.3	47.5	19.5
23/05/2021	01:01	01:11	50.6	53.8	37.7	52.7	52.2	48.2	-3.5	1.9	19.6	18.7	26.0	28.8	29.8	29.3	48.3	46.3	18.2
23/05/2021	01:11	01:21	50.4	53.6	39.0	52.6	52.1	47.8	-3.9	2.1	18.5	19.6	23.4	28.8	30.0	27.7	47.9	46.3	18.2
23/05/2021	01:21	01:31	47.4	54.8	34.0	53.9	52.2	39.7	-4.1	4.1	18.1	16.8	20.8	26.0	28.0	28.4	45.2	42.9	15.3
23/05/2021	01:31	01:41	51.1	61.9	40.6	59.1	52.1	48.1	-0.7	7.0	19.9	20.9	25.3	31.1	31.6	29.4	48.1	47.6	19.9
23/05/2021	01:41	01:51	49.6	55.1	38.5	52.1	51.2	47.3	-4.9	1.1	18.4	18.6	23.7	28.5	29.9	29.8	47.1	45.4	21.7
23/05/2021	01:51	02:01	47.4	57.1	36.9	51.1	50.0	43.3	-5.2	1.4	17.5	16.0	22.9	28.0	30.3	30.1	45.5	42.0	21.7
23/05/2021	02:01	02:11	53.6	59.1	37.4	57.7	56.8	43.9	-2.4	0.5	14.0	13.7	18.7	24.4	28.1	30.1	49.7	51.1	26.3
23/05/2021	02:11	02:21	48.0	54.5	37.4	53.3	52.1	42.8	-3.1	0.6	16.0	14.1	21.4	26.0	29.6	29.0	45.7	43.2	29.7
23/05/2021	02:21	02:31	46.8	55.0	35.6	53.7	51.9	39.7	-3.3	2.2	16.7	16.2	22.0	29.2	29.9	29.3	44.7	41.8	24.6
23/05/2021	02:31	02:41	47.9	56.0	36.2	54.4	52.4	42.0	-3.5	4.4	20.1	17.7	21.8	28.1	30.5	31.2	46.2	42.1	15.5
23/05/2021	02:41	02:51	45.3	55.4	36.0	52.9	46.9	41.5	-3.4	3.2	17.5	13.7	20.4	27.2	30.3	30.0	44.3	36.3	11.2
23/05/2021	02:51	03:01	45.7	55.0	37.3	52.4	47.1	42.7	-1.3	7.3	22.5	22.8	25.2	28.3	29.8	29.9	44.6	36.5	12.7
23/05/2021	03:01	03:11	50.6	56.1	38.0	55.1	54.0	43.8	1.6	6.5	15.7	27.7	31.6	27.6	28.7	29.7	48.2	46.3	16.2

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	03:11	03:21	50.6	55.2	38.5	53.8	52.8	45.8	1.8	7.3	15.9	15.5	20.8	28.5	32.8	32.2	48.8	45.1	20.6
23/05/2021	03:21	03:31	54.1	59.8	37.2	58.9	57.6	48.7	-4.2	1.1	18.0	15.2	18.6	26.7	28.9	31.8	51.0	51.0	21.4
23/05/2021	03:31	03:41	48.1	51.4	38.3	50.4	49.5	46.0	-2.7	3.0	14.4	13.3	21.1	28.5	30.1	31.5	46.9	40.9	11.9
23/05/2021	03:41	03:51	56.8	60.5	41.6	59.4	58.5	54.2	-3.8	6.7	16.8	15.4	22.3	28.5	30.2	30.4	53.0	54.3	22.3
23/05/2021	03:51	04:01	51.9	62.9	37.8	57.7	56.3	46.2	-3.7	3.1	18.3	18.5	24.7	29.6	29.4	31.2	49.1	48.3	16.8
23/05/2021	04:01	04:11	51.8	55.5	41.8	53.9	53.3	49.8	-4.0	3.0	15.5	15.3	21.7	27.9	29.6	30.8	50.5	45.5	18.2
23/05/2021	04:11	04:21	49.1	55.7	38.3	53.8	52.4	45.6	-4.4	1.9	16.0	15.9	24.8	30.1	30.7	31.6	48.2	40.8	14.4
23/05/2021	04:21	04:31	53.1	62.9	38.5	60.5	58.6	45.5	-5.6	-0.1	9.7	14.5	16.1	29.6	32.4	32.8	49.8	50.0	19.4
23/05/2021	04:31	04:41	47.9	63.7	37.1	55.8	49.9	43.1	-3.1	0.9	13.2	13.2	18.9	29.6	32.2	32.2	46.3	41.7	15.3
23/05/2021	04:41	04:51	47.8	57.0	38.0	51.5	49.4	45.4	-2.3	1.9	13.8	14.5	18.3	31.0	35.7	39.6	46.1	37.1	12.4
23/05/2021	04:51	05:01	49.8	60.3	43.8	56.9	50.8	47.4	-3.7	0.7	11.9	12.9	16.8	36.5	40.7	44.6	46.5	36.7	11.7
23/05/2021	05:01	05:11	47.8	62.0	42.0	53.8	49.3	45.1	-3.1	2.2	15.6	16.8	25.5	33.0	37.5	41.5	45.3	36.1	11.8
23/05/2021	05:11	05:21	54.4	74.6	40.4	68.5	52.4	44.4	-1.8	7.6	19.9	25.4	28.7	48.8	49.7	48.7	44.2	36.9	12.3
23/05/2021	05:21	05:31	51.9	73.9	37.8	67.5	46.9	42.4	-3.2	5.0	19.1	30.1	28.3	46.9	47.3	44.8	42.5	34.5	11.1
23/05/2021	05:31	05:41	49.9	73.4	35.6	62.5	50.7	40.9	-0.4	7.9	24.8	36.8	36.7	38.8	41.9	45.2	43.8	38.2	28.5
23/05/2021	05:41	05:51	53.1	64.3	38.1	60.0	56.6	43.7	-0.9	12.9	25.0	31.7	32.3	46.5	51.0	42.5	40.3	30.4	15.0
23/05/2021	05:51	06:01	55.9	78.0	39.9	63.6	58.5	49.7	-2.2	8.3	23.8	32.7	33.7	48.6	54.1	46.5	39.6	29.9	11.7
23/05/2021	06:01	06:11	49.7	63.5	33.8	58.7	54.4	38.1	-2.1	9.0	23.1	35.0	34.3	43.4	47.1	39.6	37.1	27.4	11.7
23/05/2021	06:11	06:21	49.1	64.5	34.5	61.5	52.0	38.7	-2.1	9.4	24.0	31.6	29.2	41.9	43.5	45.3	38.5	25.9	9.6
23/05/2021	06:21	06:31	51.9	71.2	34.9	64.5	53.2	39.2	-1.9	9.4	25.3	33.3	30.9	37.3	47.9	48.7	39.6	28.8	11.4
23/05/2021	06:31	06:41	50.9	70.7	35.0	63.7	50.6	40.1	-1.6	11.7	25.8	34.0	30.9	38.8	47.5	46.8	38.4	27.0	11.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	06:41	06:51	47.7	68.6	34.7	61.3	48.2	37.7	-1.5	9.4	24.6	33.4	31.8	33.9	41.1	45.6	35.7	26.2	10.0
23/05/2021	06:51	07:01	44.0	62.6	34.0	55.3	45.6	37.3	-2.0	10.0	24.2	31.5	27.2	32.6	37.8	40.4	35.3	28.5	11.5
23/05/2021	07:01	07:11	50.6	65.8	34.3	59.9	55.0	38.6	-1.4	11.6	26.0	33.8	33.2	43.6	48.4	41.3	35.3	27.6	10.2
23/05/2021	07:11	07:21	56.1	66.8	43.3	63.1	59.1	50.6	-0.4	14.1	27.3	33.5	35.0	49.2	54.6	43.7	38.2	29.6	8.7
23/05/2021	07:21	07:31	58.9	70.9	42.0	68.3	62.9	50.3	3.5	23.4	36.4	42.6	39.6	49.5	55.0	53.9	49.1	40.0	22.7
23/05/2021	07:31	07:41	55.4	68.5	41.6	62.3	58.5	49.8	-0.1	13.2	28.1	34.4	34.7	48.8	53.8	43.3	35.9	27.5	8.6
23/05/2021	07:41	07:51	55.0	67.5	42.8	62.4	57.9	49.9	1.6	15.9	31.9	39.5	39.5	49.0	52.8	43.1	36.1	24.6	10.1
23/05/2021	07:51	08:01	54.6	67.5	40.1	61.8	57.6	49.0	0.3	12.4	31.7	34.8	33.9	48.4	52.7	43.4	37.4	23.1	9.7
23/05/2021	08:01	08:11	56.7	76.8	39.8	63.8	59.5	50.8	2.3	14.5	29.1	40.9	41.7	49.5	54.0	47.2	44.9	43.0	34.1
23/05/2021	08:11	08:21	57.0	69.1	43.9	64.5	60.1	50.9	4.3	20.0	30.5	37.6	36.6	50.9	55.0	45.7	39.9	24.0	11.4
23/05/2021	08:21	08:31	53.3	64.1	38.4	59.5	56.3	47.9	0.9	13.1	29.0	36.2	35.1	47.5	51.3	41.1	32.8	20.5	8.8
23/05/2021	08:31	08:41	55.7	68.5	40.0	62.9	58.8	49.6	2.6	14.6	31.3	35.8	35.2	48.9	54.2	43.8	34.9	24.6	10.5
23/05/2021	08:41	08:51	55.5	69.5	37.7	62.1	58.5	50.0	3.3	15.0	29.7	38.4	39.3	48.5	53.8	42.9	36.4	31.7	20.6
23/05/2021	08:51	09:01	54.9	70.0	41.3	62.2	57.9	49.0	1.7	13.8	29.8	37.3	37.1	48.2	53.0	44.2	37.1	27.0	14.1
23/05/2021	09:01	09:11	55.5	68.1	42.8	65.2	58.3	49.0	2.9	21.8	36.0	41.6	38.8	48.2	52.6	48.4	41.9	31.1	13.7
23/05/2021	09:11	09:21	55.9	69.8	39.9	64.7	59.3	48.8	2.6	19.9	29.3	40.2	39.8	48.2	54.4	43.9	35.9	24.5	13.9
23/05/2021	09:21	09:31	56.4	72.8	43.7	64.8	59.4	49.9	4.9	14.1	28.6	35.3	34.6	49.2	54.2	48.8	37.1	24.2	12.0
23/05/2021	09:31	09:41	56.7	83.5	39.4	65.3	58.3	49.1	4.0	13.6	27.2	35.8	37.4	48.8	52.7	49.4	48.9	45.4	35.2
23/05/2021	09:41	09:51	55.2	66.6	41.0	62.5	58.8	48.5	2.3	15.4	28.2	36.2	36.9	48.2	53.6	44.0	35.0	25.6	12.4
23/05/2021	09:51	10:01	53.8	64.4	42.0	60.1	56.9	49.1	2.2	11.5	26.3	36.6	36.3	48.5	51.8	40.7	32.0	21.9	9.6
23/05/2021	10:01	10:11	54.5	66.2	40.5	61.7	57.7	48.5	0.7	14.2	29.7	37.4	36.4	47.7	52.9	42.0	34.0	24.7	11.6

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	10:11	10:21	53.9	64.6	41.4	61.0	56.9	48.1	0.8	11.1	26.7	36.8	34.5	47.2	52.3	40.5	35.5	30.7	17.7
23/05/2021	10:21	10:31	54.3	68.0	42.5	61.2	57.2	48.9	4.8	17.1	28.7	37.8	36.9	48.4	52.4	40.1	34.7	27.7	11.5
23/05/2021	10:31	10:41	53.0	65.2	40.9	61.2	55.9	47.4	3.1	16.6	27.1	33.0	34.4	47.5	51.1	40.2	30.9	20.9	11.6
23/05/2021	10:41	10:51	53.6	67.4	40.3	61.4	56.6	47.7	3.8	14.7	27.8	36.0	35.8	47.1	51.7	42.2	36.5	31.8	13.9
23/05/2021	10:51	11:01	53.5	64.5	43.1	61.1	56.5	48.0	10.4	17.5	27.1	35.5	36.9	47.3	51.5	41.6	36.5	29.8	13.5
23/05/2021	11:01	11:11	53.4	65.7	39.9	60.5	56.7	47.6	10.3	18.5	29.2	38.5	37.6	47.2	51.3	41.0	37.0	31.2	12.6
23/05/2021	11:11	11:21	52.3	64.7	39.1	59.2	55.3	46.9	6.3	14.3	28.5	33.6	33.7	46.9	50.0	40.9	34.6	26.2	10.9
23/05/2021	11:21	11:31	53.2	67.2	35.3	61.6	56.4	46.7	8.7	16.5	25.9	34.0	34.4	46.5	51.7	39.8	32.8	25.5	11.2
23/05/2021	11:31	11:41	52.5	64.7	40.9	60.0	55.4	47.2	4.9	13.3	24.9	34.7	34.4	46.4	50.6	39.3	35.8	31.3	15.9
23/05/2021	11:41	11:51	51.9	63.1	37.7	59.1	55.0	46.3	6.1	13.2	25.0	34.5	33.8	46.4	49.8	39.0	33.4	27.4	17.1
23/05/2021	11:51	12:01	52.6	63.8	37.5	60.1	55.9	46.5	3.3	14.1	29.7	36.6	34.6	46.4	50.8	39.3	33.7	27.3	12.7
23/05/2021	12:01	12:11	51.7	62.4	38.6	58.1	54.7	46.9	9.4	16.4	24.3	36.6	35.8	46.8	49.2	38.6	31.9	24.9	11.6
23/05/2021	12:11	12:21	53.2	64.7	39.4	60.9	56.5	47.0	9.1	16.4	26.2	34.5	35.1	47.3	51.1	42.8	30.6	20.9	11.6
23/05/2021	12:21	12:31	53.7	65.3	39.9	61.3	56.8	47.9	9.8	16.6	25.5	31.4	33.6	47.8	51.9	41.3	35.1	31.6	21.7
23/05/2021	12:31	12:41	52.2	66.8	38.8	59.4	55.1	46.6	7.9	14.0	24.0	31.5	33.4	47.1	50.0	39.9	32.8	25.3	12.3
23/05/2021	12:41	12:51	52.9	66.7	39.9	60.8	56.0	46.7	9.5	16.6	24.4	30.6	33.2	47.2	51.2	38.5	31.8	25.0	12.3
23/05/2021	12:51	13:01	52.1	65.0	39.4	59.4	55.2	45.9	13.1	20.7	26.4	34.3	34.6	46.4	50.3	37.5	30.8	22.6	12.6
23/05/2021	13:01	13:11	52.1	64.3	40.0	59.8	55.0	46.6	12.1	21.5	29.6	36.7	37.0	45.5	49.6	41.8	38.7	33.1	16.1
23/05/2021	13:11	13:21	50.9	63.7	36.1	58.1	53.8	45.3	11.0	18.4	26.3	37.7	39.7	44.9	48.3	37.3	33.6	29.6	13.3
23/05/2021	13:21	13:31	49.5	67.0	38.3	56.7	52.3	43.9	12.5	19.6	26.7	35.4	35.7	44.4	46.5	37.8	32.7	24.4	13.7
23/05/2021	13:31	13:41	52.3	69.0	37.6	63.4	54.1	44.1	12.0	19.5	31.1	42.2	44.9	46.1	48.5	38.4	32.4	25.7	14.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	13:41	13:51	50.1	64.5	37.3	57.7	53.2	44.2	10.7	17.1	25.3	32.8	33.2	44.4	48.1	38.2	29.7	22.4	13.2
23/05/2021	13:51	14:01	51.9	65.6	36.2	59.7	54.9	45.4	4.3	16.8	28.2	37.1	35.6	45.6	49.5	41.8	34.8	28.0	12.8
23/05/2021	14:01	14:11	51.7	64.8	38.0	59.1	54.7	45.3	11.2	18.2	25.0	34.6	36.5	45.6	49.8	37.8	30.3	22.8	12.6
23/05/2021	14:11	14:21	51.2	63.2	37.6	57.8	54.2	46.0	4.3	10.7	25.2	30.9	32.4	46.1	49.0	38.8	32.0	26.3	16.9
23/05/2021	14:21	14:31	52.7	64.5	38.6	62.3	55.1	46.1	4.5	15.9	31.4	38.7	36.9	46.2	50.0	43.2	38.1	29.6	15.5
23/05/2021	14:31	14:41	53.5	64.0	36.9	61.0	57.2	45.2		11.1	24.6	32.6	34.5	44.2	52.6	39.6	30.9	22.0	11.5
23/05/2021	14:41	14:51	50.6	61.3	34.3	59.0	54.5	42.7	5.0	13.6	24.2	31.4	29.9	39.2	49.9	38.3	28.2	17.9	11.5
23/05/2021	14:51	15:01	53.9	68.7	34.7	66.1	55.6	42.4	5.7	18.6	31.9	40.8	41.2	44.4	51.5	46.4	38.9	29.6	16.4
23/05/2021	15:01	15:11	53.8	66.2	33.2	60.9	57.0	47.1	3.6	18.7	32.5	38.0	39.5	42.8	52.6	42.7	33.3	26.5	11.4
23/05/2021	15:11	15:21	50.4	61.7	37.0	56.8	53.3	45.1	6.3	14.2	24.3	35.3	35.6	44.6	48.1	37.1	32.7	23.4	13.8
23/05/2021	15:21	15:31	46.3	63.8	33.8	57.2	50.0	37.0	3.6	11.1	23.0	35.8	31.7	38.2	42.8	39.1	34.8	23.4	11.7
23/05/2021	15:31	15:41	43.0	60.0	33.8	52.9	45.8	36.7	5.0	12.7	25.4	35.6	32.0	36.2	37.9	35.0	29.3	19.8	10.4
23/05/2021	15:41	15:51	42.4	59.2	31.2	52.1	45.1	35.8	3.8	12.3	27.5	33.5	31.7	34.5	36.9	36.1	30.1	22.4	10.8
23/05/2021	15:51	16:01	43.3	58.9	33.2	52.5	46.3	36.8	4.9	12.7	24.4	36.0	34.7	34.0	37.3	35.9	33.2	24.4	11.2
23/05/2021	16:01	16:11	43.3	57.3	32.7	51.9	47.0	36.5	4.5	12.7	24.9	35.4	35.1	34.5	37.4	36.6	31.9	22.2	10.0
23/05/2021	16:11	16:21	43.8	60.2	34.4	53.2	46.2	37.9	4.2	14.4	26.5	34.2	31.8	34.5	37.8	38.2	36.0	20.7	9.5
23/05/2021	16:21	16:31	44.8	59.8	34.2	56.2	47.6	37.0	0.3	11.8	26.1	38.1	34.3	34.7	37.5	39.9	33.2	20.8	9.7
23/05/2021	16:31	16:41	44.7	64.9	34.2	54.6	47.5	37.6	2.2	10.5	25.2	36.7	37.9	35.8	38.1	37.7	34.1	22.4	10.3
23/05/2021	16:41	16:51	47.2	66.6	34.9	59.4	48.6	38.8	2.1	12.9	27.7	37.3	35.1	35.7	39.1	44.8	32.8	21.6	10.0
23/05/2021	16:51	17:01	50.5	70.8	36.0	64.1	49.3	39.0	0.7	13.5	29.3	44.8	47.4	39.9	39.1	38.1	33.3	23.5	11.5
23/05/2021	17:01	17:11	46.3	63.3	34.6	56.3	49.1	37.8	1.2	12.5	29.1	38.3	38.4	39.9	40.5	37.2	33.6	23.9	12.8

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	17:11	17:21	52.2	71.8	35.6	63.8	55.5	39.8		15.5	34.5	42.2	43.1	42.4	48.5	44.8	38.1	26.7	13.3
23/05/2021	17:21	17:31	44.8	64.5	33.8	52.8	46.5	37.9	0.3	12.2	26.9	37.2	38.2	35.7	38.6	37.0	32.2	21.2	10.6
23/05/2021	17:31	17:41	45.1	58.8	36.1	55.3	47.8	39.2	-0.7	14.0	29.1	35.6	32.8	35.5	40.5	39.2	34.7	25.1	10.8
23/05/2021	17:41	17:51	45.3	58.0	36.7	52.3	48.2	40.3	-0.4	12.0	27.9	34.7	32.1	35.4	40.4	38.9	38.1	25.8	11.0
23/05/2021	17:51	18:01	49.1	60.2	38.1	56.6	52.9	41.8	-0.2	14.2	28.1	36.2	34.1	35.4	42.8	41.9	45.2	34.5	12.5
23/05/2021	18:01	18:11	51.4	65.6	42.3	56.6	54.5	46.2	-0.1	12.3	31.5	38.6	35.0	36.6	39.3	43.7	49.1	39.3	13.3
23/05/2021	18:11	18:21	50.6	59.1	43.6	56.0	54.0	46.0	-0.4	13.2	26.8	34.5	31.8	36.9	39.5	42.4	48.2	41.1	12.3
23/05/2021	18:21	18:31	47.4	56.7	43.9	52.3	49.2	45.5	0.6	13.1	26.7	33.0	31.1	36.2	38.4	41.1	38.8	42.9	13.6
23/05/2021	18:31	18:41	46.9	54.9	41.0	52.9	49.0	44.1	1.1	16.0	27.6	33.9	33.1	35.6	37.0	35.1	40.8	43.1	11.5
23/05/2021	18:41	18:51	46.5	64.6	41.0	53.6	47.7	44.4	1.9	15.8	27.7	34.6	32.6	35.9	39.0	35.6	40.3	41.2	13.7
23/05/2021	18:51	19:01	44.8	60.1	37.6	53.5	46.9	40.6	2.4	15.1	33.1	34.4	31.4	33.1	37.2	36.2	39.4	35.2	11.0
26/05/2021	14:55	15:05	62.3	82.5	41.6	73.4	66.0	47.1	23.0	32.8	37.8	41.7	47.5	54.2	57.2	56.7	54.3	48.8	37.0
26/05/2021	15:05	15:15	50.6	71.6	36.3	61.5	53.6	39.6	22.8	32.3	36.4	38.4	40.0	42.9	45.1	43.9	41.0	34.4	26.1
26/05/2021	15:15	15:25	48.3	69.2	35.5	59.1	50.9	40.0	1.6	13.1	29.2	36.5	38.9	38.3	41.8	43.0	40.5	33.5	22.6
26/05/2021	15:25	15:35	56.6	72.4	37.8	69.0	60.4	41.6	6.2	19.5	35.5	48.5	50.3	43.8	50.9	50.0	44.5	34.6	18.7
26/05/2021	15:35	15:45	46.4	60.9	39.3	53.0	49.4	41.9	14.6	23.1	29.6	36.7	36.2	38.4	40.6	39.6	37.4	28.2	14.9
26/05/2021	15:45	15:55	46.4	62.0	35.6	55.8	49.0	40.2	14.6	23.0	29.1	37.1	37.2	37.5	41.3	39.9	34.8	26.2	14.8
26/05/2021	15:55	16:05	51.0	65.8	39.1	62.9	53.3	43.3	16.9	26.4	33.9	44.3	42.9	41.5	44.3	43.8	39.7	29.9	15.0
26/05/2021	16:05	16:15	50.0	65.8	37.8	61.8	52.3	41.0	7.8	21.8	32.3	40.9	40.0	39.7	44.7	44.0	40.1	31.0	14.4
26/05/2021	16:15	16:25	60.8	87.6	41.9	69.8	57.7	46.7	11.1	26.9	42.0	52.7	55.2	54.9	54.3	48.0	42.2	33.5	18.9
26/05/2021	16:25	16:35	56.1	69.6	41.0	66.6	59.6	47.0	6.7	23.8	37.1	43.9	42.9	46.7	51.8	50.1	46.7	38.1	18.0

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	16:35	16:45	53.8	70.9	42.4	66.1	55.2	45.8	6.2	23.2	35.2	44.1	44.8	46.2	48.5	46.7	42.7	32.7	14.6
26/05/2021	16:45	16:55	51.9	77.4	36.7	63.6	52.7	41.9	4.3	18.8	33.0	39.3	36.8	37.4	44.1	46.2	47.0	42.3	30.5
26/05/2021	16:55	17:05	47.2	67.7	33.0	57.0	50.9	37.4	4.1	16.5	27.9	37.4	36.5	36.3	38.2	39.1	42.9	34.3	26.5
26/05/2021	17:05	17:15	54.8	69.5	32.8	64.9	58.4	38.5	4.9	18.1	29.8	41.6	41.4	46.2	49.6	49.8	45.7	37.1	25.0
26/05/2021	17:15	17:25	55.4	72.1	41.1	65.9	59.6	44.7	4.3	17.9	26.4	40.4	44.7	47.2	50.7	49.6	46.1	37.2	25.1
26/05/2021	17:25	17:35	58.4	70.2	38.2	65.2	62.6	42.4	2.0	15.8	26.7	35.7	41.1	49.1	54.2	53.7	49.5	40.4	28.6
26/05/2021	17:35	17:45	55.9	68.5	46.4	63.7	58.4	51.4	2.4	17.6	31.8	45.2	46.9	46.0	50.1	50.6	46.3	37.6	25.8
26/05/2021	17:45	17:55	51.4	63.7	42.3	58.9	54.0	45.9	-0.7	12.5	27.0	39.4	39.8	41.4	45.4	46.1	42.3	41.5	22.5
26/05/2021	17:55	18:05	48.9	55.2	40.6	52.9	51.1	44.7	-1.9	8.9	21.8	28.6	27.0	31.6	37.7	39.8	44.4	45.1	17.4
26/05/2021	18:05	18:15	53.0	66.9	46.0	58.4	54.0	50.7	-0.7	11.2	22.2	34.8	35.4	33.6	36.3	39.0	47.3	50.9	17.4
26/05/2021	18:15	18:25	55.2	67.5	51.0	61.4	57.0	52.5	0.6	14.4	23.1	34.0	39.5	43.6	47.4	47.1	46.5	51.6	22.9
26/05/2021	18:25	18:35	55.4	67.3	51.1	60.5	57.3	53.0	-2.3	9.1	24.3	35.2	36.7	43.5	48.3	48.1	45.9	51.7	24.3
26/05/2021	18:35	18:45	55.0	62.0	50.5	59.1	56.9	52.5	-1.1	10.0	22.1	31.8	30.1	32.5	36.9	37.9	50.6	52.7	20.7
26/05/2021	18:45	18:55	56.0	62.0	52.9	59.3	57.2	54.5	-2.2	11.1	25.1	40.3	37.1	34.9	33.1	37.3	49.4	54.5	24.9
26/05/2021	18:55	19:05	59.6	64.8	53.3	63.3	62.1	56.3	-2.6	7.1	19.3	27.5	26.1	26.1	29.1	35.6	54.0	58.1	27.9
26/05/2021	19:05	19:15	63.3	66.5	54.4	65.3	64.6	60.9	-3.2	6.9	21.0	32.9	30.1	27.2	29.3	34.9	57.6	61.8	28.6
26/05/2021	19:15	19:25	63.0	66.7	56.6	65.2	64.3	61.2	0.1	12.3	21.7	27.3	25.8	27.5	30.5	34.3	57.0	61.7	29.2
26/05/2021	19:25	19:35	61.8	67.8	55.1	65.1	63.3	59.7	-2.7	6.2	18.2	29.2	28.8	32.5	33.3	35.7	56.7	60.0	28.2
26/05/2021	19:35	19:45	61.4	67.4	53.7	64.9	62.5	59.8	-3.3	3.7	18.0	27.5	23.3	31.2	30.8	33.4	57.2	59.2	26.9
26/05/2021	19:45	19:55	62.1	67.8	52.1	65.4	63.5	60.0	-3.4	6.9	20.2	33.1	33.7	35.4	31.9	29.4	57.9	59.8	29.9
26/05/2021	19:55	20:05	62.5	66.8	55.1	64.8	63.8	60.7	-3.5	2.9	12.9	18.0	20.8	41.6	43.9	36.2	58.2	60.1	25.4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	20:05	20:15	55.6	64.5	44.5	63.3	61.1	49.9	-2.9	5.7	20.3	32.5	30.7	32.3	34.8	33.0	51.2	53.4	20.2
26/05/2021	20:15	20:25	53.0	60.3	48.3	56.9	54.1	51.2	-3.1	5.3	16.1	23.1	22.0	29.1	32.0	33.2	47.3	51.5	18.0
26/05/2021	20:25	20:35	54.2	60.1	48.1	58.9	57.2	51.5	-3.4	3.6	14.2	22.5	23.3	27.5	32.4	32.1	48.7	52.6	23.4
26/05/2021	20:35	20:45	60.6	65.2	50.2	63.2	62.4	57.6	-3.0	7.1	23.1	34.8	41.5	32.5	33.3	32.2	56.1	58.4	23.7
26/05/2021	20:45	20:55	58.8	62.9	45.3	62.1	61.5	50.8	-3.9	5.6	21.2	30.2	31.7	32.0	33.2	30.1	54.9	56.2	22.1
26/05/2021	20:55	21:05	60.3	63.3	51.6	62.1	61.6	58.4	-3.9	3.3	20.5	25.5	26.6	31.3	33.3	30.2	56.7	57.5	22.6
26/05/2021	21:05	21:15	60.0	65.4	51.6	62.3	61.4	58.1	-2.4	12.4	27.9	34.4	35.1	34.8	40.3	35.7	56.8	56.8	23.6
26/05/2021	21:15	21:25	60.2	63.6	50.0	62.4	61.6	58.1	-2.8	8.5	22.6	28.5	28.4	29.4	31.6	31.6	57.4	56.7	22.9
26/05/2021	21:25	21:35	60.4	65.1	49.2	62.7	61.9	58.3	-2.6	6.9	20.8	27.9	26.2	28.3	28.3	33.3	57.8	56.7	23.8
26/05/2021	21:35	21:45	60.1	63.2	48.7	62.2	61.6	58.0	-2.8	5.7	19.1	22.4	22.5	29.8	31.2	32.1	57.5	56.4	23.6
26/05/2021	21:45	21:55	59.8	64.9	47.1	62.2	61.3	57.6	-2.5	8.7	31.1	33.0	31.7	34.0	34.2	34.5	57.3	55.9	23.2
26/05/2021	21:55	22:05	60.2	66.2	50.2	62.7	61.7	57.9	-2.8	5.1	16.8	18.5	23.0	27.2	28.8	31.6	57.9	56.0	22.8
26/05/2021	22:05	22:15	59.9	62.6	48.0	62.0	61.5	57.7	-2.6	7.4	22.2	31.9	28.3	31.3	32.0	32.6	57.7	55.5	22.0
26/05/2021	22:15	22:25	59.0	61.9	47.4	61.1	60.5	56.9	-3.0	5.6	19.0	19.5	23.5	28.8	30.2	32.8	56.8	54.7	22.6
26/05/2021	22:25	22:35	58.6	61.7	46.1	61.1	60.5	52.7	-3.2	5.1	17.1	29.2	24.9	28.9	30.7	31.1	56.4	54.2	21.3
26/05/2021	22:35	22:45	51.5	62.1	43.5	60.3	55.4	47.3	-2.2	6.5	20.4	32.1	30.7	32.1	31.8	31.7	47.7	48.7	16.0
26/05/2021	22:45	22:55	58.2	62.1	41.9	60.7	60.0	55.6	-3.2	6.1	24.2	34.2	32.2	31.4	30.5	30.1	54.1	55.7	16.9
26/05/2021	22:55	23:05	58.6	63.1	43.3	61.5	60.5	55.7	-3.9	5.7	20.8	21.6	25.3	28.8	28.4	31.1	54.9	55.9	19.5
26/05/2021	23:05	23:15	56.9	65.2	42.0	61.2	59.6	47.5	-3.3	4.5	15.9	21.3	24.7	31.0	32.7	32.0	54.5	52.9	22.5
26/05/2021	23:15	23:25	51.5	62.5	40.7	59.0	54.4	45.7	-3.0	5.9	24.0	23.8	24.2	30.8	31.3	31.8	49.1	47.2	15.5
26/05/2021	23:25	23:35	53.5	61.3	40.8	60.1	56.1	47.1	-3.0	6.5	23.3	26.6	30.0	35.7	37.8	32.9	50.5	49.7	15.2

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	23:35	23:45	58.2	61.4	48.4	60.6	59.9	55.2	-3.2	5.4	26.2	28.8	30.6	33.0	32.9	33.6	55.0	54.9	16.3
26/05/2021	23:45	23:55	57.6	67.0	49.8	60.4	59.4	54.6	-2.6	6.9	22.1	20.8	27.3	28.4	29.8	31.9	54.6	54.2	15.9
26/05/2021	23:55	00:05	56.6	60.5	46.6	59.2	58.4	53.6	-2.4	6.0	23.2	32.6	27.9	31.6	30.4	32.3	54.0	52.8	15.2
27/05/2021	00:05	00:15	56.2	60.9	44.5	58.6	58.0	53.2	-2.8	6.5	17.7	21.6	30.2	29.7	30.4	33.2	53.6	52.3	15.3
27/05/2021	00:15	00:25	55.0	62.3	41.5	60.0	58.2	46.4	-3.9	1.0	13.2	19.7	23.4	27.4	27.0	33.5	52.8	50.6	17.5
27/05/2021	00:25	00:35	57.8	61.4	49.0	60.4	59.6	54.9	-3.5	2.3	17.0	18.2	24.6	29.8	28.5	33.0	55.0	54.2	18.2
27/05/2021	00:35	00:45	56.7	62.7	38.4	60.7	59.9	44.9	-3.1	2.7	18.9	18.7	21.5	27.7	28.5	31.1	53.7	53.3	17.3
27/05/2021	00:45	00:55	60.2	66.5	43.0	64.4	63.0	51.7	-5.0	-0.2	13.3	15.3	21.5	27.6	27.4	32.5	57.7	56.2	22.0
27/05/2021	00:55	01:05	61.1	66.4	47.4	64.2	63.0	58.1	-3.7	0.1	11.4	11.7	16.8	22.0	23.4	30.2	58.5	57.3	22.0
27/05/2021	01:05	01:15	61.8	66.1	46.5	64.6	63.6	59.2	-4.2	0.8	12.1	13.8	18.4	21.7	22.6	33.7	59.2	58.1	21.5
27/05/2021	01:15	01:25	61.9	66.7	54.8	64.6	63.6	59.5	-4.0	2.0	10.8	13.0	17.6	22.8	25.2	31.4	59.3	58.2	21.9
27/05/2021	01:25	01:35	62.2	66.9	53.2	64.7	63.8	59.9	-3.1	2.2	12.4	18.0	18.3	20.9	21.5	32.4	59.5	58.5	22.1
27/05/2021	01:35	01:45	62.0	66.4	55.3	64.5	63.5	59.8	-5.1	0.5	7.3	8.9	15.0	17.1	18.4	33.0	59.2	58.5	22.5
27/05/2021	01:45	01:55	59.5	65.3	40.0	63.3	61.9	50.3	-4.2	0.4	9.6	8.6	14.8	19.1	24.7	30.7	56.9	55.8	21.8
27/05/2021	01:55	02:05	59.2	65.3	42.6	62.7	61.6	54.6	-5.1	1.8	9.2	6.2	10.9	26.3	29.2	30.7	56.7	55.2	23.1
27/05/2021	02:05	02:15	61.1	67.2	44.7	65.2	63.1	57.8	-5.3	2.3	5.8	7.0	12.5	16.8	23.2	31.1	58.7	57.0	22.3
27/05/2021	02:15	02:25	62.3	66.7	54.8	65.1	63.9	59.9	-4.9	3.3	10.4	8.2	11.2	18.5	21.4	29.5	59.3	58.9	21.2
27/05/2021	02:25	02:35	62.3	70.0	56.0	67.8	63.7	59.8	-3.8	3.1	8.9	8.1	11.2	13.6	18.8	29.3	59.7	58.4	22.6
27/05/2021	02:35	02:45	59.9	65.9	44.2	64.0	62.7	55.2	-5.9	0.8	7.6	6.5	10.8	21.3	25.2	30.4	57.1	56.3	20.7
27/05/2021	02:45	02:55	57.7	61.9	46.3	60.6	59.9	54.0	-2.5	3.4	15.1	23.4	21.8	24.2	26.6	28.0	54.7	54.3	16.1
27/05/2021	02:55	03:05	58.8	63.1	49.3	61.8	61.0	55.4	-6.0	0.9	3.7	4.4	7.6	18.5	22.5	25.9	56.1	55.2	18.4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
27/05/2021	03:05	03:15	59.7	63.5	51.8	62.3	61.5	57.0	-4.0	3.2	10.3	20.0	18.2	20.9	28.2	25.3	56.8	56.3	19.7
27/05/2021	03:15	03:25	61.0	65.4	54.2	63.7	62.8	58.5	-4.9	2.6	11.9	10.4	9.3	19.9	25.1	26.9	58.3	57.4	22.4
27/05/2021	03:25	03:35	61.4	65.1	54.6	63.7	62.9	59.2	-4.5	2.2	10.8	14.0	17.7	15.6	22.0	25.4	58.8	57.5	23.3
27/05/2021	03:35	03:45	61.0	65.0	55.1	63.6	62.6	58.7	-6.6	0.9	7.1	6.1	10.0	17.8	21.2	29.8	58.5	57.2	22.7
27/05/2021	03:45	03:55	60.6	65.6	51.9	63.8	62.6	57.6	-5.4	1.0	7.3	6.0	8.8	23.8	27.3	30.2	57.9	56.8	20.8
27/05/2021	03:55	04:05	59.9	63.9	46.2	63.0	62.2	54.5	-8.1	-0.1	9.1	6.0	10.6	19.6	26.8	29.8	57.6	55.7	19.6
27/05/2021	04:05	04:15	59.8	63.9	40.6	63.0	62.2	55.7	-3.1	0.7	10.4	9.7	10.8	19.7	26.7	30.9	57.8	55.1	21.8
27/05/2021	04:15	04:25	60.5	64.4	45.8	63.1	62.3	57.7	-1.6	-0.8	4.2	3.8	6.2	16.6	23.0	29.3	58.6	55.8	22.9
27/05/2021	04:25	04:35	55.2	63.1	48.0	60.4	56.5	51.9	-3.3	-0.6	4.9	5.5	9.4	21.5	28.7	31.0	54.2	48.1	18.2
27/05/2021	04:35	04:45	55.4	60.9	48.6	57.9	56.8	52.6	-3.5	2.3	8.3	8.6	11.3	25.3	28.4	30.9	54.5	47.7	17.9
27/05/2021	04:45	04:55	56.3	60.4	49.0	59.4	58.1	54.1	-5.1	0.5	5.3	6.7	10.6	28.6	38.5	45.8	55.0	48.2	25.4
27/05/2021	04:55	05:05	57.4	71.2	49.3	67.5	58.8	54.2	-2.7	0.4	10.4	19.3	20.0	40.5	41.0	46.4	55.8	49.7	26.5
27/05/2021	05:05	05:15	55.3	58.9	47.6	57.3	56.5	53.9	-3.3	3.2	12.4	11.6	18.7	34.2	35.8	37.8	54.8	43.6	17.9
27/05/2021	05:15	05:25	55.2	69.0	47.1	62.5	56.2	52.6	-2.4	9.9	25.7	38.9	41.6	39.6	40.9	41.5	53.9	43.9	17.6
27/05/2021	05:25	05:35	53.0	66.3	44.0	57.1	55.0	48.2	-2.0	8.5	18.9	25.7	25.1	35.5	36.5	37.7	52.2	43.2	21.0
27/05/2021	05:35	05:45	54.3	59.9	43.3	56.9	56.1	49.4	-2.0	8.3	21.7	31.4	29.7	32.4	35.3	36.9	53.8	41.8	15.0
27/05/2021	05:45	05:55	52.7	71.8	42.2	60.8	55.6	46.0	-0.3	9.9	25.7	35.7	36.2	39.7	41.2	42.1	51.0	41.2	27.1
27/05/2021	05:55	06:05	55.2	83.9	40.4	66.6	50.9	44.2	-1.8	9.7	23.9	36.5	40.3	40.5	50.6	52.0	44.4	38.9	18.7
27/05/2021	06:05	06:15	50.9	67.2	42.2	60.4	53.4	45.1	-1.4	11.7	26.7	36.4	35.6	39.4	47.3	43.3	44.0	37.8	10.1
27/05/2021	06:15	06:25	48.7	64.1	40.6	57.9	51.4	43.8	0.8	15.7	29.8	38.7	36.6	37.4	42.3	41.6	42.7	37.8	12.9
27/05/2021	06:25	06:35	44.1	45.1	43.3	45.1	44.8	43.6	-1.5	13.8	26.5	36.6	34.1	29.5	34.9	33.6	38.6	36.8	10.6

Table A4: Details of noise level at monitoring site N4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	09:29	09:39	51.3	64.3	41.0	59.3	54.3	43.9	6.4	14.8	23.1	30.3	35.6	40.8	42.7	42.7	46.1	45.8	29.9
22/05/2021	09:39	09:49	49.9	61.7	37.7	57.1	52.5	40.2	6.4	13.5	22.0	27.3	27.4	36.2	42.3	41.5	44.0	45.4	30.9
22/05/2021	09:49	09:59	46.8	66.1	36.9	58.1	50.1	40.0	5.3	12.4	20.7	25.9	29.3	37.1	41.2	41.0	40.8	35.1	25.4
22/05/2021	09:59	10:09	45.6	57.8	37.6	53.0	48.2	40.9	7.8	15.3	22.7	23.3	28.3	37.2	41.0	39.4	38.1	32.0	25.5
22/05/2021	10:09	10:19	49.8	73.2	39.0	61.9	50.5	41.2	7.4	15.6	25.0	29.0	30.1	37.0	40.5	41.5	45.7	43.6	32.3
22/05/2021	10:19	10:29	46.9	58.7	37.6	53.7	48.6	40.3	7.1	14.7	24.0	28.1	29.9	38.2	39.7	37.8	39.8	41.5	28.8
22/05/2021	10:29	10:39	50.6	67.2	37.2	61.0	54.7	40.0	8.3	14.8	23.2	26.0	26.2	38.7	47.8	43.9	42.6	34.1	25.5
22/05/2021	10:39	10:49	52.1	66.3	39.0	61.5	56.6	42.2	10.6	19.0	27.6	33.3	34.4	41.1	49.9	45.0	41.0	33.6	25.5
22/05/2021	10:49	10:59	46.7	58.6	39.4	54.2	49.7	41.6	8.7	15.2	24.3	27.9	28.3	35.8	40.0	39.6	42.4	36.1	25.6
22/05/2021	10:59	11:09	44.9	59.2	37.3	53.4	47.6	40.1	7.9	15.4	22.1	26.9	28.8	37.6	39.8	39.2	35.9	31.4	25.3
22/05/2021	11:09	11:19	45.7	65.3	37.6	56.8	48.2	40.5	13.4	22.6	26.7	28.4	30.8	37.9	39.6	38.7	38.7	35.7	26.1
22/05/2021	11:19	11:29	46.4	59.3	37.7	54.1	48.9	40.3	11.8	20.2	26.9	30.0	31.5	39.5	40.7	39.4	39.6	32.6	25.3
22/05/2021	11:29	11:39	43.1	52.6	36.0	49.5	46.4	38.2	5.2	11.1	19.6	25.1	30.6	34.1	36.5	35.5	38.9	26.3	25.3
22/05/2021	11:39	11:49	44.2	54.4	37.8	50.6	46.8	40.3	7.6	16.6	22.9	26.4	28.9	36.9	40.1	37.5	34.8	28.2	25.3
22/05/2021	11:49	11:59	44.8	61.8	34.8	53.9	46.0	38.2	7.7	14.0	21.7	24.4	25.5	34.2	42.2	38.3	34.8	27.3	25.3
22/05/2021	11:59	12:09	42.6	51.9	34.9	48.9	45.8	38.3	6.2	12.7	22.6	24.7	25.5	34.5	37.2	36.1	36.5	27.9	25.3
22/05/2021	12:09	12:19	48.8	63.4	37.0	56.7	49.9	39.1	4.8	11.4	22.2	25.0	27.2	37.3	46.8	41.6	37.4	28.4	25.3
22/05/2021	12:19	12:29	45.4	58.1	36.3	53.2	48.3	39.7	6.0	12.9	21.4	25.5	27.9	37.9	40.3	39.1	38.5	29.2	25.3
22/05/2021	12:29	12:39	43.7	56.9	36.7	51.6	46.3	39.1	5.7	12.2	22.6	28.6	27.3	33.7	38.2	37.8	37.4	30.2	25.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	12:39	12:49	43.4	54.0	36.4	49.8	45.5	39.9	6.0	13.3	21.3	24.0	26.1	33.7	36.7	35.1	38.4	35.5	25.5
22/05/2021	12:49	12:59	44.2	54.2	37.3	50.7	47.1	39.7	12.9	20.3	24.6	25.6	26.8	33.9	36.1	36.8	39.6	36.0	25.7
22/05/2021	12:59	13:09	45.3	64.7	36.4	56.4	48.0	39.8	6.6	12.9	21.2	23.3	26.2	33.6	37.3	41.6	39.2	33.5	25.3
22/05/2021	13:09	13:19	44.4	57.8	37.3	52.6	47.3	39.5	7.8	15.0	22.3	25.0	27.3	35.7	39.9	38.6	36.6	30.3	25.3
22/05/2021	13:19	13:29	43.5	54.8	36.1	50.7	46.5	38.5	7.9	15.2	19.3	20.6	25.0	34.6	38.1	38.6	36.2	27.5	25.3
22/05/2021	13:29	13:39	46.4	60.1	37.1	54.1	48.1	39.3	8.2	15.7	21.4	22.3	26.2	35.5	43.2	41.2	35.5	28.3	25.3
22/05/2021	13:39	13:49	43.9	56.8	37.0	51.6	46.3	39.1	8.5	16.3	21.8	26.6	26.8	33.6	37.5	38.8	38.0	29.9	25.3
22/05/2021	13:49	13:59	44.3	53.4	37.5	50.4	47.3	39.4	7.8	16.4	21.8	24.0	28.2	39.2	38.3	35.7	37.1	31.0	25.3
22/05/2021	13:59	14:09	44.0	59.6	35.7	53.4	47.2	38.0	4.8	10.3	20.4	22.3	26.1	37.2	40.6	36.7	33.5	29.6	25.3
22/05/2021	14:09	14:19	42.0	55.8	34.8	50.5	45.2	37.9	8.6	16.1	21.7	21.2	25.2	34.3	36.1	35.3	36.0	29.5	25.6
22/05/2021	14:19	14:29	41.9	52.1	37.4	48.0	43.9	39.1	4.9	10.2	19.5	21.3	24.7	35.7	36.6	34.2	34.0	30.7	25.3
22/05/2021	14:29	14:39	55.1	75.5	35.9	62.3	49.1	38.8	6.2	13.4	22.8	25.8	28.6	38.1	42.3	50.3	49.6	48.9	42.7
22/05/2021	14:39	14:49	55.2	76.2	36.8	62.3	48.3	39.7	4.6	9.2	19.4	22.1	27.9	37.7	41.1	49.3	50.6	50.1	40.3
22/05/2021	14:49	14:59	50.2	70.7	37.5	60.1	49.5	40.2	4.7	10.6	22.9	22.1	28.2	38.0	41.0	45.9	44.9	40.9	33.5
22/05/2021	14:59	15:09	47.0	66.0	37.4	57.3	48.6	39.7	5.2	12.3	24.9	32.1	32.3	36.2	38.2	42.8	40.7	35.9	28.9
22/05/2021	15:09	15:19	42.3	53.1	37.0	48.7	44.3	39.2	6.4	12.7	23.3	25.3	26.5	34.9	36.6	35.0	35.5	31.5	25.3
22/05/2021	15:19	15:29	43.3	55.7	36.4	51.0	46.3	38.5	7.3	14.3	22.3	26.6	26.9	35.5	38.6	36.1	36.1	29.7	25.5
22/05/2021	15:29	15:39	43.7	56.7	37.4	51.6	46.5	39.6	6.0	14.7	22.8	26.8	27.2	35.0	38.4	38.8	34.5	31.7	25.3
22/05/2021	15:39	15:49	44.3	57.6	38.7	51.9	46.2	40.5	4.5	12.9	22.4	26.7	26.5	35.7	38.5	37.0	37.7	35.7	26.7
22/05/2021	15:49	15:59	43.6	55.9	38.3	51.1	46.2	40.0	4.3	10.9	22.7	26.7	25.6	34.0	36.8	35.4	37.8	36.5	25.5
22/05/2021	15:59	16:09	41.7	50.7	36.8	47.2	43.7	39.2	4.0	10.3	22.1	26.3	26.9	32.9	35.6	33.3	33.9	35.1	25.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	16:09	16:19	42.1	52.2	36.3	48.4	44.6	38.6	6.6	14.1	22.1	25.2	26.4	33.5	35.2	33.3	36.2	34.8	25.3
22/05/2021	16:19	16:29	46.3	58.0	36.9	54.0	49.9	40.4	7.5	15.5	24.8	30.1	28.8	37.2	40.9	39.8	39.4	36.2	25.8
22/05/2021	16:29	16:39	47.3	62.7	38.7	56.7	50.6	40.4	3.7	10.5	22.0	24.8	24.7	34.6	42.1	43.6	38.9	34.2	25.5
22/05/2021	16:39	16:49	53.7	69.9	39.2	63.3	56.7	40.9	3.7	11.8	24.1	27.6	26.6	45.7	51.4	46.1	40.0	35.3	25.3
22/05/2021	16:49	16:59	54.6	69.0	38.8	64.1	59.2	41.6	5.3	13.8	25.2	30.7	28.9	43.2	52.9	47.3	41.8	34.8	25.3
22/05/2021	16:59	17:09	43.3	57.6	38.0	51.3	45.0	39.9	5.9	13.1	23.6	28.1	27.8	35.5	38.6	35.6	31.9	35.5	25.4
22/05/2021	17:09	17:19	47.7	58.2	40.1	54.3	50.4	42.5	7.2	15.4	26.7	36.0	31.8	38.5	44.6	39.8	34.9	34.9	25.3
22/05/2021	17:19	17:30	43.3	56.5	38.7	51.1	45.6	40.3	5.8	11.6	20.8	26.6	26.8	34.8	38.5	36.2	31.9	36.1	25.5
22/05/2021	17:30	17:40	47.8	63.1	38.6	57.4	51.7	40.7	4.2	12.4	24.0	30.7	27.9	38.1	43.6	42.7	36.6	36.8	25.3
22/05/2021	17:40	17:50	44.3	60.0	38.7	52.9	45.7	40.6	3.9	12.6	23.3	26.2	26.8	36.1	38.1	37.1	35.1	37.9	25.3
22/05/2021	17:50	18:00	48.2	59.9	40.3	56.4	52.8	41.8	3.4	9.1	22.4	26.5	25.4	38.4	45.0	40.5	37.6	39.3	25.3
22/05/2021	18:00	18:10	47.8	61.7	40.3	56.4	51.0	43.1	3.8	11.8	22.6	25.5	26.4	35.8	39.3	37.8	41.2	43.9	25.3
22/05/2021	18:10	18:20	47.0	53.6	41.5	51.5	49.4	44.3	3.4	10.9	21.5	26.3	25.7	34.7	35.3	39.7	44.0	38.4	26.7
22/05/2021	18:20	18:30	49.1	59.7	41.2	55.8	51.8	44.4	3.5	11.5	23.2	30.7	29.4	37.3	41.6	41.9	45.6	38.0	25.6
22/05/2021	18:30	18:40	51.9	61.2	42.3	58.5	55.8	45.4	3.3	10.4	23.6	30.0	28.1	40.8	47.1	47.0	44.9	35.7	28.2
22/05/2021	18:40	18:50	56.3	66.5	40.5	63.5	60.5	44.6	3.2	11.0	21.2	27.2	28.2	44.7	55.0	47.5	40.1	38.1	29.4
22/05/2021	18:50	19:00	47.6	57.9	44.1	53.5	49.1	45.1	3.1	10.6	22.4	27.1	28.2	33.3	34.1	38.2	44.0	42.0	30.2
22/05/2021	19:00	19:10	48.0	50.2	46.0	49.6	49.0	46.9	3.1	9.5	20.6	27.4	24.6	32.0	31.9	37.6	44.3	43.3	30.6
22/05/2021	19:10	19:20	48.0	60.9	43.2	54.5	48.0	46.6	3.1	7.1	19.7	21.9	23.2	34.5	39.9	38.4	42.9	43.0	31.2
22/05/2021	19:20	19:30	48.2	60.7	45.3	54.4	48.1	46.9	3.1	8.0	21.7	27.6	25.0	31.8	40.0	39.3	42.8	43.2	33.1
22/05/2021	19:30	19:40	47.5	49.4	45.1	49.0	48.5	46.3	3.2	7.2	18.6	22.1	24.0	30.3	29.6	38.2	43.4	42.5	34.7

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	19:40	19:50	47.3	56.9	44.7	52.7	48.4	46.0	3.2	9.8	19.2	24.1	24.8	32.1	31.7	38.0	44.3	39.6	34.5
22/05/2021	19:50	20:00	50.3	61.2	46.3	56.6	51.9	47.8	3.2	8.4	21.6	26.2	25.4	38.5	43.9	41.4	44.8	43.4	35.8
22/05/2021	20:00	20:10	49.3	59.8	45.9	54.9	50.0	48.1	3.2	8.5	21.8	28.6	26.6	33.9	37.7	37.5	44.1	45.7	32.7
22/05/2021	20:10	20:20	48.4	51.6	46.7	50.4	49.2	47.8	3.1	10.0	19.4	22.0	24.6	32.6	30.0	32.7	43.1	45.8	32.9
22/05/2021	20:20	20:30	49.4	61.1	46.0	55.3	49.5	48.0	3.2	9.7	20.4	23.4	24.3	34.7	39.5	39.1	42.8	46.2	32.1
22/05/2021	20:30	20:40	49.8	53.8	46.4	53.2	52.5	47.7	3.1	7.5	18.3	21.1	21.8	29.9	28.7	36.0	45.8	46.6	32.5
22/05/2021	20:40	20:50	49.5	53.5	46.9	51.9	50.3	48.8	3.0	6.9	18.6	23.8	24.3	31.9	29.6	34.8	44.7	46.6	32.8
22/05/2021	20:50	21:00	49.1	57.5	46.0	53.7	49.9	47.9	3.1	9.6	21.2	24.0	24.2	31.9	33.1	35.8	44.4	45.8	32.4
22/05/2021	21:00	21:10	48.1	50.8	45.4	50.1	49.3	46.9	3.4	9.6	20.1	21.8	23.1	29.0	28.0	35.3	43.9	44.2	32.9
22/05/2021	21:10	21:21	47.5	62.0	42.0	55.5	48.9	44.7	4.7	17.9	27.1	27.9	27.9	33.3	33.5	35.5	41.9	43.8	31.1
22/05/2021	21:21	21:31	47.1	53.8	44.0	51.0	48.1	45.5	3.3	9.8	20.9	22.8	25.7	32.4	30.4	33.1	41.1	44.2	31.2
22/05/2021	21:31	21:41	47.9	51.1	44.3	50.1	49.1	46.7	3.4	9.0	21.7	25.7	25.5	31.5	29.3	35.6	42.9	44.5	30.0
22/05/2021	21:41	21:51	47.6	52.7	45.1	50.9	49.0	46.3	4.7	11.1	21.4	25.0	23.0	29.3	28.1	36.1	43.4	43.8	29.5
22/05/2021	21:51	22:01	48.5	56.9	45.4	53.5	50.0	47.0	3.8	11.1	20.0	31.9	37.2	31.9	32.0	34.5	43.1	44.7	31.3
22/05/2021	22:01	22:11	49.2	53.4	47.8	51.6	49.8	48.4	2.8	14.2	20.4	23.3	23.1	31.0	32.5	33.8	43.2	46.8	30.3
22/05/2021	22:11	22:21	51.3	61.7	48.0	56.9	52.0	49.4	3.4	6.8	20.5	23.5	23.3	37.5	39.1	38.1	44.4	48.7	28.2
22/05/2021	22:21	22:31	50.2	54.7	48.6	53.1	51.4	49.5	3.9	8.4	19.3	18.6	21.6	32.1	32.0	34.9	44.0	48.0	28.3
22/05/2021	22:31	22:41	51.6	54.5	49.5	53.7	52.8	50.5	3.0	5.9	17.5	23.2	22.0	30.4	31.3	34.9	45.4	49.6	32.2
22/05/2021	22:41	22:51	51.2	53.0	48.7	52.6	52.2	50.0	3.2	7.8	18.1	18.1	21.8	29.4	28.6	35.1	45.4	48.9	28.6
22/05/2021	22:51	23:01	51.1	55.4	49.9	53.6	51.8	50.6	4.1	9.0	18.2	21.9	23.7	33.8	33.4	34.9	45.0	48.8	28.4
22/05/2021	23:01	23:11	51.4	53.3	49.6	52.8	52.2	50.5	4.1	5.8	14.3	18.4	19.7	28.7	28.0	35.2	45.7	49.1	29.0

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	23:11	23:21	52.1	53.5	49.7	53.3	53.0	50.9	2.9	3.6	17.2	16.5	18.5	26.9	27.3	35.5	47.1	49.5	28.7
22/05/2021	23:21	23:31	51.6	53.6	48.6	53.3	53.0	49.8	3.1	3.9	17.2	14.2	19.1	27.2	26.6	35.5	46.4	49.1	28.3
22/05/2021	23:31	23:41	52.9	54.4	50.4	54.1	53.8	51.6	2.9	6.2	19.8	16.9	20.3	27.9	28.0	36.0	47.6	50.5	29.2
22/05/2021	23:41	23:51	53.1	54.7	50.1	54.5	54.2	51.5	3.0	4.6	16.3	11.3	17.9	27.1	26.1	35.9	47.8	50.7	27.9
22/05/2021	23:51	00:01	53.3	54.9	51.2	54.5	54.0	52.4	2.8	9.9	19.3	11.6	17.8	24.2	23.9	38.0	47.7	51.0	27.9
23/05/2021	00:01	00:11	53.6	54.9	50.9	54.6	54.3	52.6	2.8	6.8	18.2	14.0	17.1	25.0	27.8	37.8	47.9	51.4	25.3
23/05/2021	00:11	00:21	54.1	55.2	52.3	55.0	54.8	53.6	2.9	8.3	18.0	28.0	35.1	28.3	24.0	36.6	48.5	51.9	27.2
23/05/2021	00:21	00:31	53.4	54.4	52.3	54.2	53.9	53.0	2.9	2.6	14.0	11.9	16.0	26.5	25.1	35.7	48.2	51.0	28.6
23/05/2021	00:31	00:41	53.1	55.0	50.6	54.7	54.3	51.8	2.9	5.8	13.9	8.6	12.3	23.6	27.8	36.5	49.7	49.2	25.6
23/05/2021	00:41	00:51	51.4	53.0	49.7	52.7	52.4	50.7	2.8	8.1	14.4	18.4	28.1	25.3	28.2	35.0	48.9	46.3	25.5
23/05/2021	00:51	01:01	51.5	53.1	50.0	52.7	52.3	50.9	2.7	5.7	10.5	15.9	21.0	21.4	22.0	33.9	49.4	46.0	25.3
23/05/2021	01:01	01:11	52.4	53.6	50.2	53.3	53.0	51.7	2.8	2.1	13.7	9.2	15.8	23.6	24.8	33.5	50.6	46.5	25.3
23/05/2021	01:11	01:21	52.7	53.8	51.3	53.5	53.2	52.4	2.8	5.0	13.1	9.5	15.3	21.5	21.0	35.2	51.2	46.4	25.7
23/05/2021	01:21	01:31	52.1	53.5	49.5	53.3	53.0	50.5	3.3	6.6	18.4	27.4	21.9	26.9	24.7	32.1	50.2	46.2	25.3
23/05/2021	01:31	01:41	51.6	53.1	49.2	52.9	52.6	50.3	4.8	10.2	16.3	19.1	17.8	24.5	23.4	31.4	49.5	46.4	26.2
23/05/2021	01:41	01:51	52.6	54.4	51.3	53.8	53.1	52.1	2.9	8.1	17.6	17.3	16.7	27.3	32.3	33.3	50.2	47.6	28.0
23/05/2021	01:51	02:01	52.9	53.9	51.7	53.7	53.5	52.4	2.8	3.7	15.7	21.6	18.4	22.8	22.6	33.9	50.5	48.1	34.0
23/05/2021	02:01	02:11	52.5	53.6	51.1	53.4	53.1	52.1	3.2	7.5	14.2	12.2	16.9	21.2	20.3	33.8	49.7	48.2	36.3
23/05/2021	02:11	02:21	52.3	53.5	50.2	53.3	53.1	51.4	2.9	2.5	14.2	11.4	16.4	22.6	21.5	34.8	49.4	48.0	35.3
23/05/2021	02:21	02:31	52.7	54.7	50.9	54.5	54.2	51.8	2.8	3.3	14.0	10.2	16.5	22.7	21.8	35.6	49.9	48.4	30.3
23/05/2021	02:31	02:41	53.3	54.7	51.0	54.4	54.1	52.3	2.9	6.6	19.7	14.8	20.2	26.4	23.2	35.3	50.1	49.4	28.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	02:41	02:51	53.4	54.3	52.3	54.1	53.9	53.1	3.1	7.8	14.7	12.6	18.0	22.6	21.5	36.4	50.7	48.9	29.4
23/05/2021	02:51	03:01	53.1	54.1	51.7	53.9	53.7	52.7	2.9	5.5	16.4	12.1	18.2	26.0	24.9	36.3	50.6	48.4	29.6
23/05/2021	03:01	03:11	54.9	56.1	52.2	55.9	55.7	53.6	2.9	8.1	19.1	15.3	23.8	30.7	29.6	35.4	52.0	50.7	25.3
23/05/2021	03:11	03:21	54.7	56.1	53.0	55.8	55.5	54.2	3.0	8.1	18.7	27.2	32.1	31.4	32.8	34.9	51.9	50.4	25.3
23/05/2021	03:21	03:31	54.4	55.6	53.0	55.3	55.0	54.1	2.8	6.6	17.9	11.9	18.9	26.2	24.9	34.9	51.7	50.1	25.3
23/05/2021	03:31	03:41	54.5	55.4	53.5	55.2	55.0	54.2	2.8	4.0	16.7	13.5	21.5	28.0	26.8	34.9	51.8	50.1	25.3
23/05/2021	03:41	03:51	53.7	54.8	52.2	54.7	54.5	53.0	2.8	8.1	16.4	10.6	16.2	23.6	23.8	33.6	51.4	48.8	25.3
23/05/2021	03:51	04:01	53.5	54.8	51.9	54.6	54.3	52.8	2.8	5.0	15.4	12.9	20.1	28.0	29.5	35.3	51.6	47.8	25.3
23/05/2021	04:01	04:11	53.8	54.8	51.8	54.6	54.4	53.1	2.8	4.2	13.4	11.1	16.0	28.4	33.1	36.4	51.9	48.0	25.4
23/05/2021	04:11	04:21	54.3	55.6	52.8	55.3	55.0	53.8	2.8	4.7	13.2	10.2	16.2	27.7	32.0	36.5	52.1	48.9	25.3
23/05/2021	04:21	04:31	54.5	55.9	53.0	55.6	55.2	53.8	2.8	2.5	10.9	11.6	19.6	30.9	34.4	36.4	52.3	49.1	25.3
23/05/2021	04:31	04:41	55.3	56.3	53.4	56.1	55.9	54.7	2.8	3.0	14.7	9.6	15.1	28.2	33.7	35.9	52.7	50.6	25.3
23/05/2021	04:41	04:51	55.1	56.1	53.5	55.9	55.7	54.6	2.8	7.2	12.4	8.6	14.6	27.3	30.7	35.4	52.4	50.7	25.3
23/05/2021	04:51	05:01	53.9	56.0	51.1	55.4	54.7	52.8	2.8	2.9	17.6	10.4	15.1	30.2	36.8	37.4	51.0	49.3	25.3
23/05/2021	05:01	05:11	56.2	57.7	53.4	57.4	57.1	55.1	3.1	8.9	16.8	11.1	16.0	31.2	42.8	50.5	52.2	49.6	25.3
23/05/2021	05:11	05:21	55.0	62.8	52.1	60.1	57.3	53.3	2.9	5.5	13.9	13.5	20.5	41.1	45.0	47.1	50.8	49.0	25.3
23/05/2021	05:21	05:31	57.8	65.1	51.8	63.1	61.0	53.8	3.0	7.3	18.7	23.2	24.9	46.8	52.8	52.4	50.2	48.5	25.3
23/05/2021	05:31	05:41	54.0	65.0	50.9	60.6	56.2	51.7	2.9	6.7	14.4	17.1	18.3	40.0	45.8	46.0	49.1	48.1	25.3
23/05/2021	05:41	05:51	52.4	61.0	49.0	57.1	53.1	51.7	2.9	6.5	16.5	21.1	24.4	31.0	35.7	36.3	48.7	48.8	25.3
23/05/2021	05:51	06:01	53.1	59.1	50.2	56.6	54.0	51.9	2.9	5.4	17.0	19.3	19.6	33.5	37.9	38.4	49.2	49.5	25.3
23/05/2021	06:01	06:11	53.4	58.9	51.1	56.5	54.0	52.5	2.9	6.6	18.4	24.7	22.3	34.3	39.4	36.4	49.8	49.4	25.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	06:11	06:21	52.7	55.8	50.6	54.7	53.5	51.8	2.8	7.5	19.3	24.5	22.5	29.9	33.5	36.4	48.9	49.3	25.3
23/05/2021	06:21	06:31	53.0	61.1	49.4	57.2	53.3	52.1	3.0	10.5	20.6	25.7	25.2	35.7	39.7	38.3	48.1	49.9	25.3
23/05/2021	06:31	06:41	53.7	56.8	51.8	55.6	54.4	52.9	2.9	10.1	22.3	29.1	25.0	30.9	33.2	34.5	49.1	50.8	25.3
23/05/2021	06:41	06:51	52.7	58.3	50.8	56.0	53.6	52.1	3.1	10.8	21.6	26.5	23.8	33.6	38.4	38.7	47.6	49.8	25.3
23/05/2021	06:51	07:01	51.5	62.1	47.9	57.3	52.5	50.3	2.9	8.6	21.6	28.3	23.2	32.2	35.8	35.7	46.1	49.0	25.4
23/05/2021	07:01	07:11	50.4	56.1	46.5	53.9	51.6	48.6	3.6	10.2	20.1	24.1	23.5	33.3	38.0	38.9	44.2	47.7	25.3
23/05/2021	07:11	07:21	50.5	55.0	47.5	53.4	51.7	49.6	3.3	10.7	22.0	26.9	25.2	34.9	37.5	38.5	43.7	48.1	25.3
23/05/2021	07:21	07:31	50.7	59.1	45.6	55.8	52.4	48.2	4.4	17.4	29.2	35.1	34.0	40.5	42.6	41.3	43.0	46.3	25.6
23/05/2021	07:31	07:41	50.5	64.5	45.8	58.5	52.4	47.6	3.7	12.2	23.8	27.9	26.7	37.9	43.3	41.3	42.7	46.6	27.6
23/05/2021	07:41	07:51	49.7	58.3	46.4	54.9	51.5	47.8	3.5	12.8	23.0	26.6	25.4	37.6	43.0	40.1	39.8	46.3	25.3
23/05/2021	07:51	08:01	48.3	54.5	44.3	52.2	49.9	46.7	3.6	10.7	22.1	28.0	26.9	36.9	41.6	38.5	39.3	44.4	25.3
23/05/2021	08:01	08:11	48.3	59.7	43.9	55.0	50.2	46.0	3.7	10.8	22.0	28.1	26.7	36.3	40.8	38.1	39.7	44.8	25.3
23/05/2021	08:11	08:21	50.6	60.6	45.9	57.0	53.3	47.5	4.0	10.4	21.5	25.7	27.2	38.3	44.4	42.8	43.2	45.4	25.3
23/05/2021	08:21	08:31	49.8	60.0	44.2	55.9	51.8	46.4	4.2	15.5	29.5	33.5	31.1	40.4	44.9	42.7	40.0	42.3	25.3
23/05/2021	08:31	08:41	47.9	56.0	42.5	52.9	49.8	45.8	3.3	8.6	19.4	25.4	26.7	40.0	42.5	37.9	38.2	42.5	25.3
23/05/2021	08:41	08:51	48.9	63.9	43.5	56.9	49.9	45.5	3.3	10.1	20.7	24.6	25.0	40.7	43.8	38.5	39.9	43.2	25.3
23/05/2021	08:51	09:01	48.4	56.5	42.9	53.7	50.8	45.6	3.8	13.0	24.1	28.5	28.3	38.0	40.6	39.2	40.9	44.1	27.0
23/05/2021	09:01	09:12	48.1	61.2	42.2	55.5	49.8	45.3	3.7	11.6	22.4	28.5	32.4	41.6	41.3	38.6	38.5	42.3	25.4
23/05/2021	09:12	09:22	47.9	56.0	44.8	52.8	49.6	46.4	3.2	10.9	20.9	25.7	24.9	37.3	40.4	37.7	39.1	44.4	25.3
23/05/2021	09:22	09:32	47.6	53.3	44.4	51.1	48.9	46.2	3.0	12.0	22.0	26.0	25.2	35.8	39.0	37.2	39.0	44.5	25.3
23/05/2021	09:32	09:42	46.6	56.2	41.1	52.1	48.0	44.1	3.1	10.2	22.3	24.7	24.5	35.0	38.7	36.6	36.0	43.8	25.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	09:42	09:54	47.7	59.9	40.8	54.9	49.8	44.5	5.2	14.1	25.3	29.4	28.2	37.2	40.1	39.0	40.8	42.8	25.4
23/05/2021	09:54	10:04	43.3	53.7	37.7	49.7	45.6	40.5	3.6	12.5	21.0	24.0	25.6	36.2	37.6	35.4	35.5	35.2	25.4
23/05/2021	10:04	10:14	45.3	55.8	40.4	51.8	47.8	42.1	3.6	12.4	23.3	27.8	26.9	36.6	38.7	36.4	40.2	37.1	25.3
23/05/2021	10:14	10:24	48.5	60.2	39.3	55.5	50.8	41.3	3.5	13.9	25.1	30.7	28.5	37.9	41.8	39.3	42.8	42.5	27.8
23/05/2021	10:24	10:34	47.7	61.3	39.1	55.7	50.1	41.4	3.6	11.1	21.4	26.8	27.5	38.2	44.6	41.2	36.9	35.7	25.3
23/05/2021	10:34	10:44	45.3	58.4	39.2	53.2	47.9	41.2	3.2	11.1	21.1	27.1	26.4	37.5	39.5	37.5	38.9	36.4	25.3
23/05/2021	10:44	10:54	47.4	55.3	38.8	52.8	50.2	42.9	3.5	11.2	21.4	27.3	28.8	38.6	40.1	37.7	42.6	40.1	25.7
23/05/2021	10:54	11:04	51.5	64.6	39.0	59.3	54.0	43.3	4.5	11.0	20.0	23.7	25.9	37.0	38.8	40.0	46.8	48.3	32.3
23/05/2021	11:04	11:14	46.2	56.2	39.4	52.7	49.2	42.0	6.6	13.7	23.3	26.0	26.6	38.1	41.7	39.7	38.7	32.7	25.3
23/05/2021	11:14	11:24	46.8	60.0	38.5	54.8	49.5	41.6	4.6	12.0	26.6	34.0	33.9	38.4	41.4	40.2	38.7	35.3	25.4
23/05/2021	11:24	11:34	48.5	66.8	38.2	59.0	51.1	42.1	6.7	15.7	27.8	31.2	32.0	38.4	44.1	43.4	39.6	34.2	25.9
23/05/2021	11:34	11:44	51.4	64.4	39.0	59.3	54.2	41.9	6.7	14.0	24.0	28.2	26.5	35.8	39.1	39.5	45.6	48.8	32.4
23/05/2021	11:44	11:54	46.9	66.5	38.5	57.3	48.0	42.1	6.5	13.4	23.0	30.5	30.2	39.1	41.1	41.1	39.3	35.0	25.9
23/05/2021	11:54	12:04	46.0	56.6	38.3	53.2	49.8	40.6	8.7	15.8	22.1	25.5	27.6	36.8	40.8	39.1	40.0	34.6	26.1
23/05/2021	12:04	12:14	45.8	65.9	36.9	56.8	47.7	40.2	5.8	13.0	23.5	34.5	29.6	36.1	39.0	41.1	38.3	32.7	25.3
23/05/2021	12:14	12:24	45.2	56.4	38.7	52.0	47.6	41.7	7.8	14.7	20.5	25.2	27.1	37.6	40.4	38.2	37.4	33.6	25.3
23/05/2021	12:24	12:34	51.2	67.5	37.0	60.6	53.6	40.1	7.7	14.7	24.5	37.9	41.0	43.2	45.0	40.0	43.7	44.1	30.5
23/05/2021	12:34	12:44	42.1	52.9	36.2	48.9	44.9	39.0	6.4	11.0	19.4	23.8	26.1	34.4	35.5	35.0	36.2	31.6	25.4
23/05/2021	12:44	12:54	43.5	55.2	36.4	50.6	46.0	39.5	8.7	15.5	20.6	24.3	26.6	34.7	37.4	36.0	37.5	35.1	25.3
23/05/2021	12:54	13:04	56.1	65.8	36.7	64.5	63.1	39.0	10.5	17.6	23.0	25.6	27.4	34.9	37.3	42.0	52.0	53.3	36.1
23/05/2021	13:04	13:14	49.1	62.5	36.5	57.4	52.2	40.0	8.9	15.3	21.1	22.7	26.4	35.7	43.6	42.5	42.6	42.2	27.8

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	13:14	13:24	49.3	60.5	35.0	57.2	53.8	38.3	4.5	12.0	22.1	36.3	39.7	37.4	45.0	43.0	40.8	29.0	25.4
23/05/2021	13:24	13:34	42.8	61.4	33.0	53.0	44.6	36.9	4.4	9.6	19.0	21.3	23.5	32.7	34.9	34.9	39.3	32.7	25.3
23/05/2021	13:34	13:44	42.8	55.2	33.8	50.6	46.0	36.7	4.6	9.7	18.8	23.3	25.1	35.0	37.5	36.0	36.7	27.3	25.3
23/05/2021	13:44	13:54	41.9	52.0	34.8	48.4	44.7	37.4	5.7	11.6	20.5	27.2	25.4	34.1	36.2	36.3	34.5	27.2	25.4
23/05/2021	13:54	14:04	42.1	52.3	35.1	48.7	45.1	37.4	18.6	16.1	22.6	26.9	25.6	33.9	35.7	35.7	35.2	31.0	25.3
23/05/2021	14:04	14:14	41.4	51.2	34.8	48.2	45.2	36.7	4.5	11.1	21.1	25.4	23.7	31.7	35.3	33.9	36.5	30.3	25.3
23/05/2021	14:14	14:24	40.3	53.3	33.9	48.3	43.2	35.2	3.5	8.1	18.5	25.9	23.0	31.2	33.1	33.5	35.2	29.4	25.8
23/05/2021	14:24	14:34	43.8	66.7	33.6	54.1	41.5	35.3	4.6	10.9	19.1	23.2	22.3	30.4	32.2	32.8	40.5	38.4	25.6
23/05/2021	14:34	14:44	42.2	54.8	34.4	50.1	45.3	37.5	3.2	10.2	21.9	27.8	25.5	33.9	35.7	35.3	36.2	31.7	25.3
23/05/2021	14:44	14:54	41.9	55.2	35.0	50.0	44.8	37.0	3.6	8.0	19.1	25.0	23.0	31.0	35.4	34.1	37.2	32.8	25.3
23/05/2021	14:54	15:04	41.5	54.1	34.7	49.0	43.9	36.5	3.1	8.4	19.2	25.9	23.4	31.9	35.1	36.3	34.0	31.8	25.5
23/05/2021	15:04	15:14	44.2	56.0	34.4	51.8	47.5	37.2	4.2	10.0	18.0	18.5	22.2	31.7	35.1	35.6	40.9	36.8	25.4
23/05/2021	15:14	15:24	42.6	52.7	34.4	49.8	46.8	36.9	3.6	8.0	19.2	24.4	23.5	32.5	35.1	33.3	36.8	37.3	25.5
23/05/2021	15:24	15:34	41.3	55.2	34.1	49.5	43.7	37.0	3.4	13.3	23.1	27.2	25.6	32.8	36.4	33.7	32.6	32.6	25.4
23/05/2021	15:34	15:44	41.8	56.1	34.3	49.9	43.7	37.3	4.1	10.1	21.1	27.7	25.8	32.7	36.7	36.3	33.6	28.7	25.3
23/05/2021	15:44	15:54	40.4	52.8	33.8	47.9	43.0	36.6	5.1	10.9	22.2	28.4	25.2	31.1	34.4	34.4	33.1	28.0	25.3
23/05/2021	15:54	16:04	39.9	53.6	33.4	47.8	42.0	35.1	4.4	10.6	23.1	27.4	24.1	30.5	34.1	33.1	32.9	28.9	25.3
23/05/2021	16:04	16:14	41.0	54.3	32.8	48.7	43.1	35.9	3.9	9.1	19.5	25.6	23.2	31.5	35.2	34.5	35.3	28.9	25.3
23/05/2021	16:14	16:24	40.1	51.5	33.4	47.4	43.3	35.7	5.1	9.4	20.7	26.7	28.1	32.4	34.7	32.5	32.3	26.4	25.3
23/05/2021	16:24	16:34	45.7	70.1	35.9	57.3	44.5	37.7	38.5	33.2	25.2	27.1	27.0	32.3	35.5	34.4	34.8	30.3	25.3
23/05/2021	16:34	16:49	44.1	62.5	35.3	54.7	46.8	38.1	29.2	22.7	21.4	25.9	25.8	34.2	37.2	37.3	37.0	33.9	26.0

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
23/05/2021	16:49	16:59	46.1	58.1	36.5	53.7	49.2	40.1	3.5	12.4	24.5	32.3	29.3	38.5	42.0	38.7	36.2	33.0	26.4
23/05/2021	16:59	17:09	42.8	60.9	35.1	53.0	45.0	37.8	3.0	9.9	20.1	26.2	26.0	31.6	36.9	36.4	37.4	32.1	25.3
23/05/2021	17:09	17:19	44.8	60.8	37.3	53.7	46.6	38.9	3.0	9.5	20.3	24.1	22.8	31.4	39.6	39.3	38.9	34.0	25.3
23/05/2021	17:19	17:29	46.0	59.9	38.7	54.4	48.8	40.6	3.1	11.7	23.3	27.3	25.1	33.2	41.0	40.8	37.0	38.2	25.4
23/05/2021	17:29	17:39	48.1	63.7	39.8	56.9	50.1	42.6	3.2	10.9	23.1	30.1	25.5	34.1	41.8	41.9	38.4	43.3	25.3
23/05/2021	17:39	17:49	46.6	62.6	38.5	56.3	49.9	40.5	3.2	11.7	22.0	27.6	25.4	33.5	41.2	41.6	35.3	40.1	25.3
23/05/2021	17:49	17:59	43.9	53.0	39.9	49.3	45.5	41.5	3.2	10.0	21.2	25.2	24.2	32.0	36.2	34.6	37.5	39.3	25.3
23/05/2021	17:59	18:09	47.1	59.0	43.4	54.3	49.5	44.7	3.1	9.3	18.9	23.0	23.8	32.7	36.8	38.1	42.5	42.4	25.3
23/05/2021	18:09	18:19	54.4	66.9	43.2	61.5	56.1	46.7	3.7	14.3	23.5	26.8	25.9	36.9	43.1	45.0	52.7	44.2	25.3
23/05/2021	18:19	18:29	56.6	70.9	41.6	64.8	58.6	44.7	4.8	13.4	23.2	26.2	26.2	33.1	39.1	46.7	55.5	45.6	25.7
23/05/2021	18:29	18:39	48.1	61.4	40.0	56.3	51.2	42.4	4.4	14.3	23.8	26.0	24.2	33.9	43.1	42.8	42.2	34.9	27.2
23/05/2021	18:39	18:49	47.3	63.7	41.0	55.9	48.1	43.2	4.5	15.3	24.1	29.2	28.2	33.4	40.2	40.8	42.9	37.4	27.9
23/05/2021	18:49	18:59	47.0	57.5	43.9	52.8	48.0	45.2	5.3	16.4	25.4	26.6	27.7	32.6	36.4	39.6	43.9	36.6	29.6
23/05/2021	18:59	19:09	46.2	53.2	44.3	50.2	47.1	45.3	5.3	17.2	26.1	29.5	29.5	29.7	31.9	36.6	43.8	35.1	32.4
23/05/2021	19:09	19:19	51.5	62.2	44.0	59.2	56.2	45.6	14.2	25.4	31.5	31.9	35.1	42.5	45.0	45.4	45.6	39.7	32.4
23/05/2021	19:19	19:29	52.5	69.1	40.8	62.7	56.3	43.5	15.8	25.6	28.1	31.2	34.7	43.9	46.4	46.8	45.7	42.1	33.6
23/05/2021	19:29	19:40	46.3	54.4	39.5	52.1	49.7	42.6	3.2	13.2	22.6	29.6	33.3	32.9	38.1	39.4	42.2	35.9	26.9
26/05/2021	15:42	15:52	58.5	84.3	39.1	68.8	53.2	42.7	22.7	34.1	39.7	46.6	47.8	53.0	53.8	49.9	46.0	39.2	29.5
26/05/2021	15:52	16:02	51.4	67.5	37.9	60.6	53.7	45.1	12.8	22.7	33.2	44.4	41.3	43.9	43.4	42.0	44.0	36.5	26.5
26/05/2021	16:02	16:12	50.6	62.4	42.1	58.2	54.0	44.7	11.8	21.6	30.2	42.1	37.6	42.8	44.0	42.9	43.3	37.5	28.1
26/05/2021	16:12	16:22	52.0	63.0	39.1	59.1	55.2	45.2	6.1	15.2	28.5	40.7	42.4	46.1	46.5	41.9	43.3	36.0	25.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	16:22	16:32	54.4	66.4	41.1	61.8	57.1	49.7	7.6	19.6	32.3	44.3	44.0	48.3	48.0	44.6	47.4	38.3	25.3
26/05/2021	16:32	16:42	55.5	75.1	41.6	65.9	56.6	47.2	9.6	25.8	37.7	47.5	49.3	50.6	46.4	43.6	42.4	37.8	25.3
26/05/2021	16:42	16:52	52.9	62.9	42.1	59.5	56.1	48.6	7.5	20.7	34.0	44.7	42.5	47.4	45.6	43.6	43.7	38.4	25.3
26/05/2021	16:52	17:02	52.9	60.6	42.8	58.3	55.9	47.7	6.6	16.8	29.5	42.5	41.2	46.7	46.9	44.7	44.2	38.8	25.7
26/05/2021	17:02	17:12	52.5	62.4	43.0	59.3	56.2	46.0	5.8	15.9	28.8	41.8	40.9	46.3	46.9	44.0	43.6	38.4	26.2
26/05/2021	17:12	17:22	49.8	56.8	41.7	54.9	52.9	45.1	6.9	16.9	28.4	42.3	40.1	42.8	42.5	38.4	42.3	37.5	25.3
26/05/2021	17:22	17:32	54.5	66.1	44.9	61.9	57.6	48.8	7.9	17.2	29.0	42.9	43.5	49.5	47.6	44.9	46.9	39.1	25.3
26/05/2021	17:32	17:42	52.5	61.0	42.5	58.1	55.1	47.5	6.3	14.1	29.4	45.2	42.7	44.5	45.7	42.2	45.4	38.6	25.3
26/05/2021	17:42	17:52	51.1	56.7	41.6	55.1	53.5	46.6	4.8	13.0	28.6	41.2	39.5	41.7	45.3	43.4	44.6	36.9	25.3
26/05/2021	17:52	18:02	49.9	57.0	41.0	54.8	52.5	44.7	4.2	13.3	27.4	40.6	38.4	40.1	44.0	43.1	42.8	32.6	25.3
26/05/2021	18:02	18:12	51.0	60.3	41.8	57.3	54.2	44.4	3.4	8.1	25.3	41.4	39.1	42.8	44.2	43.1	44.4	38.3	25.3
26/05/2021	18:12	18:22	53.3	59.6	47.4	57.7	55.7	50.6	3.3	9.3	26.1	43.9	42.3	45.4	44.4	43.3	48.6	40.6	25.3
26/05/2021	18:22	18:32	52.3	56.4	47.9	55.4	54.3	49.9	3.4	10.3	27.3	44.9	41.6	43.1	44.4	44.7	46.1	37.7	25.4
26/05/2021	18:32	18:42	52.1	59.6	45.6	57.1	54.6	47.9	3.4	9.0	26.0	42.5	40.6	45.9	44.8	44.9	44.5	36.5	25.8
26/05/2021	18:42	18:52	52.0	60.6	43.9	58.9	57.1	46.0	3.1	7.7	22.7	35.6	37.7	47.3	43.9	44.2	45.9	36.4	25.4
26/05/2021	18:52	19:02	51.9	57.9	46.9	56.1	54.2	48.0	3.2	10.2	28.5	43.8	41.4	43.8	42.6	40.9	46.7	37.4	38.0
26/05/2021	19:02	19:12	53.2	61.2	47.2	58.4	55.6	49.2	3.4	9.2	28.1	42.3	42.8	46.2	44.0	43.8	48.2	37.8	38.8
26/05/2021	19:12	19:22	52.5	58.2	47.1	56.9	55.5	48.3	3.2	7.9	25.9	42.9	41.0	45.6	43.9	42.5	47.3	38.6	32.7
26/05/2021	19:22	19:32	53.1	59.6	47.5	57.8	55.9	48.6	3.2	11.4	27.0	43.1	43.2	47.0	44.5	42.0	47.6	39.5	31.9
26/05/2021	19:32	19:42	53.9	65.3	47.4	60.9	56.5	49.4	3.2	13.4	27.8	43.7	43.2	46.7	46.2	43.7	48.5	41.1	32.6
26/05/2021	19:42	19:52	55.6	62.3	49.8	60.4	58.4	51.6	3.2	7.8	28.3	42.8	43.0	49.5	48.1	47.6	49.1	43.0	30.5

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	19:52	20:02	54.8	59.6	49.4	58.2	56.8	52.0	3.2	7.6	28.2	43.2	41.9	47.3	45.0	45.6	49.9	45.4	29.1
26/05/2021	20:02	20:12	55.2	63.5	46.9	60.7	57.8	51.9	3.1	8.1	29.6	44.1	42.0	48.1	48.7	46.3	49.0	43.2	29.9
26/05/2021	20:12	20:22	53.5	60.5	47.6	58.4	56.2	48.5	3.2	7.3	26.9	42.0	40.6	44.8	46.7	46.0	47.7	41.3	27.4
26/05/2021	20:22	20:32	50.8	58.7	46.2	56.2	53.7	47.7	3.3	8.5	28.0	42.1	39.3	41.2	43.6	41.8	44.8	39.3	29.3
26/05/2021	20:32	20:42	50.2	56.6	46.6	54.5	52.3	48.1	3.2	11.4	27.0	42.6	41.0	41.9	38.4	39.4	44.9	38.2	28.4
26/05/2021	20:42	20:52	52.4	56.6	46.6	55.5	54.4	49.7	3.2	8.6	27.6	43.7	43.8	46.5	43.3	40.6	45.2	38.6	29.2
26/05/2021	20:52	21:02	54.0	60.4	47.2	58.7	56.9	50.0	3.2	9.1	29.8	42.7	41.2	43.2	43.7	44.2	50.9	41.7	27.8
26/05/2021	21:02	21:12	53.3	60.4	46.4	58.9	57.3	47.7	3.0	6.2	19.1	24.5	23.0	29.7	29.2	43.4	52.1	42.1	31.3
26/05/2021	21:12	21:22	52.3	59.5	47.4	57.9	56.3	48.1	3.0	11.6	20.5	23.0	24.9	30.8	29.3	43.1	50.8	42.5	31.3
26/05/2021	21:22	21:32	52.1	62.7	47.2	59.1	55.4	48.5	3.0	10.2	21.6	26.7	24.3	30.6	30.0	41.6	50.6	42.8	31.4
26/05/2021	21:32	21:42	54.8	61.3	49.0	59.6	57.9	50.7	3.0	7.6	24.9	22.4	25.3	32.8	30.0	43.9	53.4	45.7	31.7
26/05/2021	21:42	21:52	55.0	64.5	50.0	62.1	59.6	51.2	3.0	8.2	21.1	27.9	26.0	32.6	31.2	43.6	53.6	45.9	31.9
26/05/2021	21:52	22:02	52.4	61.1	49.2	57.5	53.9	51.0	3.2	11.3	21.7	22.8	24.4	31.5	29.7	40.9	50.5	45.3	31.6
26/05/2021	22:02	22:12	53.3	63.3	49.4	59.4	55.4	51.3	2.9	8.8	19.6	21.1	24.0	31.2	30.3	41.5	51.8	45.1	31.0
26/05/2021	22:12	22:22	53.4	62.3	50.7	59.2	56.0	51.6	3.1	10.1	22.1	20.9	23.7	31.1	33.1	42.3	51.8	44.8	31.6
26/05/2021	22:22	22:32	52.6	58.7	50.1	56.2	53.7	51.8	3.0	7.0	21.6	21.9	23.3	29.3	31.7	38.7	51.2	44.7	31.2
26/05/2021	22:32	22:42	52.8	60.2	49.3	56.9	53.5	51.2	2.9	6.4	22.0	19.7	22.4	29.6	29.7	38.1	51.5	44.8	30.6
26/05/2021	22:42	22:52	54.5	60.2	49.2	58.9	57.5	50.0	2.9	6.1	17.0	19.2	22.4	26.5	27.3	42.0	53.5	44.5	30.7
26/05/2021	22:52	23:02	54.7	63.3	50.2	60.3	57.3	51.8	2.9	5.8	16.8	15.5	19.8	28.4	28.4	43.9	53.5	45.0	30.9
26/05/2021	23:02	23:12	54.7	62.9	50.9	60.9	58.8	52.0	3.0	9.3	17.7	17.0	22.7	30.1	29.7	43.5	53.5	44.9	30.4
26/05/2021	23:12	23:22	54.7	60.9	49.2	59.0	57.1	51.8	3.0	3.4	12.3	16.8	21.3	46.7	48.1	43.6	50.6	45.3	31.2

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
26/05/2021	23:22	23:32	53.3	58.2	50.2	56.8	55.3	51.7	2.9	3.2	12.0	13.6	18.1	42.4	43.4	41.3	50.6	45.3	31.3
26/05/2021	23:32	23:42	52.2	56.1	49.7	54.4	52.7	51.9	2.9	4.2	18.5	28.0	33.7	29.7	29.0	33.4	50.7	45.1	29.7
26/05/2021	23:42	23:52	51.1	58.0	49.0	55.0	52.0	50.0	2.9	5.0	14.5	14.9	17.9	34.9	33.7	33.3	49.6	43.6	30.9
26/05/2021	23:52	00:02	51.7	59.9	49.2	56.9	53.9	49.8	3.1	5.6	21.1	18.4	27.1	40.9	41.0	36.9	49.6	43.4	29.3
27/05/2021	00:02	00:12	54.4	60.6	50.2	58.4	56.2	53.0	3.2	8.5	18.9	15.5	19.2	43.6	45.1	39.8	52.1	46.0	30.9
27/05/2021	00:12	00:22	52.9	53.7	50.1	53.6	53.4	52.6	2.8	8.6	16.9	20.6	29.4	21.0	22.7	31.3	51.7	45.4	28.1
27/05/2021	00:22	00:32	53.2	54.0	51.1	53.9	53.8	52.7	2.8	5.8	15.7	15.0	19.5	27.0	24.1	31.1	52.0	45.8	28.6
27/05/2021	00:32	00:42	53.2	54.9	50.5	54.4	53.9	52.5	2.9	6.6	20.9	14.8	17.4	28.0	25.5	31.1	51.6	46.7	27.2
27/05/2021	00:42	00:52	52.6	54.1	50.0	53.9	53.7	51.2	2.9	6.9	16.3	13.5	17.8	24.7	23.9	31.1	50.6	47.3	25.8
27/05/2021	00:52	01:02	53.3	54.4	50.9	54.3	54.1	52.4	2.9	4.6	16.4	13.8	16.9	26.0	29.9	31.3	51.2	48.0	26.4
27/05/2021	01:02	01:12	53.0	53.9	51.3	53.8	53.6	52.3	3.0	5.1	15.6	14.7	16.7	20.4	21.0	27.7	50.3	48.6	26.1
27/05/2021	01:12	01:22	52.8	54.4	49.5	54.1	53.7	51.8	2.8	3.9	13.9	16.2	18.3	19.3	20.8	29.0	49.8	48.8	26.2
27/05/2021	01:22	01:32	53.2	54.3	50.7	54.1	53.8	52.6	2.8	5.9	14.7	11.4	14.6	18.0	20.8	31.7	50.3	49.1	25.9
27/05/2021	01:32	01:42	52.9	54.1	50.8	53.8	53.5	52.4	2.9	4.8	16.5	8.7	11.7	17.2	18.4	31.1	49.8	48.9	26.4
27/05/2021	01:42	01:52	51.8	54.4	49.8	53.6	52.8	50.9	2.8	3.4	13.7	8.2	12.3	22.1	22.6	31.6	48.7	48.0	26.0
27/05/2021	01:52	02:02	51.8	54.2	44.9	53.9	53.6	48.3	2.8	4.7	12.2	9.0	12.8	19.0	22.7	31.1	49.0	47.7	25.6
27/05/2021	02:02	02:12	52.8	54.7	50.2	54.3	53.9	51.5	2.8	5.4	16.1	9.1	11.9	17.4	19.0	30.5	50.6	47.8	26.4
27/05/2021	02:12	02:22	52.9	54.7	51.1	54.3	53.8	52.0	3.0	3.1	14.0	7.8	11.2	16.8	19.1	31.4	50.2	48.5	26.3
27/05/2021	02:22	02:32	52.6	54.2	50.2	53.7	53.2	52.1	2.9	7.5	17.9	10.4	12.2	18.1	21.7	31.4	49.4	48.7	26.1
27/05/2021	02:32	02:42	52.5	54.3	50.2	53.8	53.2	51.7	2.9	6.5	16.6	11.3	14.9	23.2	24.4	24.8	49.6	48.3	25.8
27/05/2021	02:42	02:52	53.1	54.9	49.8	54.5	54.1	51.9	2.9	4.3	11.3	9.5	18.5	29.4	30.2	27.3	50.1	49.2	25.4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
27/05/2021	02:52	03:02	53.0	54.0	50.0	53.9	53.7	52.2	3.1	5.6	13.5	10.1	12.9	19.2	18.6	22.8	49.7	49.3	25.3
27/05/2021	03:02	03:12	54.3	56.6	51.9	56.4	56.1	53.2	2.9	4.0	11.5	11.4	16.0	21.3	22.2	24.6	51.4	50.4	25.3
27/05/2021	03:12	03:22	53.4	54.7	51.2	54.5	54.3	51.9	2.9	6.9	11.7	10.1	13.5	17.6	19.0	25.4	50.2	49.6	25.3
27/05/2021	03:22	03:32	52.8	54.4	51.1	53.9	53.3	52.0	2.9	4.3	11.6	10.0	13.6	22.0	22.3	29.1	49.9	48.8	25.3
27/05/2021	03:32	03:42	53.2	56.0	51.6	54.9	53.8	52.6	3.0	4.7	12.4	14.8	17.9	25.5	29.6	32.4	50.5	48.8	25.3
27/05/2021	03:42	03:52	53.1	54.2	51.2	54.0	53.8	52.8	2.9	4.5	14.3	13.5	15.2	23.2	23.5	33.1	50.2	49.0	25.3
27/05/2021	03:52	04:02	51.8	53.7	49.4	53.4	53.0	50.3	2.9	6.0	15.9	12.3	15.0	21.4	22.7	33.2	48.7	47.7	25.3
27/05/2021	04:02	04:12	52.9	55.0	50.4	54.5	54.0	51.8	2.9	2.9	17.8	12.3	20.2	28.6	31.1	33.1	50.0	48.8	25.3
27/05/2021	04:12	04:22	52.8	54.2	51.1	54.0	53.7	51.8	2.9	6.7	14.7	13.7	17.6	26.8	31.7	31.9	49.8	48.7	25.3
27/05/2021	04:22	04:32	53.5	54.8	51.3	54.5	54.2	53.0	3.0	2.4	11.3	12.5	20.3	28.0	30.3	31.8	50.7	49.3	25.3
27/05/2021	04:32	04:42	53.8	55.0	51.9	54.8	54.5	53.4	3.0	2.8	10.4	10.4	16.8	28.5	33.2	34.8	51.0	49.3	25.3
27/05/2021	04:42	04:52	54.6	57.6	51.3	56.9	56.2	52.7	3.3	5.8	14.5	13.1	15.5	25.1	30.7	34.7	52.2	49.8	25.3
27/05/2021	04:52	05:02	53.4	57.0	51.4	55.8	54.5	52.4	3.1	5.8	13.7	13.1	19.7	27.9	32.0	31.4	50.5	49.3	25.3
27/05/2021	05:02	05:12	56.0	65.9	52.3	61.2	56.5	54.0	3.0	7.6	17.8	15.7	22.0	30.8	40.3	49.6	52.8	49.2	25.3
27/05/2021	05:12	05:22	56.5	65.2	49.2	63.3	61.4	51.5	3.0	3.8	19.5	18.9	22.4	31.1	35.5	49.5	54.5	47.6	25.6
27/05/2021	05:22	05:32	53.9	60.7	51.9	57.8	54.9	52.9	3.0	5.6	21.8	20.1	23.7	31.1	35.6	40.1	51.5	48.4	25.3
27/05/2021	05:32	05:42	53.0	64.2	48.5	59.0	53.8	52.0	3.1	6.6	18.8	21.6	25.3	36.0	38.1	39.1	50.3	47.6	27.6
27/05/2021	05:42	05:52	52.6	74.6	48.3	63.8	53.0	49.8	8.7	24.4	32.6	36.3	38.9	43.9	42.6	41.6	48.3	45.3	25.8
22/05/2021	09:29	09:39	51.3	64.3	41.0	59.3	54.3	43.9	6.4	14.8	23.1	30.3	35.6	40.8	42.7	42.7	46.1	45.8	29.9
22/05/2021	09:39	09:49	49.9	61.7	37.7	57.1	52.5	40.2	6.4	13.5	22.0	27.3	27.4	36.2	42.3	41.5	44.0	45.4	30.9

Table A5: Details of noise level at monitoring site N5

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	08:42	08:52	56.8	71.7	40.6	66.7	61.0	45.3	1.5	19.6	33.6	42.5	42.3	41.8	48.1	49.0	52.6	50.0	29.9
20/05/2021	08:52	09:02	55.7	76.0	40.2	67.7	55.8	46.1	-1.2	15.2	31.2	46.6	46.3	46.2	46.8	48.3	49.1	46.0	28.3
20/05/2021	09:02	09:12	53.0	71.1	35.5	64.5	56.0	41.9	-1.3	15.2	31.6	39.5	39.1	36.6	45.6	46.5	49.4	38.7	20.4
20/05/2021	09:12	09:22	52.3	69.3	38.0	62.5	56.8	42.1	-0.4	16.8	31.9	37.9	37.9	38.2	43.7	47.2	48.3	38.7	17.5
20/05/2021	09:22	09:32	55.0	78.5	36.1	67.5	57.1	41.1	1.1	20.6	37.4	43.2	44.2	47.3	49.8	48.3	46.5	38.3	19.4
20/05/2021	09:32	09:42	51.6	72.7	34.4	65.1	51.8	39.7	-0.4	14.7	30.0	40.1	42.4	43.4	43.9	45.7	43.9	38.6	20.0
20/05/2021	09:42	09:52	52.9	74.0	38.5	64.8	54.6	43.1	0.8	18.5	34.2	46.0	44.2	44.3	43.5	45.1	45.3	39.9	19.3
20/05/2021	09:52	10:02	54.4	72.1	34.9	66.8	58.3	41.4	-1.4	18.5	40.5	49.6	45.9	43.1	44.3	45.1	44.6	44.4	26.9
20/05/2021	10:02	10:12	56.6	73.4	38.0	63.1	61.8	43.4	0.6	17.2	34.9	40.0	39.0	41.8	43.0	48.6	54.4	46.7	31.8
20/05/2021	10:12	10:22	59.1	78.2	33.5	63.4	62.4	40.3	0.2	18.2	28.1	40.6	40.6	39.7	47.4	50.8	57.3	47.7	33.5
20/05/2021	10:22	10:32	51.1	68.7	34.4	60.2	54.9	40.6	0.6	15.2	33.3	41.0	43.2	42.2	43.2	42.6	43.5	41.5	24.0
20/05/2021	10:32	10:42	52.0	72.1	34.1	61.5	55.8	40.6	3.8	22.4	36.6	43.9	41.1	41.0	45.8	44.7	44.9	36.8	18.1
20/05/2021	10:42	10:52	48.0	65.8	34.1	58.9	50.8	38.3	2.4	14.7	28.8	36.9	35.6	39.1	40.1	42.4	42.4	26.2	11.8
20/05/2021	10:52	11:02	52.8	67.7	34.8	64.0	56.4	39.9	5.5	20.9	35.6	44.5	44.7	42.8	46.2	45.8	44.8	32.3	15.1
20/05/2021	11:02	11:12	54.5	66.9	34.3	64.6	59.4	38.2	4.7	16.3	31.5	40.1	39.7	41.7	45.0	46.3	51.8	42.3	31.6
20/05/2021	11:12	11:22	56.5	73.8	34.1	68.5	59.5	42.0	2.5	15.5	32.7	47.3	46.7	46.8	48.7	48.1	51.5	41.2	28.9
20/05/2021	11:22	11:32	53.1	72.9	35.6	63.7	55.2	42.4	3.3	17.5	33.0	44.2	44.1	42.6	46.8	46.8	44.4	40.3	20.3
20/05/2021	11:32	11:42	56.1	75.4	39.0	65.6	61.0	45.8	4.4	20.7	34.9	42.5	41.8	42.9	47.5	49.1	50.6	49.9	31.0
20/05/2021	11:42	11:52	52.0	76.7	39.2	60.3	54.9	44.5	6.9	16.4	30.8	37.5	37.5	41.2	45.6	44.2	46.8	43.3	20.8
20/05/2021	11:52	12:02	54.6	82.8	38.7	61.9	53.9	42.3	3.6	12.2	29.4	41.0	39.5	40.4	52.0	47.6	44.3	42.0	21.7
20/05/2021	12:02	12:12	53.8	62.2	37.5	60.6	58.3	44.2	3.0	13.1	29.5	38.2	35.9	37.9	41.1	42.7	49.7	49.9	30.1

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	12:12	12:22	61.9	68.1	42.7	66.5	64.9	48.6	6.9	16.9	33.0	44.4	43.9	41.0	43.9	54.4	60.1	51.6	39.4
20/05/2021	12:22	12:32	59.8	72.0	51.0	63.9	61.9	56.2	7.0	17.8	29.9	40.8	40.9	39.3	43.2	51.1	58.3	49.2	36.0
20/05/2021	12:32	12:42	58.6	66.5	32.7	64.5	63.6	37.4	3.9	16.1	30.9	38.9	36.9	35.8	39.6	51.7	56.9	48.0	37.1
20/05/2021	12:42	12:52	52.2	68.3	32.3	64.4	55.3	37.7	7.5	22.0	34.0	42.1	42.4	41.6	46.6	47.4	41.6	29.4	13.8
20/05/2021	12:52	13:02	51.2	70.3	33.3	63.8	52.8	38.7	7.2	17.4	30.6	39.7	39.3	42.1	46.1	46.1	41.0	29.9	14.8
20/05/2021	13:02	13:12	55.7	75.9	34.3	68.9	56.0	39.0	8.1	19.8	36.9	43.8	44.5	44.3	51.7	49.6	46.5	35.2	19.6
20/05/2021	13:12	13:22	52.3	68.0	34.3	64.1	56.4	39.0	8.3	21.9	36.8	44.2	44.4	43.0	46.2	45.1	42.1	31.5	16.0
20/05/2021	13:22	13:32	51.4	70.8	30.8	63.7	53.4	38.9	13.6	22.1	27.1	34.1	34.0	36.4	48.6	44.0	44.3	33.1	18.0
20/05/2021	13:32	13:42	53.2	71.9	35.4	66.4	54.3	39.9	9.8	22.7	36.1	40.9	41.0	42.2	47.5	48.5	45.5	32.9	15.6
20/05/2021	13:42	13:52	49.1	71.4	33.5	59.0	52.2	39.4	11.8	21.0	35.6	40.3	38.7	39.5	43.8	42.0	39.8	30.6	15.5
20/05/2021	13:52	14:02	48.8	64.9	34.6	57.8	51.4	42.1	12.3	20.3	30.1	37.7	36.4	39.5	44.0	41.2	42.3	30.1	17.3
20/05/2021	14:02	14:12	56.7	81.0	34.4	68.9	58.3	40.6	12.8	21.3	37.1	49.8	46.6	44.0	52.8	49.2	44.2	33.8	18.3
20/05/2021	14:12	14:22	51.1	68.5	34.1	59.2	54.9	40.2	10.8	19.1	32.4	44.3	44.6	42.7	43.0	42.3	41.3	30.0	16.5
20/05/2021	14:22	14:32	58.0	76.1	34.6	71.1	60.4	46.1	7.5	19.0	35.0	47.6	48.4	47.1	53.3	52.9	46.1	36.5	20.1
20/05/2021	14:32	14:42	62.0	82.8	36.7	74.1	63.8	43.2	5.3	19.7	34.9	46.9	45.3	47.9	58.0	58.7	48.8	35.9	17.5
20/05/2021	14:42	14:52	56.0	78.7	34.2	67.5	59.4	40.3	10.3	19.9	33.5	43.8	44.5	43.8	51.7	50.6	47.1	36.8	23.5
20/05/2021	14:52	15:02	60.1	78.6	39.1	71.8	62.9	45.1	13.1	26.1	40.5	48.6	49.4	49.0	54.6	54.9	51.7	44.3	27.6
20/05/2021	15:02	15:12	57.2	72.9	40.3	69.8	59.1	44.2	8.6	23.0	37.8	46.3	46.2	48.4	52.9	50.2	47.5	39.0	23.3
20/05/2021	15:12	15:22	57.1	72.7	38.4	70.5	59.5	43.9	9.0	22.8	38.3	44.5	43.9	47.6	53.3	50.7	47.7	36.8	19.1
20/05/2021	15:22	15:32	56.3	71.0	39.7	68.2	59.4	44.5	11.7	24.2	39.0	46.3	46.5	46.4	51.1	50.0	47.1	37.1	24.3
20/05/2021	15:32	15:42	59.3	83.1	40.1	70.8	59.5	45.2	4.9	21.7	38.3	47.8	49.7	53.1	54.4	51.6	48.2	36.1	21.2
20/05/2021	15:42	15:52	58.0	81.5	38.8	68.4	61.7	45.1	5.3	22.1	38.6	46.4	48.6	49.4	53.2	51.2	48.4	40.5	27.0

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	15:52	16:02	54.2	72.3	36.3	67.4	56.6	40.6	5.3	21.6	35.8	44.4	44.5	47.4	49.6	46.3	40.7	30.9	15.7
20/05/2021	16:02	16:12	59.2	79.4	39.5	70.9	63.2	44.3	6.2	25.5	40.1	48.5	50.0	48.0	55.4	52.7	47.8	37.9	21.4
20/05/2021	16:12	16:22	52.7	71.5	36.8	64.2	55.6	41.0	2.6	19.5	33.9	47.2	44.3	43.7	46.3	44.5	39.8	30.9	15.8
20/05/2021	16:22	16:32	52.7	67.6	34.9	63.2	56.4	41.7	2.9	20.8	37.8	45.9	44.0	42.6	46.9	45.3	41.3	29.3	12.7
20/05/2021	16:32	16:42	52.1	66.3	37.0	63.6	54.9	43.1	2.6	20.6	35.8	44.7	43.5	42.6	46.5	44.5	41.4	32.0	19.7
20/05/2021	16:42	16:52	49.5	66.6	36.7	59.1	52.4	42.4	1.4	14.3	31.3	41.3	40.9	40.8	42.9	41.2	41.8	30.1	14.8
20/05/2021	16:52	17:02	54.0	70.9	36.6	65.0	57.5	43.7		18.8	35.6	47.9	46.1	44.6	47.0	46.9	42.5	33.2	19.4
20/05/2021	17:02	17:12	60.4	75.5	39.5	71.7	65.2	45.3	1.6	23.7	40.9	48.9	46.8	45.9	50.1	52.2	57.8	47.2	18.6
20/05/2021	17:12	17:22	57.1	76.7	37.4	68.3	60.5	45.8	-1.3	15.8	34.8	44.1	41.8	48.4	49.9	49.2	52.9	43.1	19.9
20/05/2021	17:22	17:32	55.6	69.7	36.6	65.1	60.2	45.0	-1.8	15.0	32.8	41.6	40.1	41.6	44.8	46.7	53.2	45.9	14.7
20/05/2021	17:32	17:42	58.5	79.3	38.2	67.9	61.5	45.3	0.1	17.7	38.4	49.7	46.4	51.3	48.7	48.9	53.8	45.5	20.8
20/05/2021	17:42	17:52	56.0	73.7	40.4	67.6	58.9	45.1	-1.4	17.0	33.2	44.3	43.0	46.2	47.0	47.2	52.8	42.4	15.9
20/05/2021	17:52	18:02	61.1	79.0	39.4	70.7	66.3	46.2	2.3	20.7	38.6	47.5	46.4	47.3	50.6	53.1	58.8	47.7	32.7
20/05/2021	18:02	18:12	58.0	79.0	36.6	70.5	58.5	44.0	-2.1	14.3	31.8	40.3	42.5	54.0	47.6	51.1	51.9	42.5	26.6
20/05/2021	18:12	18:22	53.8	68.1	36.6	62.0	55.4	44.0	-2.2	14.3	32.1	42.1	43.7	42.3	41.9	47.1	49.7	43.1	24.5
20/05/2021	18:22	18:32	48.7	66.8	36.4	60.7	49.7	41.2	-2.4	13.8	32.3	41.0	40.2	40.8	42.5	39.8	39.5	29.7	15.8
20/05/2021	18:32	18:42	50.5	70.6	39.6	61.8	51.9	42.8	-1.9	14.8	33.6	42.7	43.6	42.6	40.4	39.1	43.2	39.4	19.1
20/05/2021	18:42	18:52	49.1	67.0	38.8	60.8	51.5	41.8	-1.9	16.0	33.8	41.3	40.4	41.1	41.9	40.1	41.7	30.1	20.6
20/05/2021	18:52	19:02	45.3	63.3	37.8	55.3	46.8	41.0	-2.4	11.7	26.7	35.2	32.9	36.4	39.9	33.9	40.4	28.3	19.3
20/05/2021	19:02	19:12	46.2	61.7	39.6	55.8	49.1	42.0	-2.6	14.5	31.3	35.0	34.8	37.8	38.8	38.0	41.3	31.5	18.1
20/05/2021	19:12	19:22	48.4	68.0	39.1	58.1	49.9	42.0	-2.5	12.2	31.5	40.9	41.2	39.7	39.0	39.1	42.2	29.4	17.3
20/05/2021	19:22	19:32	65.9	93.2	37.7	77.2	58.4	41.6	-2.6	10.1	26.5	37.2	40.1	61.9	61.5	59.5	47.3	33.2	18.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	19:32	19:42	50.8	79.0	37.9	61.1	49.5	41.8	-2.4	15.2	39.6	42.6	43.6	43.7	43.0	39.7	42.1	30.3	15.0
20/05/2021	19:42	19:52	45.1	57.2	39.7	51.9	47.0	42.2	-2.8	11.0	30.0	34.0	33.6	34.6	34.3	34.4	42.4	27.8	13.3
20/05/2021	19:52	20:02	45.2	56.9	39.7	51.1	47.2	42.6	-3.4	9.7	26.0	32.7	32.3	34.6	34.5	32.8	43.2	27.4	13.9
20/05/2021	20:02	20:12	48.4	74.9	38.8	55.6	47.6	42.6	-1.6	10.9	25.2	34.6	34.3	37.5	44.5	40.1	42.8	27.8	16.5
20/05/2021	20:12	20:22	46.0	62.4	38.4	56.9	46.9	41.5	-4.2	8.7	23.6	37.1	38.9	36.5	34.2	35.4	41.9	29.9	18.2
20/05/2021	20:22	20:32	47.8	79.5	38.7	53.4	47.7	41.8	-3.4	9.1	23.1	32.1	31.8	34.6	37.4	44.8	42.4	27.6	18.6
20/05/2021	20:32	20:42	49.8	76.2	38.8	57.9	51.4	42.7	-2.8	13.1	31.3	37.5	38.3	44.4	40.7	38.8	45.3	29.6	17.3
20/05/2021	20:42	20:52	50.3	78.9	37.9	60.6	49.3	41.1	-1.4	11.6	28.3	39.1	38.1	45.4	43.6	39.3	43.9	29.3	15.4
20/05/2021	20:52	21:02	44.1	58.3	36.0	52.6	46.7	39.8	-2.7	12.5	28.4	36.5	34.2	34.2	35.5	33.8	39.3	28.5	17.8
20/05/2021	21:02	21:12	57.7	82.3	34.2	72.4	44.1	38.1	-4.1	6.0	19.9	26.9	27.6	56.1	51.1	44.7	42.7	30.1	18.7
20/05/2021	21:12	21:22	40.8	51.2	34.6	46.5	42.2	38.5	-3.5	5.1	20.0	26.2	24.8	27.8	27.1	27.9	39.3	29.4	17.6
20/05/2021	21:22	21:32	47.4	61.8	35.0	55.2	52.0	38.8	-3.2	6.7	24.7	34.8	36.7	32.7	31.8	35.8	46.0	29.7	15.0
20/05/2021	21:32	21:42	43.2	60.0	34.4	53.2	45.6	37.7	-3.8	9.8	27.4	36.2	35.3	32.5	33.3	32.5	38.1	28.1	11.4
20/05/2021	21:42	21:52	40.6	59.9	35.2	45.5	41.6	38.3	-6.2	1.7	15.1	24.4	20.5	27.9	27.5	28.1	39.4	27.7	11.5
20/05/2021	21:52	22:02	50.1	72.3	33.5	63.7	48.3	37.8	-3.1	10.2	26.8	44.3	46.4	39.0	40.0	37.0	39.1	29.2	13.9
20/05/2021	22:02	22:12	46.1	59.7	34.9	54.0	50.8	38.3	-3.6	8.7	22.5	32.9	33.4	32.8	30.5	31.7	44.9	29.2	11.3
20/05/2021	22:12	22:22	47.7	55.7	35.4	53.9	52.0	40.2	-5.2	11.7	20.8	24.5	25.0	30.5	29.7	34.5	47.2	29.4	11.0
20/05/2021	22:22	22:32	39.9	50.4	33.6	46.9	42.0	36.2	-1.9	6.2	18.3	29.0	25.1	28.9	29.0	28.7	37.5	29.3	13.4
20/05/2021	22:32	22:42	39.5	55.5	33.3	47.6	40.8	35.6	-3.4	8.0	23.4	27.8	28.9	24.6	26.3	26.8	37.2	29.6	13.2
20/05/2021	22:42	22:52	44.1	62.4	33.8	58.1	41.9	36.9	-4.5	7.1	26.2	39.5	37.5	31.9	30.5	29.3	38.1	30.1	14.5
20/05/2021	22:52	23:02	42.0	58.6	34.4	49.5	44.6	37.2	-4.7	4.8	21.3	33.0	29.5	29.8	34.3	31.9	38.6	28.0	17.3
20/05/2021	23:02	23:12	39.7	49.8	33.4	45.6	41.7	36.4	-4.0	-0.8	6.6	10.6	15.2	25.7	29.5	30.1	38.1	28.1	13.8

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	23:12	23:22	39.2	50.8	32.4	42.4	41.0	36.5	-5.7	2.2	12.3	19.0	19.0	20.8	21.0	26.9	38.3	27.9	15.1
20/05/2021	23:22	23:32	42.2	65.9	34.0	46.5	41.3	36.8	-2.7	4.9	16.6	28.6	32.8	36.8	28.0	28.3	38.6	28.3	13.1
20/05/2021	23:32	23:42	52.7	79.1	33.4	63.6	42.1	36.7	-1.5	-1.1	11.5	21.5	22.4	49.8	48.7	37.6	39.7	28.3	15.2
20/05/2021	23:42	23:52	52.9	79.2	34.3	66.4	43.2	36.9	-2.2	2.0	18.1	30.5	30.6	50.0	48.8	39.3	40.1	28.0	19.0
21/05/2021	23:52	00:02	61.4	79.5	33.3	74.4	61.7	37.5	-2.6	4.0	23.0	28.2	30.3	59.0	56.6	49.7	44.8	29.4	18.9
21/05/2021	00:02	00:12	45.7	68.2	33.5	55.8	47.2	37.0	-0.3	-1.5	11.9	28.3	26.6	31.2	38.7	38.8	42.7	29.7	18.7
21/05/2021	00:12	00:22	51.4	61.2	35.3	58.8	56.0	40.3	-1.0	4.3	18.4	16.6	20.8	26.6	27.2	34.6	51.2	29.7	18.5
21/05/2021	00:22	00:32	50.6	60.6	34.7	57.7	55.0	39.8	-1.6	2.9	7.9	10.6	16.0	23.6	24.5	34.0	50.5	29.0	19.0
21/05/2021	00:32	00:42	50.4	62.5	33.5	57.9	55.0	39.0	4.4	11.6	15.4	19.7	21.3	23.3	25.8	34.0	50.2	28.7	19.2
21/05/2021	00:42	00:52	52.5	64.1	34.3	60.3	57.5	39.1	6.0	13.6	15.5	17.3	19.9	23.5	26.6	35.2	52.4	29.3	15.9
21/05/2021	00:52	01:02	53.2	64.5	34.3	60.2	57.9	40.3	1.3	7.5	18.3	24.1	26.6	24.0	23.3	35.6	53.1	29.1	17.3
21/05/2021	01:02	01:12	51.9	61.2	34.2	59.0	56.7	39.4	-2.5	1.5	8.0	13.6	16.6	18.3	22.0	34.9	51.9	27.8	18.8
21/05/2021	01:12	01:22	52.4	62.1	32.7	59.5	57.1	39.3	1.5	7.5	13.5	21.0	22.5	23.3	23.3	35.1	52.3	27.7	15.7
21/05/2021	01:22	01:32	48.6	61.2	31.5	58.4	52.0	36.5	3.5	11.1	14.4	16.4	17.2	20.5	23.5	32.4	48.5	27.9	14.9
21/05/2021	01:32	01:42	45.5	60.9	32.3	51.9	49.4	36.9	-0.7	4.0	11.1	16.5	22.0	22.6	31.1	33.4	45.0	27.7	15.7
21/05/2021	01:42	01:52	43.1	62.0	31.4	54.1	47.1	33.9		4.5	10.1	12.5	15.5	24.7	35.1	36.0	41.0	27.2	16.4
21/05/2021	01:52	02:02	38.2	46.3	30.5	43.8	41.7	33.1	-2.7	1.4	9.9	12.7	14.6	19.1	19.6	30.2	36.9	27.2	15.8
21/05/2021	02:02	02:12	38.0	49.3	29.9	45.0	41.4	32.8	-1.0	5.8	17.7	24.2	23.5	23.7	21.8	28.9	36.0	27.8	15.1
21/05/2021	02:12	02:22	37.6	45.3	30.3	43.2	41.0	33.0	-1.1	3.9	10.0	12.3	15.4	21.1	20.9	28.2	36.1	28.4	15.5
21/05/2021	02:22	02:32	42.6	62.6	29.9	57.0	38.7	31.9	-2.8	1.5	8.8	10.6	17.3	28.2	38.2	39.3	32.3	28.6	15.1
21/05/2021	02:32	02:42	40.3	56.9	30.3	52.5	41.2	32.9	-1.4	3.8	11.2	11.7	16.2	35.8	31.2	33.9	33.9	28.3	14.7
21/05/2021	02:42	02:52	38.9	56.9	31.1	43.6	41.6	35.0	-0.4	5.6	11.5	14.6	21.7	18.4	21.1	35.0	35.8	27.4	14.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	02:52	03:02	44.2	64.6	29.0	57.7	42.6	34.2	-1.4	5.5	10.7	12.5	16.4	27.4	38.7	41.4	36.0	27.2	15.2
21/05/2021	03:02	03:12	38.9	49.6	31.3	46.6	41.2	34.5	-5.2	2.3	13.5	19.2	21.3	25.7	26.7	34.5	35.3	27.0	15.9
21/05/2021	03:12	03:22	37.8	51.2	29.7	47.1	40.5	31.9	-3.5	4.4	12.5	22.7	28.2	28.3	27.4	31.1	33.7	25.7	12.5
21/05/2021	03:22	03:32	45.2	66.2	29.3	59.4	41.5	31.6	-4.0		8.6	21.1	17.1	28.2	40.3	42.8	33.5	25.5	10.8
21/05/2021	03:32	03:42	45.1	67.5	27.8	59.0	38.7	31.7	-5.3	0.1	7.9	12.4	14.9	27.5	40.0	42.9	33.4	25.7	12.1
21/05/2021	03:42	03:52	46.4	69.2	29.8	59.3	43.0	33.2	-3.9	2.7	22.2	27.8	23.9	33.4	39.8	44.6	32.4	26.0	10.7
21/05/2021	03:52	04:02	45.0	65.6	30.1	59.0	41.5	33.3	-2.7	6.9	17.4	27.8	26.4	31.1	40.6	41.9	32.6	26.0	10.3
21/05/2021	04:02	04:12	50.1	75.8	30.3	62.8	48.7	34.7	-2.9	7.1	21.6	29.8	29.9	47.1	44.6	42.2	34.9	28.2	13.4
21/05/2021	04:12	04:22	47.3	67.7	31.7	59.9	47.7	35.8	-3.0	7.4	19.1	29.8	27.0	34.5	42.4	44.7	35.0	27.7	12.5
21/05/2021	04:22	04:32	58.7	82.5	33.1	73.9	54.1	36.1	-4.2	7.0	15.1	22.8	27.1	56.6	53.5	47.5	37.8	28.4	9.5
21/05/2021	04:32	04:42	53.4	79.5	33.3	65.3	52.5	36.5	-4.0	3.6	14.5	27.5	23.1	49.9	48.4	46.8	35.8	27.0	8.6
21/05/2021	04:42	04:52	57.0	77.3	36.2	65.0	62.1	38.0	-4.0	4.1	20.3	29.4	24.1	42.9	46.9	52.0	54.0	44.4	28.5
21/05/2021	04:52	05:02	60.6	69.9	36.6	65.9	64.7	40.3	-1.1	16.3	29.8	35.3	34.4	37.0	45.7	54.4	58.7	49.5	33.3
21/05/2021	05:02	05:12	57.8	87.0	34.9	70.8	51.4	38.4	-2.0	12.7	27.2	36.0	36.3	54.0	54.3	47.7	41.2	28.7	12.0
21/05/2021	05:12	05:22	67.1	92.0	36.0	80.1	56.7	40.5	-1.5	13.2	28.3	37.9	37.9	57.2	62.2	64.3	54.6	37.7	20.2
21/05/2021	05:22	05:32	50.3	66.9	34.8	59.3	54.4	39.9	-1.4	13.8	29.6	38.0	37.3	42.3	46.7	41.5	41.9	29.5	13.7
21/05/2021	05:32	05:42	49.3	66.6	34.3	59.9	53.4	38.3	-2.3	11.8	30.8	40.8	42.5	40.8	43.5	40.2	39.2	29.9	16.1
21/05/2021	05:42	05:52	47.5	63.9	33.4	55.6	50.7	38.9	-2.0	13.2	29.3	37.6	37.3	38.4	41.0	40.0	41.2	29.4	14.5
21/05/2021	05:52	06:02	54.5	81.2	35.1	62.5	54.9	40.9	-0.8	15.6	33.8	44.4	42.0	50.8	48.1	45.5	40.7	34.1	20.6
21/05/2021	06:02	06:12	49.6	65.5	34.4	61.1	51.9	39.9	-1.7	15.3	31.5	43.2	43.6	41.0	41.4	39.8	39.6	30.2	15.9
21/05/2021	06:12	06:22	51.8	73.8	34.9	63.3	54.1	40.5	-1.5	15.6	32.9	42.5	43.5	43.8	47.1	44.5	38.6	28.8	12.6
21/05/2021	06:22	06:32	60.7	80.4	41.9	70.6	64.8	48.1	4.0	24.6	41.0	48.6	50.5	50.5	54.8	54.8	53.5	45.7	30.5

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	06:32	06:42	70.0	93.9	46.2	84.0	67.8	50.3	12.6	31.2	46.3	53.7	55.9	59.8	67.5	62.6	58.8	52.7	38.4
21/05/2021	06:42	06:52	62.7	82.2	45.8	73.6	64.2	52.7	6.8	25.6	40.1	48.9	49.4	49.8	55.7	57.2	56.7	53.4	36.8
21/05/2021	06:52	07:02	61.6	80.4	44.4	74.2	64.3	48.1	5.2	23.7	40.5	47.4	50.2	51.6	57.5	55.0	52.8	47.8	31.8
21/05/2021	07:02	07:12	57.8	74.8	43.2	66.9	61.4	48.3	-0.3	17.1	35.2	43.0	42.2	44.6	49.3	48.0	52.1	53.4	34.4
21/05/2021	07:12	07:22	57.2	73.6	43.3	68.0	61.0	46.3	4.0	24.3	39.3	45.8	45.5	50.0	52.1	50.0	47.5	44.5	26.2
21/05/2021	07:22	07:32	61.9	84.1	43.6	75.6	62.4	46.9	3.2	26.8	42.1	48.8	50.3	48.8	54.1	56.7	55.2	53.2	34.6
21/05/2021	07:32	07:42	53.6	70.4	46.3	59.8	55.4	49.6	1.1	24.5	35.3	41.8	40.9	41.7	46.7	45.0	48.1	45.9	24.7
21/05/2021	07:42	07:52	58.7	77.2	44.4	68.8	62.1	48.9	4.1	24.8	37.3	46.9	48.8	51.5	53.1	50.8	49.2	47.5	29.8
21/05/2021	07:52	08:02	59.6	85.3	43.8	69.5	61.1	46.4	4.0	23.4	34.4	45.0	47.1	43.5	50.3	51.8	55.2	53.2	40.4
21/05/2021	08:02	08:12	51.8	79.3	39.1	59.9	54.4	44.3	1.8	21.0	31.0	38.3	38.4	40.5	46.1	43.4	45.6	44.3	25.3
21/05/2021	08:12	08:22	51.2	69.4	40.2	62.9	52.6	43.7	0.3	15.7	30.2	39.4	39.6	42.5	43.6	44.3	44.9	41.6	20.0
21/05/2021	08:22	08:32	55.5	70.8	42.1	66.6	57.9	45.7	1.7	16.3	33.6	39.3	38.5	44.0	46.1	49.4	49.9	49.4	29.4
21/05/2021	08:32	08:42	51.2	61.9	42.0	58.9	54.9	45.5	4.5	18.3	34.3	40.5	39.4	36.6	39.6	40.8	46.5	45.9	27.6
21/05/2021	08:42	08:52	53.5	80.6	41.0	60.3	54.6	44.4	5.5	17.3	28.2	35.5	35.5	48.2	47.8	41.5	45.8	45.9	27.1
21/05/2021	08:52	09:02	50.1	73.6	40.1	57.7	52.0	43.6	9.8	19.0	32.1	39.0	38.6	38.4	44.2	41.3	43.5	42.0	22.2
21/05/2021	09:02	09:12	47.4	64.0	38.2	55.2	50.0	42.4	4.5	16.6	30.2	37.7	36.4	36.9	40.9	39.3	40.8	38.2	15.7
21/05/2021	09:12	09:22	45.7	59.3	32.0	55.1	49.0	37.7	8.8	17.8	28.6	37.2	36.1	37.0	38.7	36.7	38.1	35.3	15.9
21/05/2021	09:22	09:32	53.5	82.0	29.8	61.6	50.1	34.8	0.7	15.5	28.6	37.4	37.5	37.1	50.8	46.3	46.0	36.7	21.9
21/05/2021	09:32	09:42	62.9	69.3	59.3	64.5	63.8	61.5	1.5	14.9	31.7	37.9	40.3	38.0	39.2	55.2	61.6	51.0	35.7
21/05/2021	09:42	09:52	57.4	65.4	32.4	64.0	62.8	41.6	-1.0	9.9	25.1	33.2	30.6	34.9	37.6	49.3	56.2	45.9	29.3
21/05/2021	09:52	10:02	45.3	62.7	33.3	54.1	48.6	37.9	6.7	15.8	33.8	35.1	34.1	35.3	38.3	38.1	37.9	34.7	12.8
21/05/2021	10:02	10:12	48.5	65.5	37.6	60.6	50.5	40.7	9.5	17.5	30.4	39.2	37.5	38.6	42.3	40.9	41.5	37.2	15.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	10:12	10:22	52.6	76.3	34.4	64.0	53.8	39.8	12.2	20.9	32.0	37.7	38.3	40.7	48.9	48.1	40.4	35.9	16.7
21/05/2021	10:22	10:32	51.3	77.2	33.6	62.1	52.2	38.9	13.6	21.1	27.3	33.4	33.6	39.5	47.5	47.5	37.9	30.3	13.6
21/05/2021	10:32	10:42	50.8	73.1	35.4	62.2	52.9	40.4	11.4	19.2	27.7	37.2	36.8	41.1	46.9	44.9	41.4	35.1	18.5
21/05/2021	10:42	10:52	53.6	79.4	35.5	64.5	53.3	39.2	15.1	23.3	32.3	39.3	39.2	48.7	49.3	46.2	39.0	32.8	16.3
21/05/2021	10:52	11:02	55.2	75.8	36.2	67.9	56.9	41.3	14.0	21.0	29.1	36.8	36.3	40.9	52.0	51.2	42.0	34.5	15.6
21/05/2021	11:02	11:12	54.4	70.6	33.1	66.3	57.9	39.3	14.1	22.6	36.7	45.4	46.5	46.4	48.5	48.2	40.4	28.6	14.9
21/05/2021	11:12	11:22	50.8	68.7	32.4	61.6	54.2	38.8	13.8	22.1	32.4	39.7	40.0	41.3	46.4	45.5	37.0	27.0	13.7
21/05/2021	11:22	11:32	55.4	88.2	32.4	62.5	54.0	38.6	15.3	23.5	32.9	47.3	42.3	41.9	52.4	48.3	42.4	30.3	16.6
21/05/2021	11:32	11:42	58.6	73.0	33.1	64.3	61.7	39.9	14.2	22.0	31.8	40.8	40.2	40.1	45.5	52.1	56.7	45.5	30.0
21/05/2021	11:42	11:52	53.7	71.5	36.4	63.5	57.9	41.8	17.3	24.9	30.4	38.8	39.2	43.4	48.3	47.5	48.2	37.9	22.2
21/05/2021	11:52	12:02	52.8	73.2	33.9	65.2	52.7	39.4	13.0	22.0	32.8	43.1	43.9	43.1	48.3	45.7	41.5	34.7	16.7
21/05/2021	12:02	12:12	50.1	67.6	36.7	62.1	52.9	42.1	14.6	23.9	34.6	40.5	38.5	37.4	42.8	43.2	44.3	39.0	17.8
21/05/2021	12:12	12:22	56.0	74.5	36.7	68.8	57.4	41.8	15.7	24.6	34.5	44.3	46.0	45.7	48.4	50.9	49.3	41.8	25.4
21/05/2021	12:22	12:32	48.2	70.3	35.0	59.3	49.5	39.9	14.3	22.0	28.9	36.1	33.2	39.3	42.5	43.6	39.5	32.2	15.6
21/05/2021	12:32	12:42	51.5	69.5	36.0	62.8	54.4	41.0	13.4	21.8	34.8	41.4	44.0	42.3	44.2	45.0	43.4	35.7	18.4
21/05/2021	12:42	12:52	50.5	69.3	36.1	63.5	51.6	41.6	17.7	26.1	30.6	36.5	36.3	43.2	45.7	45.1	39.6	31.8	20.2
21/05/2021	12:52	13:02	51.8	75.4	35.3	63.8	51.5	39.3	7.7	15.7	28.0	37.0	35.6	43.9	47.2	47.4	38.9	29.7	15.0
21/05/2021	13:02	13:12	47.9	64.8	33.6	60.4	50.3	38.5	3.8	15.9	32.7	39.3	37.4	38.5	42.7	41.8	36.8	27.5	14.1
21/05/2021	13:12	13:22	48.2	70.5	35.1	58.0	50.1	39.9	10.9	18.4	29.5	36.0	36.0	38.5	42.9	43.3	39.2	30.2	19.1
21/05/2021	13:22	13:32	53.2	66.8	37.4	64.5	56.6	42.9	13.8	25.4	37.6	43.8	42.9	41.9	47.2	48.0	44.5	33.1	16.7
21/05/2021	13:32	13:42	48.3	67.2	35.4	60.2	49.9	39.3	14.3	23.2	31.4	35.8	39.3	40.0	42.6	42.4	38.1	29.8	17.3
21/05/2021	13:42	13:52	48.6	69.1	34.1	62.0	49.9	38.1	13.5	21.7	29.8	37.7	36.6	40.6	43.4	43.8	34.6	27.2	14.4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	13:52	14:02	50.7	65.7	37.0	60.6	55.0	40.3	14.8	24.5	38.9	42.6	40.0	40.6	45.3	43.8	40.6	30.5	16.4
21/05/2021	14:02	14:12	52.5	66.2	33.6	63.0	58.1	37.9	12.0	19.9	30.6	40.3	41.5	41.2	45.9	44.8	48.0	36.4	22.5
21/05/2021	14:12	14:22	61.0	72.1	54.3	64.6	63.0	57.9	13.0	21.6	28.1	38.4	36.4	38.2	42.0	52.8	59.7	49.2	36.3
21/05/2021	14:22	14:32	58.1	83.6	36.5	69.5	59.8	41.4	11.7	20.9	33.2	42.8	43.5	45.6	49.3	52.0	54.5	45.4	32.9
21/05/2021	14:32	14:42	50.6	72.0	34.8	62.3	53.4	39.6	14.1	23.1	32.5	42.6	42.2	42.2	46.1	42.2	36.4	27.6	17.6
21/05/2021	14:42	14:52	47.0	67.7	34.7	57.9	48.9	38.9	11.7	19.6	28.8	36.7	35.0	37.0	41.5	42.6	34.7	25.5	13.2
21/05/2021	14:52	15:02	56.5	75.9	33.7	71.5	54.8	38.8	5.0	21.2	36.6	43.2	47.9	45.2	50.5	51.6	47.8	39.6	22.5
21/05/2021	15:02	15:12	55.8	72.2	35.4	67.9	58.2	42.5	4.2	23.4	36.9	44.8	46.0	46.1	50.8	50.2	45.7	36.1	19.5
21/05/2021	15:12	15:22	67.6	85.4	36.6	80.0	69.4	41.4	9.5	28.0	45.5	52.5	55.2	57.6	65.3	59.5	55.0	45.5	35.9
21/05/2021	15:22	15:32	55.5	71.9	36.7	65.1	59.1	45.7	3.8	22.9	38.8	46.3	45.7	45.5	51.0	49.1	43.8	31.2	23.8
21/05/2021	15:32	15:42	60.8	83.6	37.1	73.4	62.5	43.8	3.0	22.0	39.5	47.2	50.0	47.5	56.6	56.7	47.5	34.6	18.3
21/05/2021	15:42	15:52	59.2	77.6	39.4	72.3	61.1	46.3	4.9	23.5	39.8	49.5	50.9	51.7	54.3	51.7	46.1	34.0	19.6
21/05/2021	15:52	16:02	64.6	88.0	39.5	77.4	59.6	45.4	2.3	18.9	35.3	47.4	45.0	54.3	62.5	57.8	50.7	39.7	28.9
21/05/2021	16:02	16:12	61.6	80.9	41.2	74.6	63.1	47.1	4.4	22.5	39.9	55.8	54.6	55.0	54.6	50.3	48.2	36.7	22.1
21/05/2021	16:12	16:22	56.7	74.1	42.0	65.1	60.0	47.9	11.0	24.4	40.4	48.3	48.0	47.5	52.5	48.4	42.6	35.0	26.2
21/05/2021	16:22	16:32	56.2	76.4	40.5	65.9	60.2	45.9	9.5	23.1	39.6	45.7	44.5	46.5	51.9	50.4	45.6	34.7	25.7
21/05/2021	16:32	16:42	54.9	72.8	40.2	65.3	57.9	45.7	12.0	21.5	40.0	46.8	46.1	46.5	48.3	46.8	46.5	38.8	26.5
21/05/2021	16:42	16:52	56.6	77.4	41.1	66.8	59.9	46.2	11.0	22.2	37.2	48.5	45.9	45.5	51.7	50.7	46.4	36.1	19.3
21/05/2021	16:52	17:02	58.8	91.0	39.8	64.2	57.3	45.6	14.0	21.7	32.3	42.2	42.3	45.8	50.7	53.8	53.6	49.1	42.3
21/05/2021	17:02	17:12	56.9	70.2	46.8	63.6	60.0	51.6	5.8	18.0	33.9	42.3	41.6	47.5	52.5	52.0	47.6	38.9	24.9
21/05/2021	17:12	17:22	54.2	70.9	43.1	62.3	57.3	47.5	5.9	17.1	33.1	43.6	42.1	45.1	49.2	48.8	44.4	35.7	21.8
21/05/2021	17:22	17:32	53.7	69.6	41.2	61.3	56.8	47.9	5.3	17.5	34.3	41.1	39.9	43.9	48.9	48.7	45.0	36.0	22.4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	17:32	17:42	64.9	75.9	41.3	73.7	68.9	51.8	2.6	13.7	29.6	37.5	36.5	39.2	42.5	54.1	64.0	54.9	21.3
21/05/2021	17:42	17:52	60.4	71.1	40.4	69.1	65.0	47.6	1.4	15.1	31.5	43.8	40.1	41.6	44.5	51.4	58.9	50.2	18.7
21/05/2021	17:52	18:02	52.5	77.3	34.8	65.2	52.7	39.3	4.0	21.2	36.1	42.7	39.8	46.5	45.8	46.1	42.9	34.0	18.0
21/05/2021	18:02	18:12	48.7	76.8	34.4	58.0	49.2	39.5	2.0	16.1	31.4	39.6	39.5	44.2	41.7	39.2	36.3	29.8	13.5
21/05/2021	18:12	18:22	59.7	84.3	35.6	73.6	55.4	40.3	2.4	18.8	34.9	42.4	42.4	41.8	58.3	50.8	48.9	37.4	18.4
21/05/2021	18:22	18:32	54.8	76.5	38.3	67.1	56.0	41.9	-1.4	17.1	36.8	47.0	46.7	46.1	47.5	48.0	45.3	38.6	21.3
21/05/2021	18:32	18:42	58.8	86.1	36.0	63.8	50.4	41.3	-1.7	18.3	37.2	42.8	42.9	41.6	50.9	57.1	47.8	33.4	15.5
21/05/2021	18:42	18:52	47.0	63.0	36.4	56.5	49.5	41.0	1.1	17.4	36.9	40.8	39.3	40.3	38.7	34.8	35.1	28.9	13.2
21/05/2021	18:52	19:02	58.9	84.5	34.9	72.9	51.7	40.2	-1.4	15.5	35.9	43.8	46.0	55.7	54.1	48.9	39.6	28.9	14.6
21/05/2021	19:02	19:12	44.4	54.5	34.6	50.4	47.1	39.9	-1.8	14.3	36.7	35.9	33.2	37.6	37.7	33.9	33.2	28.6	15.6
21/05/2021	19:12	19:22	47.4	64.1	33.9	59.1	50.3	37.5	-1.4	15.7	40.4	38.0	36.3	39.8	40.1	39.2	36.6	30.7	15.5
21/05/2021	19:22	19:32	45.6	63.5	32.3	54.6	48.5	36.9	-0.9	12.5	28.9	36.5	36.5	39.8	40.4	35.6	33.6	27.8	14.0
21/05/2021	19:32	19:42	65.5	84.6	33.8	80.3	54.7	41.4		12.4	34.3	37.3	38.2	63.8	57.5	57.6	45.6	32.5	15.7
21/05/2021	19:42	19:52	49.8	74.8	34.1	61.5	51.0	40.1	-0.5	16.7	37.1	41.4	39.0	43.7	44.7	40.4	36.2	28.8	12.1
21/05/2021	19:52	20:02	49.5	74.1	35.4	62.5	47.5	39.6	-2.2	17.7	33.4	31.4	30.0	46.1	44.4	39.3	37.4	28.1	15.5
21/05/2021	20:02	20:12	67.4	77.4	37.0	72.2	70.4	48.2	2.3	18.1	30.5	40.5	49.0	58.3	63.2	62.9	58.3	49.0	35.1
21/05/2021	20:12	20:22	64.5	91.1	35.1	75.5	63.2	39.3	0.2	11.8	30.6	36.5	39.9	58.4	62.0	56.2	49.9	39.8	28.4
21/05/2021	20:22	20:32	42.1	59.3	30.9	52.7	44.6	36.0	-3.1	7.4	32.6	32.9	31.4	35.3	35.8	33.5	31.3	26.6	12.1
21/05/2021	20:32	20:42	39.1	55.5	30.7	47.8	42.1	33.5	-3.6	4.9	20.8	28.6	27.7	33.8	32.0	30.0	30.5	27.2	11.4
21/05/2021	20:42	20:52	42.9	62.6	30.4	53.6	44.6	34.7	-1.7	9.6	24.1	35.5	34.9	31.7	34.1	35.4	35.7	31.3	20.5
21/05/2021	20:52	21:02	39.0	55.4	29.0	50.4	41.1	31.7	-3.1	7.8	21.5	32.5	31.2	30.6	30.3	29.4	30.8	26.9	13.3
21/05/2021	21:02	21:12	37.8	55.2	28.8	48.1	39.8	32.0	-1.0	8.7	22.0	29.6	28.9	28.5	30.6	29.8	30.2	25.6	10.4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	21:12	21:22	40.8	61.9	29.7	52.6	42.5	32.6	-1.7	8.9	25.0	31.7	32.9	32.3	33.4	34.0	31.6	26.8	12.2
21/05/2021	21:22	21:32	44.5	76.0	30.1	51.5	38.1	32.4	-3.5	3.1	13.7	21.0	22.2	42.5	38.5	33.4	30.4	27.1	10.2
21/05/2021	21:32	21:42	42.8	62.2	29.7	55.9	40.3	31.6	-2.8	8.1	27.8	35.9	37.0	35.7	32.4	32.5	31.7	28.0	13.2
21/05/2021	21:42	21:52	38.8	57.4	29.6	53.5	37.7	31.8	-3.3	7.2	26.4	27.9	32.2	30.2	31.8	29.8	29.2	27.4	9.5
21/05/2021	21:52	22:02	34.6	48.5	30.3	42.9	35.1	32.7	-4.1	2.2	19.6	24.5	19.9	19.7	21.8	27.4	29.1	29.3	10.4
21/05/2021	22:02	22:12	42.7	74.5	29.5	51.1	38.0	31.6	-3.9	5.0	21.3	25.7	28.8	33.5	36.6	36.4	37.4	29.1	12.6
21/05/2021	22:12	22:22	34.8	47.2	29.1	43.7	37.0	31.2	-3.7	1.2	14.1	20.4	18.9	20.3	22.4	26.4	32.0	27.6	10.8
21/05/2021	22:22	22:32	34.8	53.4	28.9	43.0	36.8	30.7	-2.9	3.6	16.7	23.7	20.7	23.2	22.4	22.9	31.4	28.3	11.7
21/05/2021	22:32	22:42	37.8	60.5	28.4	48.5	40.3	30.8	-2.3	8.3	16.4	29.6	33.8	24.4	25.2	24.8	31.2	27.1	10.3
21/05/2021	22:42	22:52	35.1	48.0	29.7	40.8	37.3	31.8	-4.0	3.0	14.5	22.2	20.2	22.8	25.2	26.2	31.8	27.0	10.5
21/05/2021	22:52	23:02	35.4	49.4	29.5	42.5	37.4	32.3	-1.6	3.3	9.6	14.5	15.8	25.1	29.4	28.0	30.1	27.3	10.3
21/05/2021	23:02	23:12	43.2	63.3	29.9	58.5	41.4	32.1	-0.8	15.0	28.3	32.6	31.5	32.6	38.1	35.8	36.1	28.8	11.4
21/05/2021	23:12	23:22	36.9	47.0	29.4	43.8	40.2	31.8	-5.2	3.5	9.5	15.2	16.5	20.6	26.5	26.2	35.2	27.4	10.1
21/05/2021	23:22	23:32	40.0	48.9	30.4	46.2	42.7	35.5	-4.9	-1.3	6.3	16.9	15.9	21.4	22.6	29.2	39.0	28.8	13.9
21/05/2021	23:32	23:42	39.0	49.0	29.9	46.4	42.4	32.6	0.7	-2.8	3.1	10.7	12.2	17.3	17.4	28.0	38.2	28.0	15.8
21/05/2021	23:42	23:52	34.9	49.5	27.8	42.9	37.5	31.2	-1.4	2.6	8.9	20.2	27.2	20.7	22.3	24.2	31.3	27.2	13.6
22/05/2021	23:52	00:02	33.3	50.2	30.3	35.2	34.2	32.0	-8.1	-2.4	3.1	10.8	12.6	17.1	17.6	25.4	29.7	28.8	14.4
22/05/2021	00:02	00:12	39.6	61.9	30.5	52.5	37.7	33.3	-4.9	1.6	8.8	12.8	14.6	28.8	35.6	33.6	31.2	30.4	14.5
22/05/2021	00:12	00:22	35.6	48.6	32.3	41.5	37.2	33.9	-6.7	-2.5	3.0	10.3	12.3	20.3	19.8	28.0	32.4	30.3	13.6
22/05/2021	00:22	00:32	39.8	54.8	31.0	48.5	42.8	33.8	0.1	-1.0	16.4	19.6	17.3	18.5	21.2	29.8	38.6	29.7	14.9
22/05/2021	00:32	00:42	40.1	54.8	32.4	48.2	42.7	35.3	0.9	-2.5	2.8	11.4	13.3	27.4	30.6	30.5	37.7	32.1	15.0
22/05/2021	00:42	00:52	43.0	74.4	32.7	47.3	43.2	35.2	-2.7	-1.4	5.8	16.9	20.4	25.8	29.1	37.0	39.4	36.8	19.0

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	00:52	01:02	36.1	49.6	30.7	41.4	38.4	33.4	-.-	-2.6	4.3	10.6	12.0	19.2	21.8	28.1	33.6	29.4	17.0
22/05/2021	01:02	01:12	42.7	65.4	30.0	56.5	38.6	33.2	-1.0	-2.6	2.9	10.8	15.6	27.4	40.1	36.6	33.9	29.4	17.2
22/05/2021	01:12	01:22	36.5	49.3	31.4	43.4	38.6	33.4	-3.0	-0.4	12.8	22.2	20.9	21.5	21.9	26.5	33.8	30.2	16.5
22/05/2021	01:22	01:32	36.5	54.5	31.5	41.7	39.1	33.4	0.5	-2.9	1.9	11.4	13.2	19.9	20.8	27.1	34.1	30.5	16.5
22/05/2021	01:32	01:42	38.2	45.7	31.4	43.4	41.4	34.1	-0.7	-2.7	1.7	10.9	12.0	16.7	15.3	28.8	36.7	30.2	14.0
22/05/2021	01:42	01:52	38.3	45.7	30.8	43.5	41.6	34.1	-2.9	-2.6	2.4	11.2	13.0	17.3	16.0	28.5	37.1	29.6	12.4
22/05/2021	01:52	02:02	38.0	47.7	30.7	43.0	40.8	33.9	-0.1	-2.2	6.5	11.6	12.1	19.1	21.0	28.0	36.6	29.2	12.8
22/05/2021	02:02	02:12	38.1	45.1	30.5	42.8	40.8	34.0	-7.4	-2.5	2.9	12.4	12.7	19.2	20.1	29.5	36.6	29.4	11.8
22/05/2021	02:12	02:22	62.9	83.5	31.4	79.0	41.6	34.0	-9.7	-2.5	3.4	18.7	31.9	60.3	58.0	53.5	44.0	33.9	16.4
22/05/2021	02:22	02:32	37.4	44.0	31.9	42.3	40.1	34.3	-2.6	-3.1	2.7	10.7	11.4	16.8	16.6	30.1	35.3	30.4	9.7
22/05/2021	02:32	02:42	37.1	59.4	30.8	42.3	39.7	33.5	0.8	-1.1	8.2	12.4	14.6	17.7	17.9	28.2	34.9	31.2	12.4
22/05/2021	02:42	02:52	42.2	61.6	30.1	56.2	39.9	32.2	1.0	-2.9	2.4	11.2	13.1	29.1	38.0	38.2	33.3	29.2	8.3
22/05/2021	02:52	03:02	35.6	48.7	28.9	44.4	38.1	31.5		0.7	8.8	17.6	18.0	22.2	23.9	28.1	32.4	28.6	9.3
22/05/2021	03:02	03:12	35.9	47.9	29.3	45.2	38.3	31.4	-4.9	-0.3	13.1	26.7	18.2	22.6	24.3	28.8	32.3	27.0	10.0
22/05/2021	03:12	03:22	43.3	67.2	29.9	57.2	39.3	32.6	-7.1	-2.6	3.2	11.4	15.2	28.6	39.8	39.1	34.2	27.5	10.4
22/05/2021	03:22	03:32	45.7	64.9	29.5	58.2	47.0	32.3	1.1	3.2	19.9	24.2	30.1	32.1	42.1	42.0	32.4	26.5	9.6
22/05/2021	03:32	03:42	46.6	66.4	30.8	60.4	39.0	33.2	-9.8	-2.3	4.3	8.0	13.3	28.4	42.6	44.0	32.3	26.6	11.3
22/05/2021	03:42	03:52	43.7	64.9	29.7	57.8	40.0	33.1	-1.5	3.4	21.2	27.0	23.9	27.1	39.3	40.7	32.1	25.1	12.8
22/05/2021	03:52	04:02	48.0	67.7	29.5	61.1	46.4	33.1	-4.4	2.2	14.3	20.0	20.7	31.2	43.7	45.5	32.5	24.5	13.8
22/05/2021	04:02	04:12	48.1	67.9	31.0	61.8	47.7	33.4	-6.6	0.1	8.1	19.6	23.4	32.0	44.5	45.1	32.9	27.5	16.8
22/05/2021	04:12	04:22	46.9	73.9	30.0	59.8	45.1	33.1	-5.1		6.6	11.2	14.5	31.0	41.8	44.7	33.4	26.0	11.1
22/05/2021	04:22	04:32	50.4	78.0	30.7	62.5	48.9	33.7	-4.2	0.5	16.6	25.4	23.1	45.9	45.1	45.5	34.0	26.5	14.7

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	04:32	04:42	49.6	67.3	30.3	62.1	52.4	35.2	-3.2	3.9	13.4	26.0	22.5	35.5	46.0	46.1	37.8	27.2	9.0
22/05/2021	04:42	04:52	60.6	72.0	32.4	65.7	64.9	36.4	-3.8	9.7	22.2	27.3	28.1	34.5	45.4	53.3	58.9	50.4	34.8
22/05/2021	04:52	05:02	55.5	73.6	34.4	64.1	60.8	38.9	-2.1	11.8	27.7	39.6	38.8	37.9	39.0	47.6	53.7	44.8	29.1
22/05/2021	05:02	05:12	48.7	75.6	33.7	61.7	46.6	37.7	-0.7	11.2	23.8	32.2	29.6	35.8	40.6	43.4	44.1	38.6	29.4
22/05/2021	05:12	05:22	46.6	69.6	33.6	56.4	47.8	37.9	-2.9	8.2	26.1	35.3	33.1	39.0	40.3	41.7	38.0	27.9	12.3
22/05/2021	05:22	05:32	57.1	80.9	35.0	70.4	54.3	39.9	-1.8	12.8	27.7	38.0	37.7	46.9	51.5	54.5	43.9	32.8	14.1
22/05/2021	05:32	05:42	50.4	70.6	34.5	61.5	52.6	40.8	-0.3	16.5	30.5	38.9	39.3	42.8	45.0	43.6	42.8	29.9	12.0
22/05/2021	05:42	05:52	56.3	83.4	36.8	64.0	53.1	41.6	-0.5	15.5	32.6	40.9	40.9	53.4	50.7	46.9	42.3	31.9	15.0
22/05/2021	05:52	06:02	51.7	71.9	32.9	62.9	53.2	38.2	-2.4	13.4	31.9	42.5	45.9	43.1	43.9	41.7	43.7	38.1	23.0
22/05/2021	06:02	06:12	47.7	67.2	35.9	58.3	50.2	40.8	-0.5	15.4	30.0	38.4	39.0	41.1	41.5	40.1	37.0	27.6	11.8
22/05/2021	06:12	06:22	60.2	88.2	35.9	71.8	61.7	42.6	3.6	23.9	39.0	48.4	49.1	54.2	55.9	52.2	47.9	39.7	24.5
22/05/2021	06:22	06:32	60.2	76.3	38.4	74.7	59.5	43.8	1.8	19.8	36.3	47.5	48.4	53.9	55.3	51.8	51.1	47.4	32.5
22/05/2021	06:32	06:42	65.7	82.7	43.4	77.5	68.9	51.3	9.9	29.5	46.1	51.9	52.4	60.3	60.4	58.6	56.5	47.6	30.6
22/05/2021	06:42	06:52	59.4	76.9	39.2	72.9	61.9	45.1	5.9	25.7	39.3	49.2	49.6	50.7	54.1	53.3	49.1	40.6	24.5
22/05/2021	06:52	07:02	57.8	78.2	36.7	69.6	59.9	44.8	1.8	20.6	38.6	53.3	50.0	45.7	49.1	50.7	46.1	38.8	15.6
22/05/2021	07:02	07:12	52.9	70.7	36.2	62.9	56.2	43.9	1.9	20.6	34.5	44.3	43.6	43.9	47.3	46.6	42.8	31.4	13.7
22/05/2021	07:12	07:22	55.6	77.6	40.7	64.5	59.5	45.8	3.7	19.4	35.1	47.0	47.8	48.2	48.9	45.6	48.1	38.2	18.1
22/05/2021	07:22	07:32	59.9	85.1	37.2	72.3	57.5	42.9	1.4	22.1	39.2	47.1	44.6	55.6	54.4	53.5	45.7	35.5	19.0
22/05/2021	07:32	07:42	55.0	86.4	42.3	63.6	54.7	45.8	0.9	15.1	34.5	40.6	38.7	44.9	45.9	52.9	43.8	38.7	27.8
22/05/2021	07:42	07:52	52.5	78.3	42.7	60.7	55.0	46.1	1.6	17.5	33.8	42.3	38.4	41.2	48.5	46.4	42.4	37.8	19.4
22/05/2021	07:52	08:02	70.5	98.1	35.6	76.6	56.5	43.0		17.8	34.5	41.1	40.5	69.3	63.4	56.7	46.1	36.2	19.5
22/05/2021	08:02	08:12	54.2	71.5	38.3	63.7	57.8	44.0	0.6	15.4	32.4	40.7	39.5	43.8	50.6	48.1	44.7	37.6	23.0

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	08:12	08:22	60.4	78.6	41.8	71.3	63.7	48.1	1.5	22.6	38.2	44.3	44.4	48.8	55.3	56.1	52.0	48.1	29.6
22/05/2021	08:22	08:32	61.6	83.1	42.4	72.6	64.4	48.5	2.2	15.5	33.6	42.9	42.9	53.7	56.2	54.8	53.2	53.8	35.0
22/05/2021	08:32	08:42	57.4	77.6	42.6	68.0	60.5	48.2	-1.1	12.3	28.3	38.5	39.4	45.5	52.5	52.4	49.2	48.3	29.9

Table A6: Details of noise level at monitoring site N6

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	7:49	7:59	51.4	72.8	30.1	62.3	55.1	37.8	4.5	14.8	30.4	40.1	39.0	40.3	46.7	46.4	40.4	37.4	20.8
20/05/2021	7:59	8:09	41.3	59.2	29.8	51.9	44.6	34.7	3.4	11.1	23.0	26.4	26.5	29.5	33.3	34.5	34.5	35.4	18.0
20/05/2021	8:09	8:19	42.7	59.2	30.6	52.6	45.9	35.6	3.4	11.0	22.9	28.6	26.4	28.7	35.7	37.8	34.3	35.7	17.2
20/05/2021	8:19	8:29	48.4	68.3	31.4	59.1	49.9	36.2	3.3	9.4	21.8	25.9	27.6	37.3	45.0	43.6	35.3	35.4	17.5
20/05/2021	8:29	8:39	51.8	61.5	30.7	58.4	55.2	36.5	3.8	9.1	20.5	24.8	25.5	29.8	37.7	42.0	50.6	40.6	28.3
20/05/2021	8:39	8:49	43.6	64.4	30.7	54.7	45.0	34.2	3.6	8.3	19.8	24.9	25.4	28.1	37.1	40.0	34.2	34.9	23.3
20/05/2021	8:49	8:59	50.8	68.3	28.9	61.3	54.3	34.5	4.2	13.8	27.2	34.4	35.1	37.8	47.1	46.8	36.9	35.9	17.7
20/05/2021	8:59	9:09	45.0	63.2	30.3	55.2	47.1	34.3	4.0	10.3	23.4	35.5	33.2	30.8	40.6	39.5	35.0	30.3	16.6
20/05/2021	9:09	9:19	46.9	62.1	30.7	54.0	45.9	34.5	4.0	8.2	21.0	27.9	24.7	28.5	35.1	36.6	40.6	44.2	29.4
20/05/2021	9:19	9:29	48.0	63.9	29.6	57.5	51.1	36.4	4.2	12.5	25.4	36.7	36.3	35.1	36.7	40.0	42.2	42.6	21.1
20/05/2021	9:29	9:39	55.7	67.9	47.8	62.3	56.6	51.3	4.3	13.0	28.5	38.2	39.3	39.3	47.6	49.7	52.2	44.1	29.8
20/05/2021	9:39	9:49	52.5	62.7	45.4	58.7	54.7	48.1	4.1	8.5	21.8	31.0	27.9	30.1	38.3	46.2	50.5	41.3	26.7
20/05/2021	9:49	9:59	54.4	60.7	47.1	58.7	56.6	50.3	4.7	18.1	30.2	35.9	37.0	35.1	40.9	46.4	52.7	43.3	28.6
20/05/2021	9:59	10:09	58.4	66.8	47.1	64.4	62.0	52.6	4.6	9.6	19.4	25.7	25.5	27.4	35.4	49.8	56.8	49.6	41.6
20/05/2021	10:09	10:19	57.4	67.6	45.2	65.7	63.8	47.6	4.0	5.8	16.0	24.0	24.4	25.6	34.1	48.0	56.0	48.8	38.0
20/05/2021	10:19	10:29	63.0	67.8	48.3	66.8	65.8	52.5	4.1	6.0	19.6	29.1	25.5	27.7	34.6	52.8	61.6	54.9	44.1
20/05/2021	10:29	10:39	45.6	58.8	30.9	54.1	49.4	33.9	4.4	6.0	18.8	30.1	26.1	27.9	36.0	40.4	41.6	36.1	21.2
20/05/2021	10:39	10:49	43.7	62.1	31.0	54.6	47.1	34.7	4.1	9.1	20.5	25.1	26.3	29.8	38.1	40.5	34.0	30.1	16.9
20/05/2021	10:49	10:59	43.9	59.4	29.6	53.8	48.1	33.1	4.3	8.4	23.5	30.0	29.8	33.1	41.1	37.0	30.4	27.7	16.6

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	10:59	11:09	52.9	72.7	28.6	60.3	47.8	33.4	4.6	18.5	34.7	40.3	39.6	40.7	47.8	47.5	44.7	39.8	23.4
20/05/2021	11:09	11:19	40.8	60.6	29.1	51.8	42.9	33.0	4.3	8.2	23.1	33.9	31.0	29.6	32.1	33.0	31.4	33.3	16.9
20/05/2021	11:19	11:29	45.5	65.6	29.9	56.3	46.9	33.2	4.6	11.5	24.4	37.7	38.3	37.4	35.7	38.3	33.7	35.6	18.6
20/05/2021	11:29	11:39	45.3	59.6	29.1	54.4	49.1	33.8	4.5	8.5	22.7	33.0	35.8	34.3	37.3	39.9	38.1	34.9	19.8
20/05/2021	11:39	11:49	43.2	58.0	29.5	52.6	47.2	32.8	4.8	10.9	24.6	30.6	31.7	34.4	37.8	37.1	32.6	33.3	16.5
20/05/2021	11:49	11:59	43.2	63.8	31.9	54.4	44.9	35.0	6.3	12.9	22.6	30.8	32.5	34.4	37.4	37.6	33.0	31.5	16.5
20/05/2021	11:59	12:09	47.7	57.7	29.0	55.5	53.2	32.2	4.4	7.3	16.6	24.1	23.9	26.8	31.8	40.8	45.1	40.4	28.4
20/05/2021	12:09	12:19	47.3	59.2	29.5	55.8	52.4	32.8	4.8	8.4	18.2	26.1	24.9	26.0	32.9	39.9	44.3	40.7	29.0
20/05/2021	12:19	12:29	46.8	65.1	30.6	56.7	48.3	34.0	5.2	16.3	30.9	35.8	33.0	35.7	43.0	41.4	33.7	30.7	16.6
20/05/2021	12:29	12:39	39.1	54.5	29.1	48.4	42.3	32.6	4.6	7.5	17.2	25.2	23.2	25.7	31.7	34.9	29.5	31.8	16.4
20/05/2021	12:39	12:49	44.1	62.7	29.6	55.3	47.8	32.4	5.3	12.5	26.4	33.9	31.5	35.6	39.5	37.9	33.1	28.5	17.1
20/05/2021	12:49	12:59	42.3	59.2	28.6	51.9	44.5	31.8	4.7	10.3	23.5	32.3	31.1	31.4	33.1	35.8	35.2	34.5	19.2
20/05/2021	12:59	13:09	43.0	61.1	29.4	53.3	45.4	33.0	5.6	12.2	24.6	35.6	35.3	33.7	35.4	35.8	32.2	30.9	16.6
20/05/2021	13:09	13:19	44.7	72.9	29.4	59.2	45.5	32.9	4.4	9.5	21.7	29.4	28.9	33.5	40.4	39.5	35.4	32.3	18.8
20/05/2021	13:19	13:29	59.9	94.6	30.8	72.3	49.9	34.2	19.6	33.2	41.1	47.3	51.5	54.4	53.4	52.2	49.0	45.2	35.6
20/05/2021	13:29	13:39	42.4	59.8	30.1	51.1	42.4	32.9	6.4	14.1	28.9	32.9	30.4	34.0	38.4	34.6	27.0	24.7	16.6
20/05/2021	13:39	13:49	39.8	57.4	31.3	49.1	40.7	34.2	4.2	9.0	20.6	31.2	33.4	29.0	32.8	32.5	28.9	26.3	16.5
20/05/2021	13:49	13:59	44.1	64.0	29.7	53.6	43.2	33.5	4.8	12.1	25.5	28.5	27.6	31.4	38.5	41.4	29.1	28.5	16.5
20/05/2021	13:59	14:09	46.2	61.1	30.5	55.5	49.8	35.0	4.6	11.7	23.6	32.0	31.9	33.4	40.4	42.7	36.1	31.7	19.0
20/05/2021	14:09	14:19	53.3	64.9	33.9	61.0	57.0	42.8	7.5	15.4	26.4	34.2	36.1	34.2	40.8	47.5	50.5	43.3	31.5
20/05/2021	14:19	14:29	49.9	61.8	33.4	58.9	56.0	37.1	8.0	15.9	24.3	27.6	28.2	29.9	33.2	43.2	47.6	40.7	30.5

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	14:29	14:39	48.5	62.1	36.2	58.1	54.0	41.0	4.2	11.2	24.8	28.9	30.5	34.8	38.8	42.1	45.4	38.1	26.5
20/05/2021	14:39	14:49	44.1	63.2	31.1	54.1	44.9	35.2	8.4	15.7	21.3	28.1	29.4	31.1	39.5	39.5	33.8	32.8	20.1
20/05/2021	14:49	14:59	46.0	67.4	31.1	58.2	48.9	34.5	5.5	14.1	27.1	32.5	31.9	33.5	41.0	42.9	30.8	26.0	17.0
20/05/2021	14:59	15:09	41.2	58.4	31.6	51.6	44.8	34.0	5.6	10.5	22.1	31.4	32.7	32.5	34.6	34.1	30.9	30.9	17.1
20/05/2021	15:09	15:19	49.0	66.8	31.9	56.4	46.0	35.1	5.3	19.6	30.4	37.0	34.2	39.2	46.1	42.6	33.5	27.0	16.5
20/05/2021	15:19	15:29	51.9	71.3	32.3	61.8	52.2	36.5	5.3	17.8	29.7	38.2	39.8	40.9	46.7	46.7	43.5	38.2	23.6
20/05/2021	15:29	15:39	53.9	77.8	34.2	67.0	56.2	38.9	5.4	18.1	32.8	41.8	42.4	45.4	50.9	46.1	39.3	33.1	20.3
20/05/2021	15:39	15:49	50.8	67.4	34.3	61.0	54.5	38.0	5.4	19.5	33.2	38.7	38.4	40.1	46.9	45.0	39.9	33.4	19.6
20/05/2021	15:49	15:59	48.0	64.0	34.3	58.3	52.6	37.8	4.6	14.3	28.4	37.1	41.1	39.7	42.9	40.7	34.3	27.6	17.1
20/05/2021	15:59	16:09	52.1	70.1	32.7	62.6	55.1	37.3	5.1	16.9	33.0	39.5	38.1	39.1	47.6	47.5	41.8	38.0	23.7
20/05/2021	16:09	16:19	49.2	72.1	33.3	62.5	52.9	36.8	5.3	17.2	30.4	39.0	39.4	39.1	44.0	43.3	39.0	33.3	19.7
20/05/2021	16:19	16:29	51.0	63.6	35.9	58.7	53.8	43.3	4.8	15.3	31.9	38.2	41.3	43.5	47.5	42.1	37.5	31.0	20.5
20/05/2021	16:29	16:39	50.0	63.2	36.0	58.2	53.2	43.8	4.3	13.2	27.1	33.4	33.7	43.5	47.8	38.8	33.7	28.9	16.9
20/05/2021	16:39	16:49	56.0	69.9	38.4	65.1	60.3	44.3	5.4	17.4	30.3	34.8	33.9	46.8	53.8	49.1	41.8	35.2	17.9
20/05/2021	16:49	16:59	49.1	67.5	36.2	59.6	51.6	43.2	4.2	13.7	27.2	33.1	32.7	43.4	45.3	41.1	35.9	33.5	24.0
20/05/2021	16:59	17:09	52.5	71.1	34.9	62.5	53.9	42.6	5.7	21.0	34.1	39.6	37.6	45.3	49.1	45.5	37.5	28.9	18.7
20/05/2021	17:09	17:22	48.8	63.7	33.5	58.0	52.3	40.7	3.8	12.1	26.4	35.5	34.4	42.1	46.0	38.1	34.2	32.1	24.4
20/05/2021	17:22	17:32	48.5	64.7	34.2	58.3	51.8	40.7	3.8	13.9	28.2	36.2	37.3	40.8	45.3	40.4	33.8	25.7	16.6
20/05/2021	17:32	17:42	49.4	63.5	35.8	57.8	52.1	43.5	3.6	10.8	26.9	36.5	36.5	43.6	45.8	41.2	33.8	27.4	16.8
20/05/2021	17:42	17:52	53.9	67.3	37.3	63.0	58.6	44.4	3.5	10.3	26.3	33.7	32.7	44.6	47.6	45.4	49.9	42.4	17.2
20/05/2021	17:52	18:02	49.6	60.7	34.8	56.7	52.6	44.2	3.5	8.3	24.5	32.9	31.0	43.4	46.8	39.6	36.6	33.1	16.7

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	18:02	18:12	52.2	65.5	36.0	60.7	55.8	44.0	3.6	8.9	22.8	32.5	30.4	43.5	49.2	41.4	45.2	39.0	17.0
20/05/2021	18:12	18:22	65.5	80.9	37.6	75.8	70.6	44.8	3.6	7.4	20.7	32.6	33.9	58.7	62.4	59.0	52.9	42.3	27.9
20/05/2021	18:22	18:32	60.3	80.6	43.8	68.5	56.3	47.3	4.2	13.6	22.0	29.4	31.6	51.9	56.1	56.2	47.8	40.1	23.2
20/05/2021	18:32	18:42	48.8	61.4	42.3	55.8	50.2	46.0	4.7	14.6	24.4	33.8	31.6	38.9	38.9	33.5	44.4	43.9	17.1
20/05/2021	18:42	18:52	49.7	66.6	44.0	59.3	52.0	46.8	4.1	12.5	24.9	35.1	35.0	39.0	42.0	37.1	44.1	44.8	17.5
20/05/2021	18:52	19:02	48.4	63.3	43.1	56.4	49.5	46.5	3.5	9.8	25.8	35.6	33.8	35.2	37.7	36.5	43.7	43.8	19.1
20/05/2021	19:02	19:12	46.9	60.9	42.6	54.5	48.1	45.1	3.4	5.7	20.1	28.9	27.2	33.2	32.5	32.9	43.5	42.6	21.0
20/05/2021	19:12	19:22	48.3	64.5	41.3	57.2	49.9	44.5	3.4	7.5	21.7	28.1	28.9	37.2	39.2	35.8	45.2	41.7	18.6
20/05/2021	19:22	19:32	48.3	63.7	42.3	56.7	49.6	44.9	3.4	7.3	19.5	27.7	25.7	40.8	39.3	36.9	44.0	41.5	20.3
20/05/2021	19:32	19:42	47.2	62.8	38.8	55.8	48.8	44.5	3.4	7.3	21.8	28.4	28.0	36.0	33.2	37.2	44.2	40.7	17.2
20/05/2021	19:42	19:52	45.7	55.1	40.3	51.2	47.3	43.5	3.8	7.9	20.0	27.5	27.0	29.4	32.6	37.4	43.5	36.3	20.2
20/05/2021	19:52	20:02	49.9	70.0	38.2	59.8	49.5	41.5	3.5	8.1	21.5	30.8	30.4	42.5	45.8	41.1	42.9	37.0	17.1
20/05/2021	20:02	20:12	50.0	68.4	37.8	58.6	48.7	41.6	3.4	5.4	17.0	23.9	25.2	35.6	46.9	42.6	42.7	38.8	17.2
20/05/2021	20:12	20:22	46.2	52.0	38.5	50.5	49.0	42.3	3.5	8.3	16.5	23.3	25.6	26.0	26.8	31.3	44.0	41.0	17.8
20/05/2021	20:22	20:32	46.0	50.8	38.9	49.4	48.0	43.3	3.3	4.4	13.6	20.1	21.7	26.6	27.5	32.7	43.7	40.9	18.1
20/05/2021	20:32	20:42	45.6	60.3	39.0	54.0	47.7	42.9	3.3	3.4	17.2	25.4	25.3	33.5	31.4	32.7	43.8	37.2	17.4
20/05/2021	20:42	20:52	47.7	63.3	35.7	56.1	48.8	41.1	3.2	2.4	15.6	25.0	23.0	40.1	42.7	37.0	42.6	37.3	17.6
20/05/2021	20:52	21:02	48.8	67.0	36.5	57.6	48.2	42.1	3.1	2.1	13.3	21.6	21.8	38.7	43.4	41.0	43.0	41.0	17.7
20/05/2021	21:02	21:12	45.7	62.4	37.0	55.0	47.5	41.7	3.1	2.4	15.8	23.2	22.5	26.4	34.8	38.4	42.9	37.5	19.1
20/05/2021	21:12	21:22	43.9	63.6	38.4	54.3	45.0	41.4	3.1	2.1	13.4	26.8	23.4	26.0	32.7	35.3	41.7	34.8	16.6
20/05/2021	21:22	21:32	43.3	52.7	36.6	49.4	46.1	39.5	3.1	5.5	15.4	21.3	23.0	28.8	29.3	34.2	41.0	35.5	16.5

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
20/05/2021	21:32	21:42	42.1	52.9	34.7	49.1	45.3	38.2	3.2	4.5	17.9	26.5	25.0	29.8	30.8	31.2	39.5	34.0	16.8
20/05/2021	21:42	21:52	44.8	62.4	36.6	54.9	47.4	39.3	3.0	-0.9	7.4	15.2	15.7	34.0	35.4	31.9	41.5	38.7	19.6
20/05/2021	21:52	22:02	42.4	52.5	36.1	49.0	45.5	39.0	3.1	4.1	17.6	25.0	21.6	24.9	24.2	31.5	40.2	36.1	17.4
20/05/2021	22:02	22:12	39.6	52.7	34.9	46.9	41.1	37.6	3.1	-0.2	5.7	8.8	11.2	25.7	26.3	30.7	36.9	33.1	16.5
20/05/2021	22:12	22:22	38.3	48.7	33.8	44.7	40.6	36.1	3.1	1.5	8.7	20.1	24.7	19.4	21.0	27.9	36.1	31.4	16.3
20/05/2021	22:22	22:32	40.4	52.4	33.6	48.0	43.6	36.0	3.0	-0.8	4.0	8.1	11.5	23.2	23.7	28.2	37.3	36.4	17.1
20/05/2021	22:32	22:42	38.2	44.8	33.5	42.7	40.5	35.9	3.3	1.8	8.0	20.7	19.3	19.0	21.3	28.1	35.4	32.7	16.4
20/05/2021	22:42	22:52	41.5	50.8	34.4	47.8	44.8	37.2	3.3	2.2	12.0	20.3	15.8	19.7	23.1	29.7	37.0	38.8	18.2
20/05/2021	22:52	23:02	40.5	50.4	33.3	47.3	44.1	36.6	3.0	-0.9	3.7	9.4	16.7	18.2	19.3	29.4	36.7	37.2	16.8
20/05/2021	23:02	23:12	44.6	68.8	34.9	55.0	41.2	37.5	3.0	-1.4	3.7	9.1	16.4	31.6	41.6	37.1	37.0	34.0	16.3
20/05/2021	23:12	23:22	42.3	65.8	34.0	53.3	40.8	37.0	3.2	-0.4	3.5	7.2	10.8	25.1	38.8	34.0	36.5	32.5	16.3
20/05/2021	23:22	23:32	39.5	49.5	33.6	45.5	41.4	37.2	3.0	1.9	15.7	23.3	20.5	20.8	22.9	31.0	36.3	33.8	16.6
20/05/2021	23:32	23:42	40.0	48.3	34.4	45.0	41.7	37.9	3.1	1.0	10.6	19.9	16.1	23.0	24.3	32.9	37.2	32.6	16.3
20/05/2021	23:42	23:52	46.8	61.9	34.2	52.2	42.5	37.0	3.0	-1.4	3.5	9.0	11.0	32.1	42.0	43.8	36.6	29.7	17.9
21/05/2021	23:52	0:02	38.6	47.0	33.5	43.6	40.2	36.6	3.1	-1.1	3.0	6.6	10.4	19.4	19.9	31.1	36.5	29.7	17.7
21/05/2021	0:02	0:12	38.4	47.3	34.6	43.5	39.7	36.9	3.0	-1.3	3.3	6.7	10.2	17.6	20.8	29.5	36.4	30.8	19.1
21/05/2021	0:12	0:22	39.9	51.3	34.1	45.9	40.5	36.4	3.1	0.6	13.0	24.1	19.0	20.8	21.1	28.8	36.4	35.8	21.7
21/05/2021	0:22	0:32	39.5	57.9	34.0	49.8	41.6	36.3	7.8	13.8	22.8	26.8	24.2	26.5	26.6	30.7	35.6	32.7	21.8
21/05/2021	0:32	0:42	38.5	49.9	33.9	45.0	40.1	36.7	7.6	12.6	14.4	15.8	19.5	26.4	27.5	29.9	35.6	30.1	21.4
21/05/2021	0:42	0:52	42.8	61.7	34.6	53.3	44.9	36.8	13.0	19.7	27.4	31.9	33.4	34.1	34.5	34.4	36.7	31.7	19.5
21/05/2021	0:52	1:02	40.1	55.4	33.8	49.1	42.7	36.6	11.3	18.5	20.4	20.5	23.4	30.7	31.6	32.4	35.2	31.9	22.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	1:02	1:12	38.8	48.5	34.5	44.8	41.0	36.6	7.4	12.6	14.9	15.8	18.5	24.6	26.1	30.0	36.2	30.7	22.7
21/05/2021	1:12	1:22	40.1	51.8	34.8	46.9	41.9	37.3	9.5	15.8	19.3	22.3	23.3	29.4	28.7	31.3	37.1	30.9	22.9
21/05/2021	1:22	1:32	41.1	55.9	34.6	49.6	43.2	37.1	12.9	21.3	23.4	21.5	22.1	28.6	29.5	31.6	38.7	31.1	23.4
21/05/2021	1:32	1:42	40.0	57.7	34.8	49.7	41.7	37.2	13.5	20.6	23.3	22.0	23.4	28.1	30.0	32.7	36.2	30.5	22.4
21/05/2021	1:42	1:52	39.6	49.2	33.9	45.5	41.8	36.9	11.2	17.8	19.6	21.3	24.6	26.0	27.7	31.3	36.9	29.8	17.6
21/05/2021	1:52	2:02	45.8	62.3	33.6	52.8	43.2	37.2	5.2	8.6	10.5	11.8	14.6	31.2	40.3	42.7	37.9	29.3	16.5
21/05/2021	2:02	2:12	39.6	46.6	34.4	44.2	41.8	37.1	5.7	9.3	10.7	11.3	14.3	20.1	24.1	31.6	37.9	29.1	16.9
21/05/2021	2:12	2:22	39.7	50.8	33.9	46.3	41.8	37.2	4.4	6.5	8.3	11.6	14.7	20.2	23.6	32.1	37.7	30.4	16.5
21/05/2021	2:22	2:32	46.7	66.0	34.7	54.2	42.4	37.7	3.8	3.6	8.5	9.4	13.3	19.9	23.3	33.1	46.3	31.7	23.8
21/05/2021	2:32	2:42	51.9	67.1	34.0	59.7	52.2	36.8	3.6	2.0	5.0	8.0	12.2	28.5	36.5	37.6	51.5	33.9	25.4
21/05/2021	2:42	2:52	45.1	67.6	33.8	54.6	41.6	36.6	3.4	1.6	4.8	8.3	17.9	20.6	21.8	31.5	44.6	30.7	26.1
21/05/2021	2:52	3:02	51.2	71.1	32.6	56.9	42.7	37.2	3.2	1.7	8.4	15.2	22.5	16.4	21.5	31.3	51.1	35.1	24.4
21/05/2021	3:02	3:12	46.4	68.5	32.5	55.6	42.6	35.9	3.0	-0.2	5.9	9.0	13.1	27.1	36.4	40.9	43.9	30.2	26.2
21/05/2021	3:12	3:22	45.7	63.8	32.4	53.1	42.3	35.8	3.0	-0.7	4.5	6.7	10.8	28.0	39.2	42.8	39.1	29.4	21.9
21/05/2021	3:22	3:32	47.7	72.7	31.3	56.8	40.9	35.0	3.2	3.9	10.9	19.1	28.1	21.2	20.1	28.5	47.5	31.6	23.0
21/05/2021	3:32	3:42	45.6	62.6	31.0	53.6	44.5	33.8	3.1	-0.1	5.8	9.5	14.0	31.9	40.4	42.7	36.4	27.6	17.1
21/05/2021	3:42	3:52	38.0	59.2	30.8	49.8	40.3	33.3	3.1	-0.5	5.5	9.7	12.7	22.9	30.6	30.9	34.8	27.4	20.3
21/05/2021	3:52	4:02	41.4	61.7	31.3	51.5	41.3	33.8	3.1	-0.3	5.2	8.0	13.3	28.3	36.2	36.7	34.5	30.7	17.4
21/05/2021	4:02	4:12	44.3	59.7	30.4	53.1	46.5	34.0	3.1	-0.4	5.4	8.6	11.9	30.8	40.3	40.5	34.9	27.1	16.4
21/05/2021	4:12	4:22	49.8	62.8	32.6	58.6	54.4	36.3	3.0	-0.9	5.6	10.4	13.4	36.5	44.5	47.1	37.8	36.4	16.7
21/05/2021	4:22	4:32	47.2	62.7	33.1	57.1	51.4	36.6	3.0	0.7	8.9	14.7	18.0	33.0	42.7	43.9	37.8	29.1	17.0

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	4:32	4:42	54.3	72.3	34.0	64.5	56.6	36.9	3.0	-0.7	5.9	15.1	22.1	45.1	51.4	49.2	39.4	31.0	16.5
21/05/2021	4:42	4:52	55.9	72.0	34.6	66.1	60.2	38.4	3.0	0.1	11.9	19.0	23.0	47.2	53.0	50.1	43.4	32.4	18.6
21/05/2021	4:52	5:02	54.1	69.1	40.0	63.2	57.3	47.1	3.0	0.9	14.9	20.7	23.1	39.3	48.6	50.7	47.4	35.2	19.8
21/05/2021	5:02	5:12	51.1	73.3	38.4	63.5	53.7	43.0	2.9	2.0	11.1	23.0	25.2	36.1	45.1	47.0	45.8	34.0	18.3
21/05/2021	5:12	5:22	50.2	71.6	35.9	61.0	50.3	40.1	3.1	7.3	22.9	29.1	29.9	38.9	46.2	46.4	38.8	28.3	17.0
21/05/2021	5:22	5:32	53.7	75.6	37.2	64.3	52.9	41.3	3.0	4.3	16.8	27.1	29.1	40.3	49.3	50.9	40.2	32.4	17.6
21/05/2021	5:32	5:42	48.6	68.0	36.7	59.1	50.1	41.7	3.1	6.6	21.1	31.6	30.8	40.0	44.0	43.4	40.0	29.6	16.9
21/05/2021	5:42	5:52	50.2	69.5	35.9	60.4	51.2	41.0	3.1	7.6	18.6	28.4	29.8	40.3	46.3	46.6	35.3	31.0	17.3
21/05/2021	5:52	6:02	49.6	72.7	36.0	61.6	50.5	41.8	3.2	8.7	21.5	32.1	30.9	40.8	44.2	46.1	37.8	35.5	16.7
21/05/2021	6:02	6:12	46.2	61.2	34.1	55.0	48.7	40.1	3.2	8.8	22.9	32.3	30.8	39.7	41.5	39.4	36.4	29.9	18.1
21/05/2021	6:12	6:22	53.1	67.2	32.1	61.6	55.9	41.2	5.2	16.4	32.4	43.7	44.5	42.9	48.2	46.6	41.7	33.7	19.8
21/05/2021	6:22	6:32	51.1	68.4	35.4	60.4	52.3	41.8	3.8	16.6	31.5	38.4	40.1	43.8	46.3	44.3	40.9	34.3	20.0
21/05/2021	6:32	6:42	57.5	81.8	36.2	70.2	58.5	42.7	4.9	17.9	31.0	39.6	40.5	44.4	53.7	53.5	46.3	39.1	23.9
21/05/2021	6:42	6:52	49.0	61.7	36.6	57.5	53.2	40.7	4.5	16.5	29.0	36.9	36.1	40.4	45.4	42.4	36.4	29.9	17.2
21/05/2021	6:52	7:02	52.9	68.5	36.4	62.1	55.7	41.9	5.6	19.2	33.2	42.5	43.1	42.7	49.2	44.8	42.3	35.7	22.4
21/05/2021	7:02	7:12	53.6	73.1	35.5	64.3	55.5	39.5	6.0	20.9	35.4	40.6	40.5	42.6	50.2	47.3	43.0	37.9	22.9
21/05/2021	7:12	7:22	52.5	66.9	34.3	62.1	57.3	38.8	5.0	20.2	34.5	40.2	42.2	42.6	48.3	45.6	42.4	37.2	22.2
21/05/2021	7:22	7:32	48.7	63.4	30.7	58.5	53.5	34.7	4.3	17.5	31.6	35.4	34.0	39.9	44.6	43.8	33.7	28.6	18.8
21/05/2021	7:32	7:47	50.9	68.3	32.8	61.7	55.0	37.9	5.5	16.7	30.2	37.1	37.7	44.7	46.1	44.0	41.0	29.7	18.1
21/05/2021	7:47	7:57	53.1	75.0	31.8	64.1	53.1	35.9	4.1	14.0	27.1	34.2	32.6	36.9	49.5	50.0	36.6	30.7	17.6
21/05/2021	7:57	8:07	47.9	68.1	29.5	56.3	44.5	33.7	3.3	6.6	18.9	27.6	28.2	31.7	43.0	45.5	33.0	26.8	24.0

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	8:07	8:17	46.3	66.7	28.7	56.6	46.4	32.2	3.8	14.6	23.9	29.9	28.3	34.9	42.7	42.2	31.7	27.9	17.2
21/05/2021	8:17	8:27	43.2	63.3	29.5	53.7	44.1	32.8	3.3	5.9	16.9	27.0	26.8	28.0	37.2	40.8	30.9	29.4	16.9
21/05/2021	8:27	8:37	38.7	53.3	27.7	48.0	42.6	30.9	3.4	5.9	17.3	28.5	26.3	26.7	32.0	31.7	32.3	29.6	16.8
21/05/2021	8:37	8:47	41.7	61.7	27.8	52.3	42.9	31.7	3.9	10.3	20.8	28.6	26.1	31.3	35.4	37.6	33.5	28.4	16.9
21/05/2021	8:47	8:57	46.4	62.3	28.1	55.5	48.7	31.2	3.9	10.8	25.0	38.8	39.6	35.9	39.2	39.3	35.8	31.9	18.3
21/05/2021	8:57	9:07	38.7	58.2	28.3	49.4	40.5	30.9	3.8	6.2	21.1	30.1	27.2	29.6	32.6	31.1	30.2	27.8	16.6
21/05/2021	9:07	9:17	40.9	58.0	28.6	51.5	45.0	31.4	6.0	10.3	17.3	23.9	27.4	33.2	34.9	36.0	30.8	29.6	17.4
21/05/2021	9:17	9:27	43.5	58.5	28.3	52.9	47.3	31.9	3.6	2.1	11.6	18.8	22.0	27.3	39.2	40.4	31.7	29.1	16.6
21/05/2021	9:27	9:37	47.4	65.8	28.9	55.3	44.8	32.0	4.7	14.8	19.9	22.5	25.9	39.3	42.3	44.0	34.2	28.2	16.7
21/05/2021	9:37	9:47	38.2	55.1	28.6	48.6	42.0	31.3	3.7	4.3	16.0	24.0	24.6	26.5	30.8	31.3	33.5	28.4	16.6
21/05/2021	9:47	9:57	47.7	66.4	29.0	56.6	46.7	32.1	3.9	7.2	23.6	42.5	42.3	37.4	38.5	39.4	31.6	28.8	16.8
21/05/2021	9:57	10:07	47.8	62.7	34.1	55.8	48.9	39.1	5.9	14.7	26.4	36.3	36.8	35.3	40.4	40.7	43.3	34.0	19.0
21/05/2021	10:07	10:17	54.2	74.6	38.9	63.9	53.2	41.7	4.1	11.4	29.4	47.7	50.6	46.2	41.5	39.5	43.0	33.1	17.9
21/05/2021	10:17	10:27	46.3	58.5	37.8	53.1	47.7	43.3	4.9	9.8	27.4	32.6	31.3	33.0	36.8	39.0	43.5	31.9	17.5
21/05/2021	10:27	10:37	45.8	67.9	38.9	57.5	47.0	40.7	4.5	7.7	19.4	29.1	29.7	32.6	39.3	40.1	41.4	32.4	21.9
21/05/2021	10:37	10:47	48.0	63.4	34.2	58.0	52.6	37.3	4.5	7.6	20.3	30.0	31.1	41.1	46.2	34.1	34.0	28.8	16.7
21/05/2021	10:47	10:57	46.4	66.5	33.0	57.8	49.1	40.4	5.2	10.7	22.5	31.9	32.7	41.4	42.5	36.1	34.1	29.1	21.0
21/05/2021	10:57	11:07	47.5	61.5	31.5	56.2	50.8	40.9	4.2	6.9	18.6	27.9	30.4	44.5	43.5	33.5	28.2	28.3	16.5
21/05/2021	11:07	11:17	50.5	65.2	32.8	59.7	54.2	41.3	6.5	13.9	24.3	33.9	36.2	44.2	47.1	43.5	35.3	29.0	18.4
21/05/2021	11:17	11:27	46.7	62.7	30.1	56.5	50.3	38.6	4.6	6.5	16.2	24.6	28.3	40.6	44.9	33.5	28.1	23.3	16.6
21/05/2021	11:27	11:37	50.1	62.7	33.0	58.3	53.9	41.6	4.3	6.9	18.1	27.6	29.5	43.0	48.6	34.9	36.2	25.9	16.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	11:37	11:47	50.0	63.1	34.0	58.3	53.4	42.4	5.2	10.6	18.3	24.8	28.1	42.3	48.4	37.5	36.1	29.8	22.4
21/05/2021	11:47	11:57	48.5	65.5	40.1	58.5	51.4	43.1	5.4	8.3	13.9	20.2	23.9	36.7	44.0	41.9	43.5	31.7	17.3
21/05/2021	11:57	12:07	45.2	73.3	32.6	59.4	45.4	35.9	4.7	8.4	18.5	26.3	26.5	37.0	41.6	38.4	36.4	28.2	17.0
21/05/2021	12:07	12:17	41.0	64.2	29.9	53.5	42.7	32.9	5.9	13.0	22.5	29.1	28.5	31.5	36.3	35.3	30.8	24.1	16.9
21/05/2021	12:17	12:27	44.3	62.6	30.4	55.9	49.2	34.5	5.2	12.9	25.2	32.2	30.0	31.9	36.5	38.5	39.6	31.7	23.0
21/05/2021	12:27	12:37	46.1	59.3	35.3	54.5	49.6	41.6	4.9	11.1	22.2	30.3	29.6	29.7	34.2	40.0	43.5	33.7	21.1
21/05/2021	12:37	12:47	45.2	63.4	31.5	53.0	42.6	34.3	5.7	12.1	24.1	35.8	39.1	36.2	38.3	37.3	35.7	29.1	17.9
21/05/2021	12:47	12:57	48.3	67.9	32.0	57.7	47.5	34.9	8.6	16.8	28.9	33.8	34.1	37.5	43.0	42.1	41.6	36.1	21.8
21/05/2021	12:57	13:07	46.9	68.1	29.9	56.2	44.2	33.6	7.8	16.6	30.3	37.1	34.8	37.3	42.5	40.5	35.0	32.9	17.1
21/05/2021	13:07	13:17	48.5	67.6	31.1	55.7	43.8	33.9	6.7	15.1	28.4	35.8	35.1	36.6	42.7	42.2	42.7	35.8	21.1
21/05/2021	13:17	13:27	38.2	51.7	30.9	46.1	40.5	34.1	4.1	6.7	19.1	27.3	27.2	29.5	32.1	32.1	29.4	25.2	16.5
21/05/2021	13:27	13:37	45.8	59.0	31.2	54.6	50.1	35.0	5.7	18.0	29.7	38.1	39.1	34.6	40.3	37.7	32.3	26.0	17.0
21/05/2021	13:37	13:47	40.1	55.5	31.7	49.1	42.6	34.4	4.3	7.5	21.6	34.1	31.8	29.8	33.5	31.9	28.2	26.7	16.5
21/05/2021	13:47	13:57	45.5	64.2	31.6	55.9	47.5	35.5	4.1	13.2	24.8	33.0	32.6	35.5	42.6	37.7	34.0	26.7	18.7
21/05/2021	13:57	14:07	40.4	52.4	30.9	48.1	43.7	34.7	5.0	8.9	20.4	26.6	26.6	29.4	32.6	33.9	36.3	25.2	16.5
21/05/2021	14:07	14:17	40.1	53.5	29.8	48.5	43.4	34.3	9.3	14.9	19.3	22.1	23.9	27.7	31.4	33.8	36.7	27.7	17.2
21/05/2021	14:17	14:27	39.6	54.8	30.8	48.5	42.2	34.6	7.0	11.6	19.1	23.7	25.1	29.6	34.7	34.3	30.3	27.7	17.2
21/05/2021	14:27	14:37	42.3	61.3	32.1	53.1	44.8	35.8	6.4	12.3	22.8	30.5	30.9	32.5	36.8	36.9	33.8	27.1	17.1
21/05/2021	14:37	14:47	47.9	66.7	31.4	57.1	47.5	34.7	8.5	15.8	26.8	34.8	37.5	37.3	42.6	41.6	40.7	31.7	19.9
21/05/2021	14:47	14:57	41.9	61.4	28.0	53.2	44.9	33.5	4.4	8.8	23.2	33.9	33.7	31.6	36.5	34.5	30.5	23.8	17.1
21/05/2021	14:57	15:07	51.7	67.6	30.9	61.5	55.4	34.3	5.1	19.2	31.1	40.1	36.2	40.6	49.5	44.2	36.1	27.8	19.3

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	15:07	15:17	50.9	67.5	31.9	60.5	53.5	37.4	6.1	18.6	33.3	40.5	41.1	41.4	47.3	43.1	37.5	29.6	17.6
21/05/2021	15:17	15:27	46.8	67.4	30.9	57.6	47.7	34.0	4.4	14.9	27.9	34.0	32.0	35.9	42.3	42.1	36.3	32.2	18.4
21/05/2021	15:27	15:37	51.9	70.7	31.7	63.1	55.4	36.7	5.1	17.8	33.8	40.1	39.8	41.1	48.4	45.8	40.2	32.9	19.0
21/05/2021	15:37	15:47	47.2	65.5	32.7	58.2	50.9	38.2	4.5	15.3	30.4	36.2	34.7	37.1	43.8	40.3	34.7	30.1	18.0
21/05/2021	15:47	15:57	52.8	74.3	34.7	63.6	52.8	39.2	5.7	17.5	31.2	40.0	40.2	40.3	47.3	49.5	40.3	33.4	19.8
21/05/2021	15:57	16:07	46.7	62.3	32.6	55.4	48.4	36.0	5.3	15.3	29.1	38.6	38.5	36.5	41.6	39.1	35.8	27.5	17.6
21/05/2021	16:07	16:17	53.7	74.7	38.3	65.9	57.1	45.0	12.8	21.9	32.5	39.1	39.2	46.7	51.3	44.2	37.4	30.0	19.5
21/05/2021	16:17	16:27	53.1	68.3	38.5	62.7	57.0	44.6	12.3	21.7	33.1	40.8	40.9	45.3	49.7	44.5	42.0	36.3	22.9
21/05/2021	16:27	16:37	49.4	65.2	37.3	58.6	51.9	42.2	9.2	18.2	30.2	35.8	35.1	43.5	46.7	38.1	33.0	27.0	18.3
21/05/2021	16:37	16:47	51.4	73.5	38.6	63.9	54.3	44.2	19.4	28.2	31.6	37.7	41.8	43.8	47.0	42.5	40.6	38.5	30.5
21/05/2021	16:47	16:57	51.0	67.2	37.0	60.7	54.2	42.9	12.6	22.5	31.8	38.9	38.3	43.3	47.3	42.8	40.4	33.3	20.7
21/05/2021	16:57	17:09	49.0	61.3	39.5	56.7	52.1	44.2	12.9	20.6	29.7	36.1	35.0	43.0	45.5	40.4	35.3	29.6	18.8
21/05/2021	17:09	17:19	58.3	72.6	40.3	67.3	62.0	48.2	10.0	19.7	32.3	40.7	43.9	48.5	54.2	53.0	48.7	41.3	28.9
21/05/2021	17:19	17:29	58.1	72.7	42.1	67.2	61.6	50.7	8.4	16.3	25.3	33.1	40.1	48.9	53.8	53.2	49.0	41.7	29.2
21/05/2021	17:29	17:39	53.5	67.7	39.4	62.3	56.9	46.2	7.7	16.4	28.8	34.7	37.6	44.2	49.4	48.3	43.9	36.3	24.0
21/05/2021	17:39	17:49	50.0	63.2	36.7	58.5	53.7	42.2	7.8	15.6	25.4	34.4	35.5	40.8	46.4	44.5	38.4	30.4	19.6
21/05/2021	17:49	17:59	46.7	63.4	37.2	56.5	49.6	41.0	6.6	12.1	21.7	26.7	27.5	38.0	44.0	39.8	34.5	27.6	17.2
21/05/2021	17:59	18:09	49.9	65.4	35.7	58.6	51.8	39.4	4.8	11.9	24.0	32.8	31.0	41.0	45.1	40.3	45.0	37.1	16.9
21/05/2021	18:09	18:19	52.6	64.5	36.8	61.1	57.6	41.2	4.3	10.3	23.7	32.3	29.4	39.8	41.6	41.3	50.9	42.8	17.8
21/05/2021	18:19	18:29	47.6	68.0	36.1	58.6	49.1	41.3	5.3	11.0	21.2	24.8	25.2	37.2	42.5	40.6	42.6	34.7	17.5
21/05/2021	18:29	18:39	43.6	59.4	39.0	52.4	45.3	40.5	5.5	12.2	24.6	31.2	33.8	33.8	33.8	33.2	37.3	37.7	17.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	18:39	18:49	42.4	54.9	38.4	49.5	44.1	40.3	5.9	11.2	20.8	25.6	25.0	31.6	33.0	32.0	38.2	36.2	16.6
21/05/2021	18:49	18:59	41.9	53.1	38.0	48.4	43.6	39.8	4.8	11.7	22.2	26.4	26.9	31.3	31.9	31.2	37.6	35.9	17.1
21/05/2021	18:59	19:09	50.2	79.0	38.7	62.2	45.4	40.5	3.5	9.3	22.0	27.1	28.5	44.4	46.4	41.4	39.0	37.9	22.3
21/05/2021	19:09	19:19	44.3	54.3	38.3	50.3	46.3	40.5	3.6	7.9	19.0	20.4	20.6	27.5	30.9	30.8	39.2	41.3	20.6
21/05/2021	19:19	19:29	44.0	57.1	36.0	51.6	46.1	38.5	3.6	9.0	20.7	25.3	24.2	34.3	32.5	29.6	37.9	40.6	16.5
21/05/2021	19:29	19:39	41.5	60.0	34.0	52.3	44.5	36.9	4.7	11.1	22.7	31.0	28.6	27.6	29.0	29.5	35.9	37.2	16.9
21/05/2021	19:39	19:49	43.2	63.2	32.8	53.6	43.9	36.8	3.8	8.7	24.3	35.3	32.1	31.2	32.7	34.5	36.5	36.4	18.4
21/05/2021	19:49	19:59	42.5	58.9	33.7	51.7	44.5	37.7	3.9	9.2	22.7	31.2	29.6	29.5	30.0	32.2	36.7	38.1	17.1
21/05/2021	19:59	20:09	40.0	51.6	33.1	47.5	43.4	35.7	4.0	7.9	18.9	23.5	22.5	24.6	27.4	30.3	35.2	35.9	17.3
21/05/2021	20:09	20:19	43.3	47.7	35.4	46.9	46.0	38.2	4.7	11.9	21.0	21.6	19.6	24.9	26.3	29.4	37.9	40.9	16.5
21/05/2021	20:19	20:29	42.8	49.5	33.4	47.4	45.2	37.1	3.3	4.6	17.9	21.8	21.2	25.7	27.6	28.3	37.3	40.2	16.4
21/05/2021	20:29	20:39	38.3	63.2	30.9	51.9	40.5	34.2	3.3	4.4	19.1	25.2	22.1	24.7	27.3	29.5	33.5	33.0	18.8
21/05/2021	20:39	20:49	41.2	54.3	32.3	48.9	43.4	35.8	3.2	6.0	18.6	26.7	24.5	25.2	27.6	30.5	36.4	37.0	16.5
21/05/2021	20:49	20:59	39.4	55.3	33.1	48.1	40.9	35.8	3.2	1.2	16.6	25.9	22.9	31.3	31.6	30.0	34.0	31.9	16.3
21/05/2021	20:59	21:09	36.5	49.4	32.3	43.8	38.2	34.6	3.4	2.9	12.3	19.2	17.8	23.7	25.6	27.6	32.0	31.4	16.5
21/05/2021	21:09	21:19	38.9	48.9	31.1	46.5	44.0	33.9	3.4	3.4	12.6	18.7	18.3	26.3	29.5	28.6	34.3	33.9	19.0
21/05/2021	21:19	21:29	39.0	48.3	31.3	45.4	42.5	35.0	3.1	3.1	16.7	26.0	21.4	24.2	26.4	29.3	34.8	33.9	17.9
21/05/2021	21:29	21:39	39.4	49.0	31.7	46.2	43.3	34.6	3.1	2.8	12.6	20.9	19.9	23.2	22.8	28.7	35.0	35.7	16.7
21/05/2021	21:39	21:49	40.3	56.0	31.8	49.8	43.6	35.9	3.0	1.9	10.5	19.5	20.1	23.2	27.8	31.5	36.5	35.0	16.5
21/05/2021	21:49	21:59	41.8	51.9	32.4	48.2	44.4	37.0	3.0	-0.3	8.7	12.8	14.8	23.0	30.7	32.8	37.6	37.1	16.7
21/05/2021	21:59	22:09	46.3	65.8	33.7	56.4	46.9	37.2	3.0	3.3	14.7	25.2	22.2	39.8	42.7	36.6	36.6	35.8	16.6

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
21/05/2021	22:09	22:19	38.3	50.2	32.5	45.1	39.9	36.0	3.1	1.0	8.5	17.9	21.4	21.8	21.0	29.2	34.1	34.4	16.3
21/05/2021	22:19	22:29	39.1	55.9	32.6	48.4	40.9	36.4	3.0	-1.1	5.7	9.9	14.5	22.7	27.9	30.4	34.5	34.9	16.3
21/05/2021	22:29	22:39	39.2	61.2	32.1	50.7	40.2	35.9	3.1	-0.7	5.1	9.5	12.6	26.2	30.9	30.7	33.1	34.9	17.2
21/05/2021	22:39	22:49	39.7	57.4	32.5	49.5	41.5	36.0	3.2	5.3	12.8	29.4	32.8	21.6	20.6	29.2	33.4	34.8	16.8
21/05/2021	22:49	22:59	38.1	56.1	30.8	47.8	39.5	34.8	3.2	2.3	7.7	20.9	20.4	24.8	28.8	29.1	31.5	34.5	16.8
21/05/2021	22:59	23:09	36.7	45.8	30.9	42.2	38.5	33.7	3.0	-0.7	4.7	13.3	13.4	17.3	22.1	26.9	31.6	33.6	16.4
21/05/2021	23:09	23:19	39.2	53.6	30.3	47.6	41.5	33.3	3.3	0.7	3.6	8.3	13.2	31.1	34.0	31.9	31.5	31.1	16.5
21/05/2021	23:19	23:29	41.1	60.4	31.1	50.5	40.5	35.1	3.1	-0.5	4.0	10.7	13.9	32.1	36.4	33.5	33.5	33.1	16.9
21/05/2021	23:29	23:39	46.4	65.2	33.3	55.0	44.7	37.8	3.0	2.7	16.6	27.3	27.4	40.0	42.7	37.6	35.6	34.8	17.0
21/05/2021	23:39	23:49	39.8	61.2	32.9	51.1	40.9	36.7	2.9	-1.7	2.7	8.9	12.3	28.4	28.3	32.2	34.6	35.4	16.6
21/05/2021	23:49	23:59	38.2	48.1	30.8	44.2	40.3	35.0	3.1	2.7	7.6	18.3	26.1	18.3	18.6	28.2	32.8	35.0	18.0
22/05/2021	23:59	0:09	37.9	43.0	32.1	41.3	39.5	35.6	2.9	-0.3	4.6	11.4	16.3	15.6	18.7	30.0	32.2	35.0	17.7
22/05/2021	0:09	0:19	48.8	62.9	33.1	56.7	50.4	37.2	3.0	1.9	8.0	9.1	12.1	32.9	44.0	46.2	35.2	35.2	18.3
22/05/2021	0:19	0:29	38.9	42.7	33.9	41.6	40.4	37.2	3.0	-1.8	1.8	6.1	10.0	14.2	18.8	31.2	34.5	35.2	17.5
22/05/2021	0:29	0:39	41.9	61.2	34.0	50.8	40.4	36.9	2.9	-1.8	1.9	7.7	12.3	35.3	35.7	33.6	34.2	34.8	17.9
22/05/2021	0:39	0:49	38.2	48.6	32.0	44.2	39.7	36.1	2.9	-1.1	4.0	8.3	11.2	14.3	17.3	28.7	34.2	34.6	16.4
22/05/2021	0:49	0:59	38.5	42.8	32.5	41.5	40.2	36.3	3.0	-0.9	5.5	15.3	17.1	15.5	16.8	30.5	34.6	34.4	16.4
22/05/2021	0:59	1:09	37.8	44.0	32.1	41.8	39.5	35.6	3.0	-1.8	1.7	7.3	10.8	14.4	17.6	30.3	34.8	32.1	16.4
22/05/2021	1:09	1:19	37.6	47.2	32.2	43.3	39.4	35.5	3.0	-1.9	1.1	6.7	10.4	16.7	19.3	30.0	34.7	31.8	17.0
22/05/2021	1:19	1:29	38.2	44.7	33.6	42.4	40.1	36.3	3.0	-1.5	2.9	7.6	16.6	17.8	16.4	30.9	35.4	31.9	16.4
22/05/2021	1:29	1:39	45.4	62.4	32.2	51.6	40.7	35.1	3.0	-1.9	1.2	7.1	10.4	29.3	40.5	42.6	35.0	31.0	16.9

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	1:39	1:49	36.8	41.1	32.1	39.7	38.2	35.2	3.0	-1.9	0.8	6.6	10.2	13.5	16.4	30.2	34.2	29.3	16.4
22/05/2021	1:49	1:59	37.6	52.1	32.7	45.7	39.3	35.4	3.0	-1.7	1.5	7.4	11.6	20.1	20.4	29.5	35.3	30.1	18.1
22/05/2021	1:59	2:09	37.3	43.8	31.9	41.7	39.6	34.9	3.0	-1.9	1.2	6.8	10.5	13.7	15.7	29.7	35.3	29.1	16.6
22/05/2021	2:09	2:19	38.5	48.1	32.5	44.3	40.5	35.8	2.9	-1.8	1.2	6.9	10.5	18.2	26.1	31.2	35.8	30.9	16.4
22/05/2021	2:19	2:29	38.7	44.7	32.4	42.8	40.8	36.2	2.9	-2.0	0.7	6.3	10.0	13.5	16.6	29.7	35.8	33.7	17.1
22/05/2021	2:29	2:39	46.1	62.3	32.8	52.9	43.5	36.4	2.8	-2.1	0.7	6.4	10.7	31.8	41.0	43.1	36.0	33.3	16.5
22/05/2021	2:39	2:49	38.8	46.0	31.9	43.5	40.9	36.1	2.8	-2.0	0.8	6.8	11.1	15.0	18.2	28.9	35.2	34.9	16.5
22/05/2021	2:49	2:59	37.9	43.6	31.2	41.7	39.7	35.6	2.9	-1.9	1.2	6.7	10.7	15.8	22.6	29.6	34.1	33.3	17.1
22/05/2021	2:59	3:09	44.4	58.7	33.2	52.7	46.7	36.8	2.9	-0.6	6.0	15.7	19.6	29.1	38.4	39.6	35.9	37.8	18.3
22/05/2021	3:09	3:19	38.2	44.9	30.3	43.0	41.1	34.3	2.9	1.4	8.1	12.9	14.0	14.8	19.6	29.9	35.9	31.1	17.9
22/05/2021	3:19	3:29	40.6	59.9	30.4	50.7	41.5	33.9	2.9	-1.8	2.6	7.3	11.7	23.4	33.6	37.4	33.5	30.6	18.1
22/05/2021	3:29	3:39	46.4	62.5	30.8	53.7	44.8	35.2	2.8	-1.8	2.6	7.2	11.9	32.3	41.5	43.5	35.1	33.0	18.5
22/05/2021	3:39	3:49	42.1	59.8	32.5	50.7	41.6	36.7	2.8	-1.8	2.0	7.1	11.5	28.9	35.3	37.1	36.2	33.6	18.3
22/05/2021	3:49	3:59	45.2	62.6	31.5	52.8	43.0	35.2	2.8	-1.5	5.4	8.0	11.4	31.0	40.0	42.1	35.4	33.1	17.5
22/05/2021	3:59	4:09	41.9	59.7	28.8	50.9	42.0	35.0	2.8	1.1	7.5	16.2	18.4	26.2	35.4	38.5	35.9	26.3	16.3
22/05/2021	4:09	4:19	48.6	61.9	32.5	57.6	53.2	36.3	2.9	-1.3	9.9	10.3	12.6	34.0	43.9	45.8	37.0	32.4	17.3
22/05/2021	4:19	4:29	44.6	62.0	32.8	53.1	44.2	36.5	2.8	1.8	8.6	19.7	23.9	29.2	40.7	40.1	36.5	27.8	16.4
22/05/2021	4:29	4:39	48.6	64.3	34.2	58.7	53.0	37.3	2.8	0.8	8.9	15.4	15.5	32.6	44.2	45.5	37.7	30.3	16.4
22/05/2021	4:39	4:49	48.2	64.6	34.5	58.9	53.2	37.6	2.8	-0.8	7.0	13.3	17.5	32.6	44.1	44.9	37.7	28.2	17.0
22/05/2021	4:49	4:59	53.5	65.9	35.8	61.4	56.9	40.4	2.9	0.6	11.9	18.3	20.0	33.5	45.8	50.9	47.4	35.3	22.3
22/05/2021	4:59	5:09	52.9	71.4	41.8	62.7	54.0	47.6	3.3	3.4	15.1	19.4	25.5	39.0	47.4	48.2	47.7	37.5	26.4

Date	Time start	Time end	Leq	Lmax	Lmin	L1	L10	L90	Leq, Octave 1/1										
									16	31.5	63	125	250	500	1000	2000	4000	8000	16000
22/05/2021	5:09	5:19	50.8	67.8	38.8	60.8	53.7	44.3	2.9	7.6	22.2	30.0	30.9	43.1	47.2	45.6	39.0	26.8	16.7
22/05/2021	5:19	5:29	49.6	63.2	39.6	58.0	52.8	44.2	2.9	5.4	19.6	28.9	32.4	44.1	46.1	41.2	38.7	27.2	17.5
22/05/2021	5:29	5:39	50.0	65.6	36.0	59.4	53.1	43.0	3.0	8.1	22.2	31.1	32.3	43.5	46.4	44.0	37.0	27.4	17.0
22/05/2021	5:39	5:49	50.3	74.2	34.3	62.8	51.4	42.1	3.0	7.7	22.0	31.7	29.4	42.9	45.4	45.9	39.8	27.6	17.0
22/05/2021	5:49	5:59	51.4	68.5	37.8	60.4	52.3	42.9	3.0	5.9	20.3	29.1	31.1	41.1	45.9	48.4	40.9	28.6	17.1
22/05/2021	5:59	6:09	50.9	68.0	32.5	60.5	52.9	40.6	3.0	8.3	22.2	30.4	30.1	40.0	47.5	47.1	35.4	26.4	17.1
22/05/2021	6:09	6:19	50.2	69.5	35.9	60.4	51.2	41.0	3.1	7.6	18.6	28.4	29.8	40.3	46.3	46.6	35.3	31.0	17.3
22/05/2021	6:19	6:29	49.6	72.7	36.0	61.6	50.5	41.8	3.2	8.7	21.5	32.1	30.9	40.8	44.2	46.1	37.8	35.5	16.7
22/05/2021	6:29	6:39	46.2	61.2	34.1	55.0	48.7	40.1	3.2	8.8	22.9	32.3	30.8	39.7	41.5	39.4	36.4	29.9	18.1
22/05/2021	6:39	6:49	47.5	61.5	31.5	56.2	50.8	40.9	4.2	6.9	18.6	27.9	30.4	44.5	43.5	33.5	28.2	28.3	16.5
22/05/2021	6:49	6:59	50.5	65.2	32.8	59.7	54.2	41.3	6.5	13.9	24.3	33.9	36.2	44.2	47.1	43.5	35.3	29.0	18.4
22/05/2021	6:59	7:09	46.7	62.7	30.1	56.5	50.3	38.6	4.6	6.5	16.2	24.6	28.3	40.6	44.9	33.5	28.1	23.3	16.6
22/05/2021	7:09	7:19	50.1	62.7	33.0	58.3	53.9	41.6	4.3	6.9	18.1	27.6	29.5	43.0	48.6	34.9	36.2	25.9	16.9
22/05/2021	7:19	7:29	51.1	68.4	35.4	60.4	52.3	41.8	3.8	16.6	31.5	38.4	40.1	43.8	46.3	44.3	40.9	34.3	20.0
22/05/2021	7:29	7:39	57.5	81.8	36.2	70.2	58.5	42.7	4.9	17.9	31.0	39.6	40.5	44.4	53.7	53.5	46.3	39.1	23.9
22/05/2021	7:39	7:49	49.0	61.7	36.6	57.5	53.2	40.7	4.5	16.5	29.0	36.9	36.1	40.4	45.4	42.4	36.4	29.9	17.2
22/05/2021	7:49	7:59	50.3	71.0	31.8	61.3	53.0	37.6	6.0	17.2	30.1	36.5	36.4	39.1	46.0	44.1	41.5	39.7	24.4

ATTACHMENT B DAILY LOG

INSTITUTE FOR ENVIRONMENT AND RESOURCES
ENVIRONMENTAL QUALITY LABOLATORY

DAILY LOG SHEET

Sampling position:	**N1** **67 Quang Trung Hamlet, EA Tan commune, Krong Nang District, Dak Lak Province**
Latitute:	13°06'58.6"N, 108°17'14.9"E
Sampling period	May 24 to 26, 2021

No.	*Parameters*	*Sampling method*	*Equipment*	*Sample codes*	*Note*
1	Noise level	ISO 1996-2-2007	RION 52EX-RT	N1	The nearest household is Mr Tran Van Minh's house

Date	**Time**	**Equipment status**	**Temperature ^{0}C**	**Humidity %**	**Wind speed m/s**	**Wind Direction**	**Note**
May 24, 2021	8:55	Calibration passed					Calibration sound level meter
	9:00	Run Sound level meter					Starting noise measuring
	9:00		24.6	89.7	0.8-1.5	SE120	Motorbikes, birdsong
	9:25		24.5	89.5	0.7-1.3	SE120	Motorbikes, birdsong
	9:40		24.7	89.2	0.5-1.2	SE120	Agricultural vehicles
	9:55		24.8	89.0	0.6-1.2	SE120	
	10:05		25.1	88.6	0.7-1.5	SE120	Motorbikes
	10:20		25.8	88.2	1.3-2.0	SE120	Birdsong, motorbikes
	10:30		26.2	87.8	1.2-1.9	SE120	Motorbikes
	10:40		26.6	86.8	0.4-0.8	SE120	Motorbikes
	10:55		27.0	84.7	0.5-1.0	SE120	Motorbikes
	11:10		27.6	83.2	0.4-0.8	SE120	Motorbikes
	11:25		28.1	81.8	0.6-1.0	SE120	Motorbikes
	11:40		27.9	80.4	0.5-1.0	SE120	Motorbikes
	11:50		27.7	79.8	0.6-1.2	SE120	Motorbikes
	12:05		27.5	80.0	1.0-1.8	SE120	Motorbikes
	12:10		27.2	80.5	1.2-2.0	SE120	Motorbikes
	12:25		27.0	80.7	1.3-2.1	SE120	Motorbikes
	12:40		26.9	80.3	1.2-1.7	SE120	Trucks horn, Motorbikes
	12:55		26.7	81.8	1.1-1.6	SE120	Motorbikes
	13:05		26.5	82.6	0.5-1.0	SE120	
	13:25		26.1	83.8	0.4-0.9	SE120	Light rain, Agricultural vehicles
	13:35		25.0	84.5	0.6-1.1	SE120	Agricultural vehicles, sound of cicadas
	13:50		25.8	84.8	0.7-1.3	SE120	Motorbikes
	14:00		25.6	85.7	0.4-0.8	SE120	Agricultural vehicles
	14:20		25.6	86.2	0.5-1.0	SE120	Motorbikes
	14:40		25.5	85.8	0.6-1.4	SE120	Sound of cicadas, Motorbikes
	14:55		25.3	86.1	1.0-2.0	SE120	Motorbikes
	15:05		25.4	86.9	1.3-2.1	SE120	Agricultural vehicles, sound of cicadas
	15:20		25.6	89.7	1.2-1.7	SE120	Sound of cicadas

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	15:40		25.8	88.7	1.4-2.0	SE120	Sound of cicadas, motorbikes
	15:55		26.0	87.8	1.3-1.8	SE120	Sound of cicadas, motorbikes
	16:00		26.1	87.2	1.5-2.1	SE120	Agricultural vehicles, dogs barking
	16:20		26.2	86.3	1.3-1.6	SE120	Sound of cicadas
	16:40		26.1	86.8	1.0-1.5	SE120	Sound of cicadas, 65-75 dBA
	17:00		26.0	87.5	0.7-1.3	SE120	Sound of cicadas
	17:30		25.8	88.2	0.5-1.2	SE120	Agricultural vehicles, Sound of cicadas
	17:40		25.7	88.5	0.4-0.8	SE120	Sound of cicadas
	18:10		25.5	89.8	0.5-1.1	SE120	Light rain, Sound of cicadas
	18:30		25.6	90.3	0.3-0.7	SE120	Sound of cicadas
	18:40		25.1	90.7	0.4-0.8	SE120	Insects, Sound of cicadas
	18:55		24.8	91.2	0.5-1.0	SE120	Insects
	19:05		24.6	91.6	0.4-1.0	SE120	Insects
	19:25		24.7	91.9	Calm wind		Insects
	19:35		24.5	92.4	Calm wind		Insects
	19:55		24.6	92.8	Calm wind		Insects
	20:00		24.3	93.5	Calm wind		Motorbikes horn, Insects
	20:20		24.4	93.7	Calm wind		Insects
	20:40		24.2	94.8	Calm wind		Insects
	21:05		24.1	95.1	Calm wind		Insects
	21:20		24.2	95.9	Calm wind		Insects
	21:30		24.0	96.3	Calm wind		Insects
	21:40		24.1	96.7	Calm wind		Insects
	21:50		24.0	96.8	Calm wind		Insects
	22:10		23.9	96.6	Calm wind		Insects
	22:20		23.7	96.9	Calm wind		Insects
	22:40		23.8	97.2	Calm wind		Insects
	22:50		23.6	97.9	Calm wind		Insects
	23:10		23.7	97.6	0.5-1.0	SE120	Insects
	23:20		23.4	97.5	0.4-1.2	SE120	Light rain, Insects
	23:30		23.1	97.3	0.6-1.3	SE120	Light rain, Insects
	23:45		22.8	96.9	Calm wind		Light rain, Insects
May 25	0:10		22.6	96.8	Calm wind		Insects
	0:20		22.7	96.5	Calm wind		Insects
	0:40		22.6	96.8	Calm wind		Insects
	0:55		22.3	97.2	Calm wind		Insects
	1:10		22.1	97.5	Calm wind		Insects
	1:20		22.0	97.3	Calm wind		Insects
	1:45		22.1	97.6	Calm wind		Insects
	1:55		22.2	97.4	Calm wind		Insects
	2:05		22.4	97.0	Calm wind		Insects
	2:20		22.3	96.5	Calm wind		Insects

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	2:45		22.2	96.8	Calm wind		Insects
	2:55		22.3	97.0	Calm wind		Insects
	3:00		22.4	96.8	Calm wind		Insects
	3:20		22.3	96.9	Calm wind		Insects
	3:30		22.2	96.7	Calm wind		Insects
	3:45		22.1	96.1	Calm wind		Crowing rooster, Insects
	4:05		22.2	95.6	Calm wind		Crowing rooster, Insects
	4:15		22.0	95.9	Calm wind		
	4:25		22.1	95.7	Calm wind		
	4:40		22.3	95.6	Calm wind		
	4:50		22.2	95.3	Calm wind		Birdsong, Crowing rooster, sound of cicadas
	5:00		22.3	95.0	Calm wind		Birdsong, Crowing rooster, sound of cicadas
	5:25		22.4	94.9	Calm wind		Birdsong, Crowing rooster, sound of cicadas
	5:40		22.6	94.5	Calm wind		Birdsong, Crowing rooster, sound of cicadas
	5:50		22.8	94.7	Calm wind		
	6:00		23.1	94.3	Calm wind		
	6:20		23.3	93.4	Calm wind		Motorbikes
	6:30		23.5	93.1	0.5-1.1	SE120	Motorbikes
	6:40		23.7	92.9	0.4-0.9	SE120	Motorbikes
	6:50		23.9	92.4	0.3-0.8	SE120	Motorbikes
	7:05		24.1	92.0	0.5-1.1	SE120	Agricultural vehicles, Motorbikes
	7:20		23.9	91.9	0.4-1.0	SE120	Agricultural vehicles, Motorbikes
	7:30		23.8	91.8	0.3-0.7	SE120	
	7:45		24.0	91.4	0.5-1.1	SE120	
	7:55		24.1	91.2	0.4-0.9	SE120	wood saw sound
	8:10		24.5	90.6	0.5-1.2	SE120	Motorbikes, birdsong
	8:25		27.7	90.2	0.4-1.0	SE120	Motorbikes, birdsong
	8:45		24.9	90.8	0.6-1.2	SE120	Motorbikes, birdsong
	8:55		25.1	91.1	0.4-1.0	SE120	Motorbikes, birdsong
	9:10		25.4	91.3	0.5-1.2	SE120	Motorbikes, birdsong
	9:20		25.7	91.5	0.8-1.5	SE120	Motorbikes, birdsong
	9:30		25.9	92.0	1.0-2.1	SE120	Agricultural vehicles 67-68 dBA
	9:45		26.2	91.6	1.1-1.6	SE120	Agricultural vehicles
	10:00		26.5	90.5	1.3-2.0	SE120	
	10:20		26.4	90.0	1.1-1.6	SE120	Motorbikes, birdsong
	10:35		26.5	89.9	1.0-1.5	SE120	Motorbikes, birdsong
	10:50		26.4	88.7	0.6-1.1	SE120	Thunder , Motorbikes

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	11:10		26.3	87.5	Calm wind		Light rain
	11:20		26.2	86.4	Calm wind		Light rain
	11:40		25.9	87.8	Calm wind		Light rain
	11:50		25.7	88.9	Calm wind		
	12:10		25.8	89.6	Calm wind		
	12:20		25.5	90.2	Calm wind		
	12:40		25.2	91.3	Calm wind		Sound of cicadas
	12:55		25.0	94.2	Calm wind		Sound of cicadas, birdsong
	13:10		24.9	94.0	Calm wind		Sound of cicadas, birdsong
	13:20		24.8	93.9	Calm wind		Light rain, Sound of cicadas, birdsong
	13:35		24.6	93.5	Calm wind		Motorbikes
	13:55		24.2	93.0	Calm wind		Agricultural vehicles
	14:10		24.0	92.8	0.6-0.9	SE120	Agricultural vehicles
	14:25		23.8	92.1	0.4-0.8	SE120	Motorbikes
	14:40		23.6	91.9	0.5-1.0	SE120	
	14:55		23.7	91.4	0.3-0.8	SE120	
	15:00		23.5	90.3	0.5-0.9	SE120	Motorbikes, birdsong
	15:20		23.6	91.5	0.4-1.0	SE120	Agricultural vehicles
	15:40		23.4	92.7	0.3-0.7	SE120	Motorbikes
	15:50		23.4	93.0	0.4-0.7	SE120	Motorbikes
	16:10		23.5	93.4	0.4-0.8	SE120	Sound of cicadas
	16:25		23.3	93.8	0.5-1.0	SE120	Motorbikes, Sound of cicadas
	16:40		23.4	94.2	0.4-4.8	SE120	Sound of cicadas
	16:50		23.5	94.8	0.5-0.9	SE120	Sound of cicadas
	17:00		23.7	95.6	0.3-0.7	SE120	Motorbikes, Sound of cicadas
	17:20		23.6	95.9	0.4-0.7	SE120	Sound of cicadas
	17:40		23.4	96.3	0.5-1.0	SE120	Motorbikes, Sound of cicadas
	18:10		23.2	96.5	0.4-0.9	SE120	Sound of cicadas (noise level up to 74 dBA), Agricultural vehicles
	18:20		23.0	96.2	0.6-1.1	SE120	Sound of cicadas (noise level up to 80 dBA), Agricultural vehicles
	18:45		22.8	96.9	0.5-1.0	SE120	Sounds of insects
	19:00		22.6	97.2	Calm wind		Sounds of insects
	19:20		22.7	97.0	Calm wind		Sounds of insects
	19:30		22.5	96.7	Calm wind		Sounds of insects
	19:50		22.6	96.5	Calm wind		Sounds of insects
	20:00		22.4	96.8	Calm wind		Sounds of insects
	20:15		22.5	96.3	Calm wind		Dogs barking, Sounds of insects
	20:35		22.3	96.0	Calm wind		Sounds of insects

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	20:55		22.4	95.9	Calm wind		Sounds of insects
	21:05		22.2	95.4	Calm wind		Sounds of insects
	21:15		22.0	96.0	Calm wind		Sounds of insects
	21:30		21.9	96.1	Calm wind		Sounds of insects
	21:40		21.7	96.0	Calm wind		Sounds of insects
	21:55		21.8	96.4	Calm wind		Sounds of insects
	22:10		21.6	96.6	1.0-1.5	SE150	Sounds of insects
	22:35		21.5	96.7	0.8-1.4	SE150	Sounds of insects
	22:45		21.6	97.0	0.9-1.6	SE150	Sounds of insects
	22:55		21.4	97.3	1.0-1.6	SE150	Sounds of insects
	23:10		21.3	97.8	0.8-1.5	SE150	Sounds of insects
	23:20		21.2	98.0	0.6-1.2	SE150	Sounds of insects
	23:35		21.3	98.2	0.7-1.5	SE150	Sounds of insects
	23:45		21.4	97.9	0.9-1.5	SE150	Sounds of insects
May 26	0:00		21.2	97.5	1.0-1.7	SE150	Sounds of insects
	0:20		21.1	97.6	Calm wind		Sounds of insects
	0:45		21.0	96.7	Calm wind		Sounds of insects
	1:00		21.2	96.9	Calm wind		
	1:20		21.0	97.0	Calm wind		Sounds of insects
	1:40		21.3	96.5	Calm wind		Sounds of insects
	2:00		21.2	96.7	Calm wind		Sounds of insects
	2:30		21.3	96.3	Calm wind		Sounds of insects
	2:45		21.2	96.0	Calm wind		Sounds of insects
	3:00		21.4	95.6	0.5-1.0	SE150	Sounds of insects
	3:20		21.2	95.8	0.4-0.8	SE150	Sounds of insects
	3:40		21.1	96.1	0.6-1.3	SE150	Sounds of insects
	4:00		21.0	96.3	0.5-1.0	SE150	Crowing rooster
	4:20		20.9	96.8	0.4-0.9	SE150	Crowing rooster
	4:40		21.0	97.5	0.3-0.8	SE150	Rain shaking sprinkles, Crowing rooster
	5:00		21.2	97.3	0.4-1.0	SE150	Crowing rooster
	5:35		21.3	97.1	0.6-1.2	SE150	Birdsong, Crowing rooster
	5:55		21.2	96.5	0.5-1.0	SE150	Crowing rooster
	6:00		21.0	96.2	0.6-1.1	SE150	Birdsong, Crowing rooster
	6:25		21.3	96.0	0.4-0.8	SE150	Motorbikes, Crowing rooster
	6:45		21.6	95.8	0.3-0.6	SE150	Motorbikes
	7:00		21.8	95.4	0.5-1.0	SE150	Motorbikes
	7:20		22.1	95.0	0.7-1.4	SE150	Agricultural vehicles, Motorbikes
	7:35		22.3	94.2	0.5-1.0	SE150	Agricultural vehicles, Motorbikes
	7:50		22.6	90.5	0.6-1.3	SE150	
	8:05		23.0	89.7	0.7-1.4	SE150	Agricultural vehicles, Motorbikes
	8:15		23.5	87.6	0.6-1.3	SE150	Agricultural vehicles, Motorbikes

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	8:25		23.8	87.1	0.5-1.1	SE150	Agricultural vehicles, Motorbikes
	8:40		24.5	86.4	0.7-1.6	SE150	Agricultural vehicles, Motorbikes
	9:00		25.2	84.7	1.0-2.1	SE150	Motorbikes
	9:00	Stop Sound level meter					Team finished noise measuring at this site
May 24, 2021	8:55	Calibration passed					Calibration sound level meter
	9:00	Run Sound level meter					Starting noise measuring
	9:00		24.6	89.7	0.8-1.5	SE120	Motorbikes, birdsong
	9:25		24.5	89.5	0.7-1.3	SE120	+ Motorbikes, birdsong
	9:40		24.7	89.2	0.5-1.2	SE120	+ Agricultural vehicles
	9:55		24.8	89.0	0.6-1.2	SE120	
	10:05		25.1	88.6	0.7-1.5	SE120	Motorbikes
	10:20		25.8	88.2	1.3-2.0	SE120	Birdsong, motorbikes
	10:30		26.2	87.8	1.2-1.9	SE120	Motorbikes
	10:40		26.6	86.8	0.4-0.8	SE120	Motorbikes
	10:55		27.0	84.7	0.5-1.0	SE120	Motorbikes
	11:10		27.6	83.2	0.4-0.8	SE120	Motorbikes
	11:25		28.1	81.8	0.6-1.0	SE120	Motorbikes
	11:40		27.9	80.4	0.5-1.0	SE120	Motorbikes
	11:50		27.7	79.8	0.6-1.2	SE120	Motorbikes
	12:05		27.5	80.0	1.0-1.8	SE120	Motorbikes
	12:10		27.2	80.5	1.2-2.0	SE120	Motorbikes
	12:25		27.0	80.7	1.3-2.1	SE120	Motorbikes
	12:40		26.9	80.3	1.2-1.7	SE120	Trucks horn, Motorbikes
	12:55		26.7	81.8	1.1-1.6	SE120	Motorbikes
	13:05		26.5	82.6	0.5-1.0	SE120	
	13:25		26.1	83.8	0.4-0.9	SE120	Light rain, Agricultural vehicles
	13:35		25.0	84.5	0.6-1.1	SE120	Agricultural vehicles, sound of cicadas
	13:50		25.8	84.8	0.7-1.3	SE120	Motorbikes
	14:00		25.6	85.7	0.4-0.8	SE120	Agricultural vehicles
	14:20		25.6	86.2	0.5-1.0	SE120	Motorbikes
	14:40		25.5	85.8	0.6-1.4	SE120	Sound of cicadas, Motorbikes
	14:55		25.3	86.1	1.0-2.0	SE120	Motorbikes
	15:05		25.4	86.9	1.3-2.1	SE120	Agricultural vehicles, sound of cicadas
	15:20		25.6	89.7	1.2-1.7	SE120	Sound of cicadas
	15:40		25.8	88.7	1.4-2.0	SE120	Sound of cicadas, motorbikes
	15:55		26.0	87.8	1.3-1.8	SE120	Sound of cicadas, motorbikes

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	16:00		26.1	87.2	1.5-2.1	SE120	Agricultural vehicles, dogs barking
	16:20		26.2	86.3	1.3-1.6	SE120	Sound of cicadas
	16:40		26.1	86.8	1.0-1.5	SE120	Sound of cicadas, 65-75 dBA
	16:50		23.5	94.8	0.5-0.9	SE120	Sound of cicadas
	17:00		23.7	95.6	0.3-0.7	SE120	Motorbikes, Sound of cicadas
	17:20		23.6	95.9	0.4-0.7	SE120	Sound of cicadas
	17:40		23.4	96.3	0.5-1.0	SE120	Motorbikes, Sound of cicadas
	18:10		23.2	96.5	0.4-0.9	SE120	Sound of cicadas (noise level up to 74 dBA), Agricultural vehicles
	18:20		23.0	96.2	0.6-1.1	SE120	Sound of cicadas (noise level up to 80 dBA), Agricultural vehicles
	18:45		22.8	96.9	0.5-1.0	SE120	Sounds of insects
	19:00		22.6	97.2	Calm wind		Sounds of insects
	19:20		22.7	97.0	Calm wind		Sounds of insects
	19:30		22.5	96.7	Calm wind		Sounds of insects
	19:50		22.6	96.5	Calm wind		Sounds of insects
	20:00		22.4	96.8	Calm wind		Sounds of insects
	20:15		22.5	96.3	Calm wind		Dogs barking, Sounds of insects
	20:35		22.3	96.0	Calm wind		Sounds of insects
	20:55		22.4	95.9	Calm wind		Sounds of insects
	21:05		22.2	95.4	Calm wind		Sounds of insects
	21:15		22.0	96.0	Calm wind		Sounds of insects
	21:30		21.9	96.1	Calm wind		Sounds of insects
	21:40		21.7	96.0	Calm wind		Sounds of insects
	21:55		21.8	96.4	Calm wind		Sounds of insects
	22:10		21.6	96.6	1.0-1.5	SE150	Sounds of insects
	22:35		21.5	96.7	0.8-1.4	SE150	Sounds of insects
	22:45		21.6	97.0	0.9-1.6	SE150	Sounds of insects
	22:55		21.4	97.3	1.0-1.6	SE150	Sounds of insects
	23:10		21.3	97.8	0.8-1.5	SE150	Sounds of insects
	23:20		21.2	98.0	0.6-1.2	SE150	Sounds of insects
	23:35		21.3	98.2	0.7-1.5	SE150	Sounds of insects
	23:45		21.4	97.9	0.9-1.5	SE150	Sounds of insects
May 26	0:00		21.2	97.5	1.0-1.7	SE150	Sounds of insects
	0:20		21.1	97.6	Calm wind		Sounds of insects
	0:45		21.0	96.7	Calm wind		Sounds of insects
	1:00		21.2	96.9	Calm wind		
	1:20		21.0	97.0	Calm wind		Sounds of insects
	1:40		21.3	96.5	Calm wind		Sounds of insects
	2:00		21.2	96.7	Calm wind		Sounds of insects
	2:30		21.3	96.3	Calm wind		Sounds of insects

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	2:45		21.2	96.0	Calm wind		Sounds of insects
	3:00		21.4	95.6	0.5-1.0	SE150	Sounds of insects
	3:20		21.2	95.8	0.4-0.8	SE150	Sounds of insects
	3:40		21.1	96.1	0.6-1.3	SE150	Sounds of insects
	4:00		21.0	96.3	0.5-1.0	SE150	Crowing rooster
	4:20		20.9	96.8	0.4-0.9	SE150	Crowing rooster
	4:40		21.0	97.5	0.3-0.8	SE150	Rain shaking sprinkles, Crowing rooster
	5:00		21.2	97.3	0.4-1.0	SE150	Crowing rooster
	5:35		21.3	97.1	0.6-1.2	SE150	Birdsong, Crowing rooster
	5:55		21.2	96.5	0.5-1.0	SE150	Crowing rooster
	6:00		21.0	96.2	0.6-1.1	SE150	Birdsong, Crowing rooster
	6:25		21.3	96.0	0.4-0.8	SE150	Motorbikes, Crowing rooster
	6:45		21.6	95.8	0.3-0.6	SE150	Motorbikes
	7:00		21.8	95.4	0.5-1.0	SE150	Motorbikes
	7:20		22.1	95.0	0.7-1.4	SE150	Agricultural vehicles, Motorbikes
	7:35		22.3	94.2	0.5-1.0	SE150	Agricultural vehicles, Motorbikes
	7:50		22.6	90.5	0.6-1.3	SE150	
	8:05		23.0	89.7	0.7-1.4	SE150	Agricultural vehicles, Motorbikes
	8:15		23.5	87.6	0.6-1.3	SE150	Agricultural vehicles, Motorbikes
	8:25		23.8	87.1	0.5-1.1	SE150	Agricultural vehicles, Motorbikes
	8:40		24.5	86.4	0.7-1.6	SE150	Agricultural vehicles, Motorbikes
	9:00		25.2	84.7	1.0-2.1	SE150	Motorbikes
	9:00	Stop Sound level meter					Team finished noise measuring at this site

INSTITUTE FOR ENVIRONMENT AND RESOURCES
ENVIRONMENTAL QUALITY LABOLATORY

DAILY LOG SHEET

Sampling position:	**N2** **Ea Nguoi Hamlet, Cu Ne commune, Brong Buk District, Dak Lak Province**
Latitute:	13°6'10.5"N; 108°14'34.7"E
Sampling period	May 24-26, 2021

No.	*Parameters*	*Sampling method*	*Equipment*	*Sample codes*	*Note*
1	Noise level	ISO 1996-2-2007	3M SoundPro DL 2-1/1	N2	The nearest household is Ms Phan Thi Hang 's house

Date	**Time**	**Equipment status**	**Temperature ^{0}C**	**Humidity %**	**Wind speed m/s**	**Wind Direction**	**Note**
May 24 , 2021	8:25	Calibration passed					Calibration sound level meter
	8:30	Run Sound level meter					Starting noise measuring
	8:40		25.5	83.2	1.2-1.5	NW300	dogs barking
	8:50		25.4	80.9	0.7-1.8	NW300	dogs barking
	9:00		25.9	78.3	0.4-1.4	NW300	Dogs barking, Loudspeakers
	9:10		26.9	76.5	0.3-1.4	NW300	dogs barking
	9:20		27.5	75.1	0.3-1.4	NW300	Dogs barking, Agricultural vehicles
	9:30		28.2	73.9	0.2-0.8	NW300	
	9:40		28.9	71.2	0.2-1.3	NW300	cow crying
	9:50		29.2	69.8	0.2-1.3	NW300	Dogs barking, Agricultural vehicles, cow crying
	10:00		30.5	68.4	0.9-1.8	NW300	
	10:10		31.3	66.7	0.4-1.2	NW300	
	10:20		32.2	65.3	0.8-1.3	NW300	
	10:30		32.1	64.1	0.3-1.4	NW300	Agricultural vehicles
	10:40		32.2	62.5	0.4-1.2	NW300	
	10:50		33.2	61.3			Motorbikes
	11:05		32.6	61.7	Calm wind		
	11:20		33.3	61.9			
	11:35		34.2	61.1	Calm wind		dogs barking
	11:45		33.2	62.2			
	11:55		33.6	61.7	0.3-1.2	NW300	
	12:05		32.6	61.5	0.7-1.6	NW300	Crowing rooster
	12:15		32.2	61.6			
	12:25		31.7	61.6	Calm wind		Motorbikes, Crowing rooster
	12:35		32.1	61.4			
	12:45		31.5	61.7	Calm wind		Crowing rooster, dogs barking
	12:55		31.2	62.3	0.3-1.3	NW300	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	13:05		31.4	61.9	0.9-1.5	NW300	Agricultural vehicles
	13:20		31.4	62.1	0.7-1.8	NW300	
	13:35		31.4	62.5	0.5-1.1	N10	
	13:50		32.1	63.6	0.4-1.2	N10	
	14:05		31.1	63.7	Calm wind		Agricultural vehicles
	14:20		31.2	63.6	0.6-1.6	NE30	
	14:35		31.6	63.8	0.3-0.8	N10	
	14:50		31.5	63.5	0.7-1.5	NE30	
	15:05		31.3	63.1	0.4-1.3	NE30	Agricultural vehicles
	15:20		30.7	64.8	0.4-1.4	NE30	Agricultural vehicles
	15:35		30.8	65.3	0.4-1.1	NE30	
	15:50		30.4	66.2	0.8-1.3	NW300	
	16:05		29.7	66.4	0.9-1.6	NW300	Agricultural vehicles
	16:20		29.4	66.6	0.7-1.6	NW300	
	16:35		28.4	67.6	0.9-1.9	NW300	
	16:45		27.9	68.5	1.2-1.5	NW300	
	16:55		27.1	69.1	0.7-1.6	NW300	
	17:05		28.2	70.2	Calm wind		Light rain until 18:15
	17:15		27.2	68.1	Calm wind		
	17:25		27.9	71.3	Calm wind		
	17:35		28.2	73.7	0.2-1.1	NW300	sound of cicadas
	17:45		27.5	75.2	0.2-0.7	NW300	
	17:55		27.3	76.4	Calm wind		
	18:05		27.2	76.8	Calm wind		Insects
	18:15		26.2	78.6	Calm wind		Insects
	18:25		25.2	79.8	Calm wind		Insects
	18:35		25.6	81.5	Calm wind		
	18:45		25.6	83.6	Calm wind		
	18:55		25.1	84.6	Calm wind		Light rain from 18:50 to 20:40
	19:05		25.2	85.9	Calm wind		
	19:15		25.9	86.7	Calm wind		Light rain, insects
	19:25		25.2	87.4	Calm wind		19:30 thunder sounds, insects, motorbikes
	19:35		25.2	88.6	Calm wind		
	19:45		25.7	89.5	Calm wind		19:42 motorbikes, dogs barking, insects
	20:00		24.2	90.2	Calm wind		dogs barking
	20:15		24.4	91.2	Calm wind		Insects
	20:30		24.2	91.7	Calm wind		Insects
	20:45		24.4	91.2	Calm wind		Insects
	21:00		24.9	91.6	Calm wind		
	21:15		24.1	91.3	Calm wind		Insects
	21:30		24.2	91.7	Calm wind		Motorbikes
	21:45		24.4	91.5	Calm wind		21:40 dogs barking
	22:00		24.5	92.5	Calm wind		Insects
	22:15		24.7	92.8	Calm wind		Insects
	22:30		24.1	92.9	Calm wind		

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	22:45		24.9	92.1	Calm wind		Insects, 22:50 Light rain
	23:00		23.9	90.1	Calm wind		23:05
	23:10		23.2	93.9	Calm wind		dogs barking
	23:20		23.5	90.4	Calm wind		23:27 rain stop
	23:30		23.6	90.6	Calm wind		
	23:40		24.2	93.8	Calm wind		Insects
	23:55		23.4	91.3	Calm wind		Insects
	0:10		23.8	92.3	Calm wind		
	0:25		23.1	91.8	Calm wind		Insects
	0:40		23.8	93.4	Calm wind		Insects
	0:55		23.5	95.3	Calm wind		Insects
	1:10		23.6	94.3	Calm wind		
	1:25		23.7	94.9	Calm wind		Insects
	1:40		23.1	95.8	Calm wind		
	1:55		23.6	94.4	Calm wind		Insects
	2:10		23.8	94.5	Calm wind		Insects
	2:25		23.1	94.3	Calm wind		
	2:40		24.2	95.4	Calm wind		Insects
	2:55		23.4	94.8	Calm wind		Insects
	3:10		23.8	94.5	Calm wind		
	3:25		23.4	94.5	Calm wind		Insects
	3:40		23.2	94.1	Calm wind		Insects
	3:55		24.2	94.6	Calm wind		Crowing rooster
	4:10		23.2	94.6	Calm wind		Insects, Crowing rooster
	4:25		23.2	94.8	Calm wind		
	4:40		23.2	94.2	Calm wind		Crowing rooster
	4:55		23.2	94.6	Calm wind		Crowing rooster
	5:10		24.1	93.2	Calm wind		
	5:25		24.4	93.3	Calm wind		Crowing rooster
	5:40		24.3	92.9	Calm wind		Crowing rooster
	5:55		24.1	91.3	Calm wind		
	6:05		24.4	91.6	Calm wind		
	6:15		24.7	91.2	Calm wind		Crowing rooster
	6:25		25.2	90.5	Calm wind		
	6:35		25.5	89.3	Calm wind		Agricultural vehicles
	6:45		25.8	89.7	Calm wind		Agricultural vehicles, motorbikes
	6:55		25.3	89.9	Calm wind		
	7:05		25.3	89.9	Calm wind		Agricultural vehicles
	7:15		25.7	87.2	Calm wind		
	7:25		25.2	87.1	Calm wind		
	7:35		26.5	87.5	Calm wind		
	7:45		26.3	87.8	Calm wind		
	7:55		26.2	87.2	Calm wind		
	8:05		26.1	86.4	Calm wind		
	8:15		26.1	86.1	Calm wind		
	8:25		26.7	85.6	Calm wind		

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	8:40		26.2	84.1	Calm wind		Agricultural vehicles, motorbikes
	8:55		26.9	83.9	Calm wind		
	9:10		27.8	83.2	Calm wind		
	9:25		27.4	82.3	Calm wind		
	9:40		27.2	81.5	Calm wind		
	9:55		27.1	80.7	Calm wind		
	10:10		28.8	79.6	Calm wind		Agricultural vehicles, sound of cicadas
	10:25		28.6	78.1	0.3-0.9	NW300	
	10:40		28.8	78.7	1.2-1.6	NW300	
	10:55		28.4	78.8	0.6-1.5	NW300	
	11:10		27.6	79.3	0.4-1.5	NW300	
	11:25		27.5	79.1	0.4-1.2	NW300	
	11:40		27.2	78.4	Calm wind		Agricultural vehicles
	11:55		27.3	78.3	Calm wind		
	12:10		27.2	78.8	Calm wind		
	12:25		26.6	79.6	0.6-1.6	NW300	Agricultural vehicles
	12:35		26.4	78.8	0.5-1.4	NW300	
	12:45		26.5	79.9	0.3-1.2	NW300	Agricultural vehicles
	12:55		26.2	78.2	0.2-1.1	NW300	
	13:05		26.2	79.3	Calm wind		
	13:15		26.9	80.9	Calm wind		Motorbikes
	13:25		26.9	81.4	Calm wind		
	13:35		25.2	82.5	Calm wind		
	13:45		25.1	82.6	Calm wind		
	13:55		25.3	82.2	Calm wind		
	14:10		25.3	82.2	Calm wind		
	14:20		25.4	83.2	0.5-1.4	NW300	
	14:35		25.1	83.3	0.4-1.5	NE30	Motorbikes
	14:55		25.5	83.5	0.4-1.4	NE30	
	15:10		25.5	84.7	0.9-1.8	NE30	
	15:25		25.1	85.1	Calm wind		
	15:40		25.2	85.1	Calm wind		
	15:55		25.5	83.7	Calm wind		
	16:10		25.3	84.9	Calm wind		16:15: Karaoke about 70m away
	16:25		25.7	85.8	Calm wind		
	16:40		25.1	83.5	Calm wind		Karaoke about 70m away, dogs barking
	16:55		25.2	84.7	Calm wind		
	17:10		24.3	84.7	Calm wind		dogs barking
	17:25		24.3	88.8	Calm wind		Karaoke about 70m away
	17:40		24.9	89.5	Calm wind		
	17:55		24.2	89.1	0.4-1.2	NW300	Sound of cicadas, Insects
	18:10		24.5	89.8	0.7-1.4	NW300	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	18:25		24.2	90.8	0.5-1.3	NW300	Sound of cicadas, Insects
	18:40		23.7	91.4	Calm wind		
	18:55		23.5	92.6	Calm wind		Sound of cicadas, Insects
	19:10		23.3	93.7	Calm wind		Insects
	19:20		23.9	94.4	Calm wind		
	19:30		24.2	94.5	0.3-1.2	NW300	Insects
	19:40		23.4	93.9	Calm wind		19:45 motorbikes
	19:50		23.2	93.2	Calm wind		Insects
	20:00		23.9	91.9	Calm wind		
	20:10		23.1	90.7	Calm wind		Insects
	20:20		23.9	91.7	Calm wind		20:15 karaoke
	20:30		23.9	92.1	Calm wind		Insects
	20:40		23.2	92.6	0.3-1.2	SW240	
	20:50		23.7	92.5	0.9-1.8	SW240	Insects
	21:00		23.6	90.3	0.5-1.3	SW240	Insects
	21:10		23.2	91.2	Calm wind		Dense fog
	21:25		23.4	90.4	Calm wind		Insects, 21:17 dogs barking
	21:40		23.5	90.2	Calm wind		Dense fog
	21:55		23.3	92.9	Calm wind		Insects motorbikes
	22:10		23.8	92.1	Calm wind		Dense fog, Insects
	22:25		22.8	90.1	Calm wind		Insects
	22:40		22.1	91.9	Calm wind		Dense fog
	22:55		23.2	92.2	Calm wind		Insects
	23:10		22.1	92.2	Calm wind		Insects
	23:25		22.6	94.8	Calm wind		Dense fog
	23:40		22.2	94.2	Calm wind		Insects
	23:55		23.2	94.5	0.4-1.5	NW300	
	0:10		22.7	93.1	0.5-1.3	NW300	
	0:25		22.7	95.7	0.5-1.6	NW300	Insects
	0:40		22.9	95.5	0.3-0.8	NW300	Dense fog
	0:55		21.6	95.4	0.4-1.4	NW300	Insects
	1:10		21.7	94.3	0.5-1.3	NW300	dogs barking
	1:25		21.1	95.2	Calm wind		
	1:40		21.6	95.6	Calm wind		Dense fog
	1:55		21.7	94.4	Calm wind		Insects
	2:10		21.1	95.5	Calm wind		Insects
	2:25		21.7	94.4	Calm wind		Dense fog, Insects
	2:40		21.5	94.3	Calm wind		Insects
	2:55		21.3	95.5	0.6-1.5	NW300	
	3:10		21.5	94.3	0.4-1.5	NW300	Dense fog
	3:20		21.2	95.7	0.2-1.1	NW300	
	3:30		21.2	95.9	0.5-1.5	NW300	Dense fog
	3:40		21.8	94.4	Calm wind		
	3:55		21.5	95.7	Calm wind		Crowing rooster
	4:10		21.8	95.2	Calm wind		4:20 dogs barking, Crowing rooster

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	4:25		21.6	94.2	0.2-1.1	NE30	
	4:40		22.4	94.4	0.3-1.2	NE30	Crowing rooster
	4:55		23.2	93.5	Calm wind		Crowing rooster
	5:10		22.3	93.1	Calm wind		
	5:25		22.7	93.9	0.2-1.3	N10	Crowing rooster, birdsong
	5:40		23.2	93.2	0.3-1.3	N10	Crowing rooster, birdsong
	5:55		23.4	93.8	0.7-1.7	N10	Crowing rooster, birdsong
	6:10		23.4	91.6	0.4-1.1	N10	
	6:25		23.3	91.8	0.3-0.9	N10	6:30 Agricultural vehicles
	6:40		23.6	91.3	0.3-1.3	N10	
	6:55		23.5	91.4	0.4-1.5	N10	Agricultural vehicles
	7:10		23.8	91.6	0.2-1.3	N10	Agricultural vehicles
	7:25		24.2	91.1	0.2-1.3	N10	7:17 Agricultural vehicles
	7:40		25.2	91.2	0.7-1.6	N10	
	7:55		24.9	91.5	0.2-1.3	NE30	7:50 Agricultural vehicles
	8:10		24.2	91.3	0.7-1.2	NE30	Light rain , Agricultural vehicles
	8:25		24.1	91.3	0.4-0.9	NE30	
	8:35		24.6	91.3	0.6-1.7	NE30	
	8:37	Stop Sound level meter					Team finished noise measuring at this site

INSTITUTE FOR ENVIRONMENT AND RESOURCES
ENVIRONMENTAL QUALITY LABOLATORY

DAILY LOG SHEET

Sampling position: **N3**
Buon Dhia 1 village, Cu Ne commune, Krong Buk District, Dak Lak Province
Latitute: 13°04'50.4"N; 108°14'08.3"E
Sampling period 22-23 May 2021 and 26-27 May 2021

No.	Parameters	Sampling method	Equipment	Sample codes	Note
1	Noise level	ISO 1996-2-2007	RION 52EX-RT	N3	The nearest household is Mr Y DIPNIE's house

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
May 22, 2021	9:45	Calibration passed					Calibration sound level meter
	9:50	Run Sound level meter					Starting noise measuring
	9:50		28.3	78.7	1.6-2.5	SE120	Motorbikes, Loudspeakers
	10:00		28.5	79.0	1.8-2.7	SE120	Loudspeakers
	10:20		28.4	78.9	1.6-2.3	SE120	Loudspeakers
	10:35		28.2	79.1	2.0-3.2	SE120	Loudspeakers
	10:45		28.3	79.6	2.4-3.5	SE120	Loudspeakers
	10:55		28.4	80.2	2.0-3.0	SE120	Loudspeakers
	11:05		28.5	80.5	2.1-3.2	SE120	Loudspeakers
	11:20		28.6	81.0	2.2-3.0	SE120	Loudspeakers
	11:35		28.5	80.6	1.9-3.0	SE120	Loudspeakers
	11:55		28.4	79.7	1.8-2.6	SE120	Loudspeakers
	12:05		28.3	78.4	2.0-3.1	SE120	Loudspeakers
	12:15		28.5	77.5	1.5-2.3	SE120	Loudspeakers
	12:25		28.4	77.7	1.0-2.2	SE120	Loudspeakers
	12:40		28.5	78.9	1.5-2.2	SE120	Agricultural vehicles, Loudspeakers
	12:55		28.6	77.3	1.6-2.5	SE120	Loudspeakers
	13:05		28.8	76.5	1.7-2.3	SE120	Loudspeakers
	13:20		28.7	76.1	1.5-2.2	SE120	Loudspeakers
	13:30		28.8	74.3	1.6-2.0	SE120	Loudspeakers
	13:50		28.9	73.2	2.6-3.7	SE120	Loudspeakers
	14:00		30.1	70.3	3.0-4.1	SE120	Motorbikes, Loudspeakers
	14:20		30.3	69.7	2.0-3.0	SE120	Loudspeakers
	14:40		30.2	68.6	2.2-3.1	SE120	Loudspeakers
	14:55		30.3	65.3	2.1-3.0	SE120	Loudspeakers
	15:05		30.4	64.6	3.1-4.2	SE120	Agricultural vehicles, Loudspeakers
	15:20		30.3	65.1	3.0-3.8	SE120	Loudspeakers
	15:35		30.4	67.8	2.1-3.2	SE120	Loudspeakers
	15:50		30.5	73.5	2.1-3.0	SE120	Motorbikes, Loudspeakers

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	16:00		30.1	73.7	2.0-3.1	SE120	Loudspeakers
	16:20		29.7	74.2	1.9-2.8	SE120	Loudspeakers
	16:40		29.0	75.3	1.6-2.3	SE120	Agricultural vehicles, Loudspeakers
	17:10		28.6	77.0	1.8-2.7	SE120	Loudspeakers
	17:25		28.2	77.7	2.0-3.0	SE120	Sound of cicadas, Loudspeakers
	17:40		27.8	79.8	1.5-2.2	SE120	Sound of cicadas, Loudspeakers
	17:55		27.3	80.5	1.2-2.0	SE120	Sound of cicadas, Loudspeakers
	18:10		26.8	81.8	0.5-1.2	SE120	Sound of cicadas, insects
	18:30		26.2	82.6	0.6-1.3	SE120	Sound of cicadas, insects
	18:45		25.8	84.4	0.4-1.0	SE120	Motorbikes, Sound of cicadas, insects
	19:00		25.5	85.8	0.5-1.1	SE120	Sound of cicadas, insects
	19:20		25.3	86.2	Calm wind		Sound of cicadas, insects
	19:40		25.1	87.8	Calm wind		Sound of cicadas, insects
	20:00		24.9	88.8	Calm wind		insects
	20:20		24.6	89.8	Calm wind		insects
	20:35		24.2	90.5	Calm wind		insects
	20:55		24.3	90.7	Calm wind		insects
	21:05		24.2	91.3	Calm wind		insects
	21:15		24.3	91.9	Calm wind		Dogs barking, insects
	21:30		24.1	92.2	Calm wind		insects
	21:45		24.3	92.5	Calm wind		insects
	21:55		24.5	93.3	Calm wind		insects
	22:10		24.4	93.6	0.5-1.2	SE120	insects
	22:30		24.5	93.8	0.4-1.0	SE120	insects
	22:45		24.6	94.1	0.5-1.1	SE120	insects
	22:55		24.2	94.5	0.4-0.9	SE120	insects
	23:15		24.0	94.8	0.3-0.8	SE120	insects
	23:30		23.9	95.0	0.6-1.2	SE120	insects
	23:45		23.7	95.3	Calm wind		insects
May 23	0:00		23.8	95.6	Calm wind		insects
	0:30		23.5	95.1	Calm wind		insects
	0:45		23.0	95.5	Calm wind		insects
	1:00		22.8	95.8	Calm wind		insects
	1:30		22.5	96.0	Calm wind		insects
	1:45		22.3	96.3	Calm wind		insects
	2:00		22.4	96.7	Calm wind		2:05 Dog barking, insects
	2:25		22.1	96.5	Calm wind		insects

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	2:45		22.0	96.4	Calm wind		insects
	3:00		21.9	96.8	Calm wind		insects
	3:20		21.7	96.6	Calm wind		insects
	3:40		21.8	97.0	Calm wind		4:47 Dog barking insects
	4:00		22.3	96.7	Calm wind		Crowing rooster
	4:15		22.0	97.0	Calm wind		Crowing rooster, Loudspeakers
	4:30		21.6	97.2	Calm wind		Crowing rooster, Loudspeakers
	4:45		21.7	97.4	Calm wind		Crowing rooster, Loudspeakers
	5:00		21.8	97.5	Calm wind		Crowing rooster, Loudspeakers
	5:30		21.5	97.2	Calm wind		Crowing rooster, Loudspeakers
	5:45		21.6	97.0	Calm wind		Crowing rooster, Loudspeakers
	6:00		21.9	96.7	0.5-0.8	SW240	Crowing rooster, Loudspeakers
	6:20		22.0	96.8	0.4-0.9	SW240	Loudspeakers
	6:40		22.3	96.4	0.6-1.1	SW240	Birdsong, Loudspeakers
	7:00		22.7	96.2	0.5-1.0	SW240	Motorbikes, Loudspeakers
	7:20		23.3	96.0	0.6-1.3	SW240	Agricultural vehicles, Loudspeakers
	7:40		23.7	95.9	0.8-1.5	SW240	Motorbikes, Loudspeakers
	7:55		23.9	95.5	1.0-1.8	SW240	Motorbikes, Loudspeakers
	8:10		24.0	95.0	1.3-2.1	SW240	Motorbikes, Loudspeakers
	8:25		24.2	95.5	1.2-1.7	SW240	Motorbikes, Loudspeakers
	8:40		24.3	95.7	1.0-1.5	SW240	Motorbikes, Loudspeakers
	8:55		24.5	96.0	1.3-1.6	SW240	Motorbikes, Loudspeakers
	9:10		24.6	96.3	1.5-2.0	SW240	Loudspeakers
	9:25		24.7	95.7	1.1-1.5	SW240	Loudspeakers
	9:35		24.9	95.2	1.4-2.0	SW240	Loudspeakers
	9:45		25.0	93.4	1.3-1.8	SW240	Agricultural vehicles, Loudspeakers
	10:00		25.2	92.5	1.2-1.6	SW240	Motorbikes, Loudspeakers
	10:15		25.5	91.0	1.0-1.6	NW300	Motorbikes, Loudspeakers
	10:30		25.7	90.2	1.3-2.0	NW300	Motorbikes, Loudspeakers

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	10:50		26.0	88.9	1.0-1.6	NW300	Loudspeakers
	11:10		26.2	86.8	0.9-1.3	NW300	Motorbikes, Loudspeakers
	11:25		26.4	84.8	0.5-1.3	NW300	Motorbikes, Loudspeakers
	11:35		26.8	83.6	0.6-1.2	NW300	Motorbikes, Loudspeakers
	11:55		27.1	83.4	0.9-1.5	NW300	Motorbikes, Loudspeakers
	12:15		27.4	82.1	1.2-1.8	NW300	Loudspeakers
	12:30		27.5	81.8	1.3-1.9	NW300	Loudspeakers
	12:40		27.7	80.5	1.2-1.6	NW300	Trucks, Loudspeakers
	12:55		27.9	79.7	1.4-2.0	NW300	Loudspeakers
	13:05		28.2	78.6	0.9-1.5	NW300	Loudspeakers
	13:25		28.6	77.8	1.1-1.6	NW300	Loudspeakers
	13:40		28.9	76.7	1.3-1.7	NW300	Motorbikes, Loudspeakers
	13:55		29.2	75.7	1.2-1.5	NW300	Loudspeakers
	14:10		29.5	75.1	1.3-1.6	NW300	Loudspeakers
	14:20		29.9	71.6	1.1-1.4	NW300	Loudspeakers
	14:40		30.3	70.3	1.3-1.7	NW300	Loudspeakers
	14:50		30.5	69.6	1.5-2.0	NW300	Loudspeakers
	15:05		30.4	68.7	1.6-2.1	NW300	Agricultural vehicles
	15:25		30.5	68.6	1.3-2.0	NW300	Motorbikes
	15:45		30.4	69.1	1.1-1.7	NW300	Motorbikes
	16:00		30.3	70.4	1.2-1.6	NW300	Motorbikes
	16:20		29.7	70.8	1.0-1.6	NW300	Motorbikes
	16:35		29.5	71.3	1.2-1.7	NW300	Motorbikes
	16:45		29.0	71.8	0.8-1.5	NW300	Motorbikes
	17:00		28.9	72.7	0.5-1.2	NW300	Agricultural vehicles
	17:15		28.4	73.5	0.4-1.0	NW300	Motorbikes
	17:30		27.5	74.6	1.1-2.0	NW300	
	17:45		27.2	75.8	0.6-1.2	NW300	
	18:05		26.7	77.9	0.4-0.9	NW300	Agricultural vehicles
	18:15		26.7	77.9	0.4-0.9	NW300	
	18:30		26.0	78.5	0.3-0.8	NW300	Light rain, Insects
	18:40		25.7	80.4	0.5-1.0	NW300	Insects
	18:55		25.2	84.3	0.3-0.7	NW300	Insects
	19:05		24.5	86.5	0.4.-1.0	NW300	Insects
	19:20	Stop Sound level meter					Stop measuring because of heavy rain and lots of thunder
May 26	15:15	Rerun Sound level meter	26.9	86.8	1.3-1.9	SW240	Agricultural vehicles
	15:30		26.7	85.7	1.4-2.1	SW240	Motorbikes
	15:45		26.5	86.7	1.3-2.0	SW240	Motorbikes
	16:00		26.4	89.4	1.5-2.0	SW240	Agricultural vehicles, Motorbikes

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	16:20		25.5	90.3	1.3-2.0	SW240	Loudspeakers, motorbikes
	16:30		25.3	91.5	1.6-2.2	SW240	Motorbikes
	16:45		25.2	91.0	1.8-2.6	SW240	Agricultural vehicles, thunder
	17:00		25.0	89.8	2.0-2.8	SW240	Motorbikes
	17:20		24.8	90.3	1.5-2.2	SW240	Agricultural vehicles
	17:30		24.5	91.2	1.2-1.6	SW240	Light rain,
	17:45		24.1	91.9	1.5-2.0	SW240	Light rain, Motorbikes
	18:00		23.8	92.5	1.4-1.8	SW240	Light rain
	18:20		23.3	93.1	0.9-1.3	SW240	Light rain, motorbikes
	18:40		23.0	93.3	1.2-1.8	SW240	Agricultural vehicles
	18:50		23.2	92.7	1.5-2.0	SW240	Motorbikes, Insects
	19:00		23.4	92.0	1.3-1.7	SW240	Insects
	19:20		24.0	88.7	Calm wind		Dogs barking, Insects
	19:40		23.8	90.5	Calm wind		Insects
	19:55		23.4	91.6	Calm wind		Insects
	20:05		23.5	92.8	Calm wind		Insects
	20:20		23.2	93.3	Calm wind		Insects
	20:40		23.3	94.6	Calm wind		Insects
	21:00		23.1	95.7	Calm wind		Insects
	21:15		23.0	96.4	Calm wind		Insects
	21:30		22.8	96.5	Calm wind		Insects
	21:45		22.7	96.7	Calm wind		Insects
	21:55		22.8	97.2	Calm wind		Insects
	22:05		22.6	97.6	Calm wind		
	22:20		22.5	97.8	Calm wind		Insects
	22:40		22.4	97.3	Calm wind		Insects
	22:55		22.3	97.5	Calm wind		Insects
	23:10		22.4	96.6	Calm wind		Insects
	23:25		22.3	97.0	Calm wind		Insects
	23:35		22.2	97.3	Calm wind		Insects
	23:50		22.0	97.8	Calm wind		Crowing rooster, Insects
May 24	0:00		21.9	98.1	Calm wind		Insects
	0:20		21.7	97.8	Calm wind		Insects
	0:30		21.8	97.3	Calm wind		Insects
	0:50		21.6	97.0	Calm wind		Insects
	1:10		21.7	97.5	Calm wind		Insects
	1:25		21.5	97.7	Calm wind		Insects
	1:35		21.6	98.2	Calm wind		Insects
	1:50		21.5	98.5	Calm wind		Insects
	2:10		21.4	98.4	Calm wind		Insects
	2:05		21.5	98.1	Calm wind		Insects
	2:30		21.3	97.6	Calm wind		Insects
	2:50		21.0	97.5	Calm wind		Insects

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	3:10		21.2	97.1	Calm wind		Insects
	3:20		21.3	96.9	Calm wind		Insects
	3:35		21.2	96.5	Calm wind		Insects
	3:50		21.4	96.7	Calm wind		Insects
	4:00		21.6	97.0	Calm wind		Crowing rooster
	4:20		21.9	96.7	Calm wind		Crowing rooster
	4:40		22.1	96.8	Calm wind		Crowing rooster
	4:50		22.4	95.9	Calm wind		Crowing rooster
	5:00		22.3	96.0	0.5-0.9	SW240	Crowing rooster
	5:20		22.5	96.3	0.4-0.7	SW240	Agricultural vehicles, Crowing rooster
	5:35		22.6	96.9	0.3-0.8	SW240	Crowing rooster
	5:50		22.5	97.2	0.5-1.0	SW240	Crowing rooster
	6:00		22.7	96.0	0.6-1.1	SW240	Crowing rooster
	6:15		22.9	96.5	0.4-1.0	SW240	
	6:30		22.7	96.2	0.5-1.1	SW240	Agricultural vehicles
	6:30	Stop Sound level meter					Team finished noise measuring at this site

INSTITUTE FOR ENVIRONMENT AND RESOURCES
ENVIRONMENTAL QUALITY LABOLATORY

DAILY LOG SHEET

Sampling position: **N4**
Kdro 2 village, Cư Né commune, Krong Buk, Đak Lak
Latitute: 13°03'25.0"N; 108°13'18.4"E
Sampling period May 22 to 23, 2021 and May 26 to early morning 27, 2021

No.	*Parameters*	*Sampling method*	*Equipment*	*Sample codes*	*Note*
1	Noise level	ISO 1996-2-2007	3M SoundPro DL 2-1/1	N4	The nearest household is Mr Kuenh's house

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
May 22, 2021	9:15	Calibration passed					Calibration sound meter
	9:19	Run Sound meter					Starting noise measuring
	9:25		31.3	60.8	1.3-1.8	SW240	Cicadas chirping, dogs barking
	9:35		31.9	60.9	1.2-1.9	SW240	
	9:45		31.9	61.5	1.1-2.2	SW240	dog barking
	9:55		32.2	60.6	0.6-1.2	SW240	
	10:05		31.4	60.2	1.2-2.2	SW240	dog barking
	10:15		31.2	61.2	0.5-1.4	SW240	Motorbikes, insects
	10:25		31.1	60.8	0.5-1.3	SW240	
	10:35		31.6	61.9	0.4-1.4	SW240	Motorbikes
	10:45		31.5	62.9	0.4-0.9	SW240	Crowing rooster
	10:55		30.1	63.4	0.9-1.8	SW240	
	11:05		30.1	64.1	0.8-1.7	SW240	11h birdsong, children's voice
	11:15		31.2	63.8	1.2-1.7	SW240	11:10 birdsong, children's voice
	11:25		30.5	64.4	0.8-1.6	SW240	11:27 Agricultural vehicles
	11:35		30.1	65.5	Calm wind		
	11:50		31.1	64.2	Calm wind		
	12:05		32.9	63.6	0.8-1.8	SW240	12:02 cows squeal, motorbikes
	12:20		32.4	62.6	0.5-1.4	SW240	
	12:30		32.7	61.9	1.2-1.6	SW240	
	12:40		32.2	61.5	0.9-1.8	SW240	12:45 loudspeaker
	12:50		32.2	61.1	0.5-1.4	SW240	
	13:00		32.4	61.2	0.7-1.5	SW240	
	13:10		32.3	62.5	0.7-1.4	SW240	
	13:20		31.7	62.8	0.4-0.9	SW240	
	13:30		31.5	63.9	0.6-1.3	W270	
	13:40		30.7	63.8	0.5-1.2	W270	
	13:50		30.6	63.2	0.5-1.6	W270	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	14:05		30.9	63.9	0.7-1.7	W270	
	14:20		30.3	63.6	1.2-1.8	W270	
	14:35		30.7	64.1	0.9-1.9	W270	14:30 motorbikes, piling 30m away
	14:50		30.5	64.1	0.9-1.8	W270	
	15:05		30.7	65.1	0.5-1.3	W270	15h motorbikes
	15:20		30.7	66.3	0.3-1.3	W270	
	15:35		30.4	66.3	0.3-1.5	W270	
	15:50		30.8	66.5	0.7-1.8	W270	
	16:05		29.4	67.3	0.3-1.4	W270	16:10 cutting trees 8m away
	16:20		29.8	66.6	1.2-2.1	SW240	
	16:35		28.3	68.7	0.6-1.1	SW240	16:42 dogs barking
	16:50		28.2	69.2	0.7-1.2	SW240	
	17:05		28.2	70.4	0.7-1.4	SW240	
	17:20		27.1	70.8	0.6-1.7	SW240	17:15 Dog barking
	17:30		26.5	71.7	0.7-1.7	SW240	Children's voice
	17:40		25.3	72.6	0.6-1.6	SW240	Sound of cicadas, dogs
	17:50		25.9	72.2	0.4-1.5	SW240	Children's voice, Agricultural vehicles on NH14 (380m away), sound of cicadas and insects
	18:00		25.9	72.2	0.2-1.5	SW240	sound of cicadas
	18:10		25.7	73.2	0.4-1.2	SW240	sound of cicadas
	18:20		25.9	74.2	0.7-1.3	W270	18:25 motorbikes
	18:30		25.3	74.5	0.7-1.5	W270	
	18:40		25.2	75.9	0.6-1.2	W270	18:45 dogs barking Insects
	18:50		25.6	76.8	0.3-1.2	W270	Insects
	19:00		24.1	78.9	Calm wind		
	19:10		24.1	80.2	Calm wind		Insects
	19:20		24.3	82.3	Calm wind		
	19:30		24.7	83.9	Calm wind		Insects
	19:40		24.2	84.2	0.9-1.5	W270	19:48 dogs barking, 19:44 motorbikes
	19:50		25.2	85.9	0.5-1.2	W270	Insects
	20:00		24.9	86.3	0.2-1.5	W270	dogs barking
	20:10		24.9	86.5	0.9-1.7	W270	Insects
	20:20		24.2	86.6	0.2-1.2	W270	gecko sound
	20:30		24.2	88.8	0.4-1.3	W270	Insects, 20:37 motorbikes
	20:45		24.5	89.2	0.3-0.8	W270	Insects
	21:00		24.8	89.7	0.8-1.5	W270	
	21:15		24.6	90.9	0.9-1.4	SW240	Insects
	21:30		24.5	91.5	0.2-1.3	SW240	
	21:45		24.3	91.4	0.3-1.2	SW240	Insects
	22:00		24.7	92.3	0.9-1.8	SW240	Insects
	22:15		24.8	90.1	1.2-2.1	SW240	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	22:30		24.7	89.3	0.5-1.2	SW240	Insects
	22:45		24.3	90.1	0.5-1.1	NE30	Insects
	23:00		25.2	89.5	0.5-1.6	NE30	
	23:15		24.8	89.2	0.8-1.9	NE30	Insects
	23:30		24.9	90.9	0.9-1.5	NE30	
	23:45		24.9	89.9	0.6-1.6	NE30	Insects
	23:55		24.2	88.9	0.5-1.2	NE30	Insects
May 23, 2021	0:05		24.8	87.3	0.3-0.9	NE30	
	0:15		24.4	87.9	0.5-1.6	W270	Insects
	0:25		25.2	87.7	0.8-1.6	W270	
	0:40		24.2	86.1	0.8-1.6	W270	Insects
	0:55		24.3	86.6	Calm wind		
	1:10		24.4	86.1	Calm wind		Insects
	1:25		24.7	87.3	Calm wind		Insects
	1:40		24.2	87.2	Calm wind		
	1:55		24.3	86.5	Calm wind		Insects
	2:10		24.2	87.2	0.2-1.4	W270	Insects
	2:25		24.5	87.2	0.2-1.2	W270	
	2:40		24.5	86.8	0.7-1.8	W270	Insects
	2:55		24.3	87.9	0.8-1.7	W270	Crowing rooster
	3:10		24.4	86.6	0.4-1.3	NW300	Crowing rooster
	3:25		24.2	86.2	0.3-1.3	NW300	
	3:40		24.5	87.1	1.1-1.9	NW300	
	3:55		24.9	86.6	0.3-1.3	NW300	Crowing rooster, dogs barking
	4:10		24.7	87.5	0.9-2.2	NW300	Crowing rooster
	4:25		24.5	86.8	0.3-0.9	NW300	Crowing rooster, dogs barking
	4:40		24.8	87.2	0.4-1.3	NW300	
	4:55		24.9	86.5	0.3-1.4	NW300	Insects
	5:10		24.6	87.2	0.6-1.2	NW300	Sound of Insects, dogs
	5:25		23.7	87.5	Calm wind		
	5:40		23.8	87.2	Calm wind		
	5:55		24.6	86.4	Calm wind		birds
	6:10		24.9	87.3	Calm wind		
	6:25		24.5	88.7	Calm wind		Resident’s voice about 40m away
	6:40		24.4	90.7	Calm wind		dogs barking
	6:50		24.7	91.3	Calm wind		
	7:00		24.8	91.2	0.4-1.2	SW240	Resident’s voice about 40m away
	7:10		24.7	90.1	0.4-1.1	SW240	Resident’s voice about 40m away
	7:20		25.8	89.2	0.8-1.5	SW240	Resident’s voice about 40m away
	7:30		25.9	89.7	0.6-1.1	SW240	Resident’s voice about 40m away
	7:40		25.7	88.7	0.7-1.7	W270	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	7:50		25.5	87.4	0.7-1.2	W270	7:57 horn from NH14
	8:00		25.4	87.8	0.6-1.5	W270	
	8:10		25.3	87.7	0.5-1.1	NE30	Agricultural vehicles, loudspeaker
	8:20		25.7	87.4	0.4-1.5	NE30	Loudspeakers, motorbikes
	8:30		25.1	87.6	0.7-1.7	NE30	
	8:40		25.6	87.4	0.4-0.9	NE30	
	8:50		25.2	86.5	0.6-1.4	SW240	Resident's voice about 40m away
	9:00		26.7	86.1	Calm wind		
	9:10		26.9	85.2	Calm wind		Resident's voice about 40m away
	9:25		26.1	84.2	0.9-1.7	NW300	
	9:40		26.8	83.4	0.4-1.3	NW300	Resident's voice about 40m away
	9:55		27.7	83.3	0.2-0.7	NW300	
	10:10		27.8	82.6	0.6-1.5	NW300	Resident's voice about 40m away
	10:25		27.6	81.4	0.5-1.2	NW300	
	10:40		27.8	80.5	0.4-1.4	W270	
	10:55		28.6	78.2	0.4-1.4	W270	sound of cicadas
	11:10		28.6	76.6	0.4-1.2	W270	Agricultural vehicles
	11:25		28.4	75.8	0.8-1.4	W270	
	11:40		29.3	73.5	0.4-1.2	W270	
	11:55		29.8	72.4	0.2-0.7	W270	dogs barking
	12:10		29.7	71.6	0.6-1.6	W270	
	12:25		29.9	70.9	0.9-1.7	W270	dogs barking
	12:40		29.6	69.6	0.7-1.4	W270	
	12:55		29.2	68.1	0.3-1.4	W270	
	13:10		29.6	68.3	0.8-1.5	W270	Motorbikes
	13:20		29.9	67.2	0.6-1.7	W270	
	13:30		30.2	66.3	0.4-1.3	W270	
	13:40		29.3	66.3	0.7-1.4	W270	
	13:50		29.7	66.6	0.8-1.4	NW300	
	14:00		29.1	66.5	0.8-1.3	NW300	
	14:10		29.8	66.7	0.5-1.3	NW300	sound of cicadas
	14:20		29.8	66.7	0.2-0.8	NW300	
	14:30		29.6	66.2	0.4-1.2	NW300	sound of cicadas
	14:40		29.3	66.6	0.8-1.7	NW300	
	14:55		30.3	67.7	0.4-1.2	NW300	
	15:10		30.8	68.1	0.9-1.5	SW240	
	15:25		31.2	68.9	0.2-0.7	SW240	
	15:40		30.7	68.6	0.4-1.3	SW240	
	15:55		29.9	69.6	0.8-1.4	SW240	
	16:10		30.2	69.2	0.5-1.2	NE30	Children playing about 40m away, car horn from NH14
	16:25		29.1	70.5	0.5-1.4	NE30	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	16:40		29.4	71.4	0.7-1.6	NE30	Children playing about 40m away
	16:55		28.3	73.1	0.6-1.6	NE30	
	17:10		27.8	74.4	0.5-1.2	NE30	Children playing about 40m away
	17:25		27.1	75.8	0.2-1.3	NW300	
	17:40		27.2	76.8	0.3-1.2	NW300	Children playing about 40m away
	17:55		26.8	77.3	0.3-1.3	NW300	Sound of cicadas, insects
	18:10		26.3	77.3	0.6-1.1	NW300	Dogs barking, sound of cicadas
	18:25		25.7	79.5	0.5-1.4	SW240	18:33 children's voice
	18:40		24.2	80.9	0.9-1.5	SW240	insects
	18:55		24.9	81.8	0.4-1.3	SW240	Sound of cicadas, insects
	19:10		24.7	82.3	0.5-1.5	SW240	
	19:25		23.3	82.5	0.7-1.2	NW300	insects
	19:40		24.2	82.2	0.8-1.9	NW300	
	19:55		23.5	82.3	0.4-0.9	W270	dogs barking
	20:05		23.9	82.3	0.3-1.4	W270	
	20:15		23.6	82.1	0.3-1.4	W270	
	20:25		23.9	83.1	1.1-2.1	W270	
	20:35		23.9	84.2	0.3-1.3	W270	Insects, dogs barking, Rain
		Stop Sound meter					Heavy Rain, stop measuring
May 26, 2021	15:40	reRun Sound meter	31.2	70.3	0.2-1.1	W270	Karaoke about 40m away
	15:50		32.2	70.6	0.9-1.6	W270	
	16:00		31.7	71.2	0.3-1.2	NE30	Karaoke about 40m away
	16:10		30.3	72.4	0.8-1.7	NE30	
	16:20		29.7	72.7	0.4-1.5	NE30	Karaoke about 40m away
	16:30		28.7	72.3	0.4-0.9	NE30	Looks like it's going to rain
	16:45		28.2	73.4	0.8-1.5	NE30	Karaoke about 40m away
	17:00		28.7	74.3	Calm wind		Looks like it's going to rain
	17:15		27.3	75.7	Calm wind		Karaoke about 40m away
	17:30		27.9	77.9	Calm wind		
	17:45		27.5	78.3	Calm wind		Karaoke about 40m away
	18:00		26.4	80.5	Calm wind		Karaoke about 40m away, sound of cicadas
	18:15		26.2	83.5	Calm wind		sound of cicadas

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	18:30		26.5	84.2	Calm wind		Karaoke about 40m away
	18:45		25.3	85.7	Calm wind		Karaoke about 40m away
	19:00		24.1	85.9	Calm wind		Karaoke about 40m away, insects
	19:10		24.6	86.4	Calm wind		Karaoke about 40m away, insects
	19:20		24.3	87.3	Calm wind		Karaoke about 40m away, insects
	19:30		24.4	88.2	Calm wind		
	19:40		23.3	89.5	Calm wind		Karaoke about 40m away, insects
	19:50		23.3	88.4	Calm wind	W270	
	20:00		23.7	89.7	0.3-1.2	W270	Karaoke about 40m away, insects
	20:10		23.4	89.6	0.6-1.6	W270	
	20:20		23.3	89.2	0.5-1.3	W270	Karaoke about 40m away, insects
	20:30		22.6	88.6	Calm wind		
	20:40		22.6	89.2	Calm wind		Karaoke about 40m away, insects
	20:50		22.9	90.2	Calm wind		
	21:00		22.6	91.2	Calm wind		Karaoke about 40m away, insects
	21:15		21.8	90.2	Calm wind		Insects
	21:30		21.1	91.8	Calm wind		Insects
	21:45		21.7	92.9	Calm wind		
	22:00		21.1	93.9	Calm wind		Insects
	22:15		21.4	94.9	Calm wind		Insects
	22:30		21.4	95.8	Calm wind		
	22:45		21.2	95.2	Calm wind		Insects
	23:00		21.5	95.5	Calm wind		dogs barking
	23:15		21.2	96.2	Calm wind		dogs barking
	23:30		21.8	95.3	Calm wind		Insects
	23:45		21.5	94.5	Calm wind		dogs barking
	0:00		21.9	94.9	Calm wind		dogs barking
	0:15		21.3	94.2	Calm wind		Insects
	0:30		21.3	93.9	Calm wind		dogs barking
	0:45		21.2	92.4	Calm wind		Insects
	1:00		21.9	91.9	Calm wind		Insects
	1:15		21.5	90.1	0.4-1.1	N10	
	1:30		21.9	89.8	0.2-1.4	N10	Insects
	1:45		21.1	89.5	0.2-1.3	N10	
	2:00		21.2	89.2	0.3-1.3	N10	Insects
	2:15		21.1	90.3	0.2-1.1	N10	
	2:30		21.3	90.3	0.6-1.4	N10	Insects
	2:45		21.9	89.9	0.4-1.4	N10	
	3:00		21.7	90.2	Calm wind		Insects
	3:15		22.7	90.7	Calm wind		

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	3:30		22.8	90.4	Calm wind		Insects
	3:45		23.2	89.7	Calm wind		Crowing rooster
	4:00		23.9	90.3	Calm wind		Crowing rooster
	4:15		23.7	90.2	Calm wind		
	4:30		23.3	90.1	Calm wind		Crowing rooster
	4:40		24.2	90.3	Calm wind		Insects
	4:50		24.4	90.6	Calm wind		Crowing rooster
	5:00		24.3	89.7	Calm wind		Crowing rooster
	5:10		24.5	90.8	Calm wind		Crowing rooster
	5:20		24.4	89.2	Calm wind		Crowing rooster
	5:30		25.2	90.1	Calm wind		Crowing rooster
	5:40		25.7	90.7	Calm wind		
	5:52	Stop Sound level meter					Team finished noise measuring at this site

INSTITUTE FOR ENVIRONMENT AND RESOURCES
ENVIRONMENTAL QUALITY LABOLATORY

DAILY LOG SHEET

Sampling position: **N5**
129, Buon Moi villaget, Cu Pong commune, Krong Buk District, Dak Lak Province
Latitute: 13°02'10.4"N, 108°10'39.2"E
Sampling period MAY 20 to 22, 2021

No.	*Parameters*	*Sampling method*	*Equipment*	*Sample codes*	*Note*
1	Noise level	ISO 1996-2-2007	RION 52EX-RT	N5	The nearest household: Mr Y HETNIE 's house

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
May 20, 2021	8:37	Calibration passed					Calibration sound level meter
	8:42	Run Sound level meter					Starting noise measuring
	8:50		30.8	66.5	0.9-2.4	NW30	Motorbikes
	9:10		31.2	66.7	1.1-2.2	NW30	Motorbikes
	9:25		31.5	67.0	0.6-2.0	NW30	Birdsong
	9:30		31.6	66.6	1.2-2.6	NW30	
	9:55		31.7	66.4	1.5-3.0	NW30	Crowing rooster, birdsong
	10:05		31.5	65.8	1.8-3.0	NW30	Motorbikes, birdsong
	10:20		31.3	65.2	1.8-2.8	NW30	Motorbikes, birdsong
	10:35		31.1	64.6	1.6-2.5	NW30	
	10:50		31.2	65.2	1.5-2.3	NW30	birdsong
	11:10		31.0	67.6	2.1-3.2	NW30	birdsong
	11:25		31.1	66.7	2.2-3.3	NW30	sound of cicadas
	11:40		31.0	66.9	2.5-3.4	NW30	Motorbikes
	11:50		30.8	67.3	2.6-3.5	NW30	
	12:10		30.7	67.6	2.8-3.7	NW30	Motorbikes
	12:25		30.5	68.5	2.2-3.1	NW30	Motorbikes, sound of cicadas
	12:45		30.6	67.2	1.6-2.5	NW30	Sound of cicadas
	12:55		30.5	66.4	1.8-3.1	NW30	
	13:05		30.4	66.1	2.1-3.2	NW30	Crowing rooster, sounds of children
	13:20		30.5	65.5	2.6-4.1	NW30	Agricultural vehicles
	13:30		30.4	65.1	2.3-3.5	NW30	
	13:45		30.3	64.6	2.2-3.1	NW30	Motorbikes, dogs barking
	14:00		30.4	64.1	2.0-3.4	NW30	Birdsong, sounds of children
	14:25		30.3	65.5	1.8-2.9	NW30	Agricultural vehicles
	14:40		30.2	66.7	1.9-2.7	NW30	
	14:55		30.1	67.3	2.1-3.4	NW30	Sounds of children, Agricultural vehicles
	15:10		30.2	68.6	2.0-3.2	NW30	Sounds of children, Agricultural vehicles

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	15:30		30.1	67.6	1.9-3.0	NW30	Sounds of children, Agricultural vehicles
	15:40		30.0	70.1	1.8-3.2	NW30	Sounds of children, Agricultural vehicles
	16:00		29.7	71.5	1.6-2.3	SE120	Dogs barking
	16:25		29.5	72.6	1.5-2.2	SE120	Crowing rooster, motorbikes
	16:40		29.6	73.1	1.4-2.0	SE120	Agricultural vehicles
	16:50		29.4	73.7	1.3-2.0	SE120	
	17:10		29.2	74.7	1.1-1.8	SE120	Motorbikes, sound of cicadas
	17:35		29.0	75.6	0.5-1.6	SE120	sound of insects, cicadas
	17:45		28.7	76.7	0.8-1.6	SE120	Motorbikes
	18:10		28.4	77.9	1.1-1.9	SE120	Motorbikes
	18:25		27.6	79.1	1.0-1.8	SE120	
	18:45		27.2	80.1	1.2-1.8	SE120	
	19:00		26.6	80.6	Calm wind		
	19:20		26.4	81.4	Calm wind		
	19:30		26.2	81.9	Calm wind		Dogs barking, Motorbikes
	19:50		26.3	82.5	Calm wind		
	20:05		26.5	83.0	Calm wind		
	20:20		26.7	83.8	Calm wind		
	20:35		26.4	84.1	Calm wind		
	20:55		26.3	84.4	Calm wind		
	21:05		26.1	84.9	0.6-1.5	SE120	Dogs barking
	21:15		25.8	85.4	0.4-1.1	SE120	Motorbikes
	21:30		25.2	86.3	0.8-1.7	SE120	Motorbikes
	21:40		24.7	87.8	Calm wind		Motorbikes
	21:55		24.3	88.1	Calm wind		Motorbikes
	22:10		24.5	88.8	Calm wind		Motorbikes
	22:35		24.4	90.1	Calm wind		
	22:45		24.5	90.5	Calm wind		
	22:55		24.6	90.9	Calm wind		
	23:10		24.4	91.4	Calm wind		
	23:20		24.7	91.7	Calm wind		
	23:35		24.6	92.0	Calm wind		
	23:45		24.7	92.4	Calm wind		
May 21	0:00		25.0	92.8	Calm wind		Dogs barking, insects
	0:20		24.9	93.2	Calm wind		
	0:30		24.8	93.5	Calm wind		insects
	0:45		24.8	93.6	Calm wind		insects
	1:00		24.7	93.7	Calm wind		insects
	1:20		24.6	94.2	Calm wind		insects
	1:40		24.5	94.6	Calm wind		insects
	2:00		24.4	95.1	Calm wind		
	2:30		24.2	95.5	Calm wind		
	2:45		24.0	95.8	Calm wind		

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	3:00		23.9	96.2	Calm wind		
	3:20		23.7	96.6	Calm wind		
	3:40		23.8	96.1	Calm wind		
	4:00		23.6	95.7	Calm wind		Crowing rooster, dogs barking
	4:15		23.1	95.6	0.5-1.0	SE120	Crowing rooster, dogs barking
	4:40		22.9	96.0	0.3-0.8	SE120	Crowing rooster, dogs barking
	5:00		22.8	95.4	0.4-1.0	SE120	Crowing rooster, dogs barking
	5:30		22.9	94.5	0.6-1.1	SE120	Crowing rooster, dogs barking
	5:40		23.1	94.9	0.5-1.0	SE120	Crowing rooster, dogs barking
	6:00		23.5	95.0	0.4-0.9	SE120	Crowing rooster, dogs barking
	6:15		24.2	95.6	0.6-1.3	SE120	Motorbikes, Agricultural vehicles
	6:30		24.6	95.8	0.5-1.2	SE120	Motorbikes, Agricultural vehicles
	7:00		25.2	94.2	0.4-1.0	SE120	
	7:20		25.8	93.1	0.6-1.4	SE120	
	7:40		26.3	90.6	0.5-1.2	SE120	
	7:55		27.1	88.4	0.7-1.5	SE120	Motorbikes, Agricultural vehicles
	8:05		26.8	84.2	1.0-1.8	SE120	Motorbikes, Agricultural vehicles
	8:15		27.2	80.1	0.6-1.3	SE120	Motorbikes
	8:25		27.5	78.5	0.8-1.5	SE120	Motorbikes
	8:40		27.8	77.6	0.9-2.0	SE120	Sound of cicadas
	9:00		28.1	77.4	1.0-2.2	SE120	Sounds of children
	9:25		28.6	77.6	1.1-2.3	SE120	Sounds of children
	9:40		28.5	77.8	1.0-2.1	SE120	Sound of cicadas,motorbikes
	9:55		28.6	78.0	1.2-2.3	SE120	
	10:05		28.7	78.4	1.0-2.1	SE120	Motorbikes, dogs barking
	10:20		29.0	73.7	1.1-2.0	SE120	Motorbikes, sounds of children
	10:30		29.5	72.7	1.3-2.4	SE120	Sounds of children
	10:40		29.8	73.0	1.0-2.1	SE120	Motorbikes, sounds of children
	10:55		30.1	72.2	0.9-2.0	SE120	Sounds of children
	11:10		30.8	71.0	0.8-1.6	SE120	Sounds of children
	11:25		30.5	69.6	1.0-1.6	SE120	Sounds of children
	11:35		30.7	69.8	1.1-2.3	SE120	Sound of cicadas, motorbikes
	11:45		31.0	67.6	1.2-2.2	SE120	Sound of cicadas, motorbikes

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	12:05		31.5	65.1	1.3-2.3	SE120	Sound of cicadas, motorbikes
	12:10		31.7	64.3	1.6-2.8	SE120	Motorbikes
	12:25		32.0	63.7	0.9-1.5	SE120	Motorbikes
	12:40		32.4	62.9	1.3-2.1	SE120	Agricultural vehicles
	12:55		32.6	60.5	1.5-2.3	SE120	Motorbikes
	13:05		33.1	59.5	1.3-2.1	SE120	Agricultural vehicles
	13:25		33.4	57.6	1.6-2.4	SE120	Motorbikes
	13:35		33.1	57.5	1.2-1.8	SE120	Crowing rooster
	13:50		33.0	57.2	1.3-2.0	SE120	Motorbikes
	14:00		32.6	61.0	1.3-2.4	SE120	Motorbikes
	14:20		31.2	62.7	1.1-2.0	SE120	Motorbikes
	14:40		30.9	61.1	1.3-2.1	SE120	Agricultural vehicles (Noise up to 66dBA)
	14:55		30.5	61.5	1.5-2.6	SE120	Agricultural vehicles
	15:05		30.2	61.8	1.6-2.8	SE120	Agricultural vehicles
	15:20		30.0	61.6	1.4-2.1	SE120	Agricultural vehicles
	15:40		29.7	63.4	1.3-2.0	SE120	Motorbikes
	15:55		29.8	63.6	1.4-2.2	SE120	Motorbikes
	16:00		29.6	63.9	1.2-2.0	SE120	Crowing rooster
	16:20		29.5	64.3	1.3-2.1	SE120	Agricultural vehicles
	16:45		28.9	66.1	1.0-1.6	SE120	Motorbikes
	17:00		25.8	67.6	0.5-1.0	SE120	Dogs barking, motorbikes
	17:30		25.6	68.8	1.2-1.8	SE120	Sound of cicadas
	17:40		25.4	70.5	1.0-1.6	SE120	Sound of cicadas
	18:15		24.9	75.6	0.7-1.5	SE120	Sound of cicadas
	18:30		24.6	79.5	0.5-1.1	SE120	Karaoke about 40m away
	18:40		24.7	80.8	0.8-1.3	SE120	Karaoke about 40m away
	18:55		24.5	86.9	1.2-2.3	SE120	Karaoke about 40m away
	19:05		24.2	90.3	1.2-1.8	SE120	Karaoke about 40m away
	19:25		24.1	91.6	0.9-1.5	SE120	Karaoke about 40m away
	19:35		24.2	92.3	1.0-1.5	SE120	Karaoke about 40m away
	19:55		24.0	93.2	1.1-1.6	SE120	Karaoke about 40m away
	20:00		23.9	94.5	0.8-1.4	SE120	Dogs barking, Karaoke about 40m away
	20:20		23.8	96.3	0.9-1.4	SE120	Light rain
	20:40		23.6	97.6	0.4-1.0	SE120	Dogs barking, motorbikes
	21:05		23.5	96.9	Calm wind		Dogs barking, motorbikes
	21:20		23.4	97.2	Calm wind		Dogs barking, motorbikes

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	21:30		23.2	95.6	Calm wind		Dogs barking, motorbikes
	21:40		23.0	96.8	Calm wind		Dogs barking, motorbikes
	21:50		22.8	97.5	Calm wind		Dogs barking, motorbikes
	22:10		22.6	96.3	Calm wind		Sound of cicadas
	22:20		22.5	96.7	Calm wind		
	22:40		22.4	97.3	Calm wind		
	22:50		22.5	97.7	Calm wind		
	23:10		22.4	98.1	Calm wind		
	23:20		22.3	97.3	Calm wind		
	23:30		22.4	96.3	Calm wind		
	23:45		22.5	97.0	Calm wind		
	0:05		22.3	96.6	Calm wind		
	0:20		22.1	97.2	Calm wind		
May 22	0:40		22.0	97.5	Calm wind		
	0:55		22.2	98.1	Calm wind		
	1:10		22.0	98.3	Calm wind		
	1:20		21.9	97.6	Calm wind		
	1:45		21.7	96.2	Calm wind		
	1:55		21.8	95.4	Calm wind		
	2:05		21.7	95.1	Calm wind		
	2:20		21.6	94.5	Calm wind		Dogs barking
	2:45		21.5	94.7	Calm wind		Dogs barking
	2:55		21.6	94.2	Calm wind		
	3:10		21.4	94.0	Calm wind		
	3:20		21.5	93.5	Calm wind		
	3:30		21.4	93.0	Calm wind		
	3:45		21.3	92.6	Calm wind		
	4:05		21.4	92.2	Calm wind		Crowing rooster
	4:15		21.5	91.0	Calm wind		Crowing rooster
	4:25		21.3	90.6	Calm wind		Crowing rooster
	4:40		21.4	90.1	Calm wind		Crowing rooster
	4:50		21.6	89.8	Calm wind		Crowing rooster
	5:00		21.5	89.2	0.5-1.2	SE120	Crowing rooster
	5:25		21.7	89.0	0.6-1.2	SE120	Crowing rooster, Loudspeakers
	5:40		21.5	88.5	0.4-0.9	SE120	Dogs barking
	5:50		21.6	89.0	0.6-1.3	SE120	Motorbikes
	6:00		22.3	88.9	0.4-1.0	SE120	Motorbikes
	6:20		22.7	89.0	0.5-1.1	SE120	Motorbikes
	6:30		23.2	90.0	0.6-1.1	SE120	Motorbikes
	6:40		23.5	90.2	0.4-0.9	SE120	Agricultural vehicles, Motorbikes
	6:50		23.8	89.3	0.6-1.3	SE120	Motorbikes
	7:10		24.2	87.8	0.4-0.8	SE120	Motorbikes
	7:20		24.5	87.3	0.6-1.2	SE120	Motorbikes

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	*Note*
	7:45		24.9	87.8	1.0-1.6	SE120	Motorbikes, dogs barking
	8:00		25.1	87.1	1.0-2.0	SE120	Agricultural vehicles, Motorbikes
	8:15		25.3	86.8	1.3-2.1	SE120	Agricultural vehicles, Motorbikes
	8:30		25.8	85.7	1.1-2.0	SE120	Sound of cicadas, Motorbikes
	8:40		26.2	85.2	0.9-1.6	SE120	Sound of cicadas, sounds of children
	8:50	Stop Sound level meter					Team finished noise measuring at this site

INSTITUTE FOR ENVIRONMENT AND RESOURCES
ENVIRONMENTAL QUALITY LABOLATORY

DAILY LOG SHEET

Sampling position: **N6**
38 Druong village, Cu Pong commune, Krong Buk District, Dak Lak Province
Latitute: 13°00'42.5"N, 108°09'41.8"E
Sampling period May 20 to 22, 2021

No.	*Parameters*	*Sampling method*	*Equipment*	*Sample codes*	*Note*
1	Noise level	ISO 1996-2-2007	RION 52EX-RT	N6	The nearest household is Mr My Hoe

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
May 20, 2021	7:45	Calibration passed					Calibration sound level meter
	7:50	Run Sound level meter					Starting noise measuring
	7:55		28.9	70.6	1.6-2.6	W280	
	8:05		29.7	69.2	1.5-2.5	W280	
	8:15		29.5	69.7	1.5-2.6	W280	
	8:25		29.2	68.9	1.2-2.2	W280	Sound of cicadas
	8:35		30.2	68.2	1.3-2.3	W280	
	8:45		30.6	68.8	1.2-1.9	W280	Sound of cicadas
	8:55		31.2	68.7	1.2-2.4	W280	Agricultural vehicles, Crowing rooster
	9:05		30.6	69.2	1.2-1.8	W280	
	9:15		30.4	68.7	1.2-1.7	W280	Sound of cicadas
	9:25		30.6	67.4	1.4-2.1	W280	Motorbikes
	9:35		31.2	66.9	1.7-2.7	W280	
	9:45		31.6	66.1	1.1-1.8	W280	sound of cicadas, 9:40 Agricultural vehicles
	9:55		31.9	65.5	1.3-2.4	W280	Agricultural vehicles
	10:05		31.6	64.5	0.9-2.3	W280	Sound of cicadas
	10:20		32.8	63.2	1.5-2.5	W280	Sound of cicadas Crowing rooster
	10:35		32.7	62.5	0.9-2.2	W280	Sound of cicadas
	10:50		32.2	61.3	1.6-2.6	W280	
	11:00		32.9	61.8	0.9-1.6	W280	11:05 Agricultural vehicles
	11:10		32.5	61.4	0.8-1.9	W280	
	11:20		32.2	60.4	1.2-1.9	W280	Agricultural vehicles
	11:30		32.8	58.7	1.5-2.2	W280	Agricultural vehicles
	11:40		32.5	59.2	1.2-2.2	W280	
	11:50		32.7	58.2	0.8-1.8	W280	Motorbikes
	12:00		33.9	57.5	1.8-2.7	W270	
	12:10		33.4	56.8	1.7-2.8	W270	Agricultural vehicles
	12:20		33.3	55.1	1.4-2.1	W270	
	12:35		33.3	55.2	1.3-1.8	W270	
	12:50		33.9	56.2	1.2-2.2	W270	
	13:05		33.3	55.1	1.2-1.8	W270	
	13:20		33.3	54.9	1.5-2.2	W270	Agricultural vehicles
	13:35		33.4	54.9	0.9-1.7	W270	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	13:50		33.2	54.7	0.8-2.4	W270	
	14:05		33.8	55.2	1.5-2.4	W270	
	14:20		33.5	54.4	1.7-2.6	SE150	14:15 motorbikes, Sound of cicadas, Agricultural vehicles
	14:35		33.2	54.9	1.4-2.5	SE150	Agricultural vehicles
	14:50		32.2	54.4	0.9-1.9	SE150	Agricultural vehicles
	15:05		32.8	55.2	1.7-2.7	SE150	
	15:20		32.3	55.6	1.8-2.3	SE150	Agricultural vehicles
	15:35		32.5	56.4	1.4-1.9	SE150	Agricultural vehicles, loudspeaker until 18:30
	15:50		32.7	56.7	1.2-1.9	SE150	Agricultural vehicles
	16:00		32.2	57.7	1.6-2.5	SE150	loudspeaker
	16:10		31.3	58.3	1.5-2.6	SE150	dogs barking
	16:20		31.8	59.4	1.3-2.4	SE150	Agricultural vehicles
	16:30		31.1	59.2	1.8-2.5	SE150	loudspeaker
	16:40		31.9	60.8	Calm wind		Agricultural vehicles
	16:50		31.3	61.8	Calm wind		loudspeaker
	17:00		30.7	62.4	Calm wind		loudspeaker
	17:10		30.3	63.8	Calm wind		17:16 motorbikes
	17:20		30.2	65.2	Calm wind		loudspeaker
	17:30		30.2	66.7	Calm wind		loudspeaker
	17:40		30.2	68.3	Calm wind		17:45 Sound of cicadas
	17:50		30.9	69.2	Calm wind		loudspeaker
	18:00		29.3	70.3	Calm wind		18:02 Sound of cicadas, motorbikes
	18:10		30.9	71.5	Calm wind		loudspeaker
	18:20		29.7	72.5	Calm wind		18:25 motorbikes
	18:30		30.2	72.2	Calm wind		loudspeaker
	18:40		29.9	73.6	Calm wind		
	18:50		29.7	75.5			Motorbikes
	19:00		28.5	76.2	Calm wind		
	19:15		28.9	77.8	Calm wind		Insects, motorbikes
	19:30		28.2	78.5	0.9-1.5	W280	Insects, motorbikes
	19:45		28.3	79.1	0.8-2.1	SW240	
	20:00		28.3	79.2	1.6-2.1	SW240	Insects, motorbikes, residents' voices is about 27m away
	20:15		28.1	79.3	0.8-2.2	SW240	dogs barking
	20:30		27.4	80.6	0.9-2.2	SW240	Dogs barking, insects
	20:45		27.5	81.9	Calm wind		Dogs barking, insects
	21:00		27.3	82.2	Calm wind		
	21:15		27.9	81.2	Calm wind		Insects
	21:30		27.8	81.4	1.4-1.9	W280	Insects
	21:45		27.2	81.2	1.2-2.3	W280	21:50 dogs barking
	22:00		27.2	82.3	1.2-2.2	W280	Insects
	22:15		26.1	82.3	0.9-2.3	W280	
	22:25		26.9	82.1	1.2-1.7	W280	Insects
	22:35		26.3	82.8	0.8-2.4	W280	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	22:45		26.9	82.3	0.8-1.7	W270	22:40 dogs barking
	22:55		26.7	82.2	1.8-2.5	W270	Insects
	23:10		27.2	82.2	1.3-2.3	W270	
	23:25		26.5	82.2	1.5-2.6	W270	Insects
	23:40		27.2	82.2	1.4-2.5	W270	
	23:50		26.2	82.5	Calm wind		Insects
May 21, 2021	0:05		26.2	82.5	Calm wind		0:05 dogs barking
	0:15		26.8	83.4	Calm wind		Insects
	0:25		26.2	84.7	Calm wind		Insects
	0:40		25.2	85.2	Calm wind		Insects
	0:55		25.8	84.3	Calm wind		dogs barking
	1:10		25.8	84.6	Calm wind		Insects
	1:25		24.4	84.5	1.4-2.3	SE150	Insects
	1:40		24.8	84.4	1.7-2.5	SE150	
	1:55		24.5	84.2	1.6-2.3	SE150	Insects
	2:10		24.2	84.7	1.3-2.1	SE150	
	2:25		24.6	84.2	1.4-2.2	SE150	Insects
	2:40		24.4	85.6	0.9-2.4	SE150	
	2:55		24.3	85.2	1.2-2.3	SE150	Insects, dogs barking
	3:10		24.9	85.7	1.7-2.4	SE150	
	3:25		24.6	85.7	1.4-2.4	SE150	
	3:40		24.3	85.4	1.3-1.9	SE150	
	3:55		23.4	85.8	1.3-2.4	SE150	
	4:10		23.5	85.4	Calm wind		
	4:25		24.9	86.3	Calm wind		Dogs barking, Crowing rooster
	4:40		24.9	86.9	Calm wind		Crowing rooster Insects
	4:55		24.5	86.7	Calm wind		Crowing rooster Insects
	5:10		24.5	86.4	1.4-2.2	W280	
	5:20		24.2	87.5	1.2-1.8	W280	Loudspeaker
	5:30		24.9	86.3	1.8-2.4	W280	
	5:40		25.1	86.9	0.9-2.2	W280	Crowing rooster
	5:50		25.6	88.2	1.1-2.4	W280	
	6:00		25.2	87.5	0.9-2.4	W280	Crowing rooster
	6:10		25.5	86.1	1.7-2.4	W270	Crowing rooster
	6:20		26.2	86.3	1.2-2.3	W270	
	6:30		26.1	85.3	0.9-1.7	W270	Agricultural vehicles
	6:40		26.2	84.5	1.2-2.4	W280	Agricultural vehicles
	6:50		27.9	82.6	1.4-2.2	W280	Agricultural vehicles
	7:00		27.5	80.4	1.4-2.2	W280	
	7:10		28.6	79.6	1.5-2.6	W280	
	7:20		29.8	77.5	1.1-2.1	SE150	
	7:30		30.1	76.2	0.9-1.5	SE150	Crowing rooster
	7:40		30.8	75.2	1.2-1.8	SE150	
	7:55		30.3	74.4	1.5-2.5	SE150	Crowing rooster
	8:10		30.2	72.5	0.8-1.7	SE150	
	8:25		30.2	69.8	1.4-1.9	SE150	
	8:40		30.2	68.4	0.9-1.9	SE150	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	8:55		30.4	68.8	1.8-2.3	SE150	Crowing rooster
	9:10		30.4	66.9	1.2-1.8	W280	
	9:25		31.3	67.1	1.2-1.9	W280	
	9:40		31.4	66.7	1.2-2.4	W280	
	9:55		31.7	67.1	1.6-2.4	W280	
	10:10		31.5	67.1	1.3-1.9	W280	Motorbikes, crowing
	10:25		32.5	66.3	1.5-2.5	W270	
	10:40		32.1	67.2	1.6-2.3	W270	
	10:55		32.7	66.7	1.1-1.9	W270	
	11:10		32.6	65.6	0.9-1.9	W270	
	11:25		33.3	64.9	1.2-1.6	W270	
	11:40		33.4	62.2	0.9-1.5	W270	
	11:50		33.1	60.3	1.2-2.2	W270	
	12:00		33.7	59.1	1.6-2.3	SE150	
	12:10		33.4	58.5	1.8-2.8	SE150	
	12:20		33.8	57.3	1.3-2.3	SE150	
	12:30		33.6	56.2	1.7-2.3	SE150	
	12:40		34.2	56.5	1.1-2.4	SE150	
	12:50		33.8	56.8	1.3-2.2	SE150	
	13:00		33.7	56.8	0.9-2.4	SE150	
	13:10		33.1	55.3	0.9-2.2	SE150	
	13:25		34.2	55.2	1.5-2.2	SE150	
	13:40		33.2	54.5	1.8-2.3	SE150	
	13:55		33.8	55.4	1.6-2.5	SE150	dogs barking,
	14:10		32.4	54.2	1.2-1.9	SE150	
	14:25		32.3	56.2	1.4-2.1	SE150	
	14:40		31.3	56.1	1.2-2.1	NE30	
	14:55		31.2	56.1	1.1-1.8	NE30	
	15:10		31.3	56.1	1.4-2.5	NE30	Motorbikes
	15:25		31.7	57.8	1.2-1.9	NE30	
	15:40		30.6	62.5	1.2-2.1	NE30	
	15:55		30.4	65.8	1.2-2.2	W280	Crowing rooster
	16:10		29.5	69.2	0.9-2.1	W280	
	16:25		29.4	72.3	1.7-2.8	W280	
	16:40		28.9	75.8	1.6-2.5	W270	
	16:55		27.4	79.4	1.2-2.3	W270	16:50, 16:55, 16:59 Agricultural vehicles
	17:10		26.4	80.8	0.9-2.3	W270	Agricultural vehicles, Light rain, loudspeaker
	17:25		25.4	81.2	1.8-2.7	W270	
	17:40		25.6	82.3	1.8-2.4	W270	17:46 Sound of cicadas
	17:55		25.3	84.4	1.1-2.2	W280	
	18:10		25.2	85.7	0.8-2.2	W280	18:00 dogs barking, 18:06 dogs barking
	18:25		25.9	84.9	1.1-2.4	W270	Thunder sounds
	18:35		25.2	83.4	1.2-1.8	W270	
	18:45		25.3	82.4	1.7-2.6	W270	
	18:55		25.9	82.7	1.3-2.4	W270	Thunder sounds
	19:05		25.6	82.1	1.5-2.4	W270	

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	19:15		25.6	81.5	1.3-2.3	W270	
	19:25		25.1	80.9	0.9-1.9	SE150	
	19:35		25.4	80.5	Calm wind		
	19:45		25.2	80.8	Calm wind		Motorbikes
	19:55		26.2	81.6	Calm wind		Thunder sounds, 19:54, Agricultural vehicles
	20:05		25.9	81.7	Calm wind		
	20:15		25.4	82.8	Calm wind		20:18 motorbikes
	20:25		25.9	83.6	Calm wind		Insects, motorbikes
	20:40		25.7	84.6	Calm wind		Insects, motorbikes 20:41, 20:46, 20:50
	20:55		25.7	83.6	Calm wind		
	21:10		25.2	84.7	Calm wind		
	21:25		25.2	84.7	Calm wind		Insects
	21:40		25.5	84.5	Calm wind		Dogs barking 21:46, motorbikes 21:34
	21:55		25.5	85.3	Calm wind		Insects
	22:10		24.6	86.2	Calm wind		22:05 motorbikes, dogs barking
	22:25		24.6	86.9	Calm wind		Insects
	22:40		25.2	85.7	Calm wind		Insects, 22:46 Thunder sounds
	22:55		24.2	86.1	Calm wind		
	23:10		24.2	85.9	Calm wind		Insects, 23:14, 23:16, 23:19 dogs barking
	23:25		24.1	85.5	Calm wind		23:20 23:33 motorbikes
	23:40		24.5	85.7	Calm wind	W270	Insects
	23:55		24.1	85.5	1.2-2.3	W270	Crowing rooster
May 22, 2021	0:10		25.2	86.6	1.4-1.9	W270	Insects
	0:25		24.5	86.3	1.8-2.4	W270	
	0:40		24.5	85.7	1.5-2.6	W270	Insects
	0:55		23.4	85.9			
	1:10		23.2	86.5	Calm wind		Insects
	1:25		23.4	85.5			
	1:40		23.2	85.9	Calm wind		Insects
	1:55		23.7	86.7			Insects
	2:10		23.9	86.2	Calm wind		Insects
	2:25		23.2	86.4			
	2:35		23.2	86.3	Calm wind		Insects
	2:45		23.1	86.6	1.1-2.2	W280	
	2:55		23.1	85.2	1.2-1.7	W280	Insects
	3:10		23.6	86.8	1.2-2.2	W280	Crowing rooster
	3:25		23.8	85.7	Calm wind		
	3:40		23.7	85.8	Calm wind		Crowing rooster
	3:55		23.9	85.4	Calm wind		
	4:10		23.4	86.3	Calm wind		Crowing rooster
	4:25		23.1	86.6	Calm wind		Crowing rooster
	4:40		23.2	86.6	Calm wind		

Date	Time	Equipment status	Temperature ^{0}C	Humidity %	Wind speed m/s	Wind Direction	Note
	4:55		23.5	86.1	Calm wind		Crowing rooster
	5:10		23.2	85.9	Calm wind		Insects
	5:25		23.2	84.6	Calm wind		
	5:40		25.4	83.2	0.9-1.9	W280	Loudspeaker, birdsong, Sound of cicadas
	5:55		25.6	84.3	1.6-2.6	W280	
	5:55		25.6	84.3	1.6-2.6	W280	
	6:10		25.8	82.1	1.6-2.5	W280	Motorbikes
	6:25		26.9	80.4	1.7-2.6	W280	Crowing rooster, Agricultural vehicles
	6:40		26.1	79.3	1.6-2.1	W280	6:45, 6:50 Agricultural vehicles
	6:55		27.2	77.6	1.4-2.3	W280	Agricultural vehicles
	7:05		27.4	74.6			Agricultural vehicles
	7:15		28.9	72.8	Calm wind		Agricultural vehicles
	7:25		28.6	70.6			
	7:35		29.2	68.5	1.2-2.4	W270	
	7:45		30.4	66.3	1.2-2.2	W270	
	7:50	Stop Sound level meter					Team finished noise measuring at this site

ATTACHMENT C SOME PICTURES

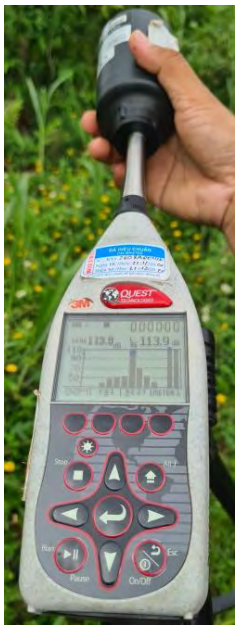
FIGURE C1. CALIBRATION IN THE LAB - 3M SoundPro DL 2-1/1

FIGURE C2. CALIBRATION IN THE LAB – RION 52EX-RT

N1

N2

N3



N4

N5

N6

FIGURE C3. CALIBRATION AT THE SITES

FIGURE C4. ANEMOMETER AND WIND DIRECTION AT THE SITES

ATTACHMENT D CERTIFICATE OF CALIBRATION

TỔNG CỤC TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG
TRUNG TÂM KỸ THUẬT
TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3
Quality Assurance & Testing Center 3

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

GIẤY CHỨNG NHẬN KIỂM ĐỊNH
CERTIFICATE OF VERIFICATION

Số / *No* **KT3-2608ADE0/2a**

1. Tên phương tiện đo: *Measuring Instrument*	**MÁY ĐO ĐỘ ỒN** ***SOUND LEVEL METER***		
2. Kiểu: *Type*	SOUND/PRO SE/DL		SN: BHJ110005
3. Sản xuất tại: *Manufacturer*	QUEST - USA		ID: TNKK-2010A-5
4. Đặc trưng đo lường: *Specifications*	Phạm vi đo/*Range* :	28 dB - 130 dB	
	Dải tần/*Frequency Band*:	20 Hz - 8 kHz	
	Cấp chính xác/*Accuracy class* :	2	
5. Nơi sử dụng: *Place*	**VIỆN MÔI TRƯỜNG VÀ TÀI NGUYÊN** **142 Tô Hiến Thành, P14, Q10, TP Hồ Chí Minh**		
6. Đơn vị sử dụng: *User*	**VIỆN MÔI TRƯỜNG VÀ TÀI NGUYÊN** **142 Tô Hiến Thành, P14, Q10, TP Hồ Chí Minh**		
7. Phương pháp kiểm định: *Method of Verification*	ĐLVN 89: 2010 Phương tiện đo độ ồn - Quy trình kiểm định *Sound Level Meters - Verification Procedure*		
8. Kết luận: *Conclusion*	Đạt yêu cầu kỹ thuật đo lường *Complying with the metrological requirements*		
9. Tem kiểm định số: *Verification stamp No*	**DE 026 174**		
10. Có giá trị đến (*): *Valid until*	31/12/2021	Ngày cấp: *Date of issue*	21/12/2020

Kiểm định viên
Verified by

Bùi Văn Tiến
Số KĐV: 0935

TL. GIÁM ĐỐC/ *PP. DIRECTOR*
TRƯỞNG PHÒNG THÍ NGHIỆM
HEAD OF LAB.

Nguyễn Tấn Tùng

(*) Với điều kiện tôn trọng các quy định về sử dụng và bảo quản
With respectfulness of rules of use and maintenance

Trụ sở chính/ *Head Office*: 49 Pasteur, Quận 1, TP HCM, Việt Nam — Tel: (84-28) 3829 4274 — Fax: (84-28) 3829 3012 — Website: www.quatest3.com.vn
Phòng thí nghiệm/ *Labs* : 7 đường 1, KCN Biên Hòa 1, Đồng Nai — Tel: (84-251) 383 6212 — Fax: (84-251) 383 6298 — E-mail: tn-cskh@quatest3.com.vn

QUATEST 3®

TỔNG CỤC TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG
TRUNG TÂM KỸ THUẬT TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3
QUALITY ASSURANCE & TESTING CENTER 3

VILAS 036 — ISO/IEC 17025:2017

KT3-3608ADE0/2b

GIẤY CHỨNG NHẬN HIỆU CHUẨN
CERTIFICATE OF CALIBRATION

Số giấy chứng nhận đăng ký cung cấp dịch vụ/ Service License №: DK 03

21/12/2020

1. Phương tiện đo/*Object* : **PHƯƠNG TIỆN ĐO ĐỘ ỒN CHỈ THỊ SỐ**
   DIGITAL SOUND LEVEL METER
2. Nơi sản xuất/*Manufacturer* : QUEST - USA
3. Kiểu/*Type* : SOUND/PRO SE/DL SN: BHJ110005 ID: TNKK-2010A-5
4. Đặc trưng kỹ thuật/*Specification* :
   - Phạm vi đo/*Range* : 28 dB - 130 dB
   - Dải tần/*Frequency Band* : 20 Hz - 8 kHz
   - Cấp chính xác/*Accuracy class* : 2 (IEC 61672)
5. Khách hàng: **VIỆN MÔI TRƯỜNG VÀ TÀI NGUYÊN**
   Customer **142 Tô Hiến Thành, P14, Q10, TP Hồ Chí Minh**
6. Nơi hiệu chuẩn: **TRUNG TÂM KỸ THUẬT 3/QUATEST 3**
   Place of Calibration **7 Đường 1, KCN Biên Hòa 1, Đồng Nai**
7. Phương pháp hiệu chuẩn: QTHC/KT3 78: 2018 Máy đo độ ồn - Quy trình hiệu chuẩn
   Method of Calibration *Sound Level Meters - Calibration Procedure*
8. Chuẩn sử dụng/*Standards Used* :

ID	Description	Traceable to	Cal. Date	Due Date
DE1958	Multifunction Acoustic Calibrator	VMI - VIỆT NAM	05/2020	05/2022

9. Môi trường hiệu chuẩn/*Calibration Environment* : [23 ± 2] °C [50 ± 10] %RH
10. Hiệu chỉnh phương tiện đo/*Adjustment* : ☑ Không/*No* ☐ Có/*Yes*
11. Ngày hiệu chuẩn/*Date of Calibration* : 21/12/2020
12. Tem hiệu chuẩn/*Calibration Label* : KT3-3608ADE0/2b

TL. TRƯỞNG PĐL ĐIỆN
PP. HEAD OF ELECTRICAL MEAS. LAB.

Nguyễn Thanh Tùng

TL. GIÁM ĐỐC/ *PP. DIRECTOR*
TRƯỞNG PHÒNG THÍ NGHIỆM
HEAD OF LAB.

TRUNG TÂM KỸ THUẬT TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3

Nguyễn Tấn Tùng

1. Các kết quả hiệu chuẩn ghi trong giấy chứng nhận này chỉ có giá trị đối với phương tiện đo đã được hiệu chuẩn ở trên đây.
   The calibration results in this certificate are applicable to the above calibrated instrument only.
2. Không được trích sao một phần giấy chứng nhận hiệu chuẩn này nếu không có sự đồng ý bằng văn bản của Trung tâm Kỹ thuật 3.
   This certificate shall not be reproduced, except in full, without the written permission by Quatest 3.
3. Tên khách hàng được ghi theo yêu cầu của nơi gửi mẫu./ *Name of customer is written as customer's request.*
4. Độ không đảm bảo đo mở rộng ước lượng được tính với k = 2, mức tin cậy 95 %./ *Estimated expanded uncertainty of measurement with k = 2, at 95 % confidence level.*
5. Mọi thắc mắc về kết quả khách hàng liên hệ theo địa chỉ dh.cs@quatest3.com.vn và rg.tn@quatest3.com.vn để biết thêm thông tin.
   Please contact Quatest 3 at the email addresses dh.cs@quatest3.com.vn and rg.tn@quatest3.com.vn for further information.
6. Ngày hiệu chuẩn kế tiếp tùy thuộc vào khách hàng./ *Recalibration date depends on the customer.*
7. Phòng Đo lường đã được Văn phòng Công nhận Chất lượng (BoA) - Việt Nam công nhận phù hợp theo ISO/IEC 17025:2017 (Vilas 036). Các chỉ tiêu có dấu (*) là chưa được công nhận.
   The Measurement Lab is accredited as conforming to ISO/IEC 17025:2017 by Bureau of Accreditation - Vietnam (Vilas 036). The characteristics marked with (*) are not accredited yet.

Head Office: 49 Pasteur, Dist. 1, HCMC, Vietnam — Tel: (84-28) 3829 4274 — Fax: (84-28) 3829 3012 — Website: www.quatest3.com.vn
Testing: No. 7, road No. 1, Bien Hoa 1 IZ, Dong Nai, Vietnam — Tel: (84-251) 383 6212 — Fax: (84-251) 383 6298 — E-mail: dh.cs@quatest3.com.vn
C5 lot, K1 road, Cat Lai IZ, Dist. 2, HCMC, Vietnam — Tel: (84-28) 3742 3160 — Fax: (84-28) 3829 3012 — E-mail: dh.cs@quatest3.com.vn

13. Kết quả hiệu chuẩn (*Results of calibration*)

13.1. Đáp ứng tần số (*Frequency response test*)

Frequency (Hz)		31,5	63	125	250	500	1000	2000	4000	8000
94 Inv.A	DUT (dB)	94,5	94,3	94,4	94,3	94,3	94,3	94,4	94,6	93,7
	Ref. (dB)	94,0	93,9	93,9	94,0	94,0	93,9	94,0	94,0	93,9
	Error (dB)	0,5	0,4	0,5	0,3	0,3	0,4	0,4	0,6	-0,2
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. A 94	DUT (dB)	55,5	68,2	78,2	85,6	91,0	94,4	95,6	95,5	92,7
	Ref. (dB)	54,5	67,7	77,9	85,4	90,7	94,0	95,1	95,0	92,8
	Error (dB)	1,0	0,5	0,3	0,2	0,3	0,4	0,5	0,5	-0,1
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. A 104	DUT (dB)	65,4	78,3	88,3	95,7	101,1	104,3	105,6	105,5	102,7
	Ref. (dB)	64,5	77,7	87,8	95,3	100,7	103,9	105,1	104,9	102,8
	Error (dB)	0,9	0,6	0,5	0,4	0,4	0,4	0,5	0,6	-0,1
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. A 114	DUT (dB)	75,4	88,3	98,3	105,7	111,1	114,4	115,7	115,5	112,6
	Ref. (dB)	74,5	87,7	97,8	105,3	110,7	113,9	115,1	114,9	112,7
	Error (dB)	0,9	0,6	0,5	0,4	0,4	0,5	0,6	0,6	-0,1
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. C 94	DUT (dB)	91,5	93,5	94,1	94,2	94,3	94,2	94,1	93,7	90,7
	Ref. (dB)	90,9	93,1	93,8	94,0	93,9	94,0	93,7	93,2	90,9
	Error (dB)	0,6	0,4	0,3	0,2	0,4	0,2	0,4	0,5	-0,2
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. C 104	DUT (dB)	101,4	103,5	104,1	104,2	104,3	104,2	104,1	103,6	100,6
	Ref. (dB)	100,9	103,1	103,7	103,9	103,9	103,9	103,7	103,1	100,9
	Error (dB)	0,5	0,4	0,4	0,3	0,4	0,3	0,4	0,5	-0,3
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. C 114	DUT (dB)	111,4	113,5	114,1	114,2	114,3	114,2	114,1	113,6	110,6
	Ref. (dB)	110,9	113,1	113,7	113,9	113,9	113,9	113,7	113,1	110,8
	Error (dB)	0,5	0,4	0,4	0,3	0,4	0,3	0,4	0,5	-0,2
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

13.2. Kiểm tra độ tuyến tính (*Linearity Test*)

Frequency (Hz)	31,5	63	125	250	500	1000	2000	4000	8000
94 dB	55,5	68,2	78,2	85,6	91,0	94,4	95,6	95,5	92,7
104 dB	65,4	78,3	88,3	95,7	101,1	104,3	105,6	105,5	102,7
114 dB	75,4	88,3	98,3	105,7	111,1	114,4	115,7	115,5	112,6
(104-94-10) dB	-0,1	0,1	0,1	0,1	0,1	-0,1	0,0	0,0	0,0
(114-104-10) dB	0,0	0,0	0,0	0,0	0,0	0,1	0,1	0,0	-0,1

13.3. Trọng số thời gian (*Time weighting test*) và *Crest factor (C.F)*

Time weighting	F	S	C.F
Nominal Value (dB)	106	106	100
DUT (dB)	105,0	101,8	99,9
Ref. (dB)	105,0	102,0	100,0
Error (dB)	0,0	-0,2	-0,1

Ghi chú/*Notes* :

- DUT: Thiết bị cần hiệu chuẩn/*Device Under Test*
- Ref.: Giá trị chuẩn/ *Reference Value*
- U: Độ không đảm bảo đo mở rộng/ *Expanded Uncertainty*

14. Thông tin khác/*Other Informations*

14.1 Độ không đảm bảo đo/*Uncertainty*

Độ KĐBĐ là độ không đảm bảo đo mở rộng được tính từ độ không đảm bảo đo chuẩn nhân với hệ số phủ k = 2, phân bố chuẩn tương ứng với 95 % độ tin cậy. Xác định độ không đảm bảo đo chuẩn theo tài liệu **JCGM 100:2008 Evaluation of measurement data - Guide to the expression of uncertainty in measurement (GUM); EA-4/02 & NIST TN 1297.**

The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with above documents.

14.2 Liên kết chuẩn/*Traceability*

Giấy chứng nhận hiệu chuẩn này thể hiện việc liên kết chuẩn đến chuẩn quốc gia, với đơn vị đo tuân thủ theo hệ đơn vị đo quốc tế SI. Nơi sử dụng thiết bị cần phải hiệu chuẩn lại thiết bị theo định kỳ phù hợp.

This calibration certificate documents the traceability to national standards, which realize the units of measurement according to the International System of Units (SI). The user is obliged to have the object recalibrated at appropriate intervals.

14.3 Phương pháp hiệu chuẩn/*Calibration Method*

a. Phương tiện đo được hiệu chuẩn bằng cách so sánh trực tiếp với các chuẩn của Trung tâm Kỹ thuật 3 được nêu tại Mục 8.

The equipment under calibration was calibrated by direct comparison with standards of Quatest 3 as description at Item 8.

b. Các kết quả hiệu chuẩn được thực hiện với bốn lần đo để tính giá trị trung bình và sai số.

All calibration results are based on four time measurements, from which the average and errors are calculated.

14.4 Điều kiện/*Conditions*

a. Các giá trị có đơn vị đo không thuộc hệ SI, được chuyển đổi từ hệ SI theo các bảng trong tài liệu **NĐ 86/2012/NĐ-CP; BIPM SI Brochure & NIST SP 811.**

All non-SI values were converted from SI units via conversion factors in above documents.

b. Kết quả hiệu chuẩn chỉ có giá trị tương ứng với điều kiện theo phương pháp hiệu chuẩn nêu ở Mục 7.

Calibration results are valid with respect to the procedure conditions as description at Item 7. only.

14.5 Hiệu chuẩn lại/*Recalibration*

Ngày đề nghị hiệu chuẩn lại theo yêu cầu của khách hàng: **21/12/2021**

Recommended recalibration date as request of customer.

TỔNG CỤC TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG
TRUNG TÂM KỸ THUẬT
TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3
Quality Assurance & Testing Center 3

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập - Tự do - Hạnh phúc

GIẤY CHỨNG NHẬN KIỂM ĐỊNH
CERTIFICATE OF VERIFICATION

Số / *No* **KT3-2681ADE0/1a**

1. Tên phương tiện đo: *Measuring Instrument*	**MÁY ĐO ĐỘ ỒN** ***SOUND LEVEL METER***	
2. Kiểu: *Type*	NL-52	SN: 00809435
3. Sản xuất tại: *Manufacturer*	RION - JAPAN	
4. Đặc trưng đo lường: *Specifications*	Phạm vi đo/*Range* :	20 dB - 140 dB
	Dải tần/*Frequency Band* :	20 Hz - 20 kHz
	Cấp chính xác/*Accuracy class* :	1
5. Nơi sử dụng: *Place*	**VIỆN MÔI TRƯỜNG VÀ TÀI NGUYÊN** **142 Tô Hiến Thành, P14, Q10, TP Hồ Chí Minh**	
6. Đơn vị sử dụng: *User*	**VIỆN MÔI TRƯỜNG VÀ TÀI NGUYÊN** **142 Tô Hiến Thành, P14, Q10, TP Hồ Chí Minh**	
7. Phương pháp kiểm định: *Method of Verification*	ĐLVN 89: 2010 Phương tiện đo độ ồn - Quy trình kiểm định *Sound Level Meters - Verification Procedure*	
8. Kết luận: *Conclusion*	Đạt yêu cầu kỹ thuật đo lường *Complying with the metrological requirements*	
9. Tem kiểm định số: *Verification stamp No*	**DE 026 191**	
10. Có giá trị đến (*): *Valid until*	31/12/2021	Ngày cấp: 24/12/2020 *Date of issue*

Kiểm định viên
Verified by

Bùi Văn Tiến
Số KĐV: 0935

TL. GIÁM ĐỐC/ *PP. DIRECTOR*
TRƯỞNG PHÒNG THÍ NGHIỆM/
HEAD OF LAB.

TRUNG TÂM KỸ THUẬT TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3

Nguyễn Tấn Tùng

(*) Với điều kiện tôn trọng các quy định về sử dụng và bảo quản
With respectfulness of rules of use and maintenance

Trụ sở chính/ *Head Office*: 49 Pasteur, Quận 1, TP HCM, Việt Nam — Tel: (84-28) 3829 4274 — Fax: (84-28) 3829 3012 — Website: www.quatest3.com.vn
Phòng thí nghiệm/ *Labs* : 7 đường 1, KCN Biên Hòa 1, Đồng Nai — Tel: (84-251) 383 6212 — Fax: (84-251) 383 6298 — E-mail: tn-cskh@quatest3.com.vn

QUATEST 3®
TỔNG CỤC TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG
TRUNG TÂM KỸ THUẬT TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3
QUALITY ASSURANCE & TESTING CENTER 3
VILAS 036 ISO/IEC 17025:2017

KT3-2681ADE0/1b

GIẤY CHỨNG NHẬN HIỆU CHUẨN
CERTIFICATE OF CALIBRATION

Số giấy chứng nhận đăng ký cung cấp dịch vụ/ Service License №: ĐK 03

24/12/2020

1. Phương tiện đo/*Object* : **PHƯƠNG TIỆN ĐO ĐỘ ỒN CHỈ THỊ SỐ** / ***DIGITAL SOUND LEVEL METER***
2. Nơi sản xuất/*Manufacturer* : RION - JAPAN
3. Kiểu/*Type* : NL-52 SN: 00809435 ID: N/A
4. Đặc trưng kỹ thuật/*Specification* :
   - Phạm vi đo/*Range* : 20 dB - 140 dB
   - Dải tần/*Frequency Band* : 20 Hz - 20 kHz
   - Cấp chính xác/*Accuracy class* : 1 (IEC 61672)
5. Khách hàng: *Customer* **VIỆN MÔI TRƯỜNG VÀ TÀI NGUYÊN** / **142 Tô Hiến Thành, P14, Q10, TP Hồ Chí Minh**
6. Nơi hiệu chuẩn: *Place of Calibration* **TRUNG TÂM KỸ THUẬT 3/QUATEST 3** / **7 Đường 1, KCN Biên Hòa 1, Đồng Nai**
7. Phương pháp hiệu chuẩn: *Method of Calibration* QTHC/KT3 78: 2018 Máy đo độ ồn - Quy trình hiệu chuẩn / *Sound Level Meters - Calibration Procedure*
8. Chuẩn sử dụng/*Standards Used* :

ID	Description	Traceable to	Cal. Date	Due Date
DE1958	Multifunction Acoustic Calibrator	VMI - VIỆT NAM	05/2020	05/2022

9. Môi trường hiệu chuẩn/*Calibration Environment* : [50 ± 10] %RH [50 ± 20] %RH
10. Hiệu chỉnh phương tiện đo/*Adjustment* : ☑ Không/*No* ☐ Có/*Yes*
11. Ngày hiệu chuẩn/*Date of Calibration* : 24/12/2020
12. Tem hiệu chuẩn/*Calibration Label* : KT3-2681ADE0/1b

TL. TRƯỞNG PĐL ĐIỆN
PP. HEAD OF ELECTRICAL MEAS. LAB.

Nguyễn Thanh Tùng

TL. GIÁM ĐỐC/ *PP. DIRECTOR*
TRƯỞNG PHÒNG THÍ NGHIỆM
HEAD OF LAB.

TRUNG TÂM KỸ THUẬT TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3

Nguyễn Tấn Tùng

1. Các kết quả hiệu chuẩn ghi trong giấy chứng nhận này chỉ có giá trị đối với phương tiện đo đã được hiệu chuẩn ở trên đây.
   The calibration results in this certificate are applicable to the above calibrated instrument only.
2. Không được trích sao một phần giấy chứng nhận hiệu chuẩn này nếu không có sự đồng ý bằng văn bản của Trung tâm Kỹ thuật 3.
   This certificate shall not be reproduced, except in full, without the written permission by Quatest 3.
3. Tên khách hàng được ghi theo yêu cầu của nơi gửi mẫu./ *Name of customer is written as customer's request.*
4. Độ không đảm bảo đo mở rộng ước lượng được tính với k = 2, mức tin cậy 95 %./ *Estimated expanded uncertainty of measurement with k = 2, at 95 % confidence level.*
5. Mọi thắc mắc về kết quả khách hàng liên hệ theo địa chỉ dh.cs@quatest3.com.vn và rq.tn@quatest3.com.vn để biết thêm thông tin.
   Please contact Quatest 3 at the email addresses dh.cs@quatest3.com.vn and rq.tn@quatest3.com.vn for further information.
6. Ngày hiệu chuẩn kế tiếp tùy thuộc vào khách hàng./ *Recalibration date depends on the customer.*
7. Phòng Đo lường đã được Văn phòng Công nhận Chất lượng (BoA) - Việt Nam công nhận phù hợp theo ISO/IEC 17025:2017 (Vilas 036). Các chỉ tiêu có dấu (*) là chưa được công nhận.
   The Measurement Lab is accredited as conforming to ISO/IEC 17025:2017 by Bureau of Accreditation - Vietnam (Vilas 036). The characteristics marked with (*) are not accredited yet.

Head Office: 49 Pasteur, Dist. 1, HCMC, Vietnam — Tel: (84-28) 3829 4274 — Fax: (84-28) 3829 3012 — Website: www.quatest3.com.vn
Testing: No. 7, road No. 1, Bien Hoa 1 IZ, Dong Nai, Vietnam — Tel: (84-251) 383 6212 — Fax: (84-251) 383 6298 — E-mail: dh.cs@quatest3.com.vn
C5 lot, K1 road, Cat Lai IZ, Dist. 2, HCMC, Vietnam — Tel: (84-28) 3742 3160 — Fax: (84-28) 3829 3012 — E-mail: dh.cs@quatest3.com.vn

GIẤY CHỨNG NHẬN HIỆU CHUẨN
CERTIFICATE OF CALIBRATION

Số giấy chứng nhận đăng ký cung cấp dịch vụ/ Service License Nº: DK 03

BỘ KHOA HỌC VÀ CÔNG NGHỆ * TỔNG CỤC TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG * TRUNG TÂM KỸ THUẬT TIÊU CHUẨN ĐO LƯỜNG CHẤT LƯỢNG 3

13. Kết quả hiệu chuẩn/ *Results of calibration*

13.1. Đáp ứng tần số (*Frequency response test*)

Frequency (Hz)		31,5	63	125	250	500	1000	2000	4000	8000	12500
94 Inv.A	DUT (dB)	93,5	94,2	94,2	94,1	94,1	94,0	94,0	93,8	93,5	93,0
	Ref. (dB)	94,0	93,9	93,9	94,0	94,0	93,9	94,0	94,0	93,9	94,0
	Error (dB)	-0,5	0,3	0,3	0,1	0,1	0,1	0,0	-0,2	-0,4	-1,0
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. A 94	DUT (dB)	54,6	68,0	78,1	85,5	90,9	94,0	95,2	94,8	92,5	88,8
	Ref. (dB)	54,5	67,7	77,9	85,4	90,7	94,0	95,1	95,0	92,8	89,6
	Error (dB)	0,1	0,3	0,2	0,1	0,2	0,0	0,1	-0,2	-0,3	-0,8
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. A 104	DUT (dB)	64,6	78,0	88,1	95,5	100,9	104,0	105,2	104,8	102,5	98,8
	Ref. (dB)	64,5	77,7	87,8	95,3	100,7	103,9	105,1	104,9	102,8	99,5
	Error (dB)	0,1	0,3	0,3	0,2	0,2	0,1	0,1	-0,1	-0,3	-0,7
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. A 114	DUT (dB)	74,6	88,0	98,1	105,5	110,9	114,0	115,2	114,8	112,5	108,8
	Ref. (dB)	74,5	87,7	97,8	105,3	110,7	113,9	115,1	114,9	112,7	109,5
	Error (dB)	0,1	0,3	0,3	0,2	0,2	0,1	0,1	-0,1	-0,2	-0,7
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. C 94	DUT (dB)	91,0	93,3	94,0	94,1	94,1	94,0	93,8	93,0	90,6	87,0
	Ref. (dB)	90,9	93,1	93,8	94,0	93,9	94,0	93,7	93,2	90,9	87,7
	Error (dB)	0,1	0,2	0,2	0,1	0,2	0,0	0,1	-0,2	-0,3	-0,7
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. C 104	DUT (dB)	101,0	103,3	104,0	104,1	104,1	104,0	103,8	103,0	100,6	97,0
	Ref. (dB)	100,9	103,1	103,7	103,9	103,9	103,9	103,7	103,1	100,9	97,6
	Error (dB)	0,1	0,2	0,3	0,2	0,2	0,1	0,1	-0,1	-0,3	-0,6
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
Lin. C 114	DUT (dB)	111,0	113,3	114,0	114,1	114,1	114,0	113,8	113,0	110,6	107,0
	Ref. (dB)	110,9	113,1	113,7	113,9	113,9	113,9	113,7	113,1	110,8	107,6
	Error (dB)	0,1	0,2	0,3	0,2	0,2	0,1	0,1	-0,1	-0,2	-0,6
	U (dB)	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1

13.2. Kiểm tra độ tuyến tính (*Linearity Test*)

Frequency (Hz)	31,5	63	125	250	500	1000	2000	4000	8000	12500
94 dB	54,6	68,0	78,1	85,5	90,9	94,0	95,2	94,8	92,5	88,8
104 dB	64,6	78,0	88,1	95,5	100,9	104,0	105,2	104,8	102,5	98,8
114 dB	74,6	88,0	98,1	105,5	110,9	114,0	115,2	114,8	112,5	108,8
(104-94-10) dB	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
(114-104-10) dB	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0

13.3. Trọng số thời gian (*Time weighting test*) và *Crest factor (C.F)*

Time weighting	F	S	C.F
Nominal Value (dB)	106	106	100
Chuẩn (dB)	104,9	102,0	99,9
Ref. (dB)	105,0	102,0	100,0
Error (dB)	-0,1	0,0	-0,1

Ghi chú/*Notes* :
- DUT: Thiết bị cần hiệu chuẩn/*Device Under Test*
- Ref.: Giá trị chuẩn/ *Reference Value*
- U: Độ không đảm bảo đo mở rộng/ *Expanded Uncertainty*

TRUNG TÂM NGHIÊN CỨU VÀ ỨNG DỤNG KHCN (ĐK 370)
(Center for Research and Application of Science and Technology)
Địa chỉ *(Add.)*: Số 285, đường CMT8, phường 12, quận 10, TP Hồ Chí Minh
No. 285, CMT8 Street, Ward 12, District 10, Ho Chi Minh City
Email: dichvu.cast@gmail.com Điện thoại (Tel.): (84-28) 668.28.606 / 0901.696.222

GIẤY CHỨNG NHẬN HIỆU CHUẨN

(Calibration Certificate)

Số (N^0): HC.1786.20

Tên đối tượng: *(Object):*	**Thiết bị chuẩn ồn**	
Kiểu: *(Type):*	Testo	Số/*(Serial N^0)*: 0554.0009 Mã QL/*(Tag N^0)*:
Nơi sản xuất: *(Manufacturer):*	Testo	
Đặc trưng kỹ thuật đo lường: *(Specification):*	Phạm vi đo: *(Measuring range)* 94 dB, 104 dB tại 1000 Hz	Độ phân giải: N/A *(Resolution)*
Cơ sở sử dụng: *(Customer):*	Viện Môi trường và Tài nguyên *142 Tô Hiến Thành, Quận 10, Thành phố Hồ Chí Minh*	
Phương pháp thực hiện: *(Method of calibration):*	CAST.HC-293.18	
Chuẩn được sử dụng: *(Standards used):*	Nguồn chuẩn ồn; Độ KĐB: 0,2 dB; LKC: VMI	
Kết quả: *(Results):*	Xem trang 2/2	
Ngày hiệu chuẩn đề nghị: *(Recommended recalibration):*	31-12-21	

Hồ Chí Minh, ngày 16 tháng 12 năm 2020
Date of issue

KT **Trưởng phòng thí nghiệm**
(Head of calibration Laboratory)

Nguyễn Duy Bình

GIÁM ĐỐC
(Director)

TỔ CHỨC KHOA HỌC VÀ CÔNG NGHỆ ★ TRUNG TÂM NGHIÊN CỨU VÀ ỨNG DỤNG KHOA HỌC CÔNG NGHỆ ★ QUẬN 10 - T.P HỒ CHÍ MINH ★

Phạm Quang Thành

KẾT QUẢ HIỆU CHUẨN

(Calibration results)

Kèm theo giấy chứng nhận hiệu chuẩn số: HC.1786.20

(Attached to certificate N⁰):

Tần số	Giá trị danh định / *Nominal values*	Giá trị đo của chuẩn/ *Reading values*	Hệ số hiệu chỉnh/ *Correction factor*	Độ không đảm bảo đo/ *Expanded Uncertainty (k=2, p=0,95)*
Hz	dB		-	dB
1000	94	93,9	1,00	0,14
	104	104,0	1,00	0,20

Chú ý:

(Note):

Điều kiện môi trường hiệu chuẩn: *(Condition of calibration environment)*

Nhiệt độ/ *Temperature*: (25 ± 5) °C

Độ ẩm tương đối/ *Relative humidity*: < 80 %RH

Người thực hiện

(Calibrator)

Phạm Hữu Nhật Anh

TRUNG TÂM NGHIÊN CỨU VÀ ỨNG DỤNG KHCN (ĐK 370)
(Center for Research and Application of Science and Technology)
Địa chỉ *(Add.)*: Số 285, đường CMT8, phường 12, quận 10, TP Hồ Chí Minh
No. 285, CMT8 Street, Ward 12, District 10, Ho Chi Minh City
Email: dichvu.cast@gmail.com Điện thoại (Tel.): (84-28) 668.28.606 / 0901.696.222

GIẤY CHỨNG NHẬN HIỆU CHUẨN

(Calibration Certificate)

Số (N^0): HC.1787.20

Tên đối tượng: *(Object):*	**Thiết bị chuẩn ồn**	
Kiểu: *(Type):*	QC-10/QC-20	Số/*(Serial N^0)*: QI9120084 Mã QL/*(Tag N^0)*:
Nơi sản xuất: *(Manufacturer):*	Quest Technologies	
Đặc trưng kỹ thuật đo lường: *(Specification):*	Phạm vi đo: *(Measuring range)* 114 dB tại 1000 Hz	Độ phân giải: N/A *(Resolution)*
Cơ sở sử dụng: *(Customer):*	Viện Môi trường và Tài nguyên *142 Tô Hiến Thành, Quận 10, Thành phố Hồ Chí Minh*	
Phương pháp thực hiện: *(Method of calibration):*	CAST.HC-293.18	
Chuẩn được sử dụng: *(Standards used):*	Nguồn chuẩn ồn; Độ KĐB: 0,2 dB; LKC: VMI	
Kết quả: *(Results):*	Xem trang 2/2	
Ngày hiệu chuẩn đề nghị: *(Recommended recalibration):*	31-12-21	

Hồ Chí Minh, ngày 16 tháng 12 năm 2020
Date of issue

KT. **Trưởng phòng thí nghiệm**
(Head of calibration Laboratory)

Nguyễn Duy Bình

GIÁM ĐỐC
(Director)

TỔ CHỨC KHOA HỌC VÀ CÔNG NGHỆ ★ TRUNG TÂM NGHIÊN CỨU VÀ ỨNG DỤNG KHOA HỌC CÔNG NGHỆ ★ QUẬN 10 - T.P HỒ CHÍ MINH ★

Phạm Quang Thành

KẾT QUẢ HIỆU CHUẨN

(Calibration results)

Kèm theo giấy chứng nhận hiệu chuẩn số: HC.1787.20

(Attached to certificate N⁰):

Tần số	Giá trị danh định / *Nominal values*	Giá trị đo của chuẩn/ *Reading values*	Hệ số hiệu chỉnh/ *Correction factor*	Độ không đảm bảo đo/ *Expanded Uncertainty (k=2, p=0,95)*
Hz	dB		-	dB
1000	114	113,7	1,00	0,20

Chú ý:

(Note):

Điều kiện môi trường hiệu chuẩn: *(Condition of calibration environment)*

Nhiệt độ/ *Temperature*: (25 ± 5) °C

Độ ẩm tương đối/ *Relative humidity*: < 80 %RH

Người thực hiện

(Calibrator)

Phạm Hữu Nhật Anh

APPENDIX D LIST OF SPECIES RECORDED IN PROTECTED AREAS AND KEY BIODIVERSITY AREAS WITHIN 50 KM RAIDUS FROM THE PROJECT

List of species identified from PAs and KBAs within 50km radius

S/N	Class	Scientific Name	Common name	IUCN	VRDB	Candidate	Criterion 1	Criterion 2	Criterion 3	EOO (km2)	Key Biodiversity Areas				Protected Areas					IBA Criteria Triggered
											Yok Don	Ea So	Ya Lop	Lake Earal	Yok Don	Ea So	Trap Kso	Earal	A Yun Pa	
Mammalia																				
1	Mammals	*Bos gaurus*	Gaur	VU	EN	**Yes**	Yes	No	No	1,200,000	X	X	X		X	X				A3
2	Mammals	*Bos javanicus*	Banteng	EN	N/A	**Yes**	Yes	No	Yes	105,000	X	X	X		X	X				A3
3	Mammals	*Cuon alpinus*	Dhole	EN	EN	**Yes**	Yes	No	No	N/A	X									
4	Mammals	*Elephas maximus*	Asian Elephant	EN	CR	**Yes**	Yes	No	No	11,317,030	X				X	X				A3
5	Mammals	*Lutrogale perspicillata*	Smooth-coated Otter	VU	EN	**Yes**	Yes	No	No	N/A	X	X								
6	Mammals	*Macaca leonina*	Northern Pig-tailed Macaque	VU	VU	**Yes**	Yes	No	No	N/A	X	X	X							
7	Mammals	*Nycticebus pygmaeus*	Pygmy Slow Loris	EN	EN	**Yes**	Yes	No	No	900,000	X	X								
8	Mammals	*Panthera tigris*	Tiger	EN	CR	**Yes**	Yes	No	No	1,184,911	X		X			X				A3
9	Mammals	*Rucervus eldii*	Eld's Deer	EN	N/A	**Yes**	Yes	No	No	N/A	X				X					A3
10	Mammals	*Pygathrix nigripes*	Black-shanked Douc Langur	CR	EN	**Yes**	Yes	No	No	60,000		X								
11	Mammals	*Canis aureus*	Golden Jackal	LC OR LR/LC	DD	No	No	No	No	N/A					X					A3
Aves																				
12	Birds	*Gyps bengalensis*	White-rumped Vulture	CR	CR	**Yes**	Yes	No	No	7,370,000	X		X							
13	Birds	*Heliopais personatus*	Masked Finfoot	EN	N/A	**Yes**	Yes	No	Yes	1,810,000	X									
14	Birds	*Leptoptilos javanicus*	Lesser Adjutant	VU	VU	**Yes**	Yes	No	Yes	11,300,000	X		X		X					A3
15	Birds	*Pavo muticus*	Green Peafowl	EN	EN	**Yes**	Yes	No	No	4,590,000	X	X	X		X	X			X	A1, A3
16	Birds	*Thaumatibis gigantea*	Giant Ibis	CR	N/A	**Yes**	Yes	No	Yes	120,000	X									
17	Birds	*Caprimulgus asiaticus*	Indian Nightjar	LC OR LR/LC	N/A	No	No	No	No	8,210,000		X								A1, A3
18	Birds	*Columba punicea*	Pale-capped Pigeon	VU	EN	**Yes**	Yes	No	No	1,530,000		X				X			X	A3
19	Birds	*Crypsirina temia*	Racquet-tailed Treepie	LC OR LR/LC	N/A	No	No	No	No	4,010,000		X	X							
20	Birds	*Lalage polioptera*	Indochinese Cuckooshrike	LC OR LR/LC	N/A	No	No	No	No	1,650,000		X							X	
21	Birds	*Passer flaveolus*	Plain-backed Sparrow	LC OR LR/LC	N/A	No	No	No	No	2,160,000		X	X						X	
22	Birds	*Pericrocotus cinnamomeus*	Small Minivet	LC OR LR/LC	N/A	No	No	No	No	13,100,000		X	X						X	
23	Birds	*Polyplectron germaini*	Germain's Peacock-pheasant	NT OR LR/NT	VU	**Yes**	Yes	No	No	60,900		X			X	X				A3
24	Birds	*Psilopogon lineatus*	Lineated Barbet	LC OR LR/LC	N/A	No	No	No	No	8,150,000		X	X						X	
25	Birds	*Pycnonotus aurigaster*	Sooty-headed Bulbul	LC OR LR/LC	N/A	No	No	No	No	10,800,000		X	X						X	
26	Birds	*Rhipidura aureola*	White-browed Fantail	LC OR LR/LC	N/A	No	No	No	No	8,760,000		X	X						X	
27	Birds	*Sarcogyps calvus*	Red-headed Vulture	CR	N/A	**Yes**	Yes	No	No	5,230,000		X	X							
28	Birds	*Sturnia malabarica*	Chestnut-tailed Starling	LC OR LR/LC	N/A	No	No	No	No	8,720,000		X	X							
29	Birds	*Tephrodornis pondicerianus*	Common Woodshrike	LC OR LR/LC	N/A	No	No	No	No	8,810,000		X	X							
30	Birds	*Treron phoenicopterus*	Yellow-footed Green-pigeon	LC OR LR/LC	N/A	No	No	No	No	8,970,000		X	X							
31	Birds	*Butastur liventer*	Rufous-winged Buzzard	LC OR LR/LC	N/A	No	No	No	No	6,620,000			X							
32	Birds	*Gracupica nigricollis*	Black-collared Starling	LC OR LR/LC	N/A	No	No	No	No	4,040,000			X						X	
33	Birds	*Himalayapsitta roseata*	Blossom-headed Parakeet	NT OR LR/NT	N/A	No	No	No	No	3,870,000			X						X	
34	Birds	*Mirafra assamica*	Bengal Bushlark	LC	N/A	No	No	No	No	1,750,000			X							
35	Birds	*Picus erythropygius*	Black-headed Woodpecker	LC OR LR/LC	N/A	No	No	No	No	1,120,000			X						X	
36	Birds	*Polihierax insignis*	White-rumped Pygmy-falcon	NT OR LR/NT	LR	No	No	No	No	1,210,000			X							
37	Birds	*Prinia polychroa*	Brown Prinia	LC OR LR/LC	N/A	**Yes**	No	No	Yes	3,820,000			X							
38	Birds	*Icthyophaga ichthyaetus*	Grey-headed Fish-eagle	NT OR LR/NT	VU	**Yes**	Yes	No	No	16,300,000					X					A3
39	Birds	*Pycnonotus blanfordi*	Streak-eared Bulbul	LC OR LR/LC	N/A	No	No	No	No	1,910,000			X							
40	Birds	*Arborophila chloropus*	Green-legged Partridge	LC OR LR/LC	N/A	No	No	No	No	1,300,000	X									A3
41	Birds	*Lophura diardi*	Siamese Fireback	LC OR LR/LC	VU	**Yes**	Yes	No	No	1,040,000	X								X	A1, A3
42	Birds	*Asarcornis scutulata*	White-winged Duck	EN	N/A	**Yes**	Yes	No	Yes	4,120,000	X									A1
43	Birds	*Anhinga melanogaster*	Oriental Darter	NT OR LR/NT	VU	**Yes**	Yes	No	Yes	19,400,000	X									A1

S/N	Class	Scientific Name	Common name	IUCN	VRDB	Candidate	Criterion 1	Criterion 2	Criterion 3	EOO (km2)	Key Biodiversity Areas				Protected Areas					IBA Criteria Triggered
											Yok Don	Ea So	Ya Lop	Lake Earal	Yok Don	Ea So	Trap Kso	Earal	A Yun Pa	
44	Birds	*Icthyophaga humilis*	Lesser Fish-eagle	NT OR LR/NT	N/A	No	No	No	No	13,300,000	X									A1
45	Birds	*Buceros bicornis*	Great Hornbill	VU	VU	**Yes**	Yes	No	No	10,300,000	X									A1
46	Birds	*Psilopogon lagrandieri*	Red-vented Barbet	LC OR LR/LC	N/A	No	No	No	No	675,000	X								X	A3
47	Birds	*Psilopogon faiostrictus*	Green-eared Barbet	LC OR LR/LC	N/A	No	No	No	No	1,600,000	X								X	A3
48	Birds	*Gecinulus grantia*	Pale-headed Woodpecker	LC OR LR/LC	N/A	No	No	No	No	3,730,000	X									A3
49	Birds	*Pitta moluccensis*	Blue-winged Pitta	LC OR LR/LC	N/A	**Yes**	No	No	Yes	1,790,000	X									A3
50	Birds	*Dicrurus annectens*	Crow-billed Drongo	LC OR LR/LC	N/A	**Yes**	No	No	Yes	2,760,000	X									A3
51	Birds	*Iole propinqua*	Grey-eyed Bulbul	LC OR LR/LC	N/A	No	No	No	No	2,380,000	X									A3
52	Birds	*Mixornis kelleyi*	Grey-faced Tit-babbler	LC OR LR/LC	N/A	No	No	No	No	348,000	X									A2, A3
53	Birds	*Garrulax monileger*	Lesser Necklaced Laughingthrush	LC OR LR/LC	N/A	No	No	No	No	5,230,000	X								X	A3
54	Birds	*Acridotheres burmannicus*	Burmese Myna	LC OR LR/LC	N/A	No	No	No	No	420,000	X									A3
55	Birds	*Ampeliceps coronatus*	Golden-crested Myna	LC OR LR/LC	N/A	No	No	No	No	2,480,000	X								X	A3
Herpetofauna																				
56	Amphibians	*Limnonectes toumanoffi*	Annam Wart Frog	VU	N/A	**Yes**	Yes	No	No	154,967	X									
57	Reptiles	*Cuora amboinensis*	Southeast Asian Box Turtle	EN	VU	**Yes**	Yes	No	No	N/A	X									
Flora																				
58	Plants	*Glyptostrobus pensilis*	Chinese Swamp Cypress	CR	CR	**Yes**	Yes	No	No	N/A				X		X	X	X		
59	Plants	*Camellia Yokdonensis*	N/A	N/A	N/A	**Yes**	No	Yes	No	N/A	X				X					A3

Note:
IUCN = IUCN Red List, **VRDB** = Vietnam Red Data Book. Within these two columns:
- LC = Least Concern - NT = Near Threatened - VU = Vulnerable - EN = Endangered - CR = Critically Endangered - N/A = Not Listed in both red lists - DD = Data Deficient

+ IFC Critical Habitat Crietria:
- Criterion 1: Species that are CR,EN,VU in either IUCN or VRDB.
- Criterion 2: Species that are restricted-rangeed, which are species having a global range size less than or equal to 50,000 km2. The global range is based on species Extent of Occurence (EOO) on IUCN Red List database.
- Criterion 3: Species that are migratory and/or congregatory.

+ IBA Criteria Triggered:
- A1: The site is known or thought regularly to hold significant numbers of a globally threatened species.
- A2: The site is known or thought to hold a significant population of at least two range-restricted species. 'Significant population': it is recommended that site-level populations of at least two restricted-range species should be equal to or exceed 1% of their global population.
- A3: The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome-realm. Bioregions are defined by the WWF classification of biome-realms.

References:

Protected Areas:

Nguyen, M. 2009, The status of Vulnerable gaur Bos gaurus and Endangered banteng Bos javanicus in Ea So Nature Reserve and Yok Don and Cat Tien National Parks, Vietnam, vol. 43, no. 1, pp. 129–35.

Viet Nature Conservation Centre n.d., Ea So Proposed Nature Reserve, viewed <https://thiennhienviet.org.vn/sourcebook/source_book/Central%20Highlands/SB%20Ea%20So.htm>.

Viet Nature Conservation Centre n.d., Earal Proposed Nature Reserve, viewed <https://www.thiennhienviet.org.vn/sourcebook/source_book/Central%20Highlands/SB%20Earal.htm>.

Viet Nature Conservation Centre n.d., Trap Kso Proposed Nature Reserve, viewed <https://thiennhienviet.org.vn/sourcebook/source_book/Central%20Highlands/SB%20Trap%20Kso.htm>.

Viet Nature Conservation Centre n.d., Yok Don National Park, viewed <https://www.thiennhienviet.org.vn/sourcebook/source_book/Central%20Highlands/SB%20Yok%20Don.htm>.

Key Biodiversity Areas

Birdlife International 2021a, A Yun Pa, viewed http://datazone.birdlife.org/site/factsheet/a-yun-pa-iba-vietnam/details>.

Birdlife International 2021b, Ea So, viewed <http://datazone.birdlife.org/site/factsheet/ea-so-iba-vietnam/details>.

Birdlife International 2021c, Ya Lop, viewed <http://datazone.birdlife.org/site/factsheet/ya-lop-iba-vietnam/details>.

Birdlife International 2021d, Yok Don, viewed <http://datazone.birdlife.org/site/factsheet/yok-don-iba-vietnam/details>.

KBA n.d., Ea So, Vietnam, viewed <http://www.keybiodiversityareas.org/site/factsheet/12050>.

KBA n.d., Lake Earal, Vietnam, viewed <http://www.keybiodiversityareas.org/site/factsheet/48963>.

KBA n.d., Ya Lop, Vietnam, viewed <http://www.keybiodiversityareas.org/site/factsheet/12050>.

KBA n.d., Yok Don NP, Vietnam, viewed <http://www.keybiodiversityareas.org/site/factsheet/22601>.

APPENDIX E LIST OF INVASIVE SPECIES IN VIETNAM.

LIST OF INVASIVE SPECIES FROM GSID AND CIRCULAR 35/2018/TT-BTNMT

S/N	Scientific Name	Common Name (Eng)	Common Name (VN)	Habitats	GSID	Circular 35/2018/TT-BTNMT
FLORA						
1	*Abrus precatorius*	Jequirity Bean (Rosary Pea)	Cam thảo dây	Terrestrial	X	
2	*Acacia farnesiana*	Sweet Acacia (Needle Bush)	Keo thơm	Terrestrial	X	
3	*Acacia mangium*	Mangium	Keo tai tượng	Terrestrial	X	
4	*Adenanthera pavonina*	Saga (Coral Bean Tree)	Trạch quạch	Terrestrial	X	
5	*Ageratum conyzoides*	Billygoat-Weed	Cây cứt lợn (cỏ cứt heo, cây cỏ hôi)	Terrestrial	X	X
6	*Alternanthera sessilis*	Joyweed	Rau Dệu	Terrestrial	X	
7	*Annona glabra*	Pond Apple	Bình bát	Terrestrial	X	
8	*Ardisia crenata*	Coral Berry	Trọng đũa	Terrestrial	X	
9	*Azolla pinnata*	Mosquito Fern	Bèo hoa dâu	Terrestrial	X	
10	*Bacopa monnieri*	Water Hyssop	Rau đắng biển	Terrestrial	X	
11	*Bidens pilosa*	Black-Jack	Đơn buốt	Terrestrial	X	
12	*Caesalpinia decapetala*	Shoofly (Cat'S Flaw)	Vuốt hùm bụi (móc diều)	Terrestrial	X	
13	*Cardamine flexuosa*	Wavy Bittercress (Wood Bitter-Cress)	Cây Rau tề tấm	Terrestrial	X	
14	*Casuarina equisetifolia*	Australian Pine Tree (Whistling Pine Tree)	Phi lao (xi lao)	Terrestrial	X	
15	*Ceratophyllum demersum*	Coontail	Cây rong đuôi chó	Marine	X	
16	*Chromolaena odorata*	Siam Weed	Cỏ lào	Terrestrial	X	X
17	*Cinnamomum camphora*	Camphor Laurel	Long não	Terrestrial	X	
18	*Coccinia grandis*	Ivy Gourd	Dây bát	Terrestrial	X	
19	*Colubrina asiatica*	Latherleaf	Cây kheo	Terrestrial	X	
20	*Ficus microcarpus*	Chinese Banyan	Gừa	Terrestrial	X	
21	*Hygrophila polysperma*	Dwarf Hygrophila	Cây thủy sinh Sunset	Freshwater	X	
22	*Leucaena leucocephala*	River Tamarind	Cây keo giậu	Terrestrial	X	X
23	*Ligustrum sinense*	Chinese Privet	Cây dược liệu Râm Trung Quốc	Terrestrial	X	
24	*Limnophila sessiliflora*	Dwarf Ambulia	Cây Tiểu Bảo Tháp	Terrestrial	X	
25	*Lygodium japonicum*	Japanese Climbing Fern	Bòng bong Nhật Bản	Terrestrial	X	
26	*Lygodium microphyllum*	Climbing Maidenhair Fern	Rối bòng bong	Terrestrial	X	
27	*Melastoma candidum*	Indian Rhododendron	Hoa mua tím	Terrestrial	X	
28	*Mimosa diplotricha*	Giant False Sensitive Plant	Trinh nữ móc	Terrestrial	X	X
29	*Mimosa pigra*	Black Mimosa	Trinh nữ thân gỗ (mai dương)	Terrestrial	X	X
30	*Mimosa pudica*	Sensitive Plant	Trinh nữ	Terrestrial	X	
31	*Nypa fruticans*	Mangrove Palm	Dừa nước	Freshwater	X	
32	*Oxalis corniculata*	Creeping Woodsorrel	Chua me đất hoa vàng	Terrestrial	X	
33	*Paederia foetida*	Skunk Vine Stinkvine	Mơ tròn	Terrestrial	X	
34	*Passiflora foetida*	Passionflower	Lạc tiên	Terrestrial	X	
35	*Prosopis juliflora*	Mesquite	Mesquite		X	
36	*Prunus campanulata*	Taiwan Cherry	Anh đào hoa chuông	Terrestrial	X	
37	*Psidium guajava*	Guava	Ổi	Terrestrial	X	
38	*Pueraria montana var. lobata*	East Asian Arrowroot	Sắn dây	Terrestrial	X	
39	*Pyrus calleryana*	Callery Pear	lê Callery	Terrestrial	X	
40	*Rhodomyrtus tomentosa*	Rose Myrtle	Sim	Terrestrial	X	
41	*Rubus moluccanus*	Broad-Leaf Bramble	Ngấy đảo molucca	Terrestrial	X	
42	*Rubus niveus*	Ceylon Raspberry	Dum tuyết	Terrestrial	X	
43	*Striga asiatica*	Asiatic Witchweed	Cây phù thủy châu Á	Terrestrial	X	
44	*Syzygium cumini*	Malabar Plum	Trâm mốc	Terrestrial	X	
45	*Terminalia catappa*	Tropical Almond	Cây bàng	Terrestrial	X	
46	*Trapa natans*	Water Caltrop	Trái ấu	Terrestrial	X	
47	*Salvinia molesta*	Giant Salvinia	Bèo tai chuột lớn	Freshwater		X
48	*Mikania micrantha*	Bitter Vine	Cây cúc leo	Terrestrial		X
49	*Spathodea campanulata*	African Tuliptree	Cây hoa Tulip châu Phi (cây Uất kim hương châu Phi, Sò đo cam)	Terrestrial		X
50	*Lythrum salicaria*	Purple Loosestrife	Cây chân châu tía	Terrestrial		X
51	*Sphagneticola trilobata*	Bay Biscayne Creeping-Oxeye	Cây cúc bò (cúc xuyến chi)	Terrestrial		X

S/N	Scientific Name	Common Name (Eng)	Common Name (VN)	Habitats	GSID	Circular 35/2018/TT-BTNMT
52	*Prosopis glandulosa*	Honey Mesquite	Cây đương Prosopis	Terrestrial		X
53	*Ulex europaeus*	Gorse	Cây kim tước	Terrestrial		X
54	*Miconia calvescens*	The Velvet Tree	Cây Micona	Terrestrial		X
55	*Tamarix ramosissima*	Salt Cedar	Cây thánh liễu	Terrestrial		X
56	*Opuntia stricta*	Erect Prickly Pear (Nopal Estrict)	Cây xương rồng đất	Terrestrial		X
57	*Callisia fragrans*	Basket Plant	Cây lược vàng	Terrestrial		X
58	*Eupatorium adenophorum*	Crofton Weed	Cỏ lào đỏ	Terrestrial		X
59	*Ageratina adenophora*	Crofton Weed	Cỏ lào đỏ	Terrestrial		X
60	*Fallopia japonica*	Asian Knotweed	Chút chít nhật	Terrestrial		X
61	*Hedychium gardnerianum*	Kahili Ginger	Gừng dại (ngải tiên dại)	Terrestrial		X
62	*Cabomba caroliniana*	Carolina Fanwort	Rong lá ngò	Marine		X
63	*Lantana camara*	Shrub Verbenas (Lantanas)	Cây ngũ sắc (bông ổi)	Terrestrial		X
64	*Parthenium hysterophorus*	Santa Maria Feverfew	Cúc liên chi	Terrestrial		X
65	*Alpinia zerumbet*	Shell Ginger	Riềng đẹp	Terrestrial	X	
66	*Bothriochloa pertusa*	Hurricane Grass	Huyệt thảo lỗ	Terrestrial	X	
67	*Cenchrus echinatus*	Southern Sandbur	Cỏ echin	Terrestrial	X	X
68	*Commelina benghalensis*	Benghal Dayflower	Thài lài lông	Terrestrial	X	
69	*Cynodon dactylon*	Bermuda Grass	Cỏ gà	Terrestrial	X	
70	*Cyperus rotundus*	Nut Grass	Hương phụ (cỏ gấu)	Terrestrial	X	
71	*Dioscorea bulbifera*	The Air Potato	Khoai trời	Terrestrial	X	
72	*Eichhornia crassipes*	Common Water Hyacinth	Bèo tây (bèo Lục bình, bèo Nhật Bản)	Terrestrial	X	X
73	*Epipremnum pinnatum*	Centipede Tongavine (Dragon-Tail Plant)	Cây trầu bà	Terrestrial	X	
74	*Neyraudia reynaudiana*	Burma Reed	cây dược liệu Sậy khô	Terrestrial	X	
75	*Panicum repens*	Torpedograss	Cỏ gừng (cỏ ống)	Terrestrial	X	
76	*Paspalum vaginatum*	Seashore Paspalum	Cỏ nước lợ	Freshwater	X	X
77	*Pistia stratiotes*	Water Lettuce	bèo cái	Terrestrial	X	
78	*Rottboellia cochinchinensis*	Itch Grass	Cỏ mía hay	Terrestrial	X	
79	*Sagittaria sagittifolia*	Arrowhead	Từ cô (cù nèo)	Terrestrial	X	
80	*Urochloa maxima*	Guinea Grass	Cỏ kê Guinea	Terrestrial	X	X
81	*Urochloa mutica*	Para Grass	Cỏ kê Para	Terrestrial	X	X
82	*Zizania latifolia*	Manchurian Wild Rice	Củ niễng	Terrestrial	X	
83	*Zostera japonica*	Dwarf Eelgrass	Cỏ Lươn nhật	Freshwater	X	
84	*Acanthophora spicifera*	Red Algae	Rong gai chùm	Marine	X	
85	*Gracilaria salicornia*	N/A	N/A	Marine	X	
86	*Gracilaria vermiculophylla*	N/A	N/A	Marine	X	
87	*Kappaphycus spp.*	The Elkhorn Sea Moss	Rong Sụn	Marine	X	
MAMAMLIA						
88	*Cervus nippon*	Sika Deer	Hươu sao	Terrestrial	X	
89	*Herpestes javanicus*	Small Asian Mongoose	Cầy lỏn	Terrestrial	X	
90	*Macaca mulatta*	Rhesus Monkey	Khỉ vàng	Terrestrial	X	
91	*Rusa unicolor*	Sambar Deer	Nai	Terrestrial	X	
92	*Viverricula indica*	Small Indian Civet	Cầy hương	Terrestrial	X	
93	*Mustela erminea*	Stoat	Chồn ecmin	Terrestrial		X
94	*Capra hircus*	Goat	Dê hircus (dê)	Terrestrial		X
95	*Sciurus carolinensis*	Eastern Gray Squirrel	Sóc nâu, sóc xám	Terrestrial		X
96	*Trichosurus vulpecula*	Common Brushtail Possum	Thú opốt	Terrestrial		X
97	*Myocastor coypus*	Coypu	Hải ly Nam Mỹ	Terrestrial		X
AVES						
98	*Acridotheres tristis*	Common Myna	Sáo nâu	Terrestrial	X	
99	*Anas platyrhynchos*	Mallard	Vịt cổ xanh	Freshwater and Terrestrial	X	
100	*Anser anser*	Greylag Goose	Ngỗng đậu	Freshwater and Terrestrial	X	
101	*Columba livia*	Rock Dove	Gầm ghì đá	Terrestrial	X	
102	*Gallus gallus*	Red Junglefowl	Gà rừng lông đỏ	Terrestrial	X	
103	*Porphyrio porphyrio*	Western Swamphen	Xít	Freshwater and Terrestrial	X	

S/N	Scientific Name	Common Name (Eng)	Common Name (VN)	Habitats	GSID	Circular 35/2018/TT-BTNMT
104	*Psittacula krameri*	Rose-Ringed Parakeet	Vẹt cổ hồng	Terrestrial	X	
105	*Pycnonotus cafer*	Red-Vented Bulbul	Bông lau đít đỏ	Terrestrial	X	
106	*Pycnonotus jocosus*	Red-Whiskered Bulbul	Chào mào	Terrestrial	X	
107	*Zosterops japonicus*	Warbling White-Eye	Vành khuyên Nhật Bản	Terrestrial	X	
HERPETOFAUNA						
108	*Hemidactylus frenatus*	Common House Gecko	Thạch sùng	Terrestrial	X	
109	*Python bivittatus*	Burmese Python	Loài trăn Miến Điện	Terrestrial	X	
110	*Trachemys scripta elegans*	Red-Eared Slider	Rùa tai đỏ	Freshwater and Terrestrial	X	
111	*Trachemys scripta*	Pond Slider	Con trượt ao	Freshwater and Terrestrial		X
112	*Rana catesbeiana*	American Bullfrog	Ếch ương beo	Freshwater and Terrestrial		X
113	*Bufo marinus*	Cane Toad	Cóc mía	Terrestrial		X
114	*Eleutherodactylus coqui*	Eleutherodactylus Coqui	Ếch Ca-ri-bê	Terrestrial		X
115	*Boiga irregularis*	Brown Tree Snake	Rắn nâu leo cây	Terrestrial		X
ACTINOPTERYGII						
116	*Acanthogobius flavimanus*	Yellowfin Goby	Cá bống hoa	Freshwater	X	
117	*Carassius auratus*	Goldfish	Cá vàng	Freshwater	X	
118	*Channa argus*	Northern Snakehead	Cá lóc hoa Trung Quốc	Freshwater	X	
119	*Channa marulius*	Bullseye Snakehead	Cá lóc mắt bò	Freshwater	X	
120	*Clarias batrachus*	Walking Catfish	Cá trê trắng	Freshwater	X	
121	*Clarias gariepinus*	African Sharptooth Catfish	Cá trê phi	Freshwater	X	X
122	*Ctenopharyngodon idella*	Grass Carp	Cá trắm cỏ	Freshwater	X	
123	*Cyprinus carpio*	Common Carp	Cá chép	Freshwater	X	
124	*Gambusia affinis*	Mosquitofish	Cá ăn muỗi	Freshwater	X	X
125	*Hypophthalmichthys molitrix*	Silver Carp	Cá Mè trắng	Freshwater	X	
126	*Hypophthalmichthys nobilis*	Bighead Carp	Cá mè hoa	Freshwater	X	
127	*Lutjanus kasmira*	Bluestripe Snapper	Cá hồng bốn sọc	Marine	X	
128	*Misgurnus anguillicaudatus*	Pond Loach	Cá chạch bùn	Freshwater	X	
129	*Monopterus albus*	Asian Swamp Eel	Lươn	Freshwater	X	
130	*Oreochromis mossambicus*	Mozambique tilapia	Cá rô phi đen	Freshwater	X	
131	*Oreochromis mossambicus*	Mozambique Tilapia	Cá rô phi đen	Freshwater	X	X
132	*Poecilia reticulata*	Guppy	Cá bảy màu	Freshwater	X	
133	*Pterois volitans*	Red Lionfish	Cá mao tiên	Marine	X	
134	*Pterygoplichthys pardalis*	Amazon Sailfin Catfish	Cá vây buồm Amazon	Freshwater	X	
135	*Pterygoplichthys spp.*	Janitor Fish	Cá tỳ bà	Freshwater	X	
136	*Piaractus brachypomus*	Pirapitinga	Cá chim trắng toàn thân	Freshwater		X
137	*Colossoma brachypomus*	Pirapitinga	Cá chim trắng toàn thân	Freshwater		X
138	*Pygocentrus nattereri*	Red-Bellied Piranha	Cá hổ	Freshwater		X
139	*Salmo trutta*	Brown Trout	Cá hồi nâu	Freshwater		X
140	*Cichla ocellaris*	The Butterfly Peacock Bass	Cá hoàng đế	Freshwater		X
141	*Micropterus dolomieu*	Smallmouth Bass	Cá vược miệng bé	Freshwater		X
142	*Micropterus salmoides*	Largemouth Bass	Cá vược miệng rộng	Freshwater		X
143	*Lates niloticus*	Nile Perch	Cá vược sông Nile	Freshwater		X
144	*Hypostomus plecostomus*	Suckermouth Catfish	Cá tỳ bà bé (cá dọn bể bé)	Freshwater		X
145	*Pterygoplichthys pardalis*	Amazon Sailfin Catfish	Cá tỳ bà lớn (cá dọn bể lớn)	Freshwater		X
146	*Pterygoplichthys disjunctivus*	Vermiculated Sailfin Catfish	Cá tỳ bà lớn (cá dọn bể lớn)	Freshwater		X
147	*Pterygoplichthys anisitsi*	Southern Sailfin Catfish	Cá tỳ bà lớn (cá dọn bể lớn)	Freshwater		X
148	*Pterygoplichthys multiradiatus*	Sailfin Catfish	Cá tỳ bà lớn (cá dọn bể lớn)	Freshwater	X	X
INVERTEBRATES						
149	*Achatina fulica*	Giant African Snail	Ốc sên châu Phi	Terrestrial	X	X
150	*Cipangopaludina chinensis*	Chinese Mystery Snail	Ốc đá	Freshwater	X	
151	*Pomacea canaliculata*	Channeled Applesnail	Ốc bươu vàng	Freshwater	X	X
152	*Pomacea insularum*	Island Apple Snail	N/A	Freshwater	X	
153	*Aedes aegypti*	Aedes	Muỗi vằn	Terrestrial	X	
154	*Anoplolepis gracilipes*	Yellow Crazy Ant	Kiến vàng điên	Terrestrial	X	
155	*Anoplophora chinensis*	Citrus Long-Horned Beetle	sâu đục gốc	Terrestrial	X	
156	*Brontispa longissima*	The Coconut Leaf Beetle	Bọ cánh cứng hại lá dừa	Terrestrial	X	X

S/N	Scientific Name	Common Name (Eng)	Common Name (VN)	Habitats	GSID	Circular 35/2018/TT-BTNMT
157	*Diaphorina citri*	Asian Citrus Psyllid	Rầy chổng cánh	Terrestrial	X	
158	*Maconellicoccus hirsutus*	Hibiscus Mealybug	N/A	Terrestrial	X	
159	*Monomorium floricola*	Bicolored Trailing Ant (Flower Ant)	N/A	Terrestrial	X	
160	*Oryctes rhinoceros*	Asiatic Rhinoceros Beetle	Kiến Vương Một Sừng	Terrestrial	X	
161	*Paratrechina longicornis*	Longhorn Crazy Ant	Kiến lười sừng dài	Terrestrial	X	
162	*Pheidole megacephala*	Big-Headed Ants	Kiến đầu to	Terrestrial	X	
163	*Quadrastichus erythrinae*	Erythrina Gall Wasp	N/A	Terrestrial	X	
164	*Solenopsis geminata*	Tropical Fire Ant	Kiến lửa đỏ	Terrestrial	X	
165	*Tapinoma melanocephalum*	Ghost Ant	Kiến ma	Terrestrial	X	
166	*Xylosandrus compactus*	Black Twig Borer	Mọt đục cành cà phê	Terrestrial	X	
167	*Tubastraea coccinea*	Orange Cup Coral	N/A	Marine	X	
168	*Cherax quadricarinatus*	Australian Red Claw Crayfish	Tôm càng đỏ	Freshwater		X
169	*Hyphantria cunea*	Fall Webworm Moth	Bướm trắng Mỹ	Terrestrial		X
170	*Carcinus maenas*	European Green Crab	Cua xanh (cua ven bờ châu Âu)	Marine		X
171	*Cercopagis pengoi*	Fishhook Waterflea	Giáp xác râu ngành pengoi	Marine		X
172	*Linepithema humile*	Argentine Ant	Kiến Ac-hen-ti-na	Terrestrial		X
173	*Solenopsis invicta*	Red Imported Fire Ant	Kiến lửa đỏ nhập khẩu (kiến lửa đỏ)	Terrestrial		X
174	*Trogoderma granarium*	Khapra Beetle	Mọt cứng đốt	Terrestrial		X
175	*Prostephanus truncatus*	Larger Grain Borer	Mọt đục hạt lớn	Terrestrial		X
176	*Bactrocera tryoni*	Queensland Fruit Fly	Ruồi đục quả châu Úc	Terrestrial		X
177	*Ceratitis capitata*	Mediterranean Fruit Fly	Ruồi đục quả Địa Trung Hải	Terrestrial		X
178	*Anastrepha ludens*	Mexican Fruit Fly	Ruồi đục quả Mê-hi-cô	Terrestrial		X
179	*Anastrepha fraterculus*	South American Fruit Fly	Ruồi đục quả Nam Mỹ	Terrestrial		X
180	*Ceratitis rosa*	Natal Fruit Fly	Ruồi đục quả Natal	Terrestrial		X
181	*Platydemus manokwari*	New Guinea Flatworm	Sán ốc sên	Terrestrial		X
182	*Asterias amurensis*	Northern Pacific Seastar	Sao biển nam Thái Bình Dương	Marine		X
183	*Euglandina rosea*	Rosy Wolfsnail	Sên sói tía	Terrestrial		X
184	*Mnemiopsis leidyi*	Warty Comb Jelly (Sea Walnut)	Sứa lược Leidyi	Marine		X
185	*Procambarus clarkii*	Louisiana Crawfish	Tôm hùm nước ngọt	Freshwater		X
186	*Mytilus galloprovincialis*	Mediterranean Mussel	Trai Địa Trung Hải	Marine		X
187	*Potamocorbula amurensis*	Asian Clam (Overbite Clam)	Trai Trung Hoa	Marine		X
188	*Dreissena polymorpha*	Zebra Mussel	Trai vằn	Marine		X
189	*Bursaphelenchus xylophilus*	Pine Wood Nematode (Pine Wilt Nematode)	Tuyến trùng hại thông	Terrestrial		X
190	*Anoplophora glabripennis*	Asian Long-Horned Beetle	Xén tóc hại gỗ châu Á	Terrestrial		X
VIRUS AND BACTERIA						
191	*Avian Influenza Virus*	H5N1	Vi-rút gây bệnh cúm gia cầm	Terrestrial	X	
192	*Banana bunchy top virus (BBTV)*	Banana Aphid	Virus gây hại chùn ngọn chuối	Terrestrial	X	
193	*Xanthomonas axonopodis pv.citri*	Bacterial Spot Of Citrus	Virus gây bệnh loét ở cây có múi	Undefined	X	
194	*Yersinia pestis*	Plague	Vi khuẩn gây bệnh dịch hạch ở chuột và động vật	Terrestrial	X	X
195	*Phytophthora cinnamomi*	Phytophthora Dieback	Nấm gây bệnh thối rễ	Terrestrial		X
196	*Banana bunchy top virus*	Banana bunchy top virus	Vi-rút gây bệnh chùn ngọn chuối	Terrestrial		X
197	*Avian influenza virus*	H5N1	Vi-rút gây bệnh cúm gia cầm	Terrestrial		X

Notes:
Species higlighted in yellow are those having the same common name but can be called in different scientific name, and vice versa.

APPENDIX F BIRD AND BAT SURVEY – MAY 2021

Bird and Bat surveys

Krongbuk Wind Energy LLC Huadian - Dele

24 June 2021

Prepared by CCD

for

ERM Vietnam

Document details	
Document title	Bird and Bat Surveys
Document subtitle	Krongbuk Wind Energy LLC Huadian - Dele
Date	24 June 2021
Version	1.0
Author	CCD
Client Name	ERM Vietnam

Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
Draft	1.0	Le Manh Hung, Le Khac Quyen, Bui Duc Tien, Tang A Pau, Le Duc Hien, Do Dinh Dong, Nguyen Hoang Hao, Nguyen Anh Tuan, Pham Van Thuan, Bui Thanh Tung, Trinh Dinh Hoang, Nguyen Truong Son and Nguyen Manh Ha	Name	Name	24.06.2021	Text
				Paola Romero	6 July 2021	

CONTENTS

1. INTRODUCTION 4
1.1 Purpose 4
1.2 Time of Survey 4
1.3 Project's Description 4

2. DESKTOP REVIEW 5
2.1 Methodology 5
2.2 Areas of Biodiversity Conservation 6
2.3. Knowledge of Biodiversity Values from Literature 10
2.3.1. Bird Survey 10
2.3.2. Bat Survey 11
2.3 Gaps 14
2.3.3. Bird Data 14
2.3.4. Bat Data 14

3. METHODOLOGY OF FIELD SURVEYS 15
3.1. Bird Survey 15
3.1.1. Vantage Point (VP) Survey 15
3.1.2. Transect Survey 19
3.2. Bat Survey 20
3.2.1. Transect Survey 20
3.2.2. Mist Net Survey 22
3.2.3. Harp Trap Survey 24
3.2.4. Echolocation Recording and Analysis 26
3.2.5. Morphological Analysis 26

4. RESULTS AND DISCUSSION 27
4.1. Birds 27
4.1.1. Habitats 27
4.1.2. Results of Surveys 29
4.2. Bats 47
4.2.1. Bat Diversity 47
4.2.2. Species Account 51

3. CONCLUSIONS 56
3.1 Habitats 56
3.2 Birds 56
3.1. Bats 56

4. RECOMMENDATIONS 57
4.1. Birds 57
4.2. Bats 57

REFERENCES 58

ATTACHMENT A BIRD SPECIES RECORDED AT PROJECT AREA

List of Tables

Table 2.1 Coordinates of Polygon Used for Data Screening on GBIF 5
Table 2.2 Information of Protected Areas within 50 km Surrounding the Project Site 8
Table 2.3 Endangered Birds in Yok Don National Park 10

Table 2.4 Checklist of Bird Species from GBIF 11
Table 2.5 List of Bat Species Recorded in the Area within 50 km Radius from the Project Site 12
Table 3.1 Coordinates of Vantage Points 15
Table 3.2 Summary of Survey Efforts at VP 17
Table 3.3 Summary of Bird Transect Survey Efforts 19
Table 3.4 Summary of Transect Survey Effort for Bats 20
Table 3.5 Summary of Mist Net Survey Efforts 23
Table 3.6 Summary of Harp Trap Survey Efforts 25
Table 4.1 Bird Species Recorded at Project Area (23-25 May 2021) 30
Table 4.2 List of Recorded Bats during the Survey 47
Table 4.3 Record of bats in details 49

List of Figures

Figure 1.1 Map of Project Area 4
Figure 2.1 Area screened in GBIF 6
Figure 2.2 Map of Biodiversity Conservation Areas 7
Figure 3.1 Map of Bird Survey by VPs 16
Figure 3.2 An observer was recording at a VP 16
Figure 3.3 An observer was observing at a VP 16
Figure 3.4 Map of Bird Survey by Transects 20
Figure 3.5 Map of Bat Survey Tracks 22
Figure 3.6 Mist Net Locations 24
Figure 3.7 Harp Trap Locations 26
Figure 4.1 The Main Habitats along the Transects 27
Figure 4.2 Habitats around the VP 1 27
Figure 4.3 Habitats around the VP 2 27
Figure 4.4 Habitats around the VP 3 28
Figure 4.5 Habitats around the VP 4 28
Figure 4.6 Habitats around the VP 5 28
Figure 4.7 Habitats around the VP 6 28
Figure 4.8 Habitats around the VP 7 28
Figure 4.9 Habitats around the VP 8 28
Figure 4.10 The Number of Recorded Species at Each VPs 40
Figure 4.11 The Relative Abundance of Recorded Species of all VPs 41
Figure 4.12 Main flight directions of bird species at eight VPs. 42
Figure 4.12 The Number of Recorded Species at Each Transects. 43
Figure 4.13 The Relative Abundance of Recorded Species of all Transects. 43
Figure 4.14 The Artificial Swiftlet's House Located Close to the VP No.2 44
Figure 4.15 Red-breasted Parakeet was flying over the VP No.1 and Transect No.1. 45
Figure 4.16 Grey-headed Parakeet at VP No.1 46
Figure 4.17 Annam Prinia was recorded in the First Survey 47
Figure 4.18 Greater Short-nosed Fruit Bat *(Cynopterus sphinx)* 51
Figure 4.19 Nepallese Whiskered Bat *(Myotis muricola)* 52
Figure 4.20 Peters's Bat (*Myotis cf. ater*) 53
Figure 4.21 Greater Asiatic yellow Bat *(Scotophilus heathii)* 54
Figure 4.22 Lesser Asiatic Yellow House *(Scotophilus kuhlii)* 54
Figure 4.23 Javan Pipistrelle (*Pipistrellus javanicus)* 55

Acronyms and Abbreviations

Name	Description
a.s.l	Above sea level
CR	Critically Endangered
CRM	Collision risk model
DARD	Department of Agriculture and Rural Development
EN	Endangered
ESIA	Environmental and Social Impact Assessment
GIBF	Global Biodiversity Information Facility
IBA	Important Bird and Biodiversity Area
IFC	International Finance Corporation
IFC PS6	International Finance Corporation’s Guidance Note 6: Biodiversity Conservation and Sustainable (2012)
IUCN	The International Union for Conservation of Nature
IUCN Red List	The International Union for Conservation of Nature's Red List of Threatened Species
SCHA	Species and Habitat Conservation Area
LC	Least Concern
NL	Not Listed
NT	Near Threatened
VP	Vantage points
VRDB	Vietnam Red Data Book
VU	Vulnerable

1. INTRODUCTION

1.1 Purpose

The main purpose of this report is to present the results from the field survey that targets on bird and bat species. This is the first survey within a series of three surveys for the Dak Lak Wind farm project (hereinafter regarded as the Project). The results of these surveys serve for the Environmental and Social Impact Assessment (ESIA) prepared by Environemntal Resrouces Management Vietnam Ltd. (ERM) for the Wind Energy LLC Huadian, following the requirements from International Financial Corporation (IFC) Performance Standard 6 (PS6).

1.2 Time of Survey

The official time for bird surveys were undertaken from 23 – 25 May 2021. Before that, on 22 May 2021, the survey team conducted a scoping visit to eight vantage points to check the real situation and compare with the survey design. Adjustment of the points was made if necessary to ensure the observers' vision in each point is clear and advantaged so that the observers can scan an arc of 180° with radius of 2km for birds. The time for bat survey was from 22 – 25 May 2021.

1.3 Project's Description

The Dak Lak Wind Farm Project is composed by 73 wind turbines and generators distributed in four different areas with an individual capacity of 2.65 MW and associated 110 kV substation for connection to the national grid. The wind turbines consist on two types, including the EN-156 type with blade length of 76 and the EN-141 type with 68.8 m blade length. Both types have a hub height of 130m. The Project covers an area of 53.5 km^2 on a low hilly topography in the northern part of Krong Buk district of the Dak Lak province at Vietnam. The geographical coordinates are between 108° 9'54.97" – 108°17'27.36"E and 13° 7'21.18" – 13° 0'19.28"N (WGS 84)

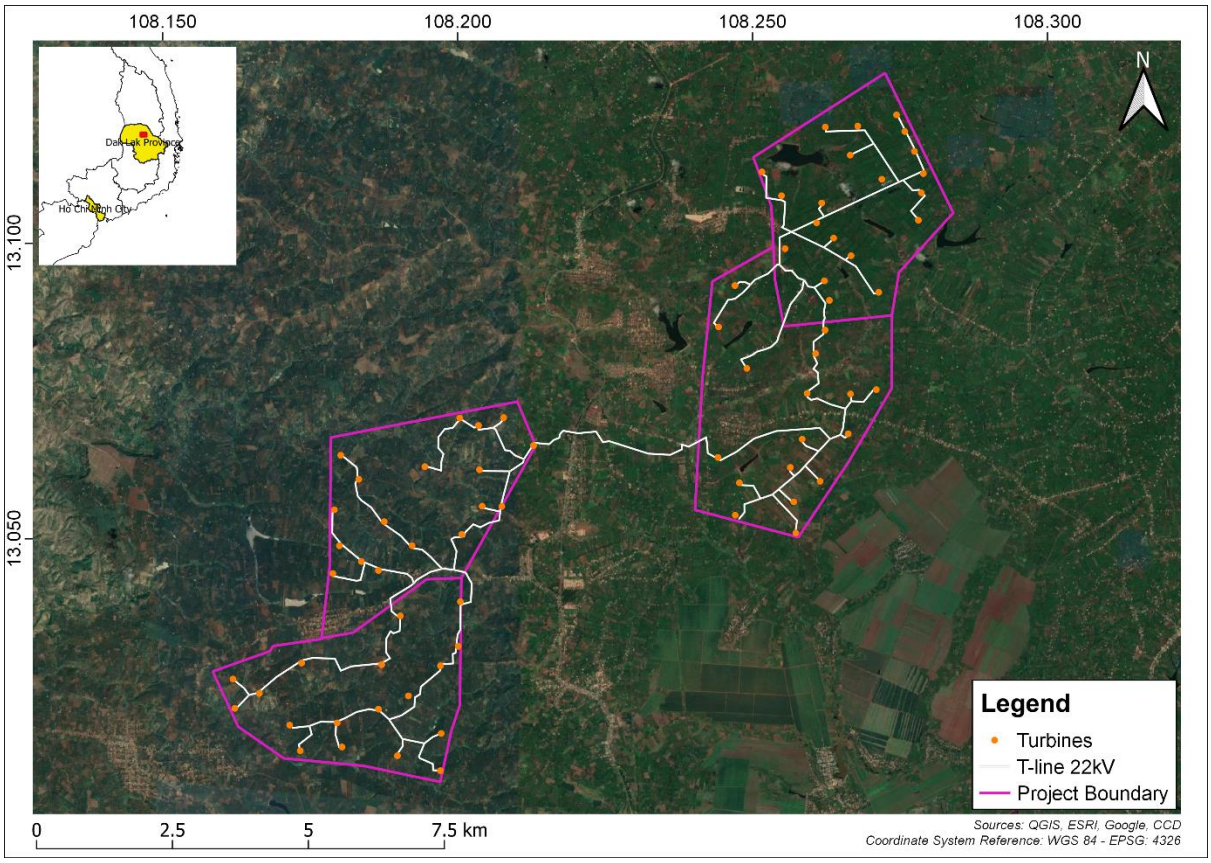


Figure 1.1 Map of Project Area

2. DESKTOP REVIEW

2.1 Methodology

Firstly, the survey team identified natural conservation areas protected areas[1] (or special-use forests[2]) in the range of 50 km radius from the center of the Project. Then, the team contacted management boards to get reports, publications, data or any references for literature review with the emphasis of bats and birds. Additionally, researches on scientific databases were also conducted for each protected area to collect biodiversity values.

The survey team used the Global Biodiversity Information Facility (GIBF) database to screen and download data of "Species List" under the CSV data. This type of data was opened and converted to the Excel table for analysis to find out bird and bat species. The coordinates of the screening area in GBIF was shown in Table 2.1 and illustrated in Figure 2.1 below[3]:

Table 2.1 Coordinates of Polygon Used for Data Screening on GBIF

Item	Longitude (WGS 84)	Latitude (WGS 84)
Point 1	12.94856	108.15742
Point 2	12.94856	108.29046
Point 3	13.16288	108.29046
Point 4	13.16288	108.15942

[1] A Protected Area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve long-term conservation of nature with associated ecosystem services and cultural values. Under the provisions of IFC PS6, a Protected Area and Internationally Recognized area require specific management actions if development proceeds within the boundary

[2] Special-use forests, which are used mainly for conservation of nature, specimens of the national forest ecosystems and forest biological gene sources; for scientific research; protection of historical and cultural relics as well as landscapes; in service of recreation and tourism in combination with protection, contributing to environmental protection. Special-use forest may include (1) national parks; (2) nature conservation zones; (3) landscape protection areas; and (4) scientific research and experiment forests

[3] https://www.gbif.org/occurrence/download/0309273-200613084148143

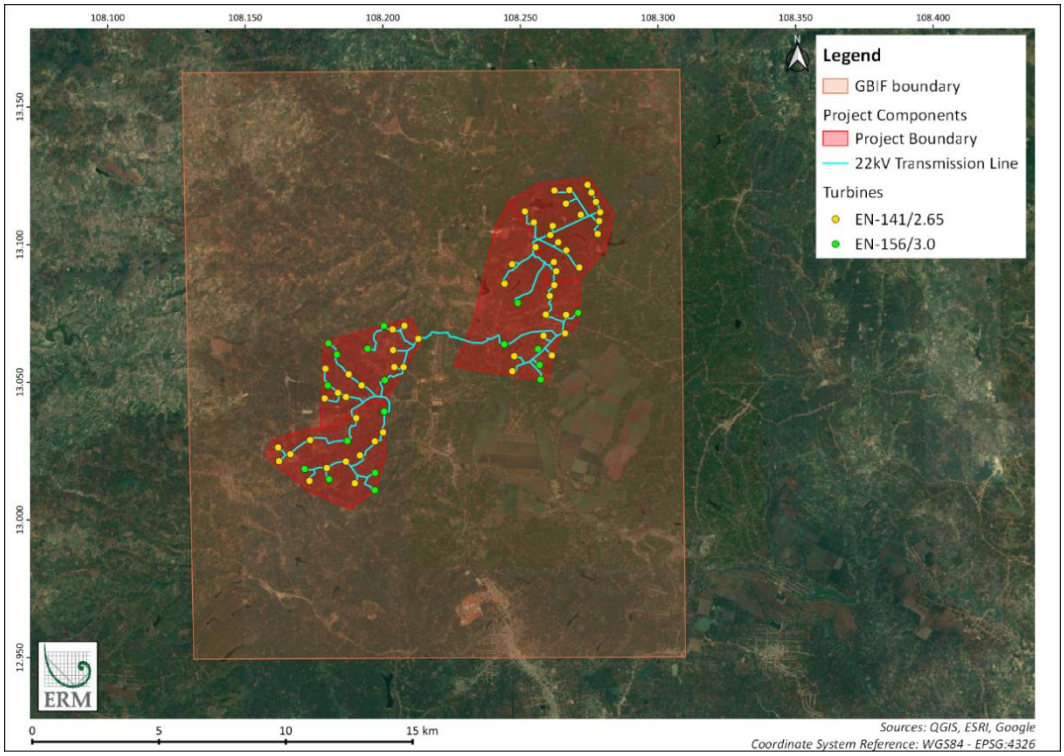


Figure 2.1 Area screened in GBIF

2.2 Areas of Biodiversity Conservation

The Project's development boundaries (also called as Project area), is located in Krong Buk district, which is known as the land of industrial and agricultural crops of the Dak Lak province. It is a low mountainous area with elevation of around 600-700 m a.s.l. The study area includes almost 100% farmlands composed of mainly coffee, pepper, avocado, jackfruit, papaya and acacia with the height of less than 15m. Several artificial lakes and empty land were also found in the survey area. The annual weather includes a dry, cool season from November through March, and a warm, wet season from April through October (Pham-Thanh et al., 2019).

Within a radius of 50 km, there are four protected areas including Ea So Nature Reserve (about 30 km to the east), Yok Don National Park (about 45 km to the west), Trap K'so Species and Habitat Conservation Area (about 10 km to the southeast), and Ea Ral Species and Habitat Conservation Area (about 15 km to the northwest) (see Figure 2.2). There are no exsiting corridors between these protected areas.

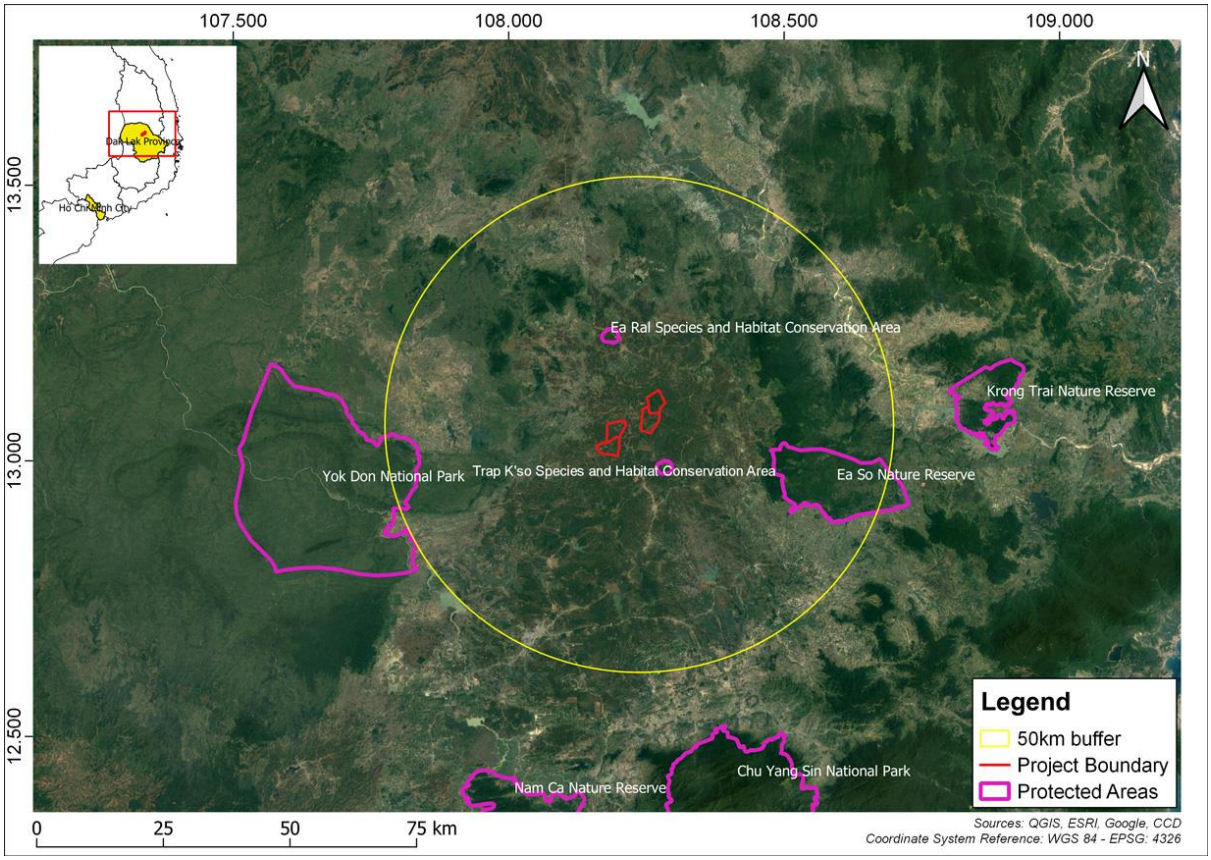


Figure 2.2 Map of Biodiversity Conservation Areas

Yok Don national park is the largest protected area amongst other three remaining protected areas. The Ea Ral Species and Habitat Conservation Area (SHCA) is smallest with only 50 ha. Yok Don national park also is the highest fauna and flora biodiversity area with many conservation-concerned species while the two SHCAs focus on conservation of Chinese swamp cypress *(Glyptostrobus pensilis)* [IUCN CR; VRDB CR). Detailed information of the four protected areas can be seen at the Table 2.2.

Table 2.2 Information of Protected Areas within 50 km Surrounding the Project Site

No.	Protected Area	Approximate Distance to Project center (km)	Biodiversity	Other information	References
1	Yok Don National Park	45 km to west	- 92 mammal species including 12 bat species; - 373 bird species (VRDB: 3 CR, 2 EN, 7 VU, 1 NT; IUCN: 3 CR, 3 EN, 2 VU, 14 NT) (see Table 2.3) - 112 fish species; - 55 reptile and 18 amphibian species; - 1006 plant species.	■ Country: Vietnam ■ Area size: 115,545 ha ■ Type: Special-use Forest ■ Designation: National ■ Status year: 2002 ■ Management Authority: Vietnam Administration of Forestry	(Dang et al., 2008; Eames et al., 2004; Krushop, 2013; Nguyen et al., 2015; Ruedi et al., 2018; Yok Don National Park *in litt.* 2021)
2	Trap Kso Species and Habitat Conservation Area	10 km to south-east	- Contain 34 individuals of Chinese swamp cypress *(Glyptostrobus pensilis)* [IUCN CR; VRDB CR); - No fauna information.	■ Country: Vietnam ■ Area size: 100 ha ■ Type: Special-use Forests ■ Designation: Provincial ■ Status year: 1987 ■ Management Authority: Dak Lak DARD	(Birdlife International, 2004)
3	Ea Ral Species and Habitat Conservation Area	15 km to north-west	- Contain 220 individuals of Chinese swamp cypress *(Glyptostrobus pensilis)* [IUCN CR; VRDB CR). - No fauna information.	■ Country: Vietnam ■ Area size: 50 ha ■ Type: Special-use Forests ■ Designation: Provincial ■ Status year: 1994 ■ Management Authority: Dak Lak DARD	(Birdlife International, 2004)

No.	Protected Area	Approximate Distance to Project center (km)	Biodiversity	Other information	References
4	Ea So Nature Reserve	30 km to east	- 63 mammal species; - 173 bird species, including globally threatened species such as: Green Peafowl *(Pavo muticus)* [IUCN EN; VRDB EN], Pale-capped Pigeon *(Columba punicea)* [IUCN VU; VRDB EN] and Germain's Peacock Pheasant *(Polyplectron germaini)* [IUCN NT; VRDB VU]; - 28 reptile species; - 15 amphibian species; - 709 plant species.	■ Country: Vietnam ■ Area size: 21,194.9 ha ■ Type: Special-use Forests ■ Designation: Provincial ■ Status year: 2019 ■ Management Authority: Dak Lak DARD	(Ea So Nature Reserve, 2019)

Table 2.3 Endangered Birds in Yok Don National Park

No	Scientific name	Common name	IUCN	VRDB
1	*Pseudibis davisoni*	White-shouldered ibis	CR	CR
2	*Gyps bengalensis*	White-rumped Vulture	CR	CR
3	*Pseudibis gigantea*	Giant Ibis	CR	DD
4	*Cairina scutulata*	White-winged Duck	EN	CR
5	*Pavo muticus*	Green Peafowl	EN	EN
6	*Heliopais personatus*	Masked Finfoot	EN	EN
7	*Ciconia episcopus*	Woolly-necked Stork	NT	VU
8	*Ephippiorhynchus asiaticus*	Black-necked stork	NT	DD
9	*Polihierax insignis*	White-rumped Falcon	NT	NT
10	*Icthyophaga humilis*	Lesser Fish Eagle	NT	VU
11	*Haliaeetus ichthyaetus*	Gray-headed Fish-Eagle	NT	VU
12	*Buceros bicornis*	Great Hornbill	NT	VU
13	*Anorrhinus austeni*	Austen's Brown Hornbill	NT	VU
14	*Anhinga melanogaster*	Oriental Darter	NT	N/A
15	*Mulleripicus pulverulentus*	Great Slaty Woodpecker	NT	N/A
16	*Psittacula eupatria*	Alexandrine Parakeet	NT	N/A
17	*Psittacula roseata*	Blossom-headed Parakeet	NT	N/A
18	*Psittacula alexandri*	Red-breasted Parakeet	NT	N/A
19	*Ploceus hypoxanthus*	Asian Golden Weaver	NT	N/A
20	*Motacilla samveasnae*	Mekong Wagtail	NT	N/A
21	*Antigone antigone*	Sarus Crane	VU	VU
22	*Leptoptilos javanicus*	Lesser Adjutant Stork	VU	VU

2.3. Knowledge of Biodiversity Values from Literature

2.3.1. Bird Survey

There were limited official avifauna publicly records at the nearby Project area. 173 bird species were recorded at Ea So Nature Reserve (Ea So Nature Reserve, 2019); 373 bird species were recorded at

Yok Don National Park (Yok Don National Park *in litt.* 2021). No fauna information was found at the two SHCAs of Trap K'so and Ea Ral.

There were seven bird species found in the screening area on GIBF database (see Figure 2.1 and Table 2.4).

Table 2.4 Checklist of Bird Species from GBIF

No	Scientific name	Common name	IUCN	VRDB	Number of occurrences
1	*Pericrocotus cinnamomeus* (Linnaeus, 1766)	Small Minivet	LC	NL	1
2	*Prinia rufescens* Blyth, 1847	Rufescent Prinia	LC	NL	1
3	*Picus erythropygius* (Elliot, 1865)	Black-headed Woodpecker	LC	NL	1
4	*Prinia hodgsonii* Blyth, 1844	Gray-breasted Prinia	LC	NL	4
5	*Cacomantis merulinus* (Scopoli, 1786)	Plaintive Cuckoo	LC	NL	2
6	*Spilornis cheela* (Latham, 1790)	Crested Serpent Eagle	LC	NL	1
7	*Dendrocitta vagabunda* (Latham, 1790)	Rufous Treepie	LC	NL	1

2.3.2. Bat Survey

Results of desktop review on literature and GBIF so far show that 72 bat species have been recorded in the Central Highlands. There are six new species and new subspecies for science, three firstly recorded for Vietnam, 12 species firstly recorded for Central Highlands and four species on the IUCN Red List including Dalat Tube-nosed Bat *(Murina harpioloides)* [IUCN EN; VRDB None Listed], Griffin's Leaf-nosed Bat *(Hipposideros griffin)* [IUCN NT; VRDB None Listed]; Tail-less Leaf-nosed Bat *(Coelops frithii)* [IUCN NT; VRDB None Listed], Beelzebub Tube-nosed Bat *(Murina Beelzebub)* [IUCN DD; VRDB None Listed].

However, none of those endagered species found in the Central Highlgands have been recorded within the radius of 50 km from the Project site. There are 15 species found from desktop survey, most of which is LC (see Table 2.5) and recorded in Yok Don National Park. There was not any information on bats found for other protected areas besides Yok Don. Among the 15 species, there was one DD species - Walston's tube-nosed bat (*Murina walstoni)* (VRDB NL) and one NT species - Painted Bat *Kerivoula picta* (VRDB NL).

Table 2.5 List of Bat Species Recorded in the Area within 50 km Radius from the Project Site

No	Scientific name	Common name	IUCN	VRDBB	Taxonomic notes	Source	Locality
1	*Cynopterus sphinx*	Greater short-nosed fruit bat	LC	NL		■ Nguyen Truong Son et al. 2021 ■ Le Vu Khoi et al. 2007 ■ Nguyen Truong Son, Vu Dinh Thong, 2011 ■ Kruskop, 2017 ■ Dang Ngoc Can et al. 2008 ■ Kruskop 2013	■ Lam Dong (Bi Dup-Nui Ba NP) ■ Dak Lak (Chu Yang Sin NP) ■ Kon Tum (Chu Mom Ray NP) ■ Gia Lai (Kon Ka Kinh NP) ■ Dak Lak (Yok Don NP)
2	*Cynopterus brachyotis*	Lesser short-nosed fruit bat	LC	NL	Common species	■ Kruskop 2013	■ Dak Lak (Yok Don NP)
3	*Megaderma spasma*	Lesser false vampire bat	LC	NL	Common species	■ Kruskop 2013 ■ Kruskop 2017	■ Dak Lak (Yok Don) ■ Kon Tum (Chu Mom Ray NP) ■ Gia Lai (Kon Ka Kinh)
4	*Rhinolophus chaseli*	Indochinese Horseshoe Bat	LC	NL	Common species	■ Nguyen Truong Son, ■ Vu Dinh Thong, 2011 ■ Kruskop 2013	■ Kon Tum (Chu Mom Ray NP) ■ Dak Lak (Yok Don NP)
5	*Hipposideros larvatus*	Intermediate leaf-nosed bat	LC	NL	Common species	■ Nguyen Truong Son, Vu Dinh Thong, 2011 ■ Kruskop 2013	■ Kon Tum (Chu Mom Ray NP) ■ Dak Lak (Yok Don NP) ■ Lam Dong (Chu Yang Sin NP)
6	*Cassistrellus yokdonensis*		NL	NL	New species for science	■ Ruedi et al. 2018	■ Dak Lak (Yok Don NP)
7	*Hesperoptenus tickelli*	Tickell's bat	LC	NL	First recorded for Central Highland	■ Kruskop 2013 ■ Hendrichsen et al. 2001	■ Dak Lak (Yok Don NP) ■ Gia Lai (Kon Cha Rang NR)

No	Scientific name	Common name	IUCN	VRDBB	Taxonomic notes	Source	Locality
8	*Scotophilus kuhlii*	Lesser Asiatic yellow bat	LC	NL	Common species	■ Kruskop 2013 ■ Dang Ngoc Can et al. 2008	■ Dak Lak (Yok Don NP) ■ Kon Tum ■ Gia Lai ■ Lam Dong
9	*Myotis ater*	Peters's myotis	LC	NL	Common species	■ Nguyen Truong Son et al. 2021 ■ Kruskop 2013 ■ Kruskop 2017	■ Lam Dong (Bi Dup-Nui Ba NP) ■ Dak Lak (Yok Don NP) ■ Lam Dong (Cat Loc Dis.) ■ Gia Lai (Kon Ka Kinh NR)
10	*Myotis muricola*	Wall-roosting mouse-eared bat	LC	NL	Common species	■ Abramov et al. 2009 ■ Kruskop 2013 ■ Kruskop 2017	■ Lam Dong (Da Lat Plateau) ■ Lam Dong (Bao Loc Dis.) ■ Dak Lak (Yok Don NP) ■ Gia Lai (Kon Cha Rang NR, Kon Ka Kinh NR)
11	*Pipistrellus javanicus*	Java pipistrelle	LC	NL	Common species	■ Kruskop 2013 ■ Kruskop 2017	■ Dak Lak (Yok Don NP) ■ Gia Lai (Kon Cha Rang NR, Kon Ka Kinh NR)
12	*Pipistrellus paterculus*	Mount Popa pipistrelle	LC	NL	Common species	■ Kruskop 2013	■ Dak Lak (Yok Don NP)
13	*Pipistrellus tenuis*	Least pipistrelle	LC	NL	Common species	■ Kruskop 2013	■ Dak Lak (Yok Don NP)
14	*Murina walstoni*	Walston's tube-nosed bat	DD	NL	New species for science	■ Csorba et al. 2011 ■ Nguyen Truong Son et al. 2015	■ Dak Lak (Yok Don NP)
15	*Kerivoula picta*	Painted bat	NT	NL	Rare species in the Central Highlands	■ Kruskop 2013	■ Dak Lak (Yok Don NP)

2.3 Gaps

2.3.3. Bird Data

There were limited surveys of avifauna at the nearby Project area. Data collected from GIBF database for the Project area and its vicinity indicated that only seven bird species could be found from there (Global Biodiversity Information Facility, 2021). No bird information was found at the two SHCAs of Trap K'so and Ea Ral which are very close to the Project area.

As part of ESIA for the Dak Lak wind farm project, it is necessary to conduct the avifauna where 73 wind turbines are going to be installed.

2.3.4. Bat Data

Dak Lak is one of the provinces in the Central Highlands that is assessed to have high biodiversity (Eames et al., 2004; BirdLife International, 2010; Birdlife International, 2004; Duckworth & Hedges, 1998; Birdlife International, 2004; Pham et al., 1990)

However, there was little studies on bats (volant mammals) in the Dak Lak province. Yok Don National Park recorded 15 bat species (Dang et al., 2008; Eames et al., 2004; Krushop, 2013; Nguyen et al., 2015; Ruedi et al., 2018). No assessment of bat diversity in Trap Kso and Ea Ral Habitat Conservation Areas, Ea So Nature Reserve and Krong Buk district were available, where the Dak Lak Wind Farm Project is going to develop. Data collected from Global Biodiversity Information Facility (2021) for Krong Buk area does not contain bat data.

3. METHODOLOGY OF FIELD SURVEYS

3.1. Bird Survey

From 23 May 2021 to 25 May 2021, the survey team used vantage point count (Bibby et al., 1998; Scottish Natural Heritage, 2017) and transect methods to survey bird species and collect biological and environmental parameters to support the assessment of collision risk for wind farm projects.

3.1.1. Vantage Point (VP) Survey

VP surveys include a number of observations from a fixed advanced location to count bird flight activities at a proposed project site to provide data to estimate the collision risk (Scottish Natural Heritage, 2017). The observers sat at VPs to scan an arc of 180° with radius of 2km to observe birds. The VPs were set up carefully in order to achieve maximum visibility of site (see Figure 3.1).

Totally, there were eight VPs established in the Project site to cover all 73 wind turbines. From 23 May 2021 to 25 May 2021, each VP was occupied by one surveyor to observe birds in 12.5 hours per day. The Table 3.1 presents coordinate of these VPs.

Table 3.1 Coordinates of Vantage Points

Vantage Points (VP)	Latitude (WGS 84)	Longitude (WGS 84)
VP 1	13°3'28.50"N	108°11'40.40"E
VP 2	13°2'30.75"N	108°11'18.07"E
VP 3	13°1'17.54"N	108°11'34.13"E
VP 4	13°0'47.56"N	108°10'16.36"E
VP 5	13°6'29.96"N	108°16'7.03"E
VP 6	13°3'15.14"N	108°14'48.97"E
VP 7	13°5'1.30"N	108°16'16.37"E
VP 8	13°5'53.04"N	108°14'46.47"E

During the surveys, from 5:30 am to 18:00, the observers sat at the established vantage points and, using a set of equipment including a HD Swarroski 20x80 telescope, a Nikon 5d camera and Nikon camera lens 500 – 600 mm with 1.4 and 2.0 extenders as well as a HD Swarroski 8x32 binoculars or similar quality equipment package to scan, photograph and focus sampling (Figure 3.2 and Figure 3.3).

All the bird species were recorded by direct observation, photography and acoustic. The number of individuals was also recorded to identify the relative abundance of each species.

All information such as weather condition, amount of work at each VP, numbers of all recorded birds' species, target species, flight paths of each species (height of flight) were recorded. Using Nikkon Forestry Pro II to record the altitude of flight.

The species-specific activities were recorded during observations at the VPs. Following that three status of recorded birds have been identified as below, in and fly over the rotor swept zone. The rotor swept zone is calculated by subtracting and adding the length of turbine blade with the hub height (see section 1.3). The average altitude of recorded flights was divided in to three categories: below (Band 1 from 0 – 51 m), in (Band 2 from 52 – 208 m) and beyond (Band 3 >208 m) the blade swept area. The total flight time at Band 2 of all the prone to collision species were recorded to assess the collision risk of the species.

Each vantage point was surveyed in a total of 37.5 hours (see Table 3.2)

Table 3.2).

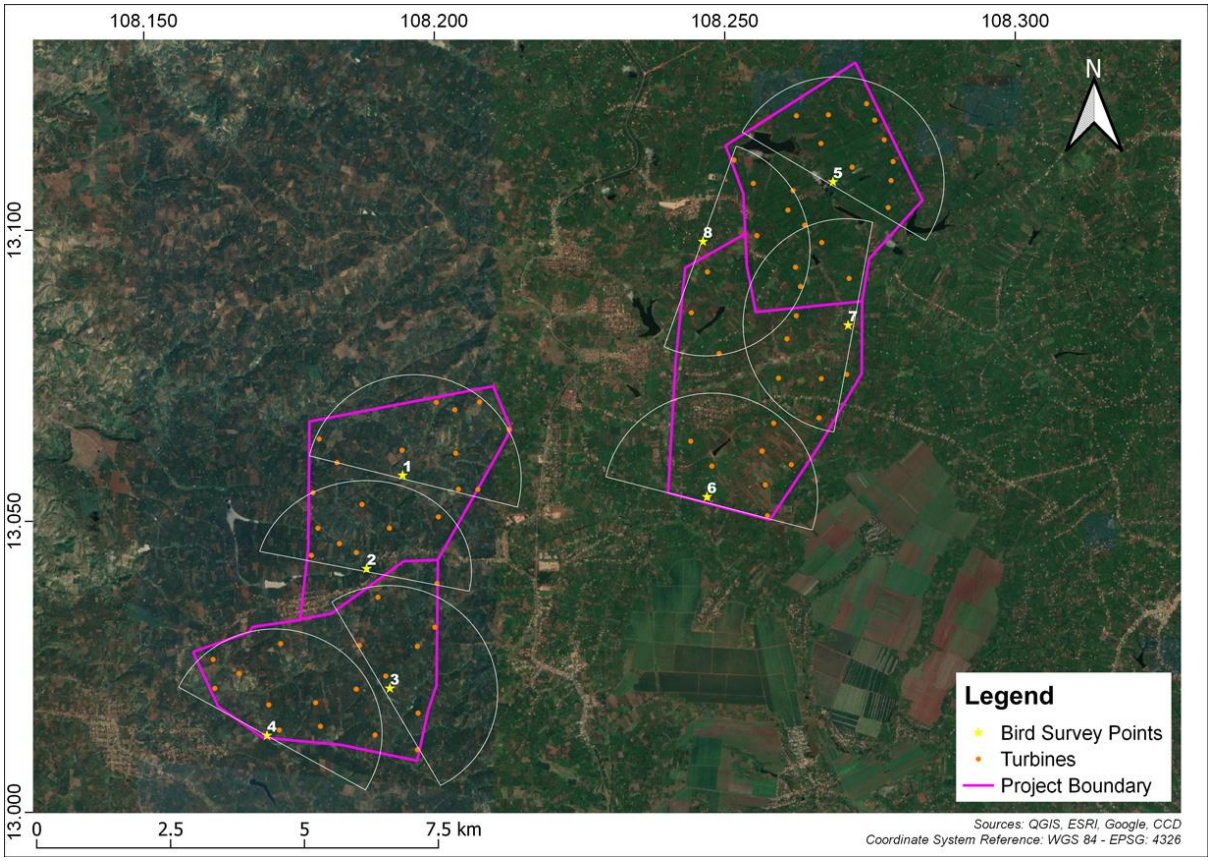


Figure 3.1 Map of Bird Survey by VPs

Figure 3.2 An observer was recording at a VP

Figure 3.3 An observer was observing at a VP

Table 3.2 Summary of Survey Efforts at VP

Date	Observer	VP	Start	Finish	Length of VP watch (hrs)	Habitat	Weather
23 May 2021	Nguyen Anh Tuan	1	5:30	18:00	12.5	Plantation, coffee gardens, fruiting tree and scrubs.	Sunny, partly cloud, slight wind, temp (19 – 33^{O}C)
24 May 2021	Le Duc Hien	1	5:30	18:00	12.5		Cloudy, windy, temp (32 – 24^{O}C)
25 May 2021	Nguyen Van Thuan	1	5:30	18:00	12.5		Cloudy from 5h30 – 7h30, sunny, partly cloudy, slight windy, rainy from 15 – 17h20, temp (22 – 34^{O}C)
Total VP 1					**37.5**		
23 May 2021	Nguyen Van Thuan	2	5:30	18:00	12.5	Coffee gardens, fruiting tree (jackfruit), scrubs and bushes	Sunny, partly cloudy, slight wind, temp (20 – 33^{O}C)
24 May 2021	Nguyen Van Thuan	2	5:30	18:00	12.5		Sunny, slight wind, temp (36 – 23^{O}C)
25 May 2021	Nguyen Hoang Hao	2	5:30	18:00	12.5		Sunny, slight wind, rainy from 15h15 – 17h10, temp (36 – 23^{O}C)
Total VP 2					**37.5**		
23 May 2021	Le Duc Hien	3	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, no wind, partly cloud, temp (21 – 35^{O}C)
24 May 2021	Nguyen Anh Tuan	3	5:30	18:00	12.5		Sunny, slight wind, temp (36 – 26^{O}C)
25 May 2021	Do Dinh Dong	3	5:30	18:00	12.5		Sunny, no wind, partly cloud, rainy from 15h15 – 17h00 temp (22 – 33^{O}C)
Total VP 3					**37.5**		
23 May 2021	Le Khac Quyen	4	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, slight wind, temp (35 – 26^{O}C)
24 May 2021	Le Khac Quyen	4	5:30	18:00	12.5		Cloudy from 5h30 – 7h45, sunny, slight wind, temp (22 – 36^{O}C)
25 May 2021	Tang A Pau	4	5:30	18:00	12.5		Sunny, slight wind, slight rain from 14h15 – 18h00 temp (33 – 23^{O}C)
Total VP 4					**37.5**		
23 May 2021	Tang A Pau	5	5:30	18:00	12.5		Sunny, slight wind, temp (35-26^{O}C)

Date	Observer	VP	Start	Finish	Length of VP watch (hrs)	Habitat	Weather
24 May 2021	Tang A Pau	5	5:30	18:00	12.5	Coffee gardens with tail trees located along the garden's fences.	Cloudy from 5h30-7h45, sunny, slight wind, temp (22-36^{O}C)
25 May 2021	Le Khac Quyen	5	5:30	18:00	12.5		Sunny, slight wind, rainy from 8h30-14h20, temp (33-23^{O}C)
Total VP 5					**37.5**		
23 May 2021	Do Dinh Dong	6	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, slight wind, temp (35-26^{O}C)
24 May 2021	Bui Duc Tien	6	5:30	18:00	12.5		Cloudy from 5h30-7h45, sunny, slight wind, temp (22-36^{O}C)
25 May 2021	Bui Duc Tien	6	5:30	18:00	12.5		Sunny, slight wind, slight rain from 17h15-18h00 temp (33-23^{O}C)
Total VP 6					**37.5**		
23 May 2021	Bui Duc Tien	7	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, slight wind, temp (35-26^{O}C)
24 May 2021	Do Dinh Dong	7	5:30	18:00	12.5		Cloudy from 5h30-7h45, sunny, slight wind, temp (22-36^{O}C)
25 May 2021	Nguyen Anh Tuan	7	5:30	18:00	12.5		Sunny, slight wind, rainy from 10h15-17h10 temp (33-23^{O}C)
Total VP 7					**37.5**		
23 May 2021	Nguyen Quang Hao	8	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, slight wind, temp (35-26^{O}C)
24 May 2021	Nguyen Quang Hao	8	5:30	18:00	12.5		Cloudy from 5h30-7h45, sunny, slight wind, temp (22-36^{O}C)
25 May 2021	Le Duc Hien	8	5:30	18:00	12.5		Sunny, slight wind rainy from 9h10-15h50, temp (33-23^{O}C)
Total VP 8					**37.5**		

3.1.2. Transect Survey

Apart from VP survey, line transects were carried out to survey birds in different habitats through the Project area. All information such as weather condition, numbers of all recorded birds' species, target species were recorded. Four transects with the total of 36.7 km long were surveyed (see Table 3.3 and Figure 3.4). These transects includes:

Table 3.3 Summary of Bird Transect Survey Efforts

Transect	Time	Start point (WGS 84)	End point(WGS 84)	Length (km)
Transect 1	05:45 – 15:00 (23 May 2021)	13°3'33.69"N; 108°11'17.45"E	13°2'7.85"N; 108°10'33.55"E	7.2
Transect 2	15:30 – 18:00 (23 May 2021) 5:30 – 12:00 (24 May 2021)	13°1'38.26"N; 108°10'14.47"E	13°1'16.66"N; 108°11'32.04"E	11.5
Transect 3	13:00 – 18:00 (24 May 2021)	13°6'19.06"N; 108°14'38.90"E	13°5'19.55"N; 108°16'18.92"E	7.2
Transect 4	05:30 – 18:00 (25 May 2021)	13°5'13.48"N; 108°16'21.15"E	13°3'41.47"N; 108°14'50.95"E	10.8
Total				**36.7**

The assessment of threatened and restricted-range species is based on the IUCN Red List (2021) and Vietnam Red Data Book (2007). The identification of bird species is followed by Le et al. (2020)

The relative abundance of the species recorded during the survey are following: Rare (less than 3 individuals); uncommon (3 – 5 individuals); fairly common (6 – 10 individuals); common (>10 individuals). The species identified by acoustic were not the subject for assessment.

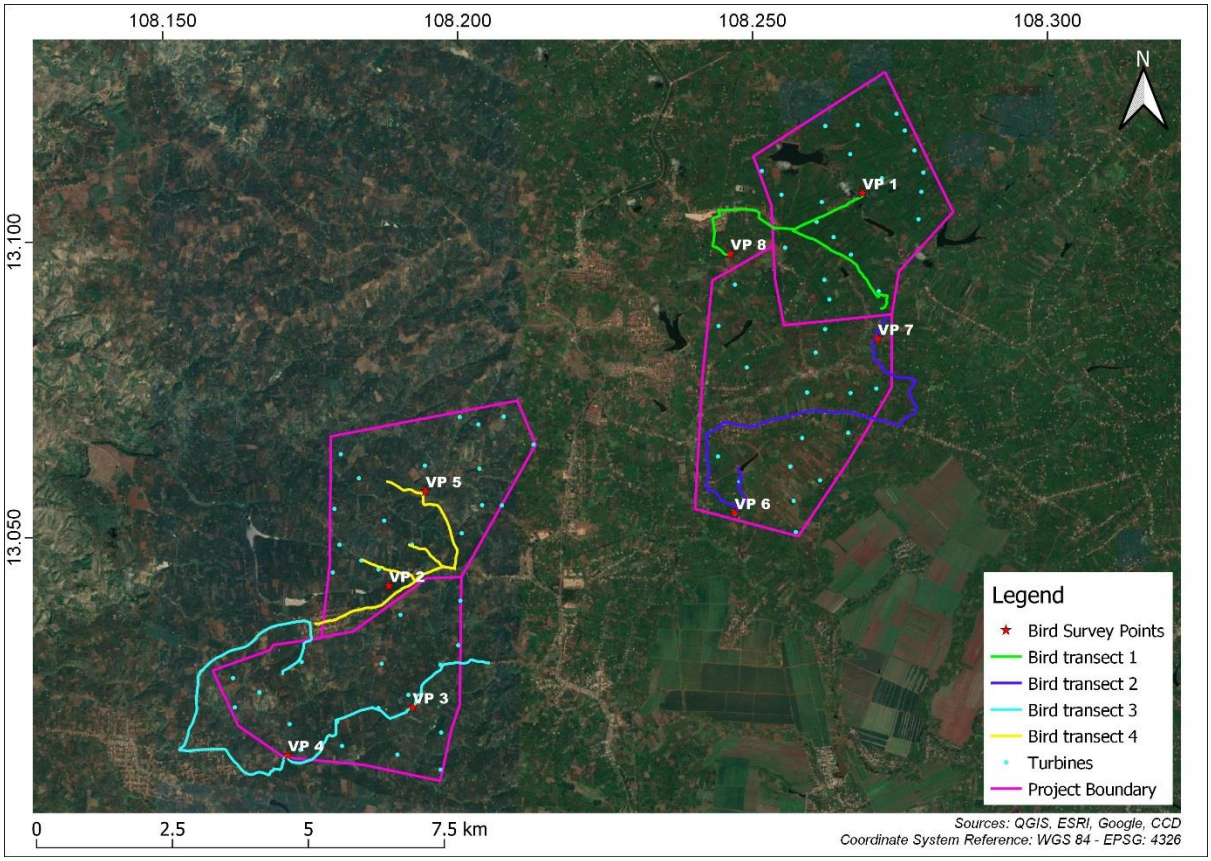


Figure 3.4 Map of Bird Survey by Transects

3.2. Bat Survey

3.2.1. Transect Survey

The survey team carried out bat transect surveys in the Project area from 22nd to 25th May. Bat breeding season in Vietnam is normally from April to June. The survey team moved slowly on each track to observe bats and use bat detectors (please refer to 3.2.4) to survey bats. The team repeatedly surveyed on eight tracks with a total of 124.72 km in 30 hours (see Table 3.4).

Table 3.4 Summary of Transect Survey Effort for Bats

Bat survey track	Survey date	Time of survey	Survey effort (hours)	Track length (Km)	Description
Bat survey track 0	22 May 2021	8:30 – 11:00	2.5	18.45	Visit the site to have overview for bat survey Habitats: coffee-durian fields, lake, residential area, scattered fruit trees
Bat survey track 1	22 May 2021	14:30 – 18:00	3.5	17.5	Setting harp trap 1, harp trap 2, mist net 1, mist net 2 *(at Bat Point 1)* and mist net 3 *(at Bat Point 2)* Habitats: coffee-durian fields, lake, residential area, scattered fruit trees
Bat survey track 2	22 May 2021	18:00 – 21:00	3	19.64	Using bat detectors to detect bats at trap location and on the ways with slow

Bat survey track	Survey date	Time of survey	Survey effort (hours)	Track length (Km)	Description
					motorbike move and walk from *Bat Point 2* to *Bat Point 1*. Habitats: coffee-durian fields, lake, residential area, scattered fruit trees
Bat survey track 3	23 May 2021	4:30 – 7:30	3	14.3	Using bat detectors to detect bats and retrieve the harp traps and mist nets from *Bat Point 1* to *Bat Point 2*. Habitats: coffee-durian fields, lake, residential area, scattered fruit trees
Bat survey track 4	23 May 2021	14:30 – 20:30	6	22.17	Setting harp trap3, harp trap4, mist net 4, mist net 5 at *Bat Point 3 (Bat Point 5*); using bat detectors to detect bats around trap locations and on the way. Habitats: lake, residential area, scattered fruit trees fields, coffee-avocado fields Limitation: rain
Bat survey track 5	24 May 2021	4:30 – 7:30	3	12.95	Using bat detectors to detect bats and retrieve the harp traps and mist nets. Habitats: lake, residential area, scattered fruit trees fields, coffee-avocado fields.
Bat survey track 6	24 May 2021	14:30 – 20:30	6	12.4	Setting harp trap3, harp trap4, mist net 4, mist net 5 *(Bat Point 4)*; using bat detectors to detect bats around trap locations and on the way Habitats: small stream, residential area, scattered fruit trees fields, coffee-durian fields Limitation: rain
Bat survey track 7	25 May 2021	4:30 – 7:30	3	7.31	Using bat detectors to detect bats and retrieve the harp traps and mist nets Habitats: small stream, residential area, scattered fruit trees fields, coffee-durian fields
Total			**30**	**124.72**	

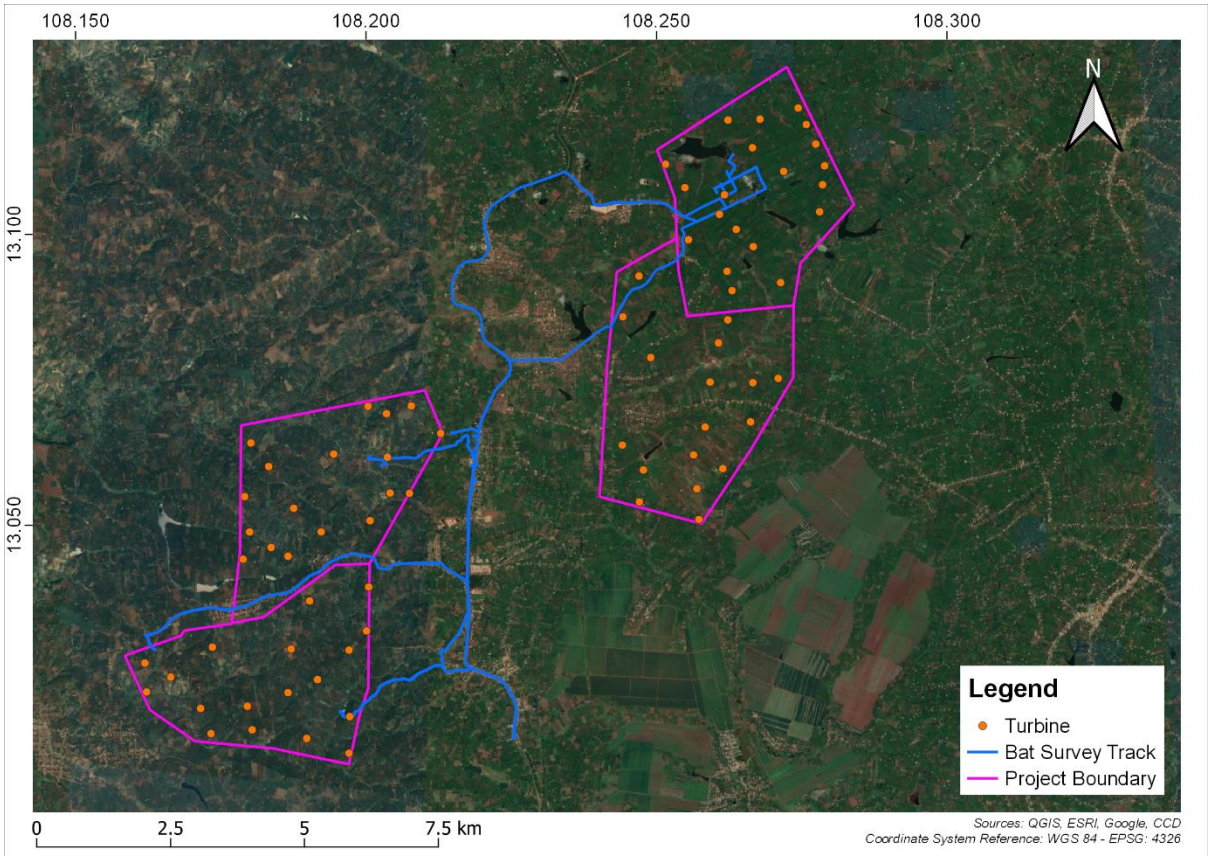


Figure 3.5 Map of Bat Survey Tracks

3.2.2. Mist Net Survey

The survey team captured bats using mist nets hanging across the trails, over small ponds, and near the edges of forests and farms. Mist nets ranged from 3.0 to 24.0 m in length and were about 3.0 m in height. Mist nets were set over 12 hours per night. Totally, mist nets were set up in six locations at three nights with a total of 82.7 hours represented for 5,241.1 square meter net*hours (m^2mnh) (see Table 3.5 and Figure 3.6).

Table 3.5 Summary of Mist Net Survey Efforts

Mist net	Set time	Retrieval time	Survey effort (hours)	Net size (m^2)	Total efforts (m^2nh)	Longitude	Latitude	Habitat	Weather
Mist net 1	15:35, 22 May 2021	5:15, 23 May 2021	13.67	60	820	3°3'29.78"N	108°12'2.63"E	Lake bank	No rain
Mist net 2	15:18, 22 May 2021	5:15, 23 May 2021	13.95	18	251.1	13°6'30.54"N	108°15'40.55"E	Drain near lake	No rain
Mist net 3	18:00, 22 May 2021	7:00, 23 May 2021	13.00	60	780	3°6'33.67"N	108°15'46.49"E	Dry stream near coffee-durian field	No rain
Mist net 4	16:45, 23 May 2021	6:00, 24 May 2021	13.75	60	825	13°1'4.94"N	108°11'44.16"E	Way between fields of coffee mixing with avocado	Rain
Mist net 5	16:15, 23 May 2021	6:10, 24 May 2021	13.92	60	835	13°1'43.04"N	108°9'49.09"E	Way between fields of coffee mixing with avocado	Rain
Mist net 6	16:05, 24 May 2020	6:30, 25 May 2021	14.42	120	1730	13°1'3.70"N	108°11'45.17"E	Coffee field	Rain
Total			**82.70**		**5241.1**				

*Note: m^2nh = square meter net*hour.*

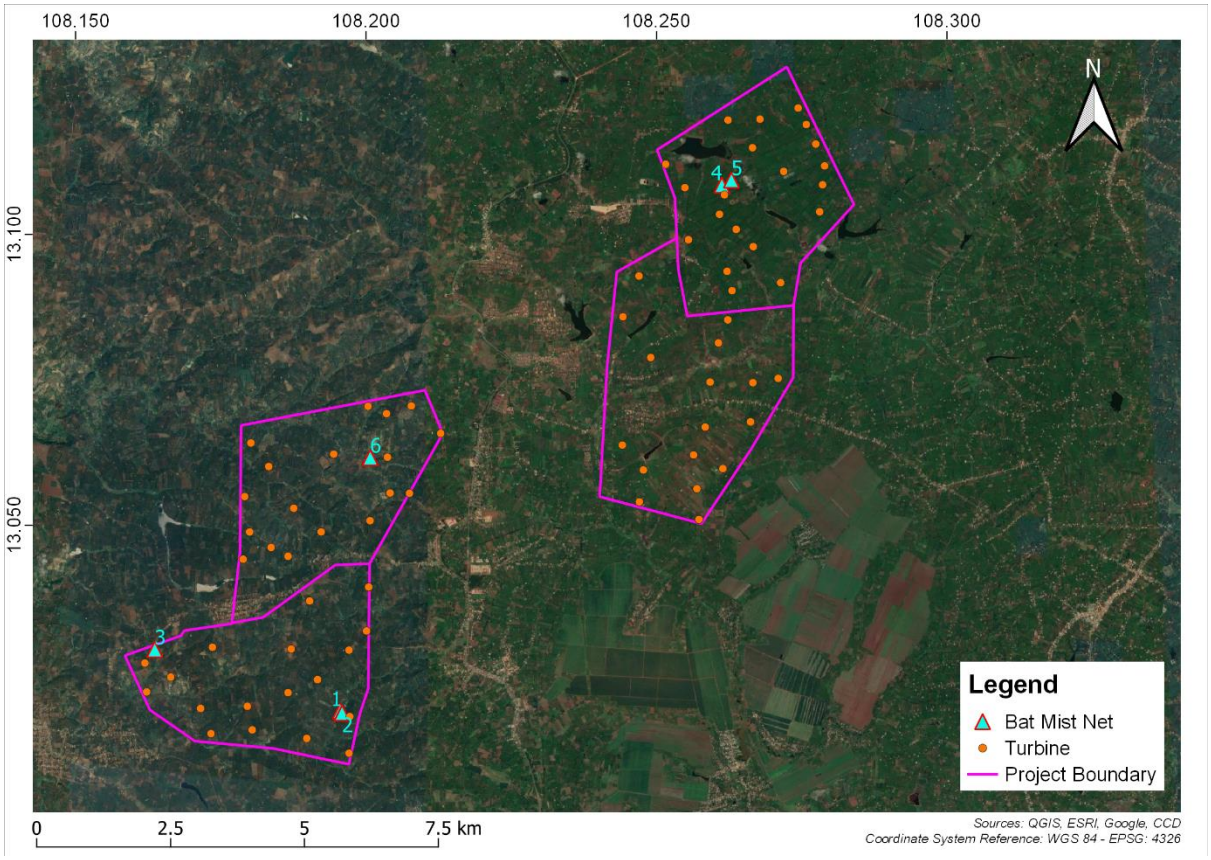


Figure 3.6 Mist Net Locations

3.2.3. Harp Trap Survey

The survey team also used harp traps setup at ground level across the trails, over small ponds, and near the edges of forests and farms to capture bats. Harp trap area ranged from 1.0 to 2.1 m^2. Harp traps were open all night. Totally, harp traps were setup at six locations with total of 88.56 hours and represented 255.02 m^2 per trap hour (m^2tp) (see Table 3.6 and Figure 3.7).

Table 3.6 Summary of Harp Trap Survey Efforts

Harp trap	Set time	Retrieval time	Survey effort (hours)	Harp trap size (m^2)	Total efforts (m^2 tp)	Longitude (WGS 84)	Latitude (WGS 84)	Habitat
Harp trap 1	15:00, 22 May 2021	6:00, 23 May 2021	15.00	2.88	43.20	108.200719	13.061852	Coffee field
Harp trap 2	16:41, 22 May 2021	6:38, 23 May 2021	13.95	2.88	40.18	108.202500	13.061288	On a path in a coffee field
Harp trap 3	15:08, 23 May 2021	6:20, 24 May 2021	15.20	2.88	43.78	108.196655	13.016925	Mix coffee and avocado field
Harp trap 4	15:38, 23 May 2021	6:30, 24 May 2021	14.87	2.88	42.82	108.199167	13.018693	Mix coffee and avocado field
Harp trap 5	16:50, 24 May 2021	7:30, 25 May 2021	14.67	2.88	42.24	108.261068	13.108719	Small stream near coffee field
Harp trap 6	16:48, 24 May 2021	7:30, 25 May 2021	14.87	2.88	42.82	108.261517	13.107732	On path through coffee field
Total			**88.56**		**255.02**			

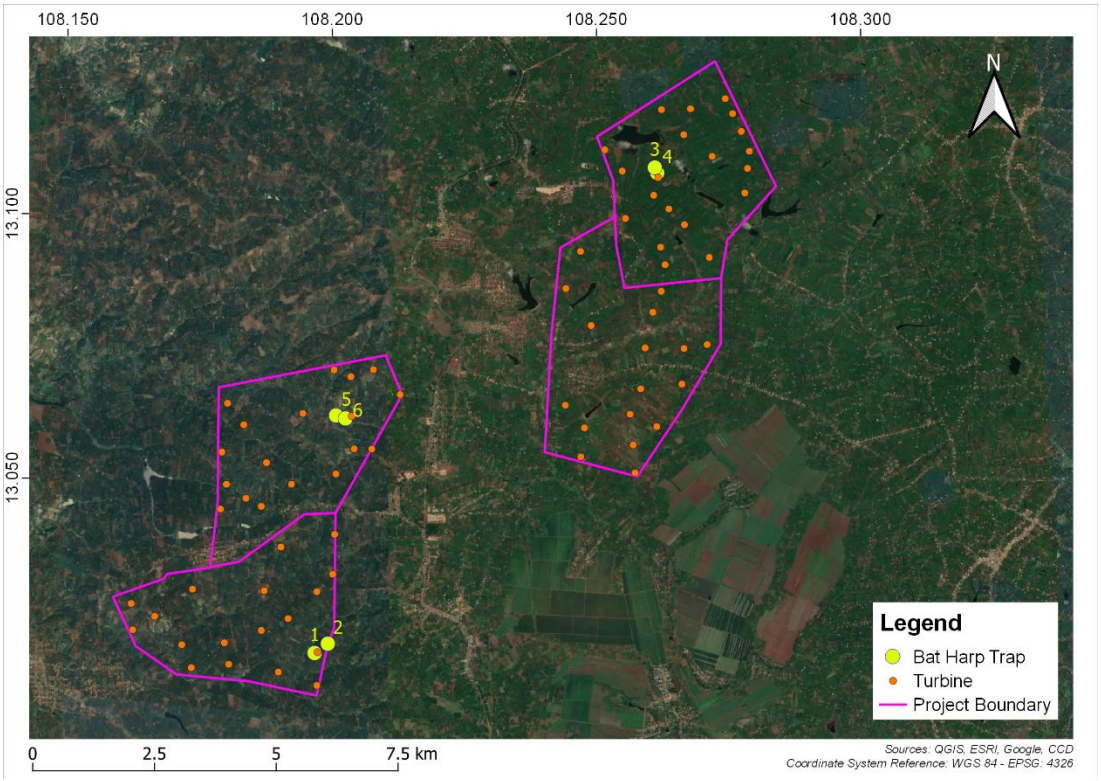


Figure 3.7 Harp Trap Locations

3.2.4. Echolocation Recording and Analysis

At the bat points and on the transects, the survey team used an Echometer M500 digital ultrasonic recorder (Patterson M500-384) and Echometer EM3 digital ultrasonic recorder (Wildlife Acoustics 2016) to detect and record bat echolocation calls in the Project site (around four bat points, trap locations and along the bat survey transects). The team recorded and analyzed 28 echolocation calls under the WAV files. Both bat detectors allow recording at sampling rates of 256 kHz and 384 kHz (providing analysis of calls up to frequencies of about 192 kHz). The team analyzed properties of recorded calls in Hanning windows using spectrograms, oscilloscope tracings, and power spectra features of Call Viewer software (Skowronski & Fenton, 2008). The team analyzed time and frequency characteristics for each call per individual and selected the calls that provide greatest amount of information. For bats with predominantly frequency modulated (FM), including FM/Quasi Constant Frequency (FM/Q-CF) calls, the team measured (all in kHz) start frequency, end frequency, frequency of maximum energy (FMAXE), midpoint frequency, bandwidth, and duration (ms). For bats with predominantly CF calls (including CF/FM and FM/CF/FM calls), the team measured (in kHz) FMAXE, the frequency range of the preceding upsweep (FM rise) if present, and the frequency range of the terminal downsweep (FM tail), as well as the sound duration (ms) (Nguyen et al., 2016, 2021).

3.2.5. Morphological Analysis

Captured bats were photographed, measured and identified species based on morphological descriptions of Csorba et al. (2003), Nguyen & Vu (2006), Krushop (2013), Francis (2019) and Wilson & Mittermeier (2019), and then released to the same locations or habitats.

Only species that could not identify were collected and preserved for voucher specimens. Collecting methods, euthanasia, and specimen preparation were followed the guidelines for obtaining mammal specimens as approved by the Mammal Society of Japan (http://www.mammalogy.jp/en/guideline.pdf) and the Sikes and the Animal Care and Use Committee of the American Society of Mammalogists (2016).

4. RESULTS AND DISCUSSION

4.1. Birds

4.1.1. Habitats

4.1.1.1. Habitats along the Transects

The main kind of habitats at along the transects of proposed wind farm are gardens (coffee, jackfruit, mango etc.), scrubs and plantation (see Figure 4.1).

Figure 4.1 The Main Habitats along the Transects

4.1.1.2. Habitats around the Vantage Points:

The figures at each VP are presented from Figure 4.2 to Figure 4.9. Habitats at VP No.1 are plantation, coffee gardens, fruiting tree and scrubs; at VP No.2 are coffee gardens, fruiting tree (jackfruit), scrubs and bushes; and at VP No.5 are coffee gardens with tail trees located along the garden's fences. The habitats at VP No.3, VP No.4, VP No.6 to VP No.8 are coffee gardens and fruiting trees.

Figure 4.2 Habitats around the VP 1

Photo: Le Duc Hien

Figure 4.3 Habitats around the VP 2

Photo: Nguyen Van Thuan

Figure 4.4 Habitats around the VP 3

Photo: Le Duc Hien

Figure 4.5 Habitats around the VP 4

Photo: Le Khac Quyen

Figure 4.6 Habitats around the VP 5

Photo: Bui Thanh Tung

Figure 4.7 Habitats around the VP 6

Photo: Bui Duc Tien

Figure 4.8 Habitats around the VP 7

Photo: Do Dinh Dong

Figure 4.9 Habitats around the VP 8

Photo: Nguyen Hoang Hao

4.1.2. Results of Surveys

A total of 72 bird species belonging to 15 orders and 34 families have been recorded during the first survey. Among 72 recorded species, two species are listed in the IUCN Red List 2021 as Near Threatened including Red-breasted Parakeet (*Psittacula alexandri)*, Grey-headed Parakeet (*Psittacula finschii)* and 70 species listed as Least Concern. Particularly, one endemic species Annam Prinia *(Prinia rocki)* was recorded. None of the recorded species are listed in the Vietnam Red Data Book 2007. Furthermore, five species are listed in appendix IIB of Decree No. 06/2019/ND – CP, dated 22 January 2019 of Vietnam Government on Management of rare and threatened Fauna, Floral and impelmentation of CITES including Red-breasted Parakeet, Grey-headed Parakeet, Black Kite *(Milvus migrans)*, Shrika *(Accipiter badius)* and Asia-barred Owlet *(Glaucidium cuculoides).*

Among 72 recorded species, 65 species were recorded within the vantage points and 61 species during the line transects. Furthermore, 54 species were recorded in both vantage points and during the transects, while 7 other species were only recorded along the transects. Red-breasted Parakeet, Grey-headed Parakeet and Annam Prinia were both recorded at the vantage points and the transects (see Table 4.1 and Attachment A).

Among 72 species recorded, there were 20 species are migratory species based on IUCN Red List (see Table 4.1). Species recorded during transects did not have their flight band recorded, which is not a requirement of the method itself.

Table 4.1 Bird Species Recorded at Project Area (23-25 May 2021)

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
	I. GALLIFORMES												
	1. Phasianidae												
1	*Francolinus pintadeanus* (Scopoli, 1786)	Chinese Francolin	LC	NL	No	Ground birds	VP, Transect	2	1/1		1	< 200	N/A
2	*Gallus gallus* (Linnaeus, 1758)	Red Junglefowl	LC	NL	No	Ground birds	VP, Transect	2	1/1		1	< 200	N/A
	II. CAPRIMULGIFORMES												
	2. Caprimulgidae												
3	*Caprimulgus macrurus* Hordfield, 1821	Large-tailed Nightjar	LC	NL	No	Canopy-birds	Transect	1	1	Gliding	N/A	< 200	N/A
	III. APODIFORMES												
	3. Apodidae												
4	*Aerodramus germani* Oustalet, 1876	Germain's Swiftlet	LC	NL	No	Sky-birds	VP, Transect	532	1.753/321	Soaring, feeding	1, 2, 3	165,945	89,950
5	*Hirundapus cochinchinensis* (Oustalet, 1878)	Silver-backed Needletail	LC	NL	Yes	Sky-birds	Transect	1	2		N/A	< 200	N/A
6	*Cypsiurus balasiensis* Gray,JE, 1829	Asian Palm Swift	LC	NL	No	Sky-birds	Transect	7	49	Soaring, feeding	N/A	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
7	*Apus nipalensis* (JE Gray, 1830)	House Swift	LC	NL	No	Sky-birds	Transect	2	9	Soaring, feeding	N/A	< 200	N/A
	IV. CUCULIFORMES												
	4. Cuculidae												
8	*Centropus sinensis* (Stephens, 1815)	Greater Coucal	LC	NL	No	Canopy-birds	VP, Transect	31	18/13	Moving around	1	< 200	N/A
9	*Centropus bengalensis* (Gmelin, 1788)	Lesser Coucal	LC	NL	No	Canopy-birds	VP, Transect	2	2/1	Moving around	1	< 200	N/A
10	*Cacomantis merulinus* (Scopoli, 1786)	Plaintive Cuckoo	LC	NL	Yes	Canopy-birds	VP, Transect	20	22/10	Moving around	1	< 200	N/A
11	*Clamator coromandus* (Linnaeus, 1766)	Chestnut-winged Cuckoo	LC	NL	Yes	Canopy-birds	VP, Transect	7	7/8	Moving around	1	< 200	N/A
12	*Cuculus micropterus* Gould, 1837	Indian Cuckoo	LC	NL	Yes	Canopy-birds	VP, Transect	9	9/8	Moving around	1	< 200	N/A
13	*Cuculus canorus* (Linnaeus, 1758)	Eurasian Cuckoo	LC	NL	No	Canopy-birds	VP, Transect	2	1/1	Moving around	1	< 200	N/A
14	*Rhopodytes tristis* (Lesson, 1830)	Green-billed Malkoha	LC	NL	No	Canopy-birds	VP, Transect	8	9/7	Moving around	1	< 200	N/A
	V. COLUMBIFORMES												
	5. Columbidae												
15	*Streptopelia tranquebarica* (Hermann, 1804)	Red-collared Dove	LC	NL	No	Canopy-birds	VP, Transect	2	5/4	Moving around	1	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
16	*Streptopelia chinensis* (Scopoli, 1786)	Spotted Dove	LC	NL	No	Canopy-birds	VP, Transect	12	19/23	Moving around	1	< 200	N/A
17	*Geopelia striata* (Linnaeus, 1766)	Zebra Dove	LC	NL	No	Canopy-birds	VP, Transect	21	54/21	Moving around	1	< 200	N/A
	VI. GRUIFORMES												
	6. Rallidae												
18	*Amaurornis phoenicurus* Pennant, 1769	White-breasted WaterHen	LC	NL	Yes	Water-birds	VP	1	1	Moving around	1	< 200	N/A
	VII. SULIFORMES												
	7. Phalacrocoracidae												
19	*Pharacrocorax niger* Vieillot, 1817	Little Cormorant	LC	NL	No	Water-birds	VP, Transect	2	2/1	Moving around	1	< 200	N/A
	VIII. PELECANIFORMES												
	8. Ardeidae												
20	*Egretta garzetta* Linnaeus, 1766	Little Egret	LC	NL	Yes	Water-birds	VP	2	7	Moving around	1	< 200	N/A
	IX. ACCIPITRIFORMES												
	9. Accipitridae												
21	*Accipiter badius* Gmelin, 1788	Shikra	LC	NL	Yes	Bird of Prey	VP	1	2	Soaring and displaying	1, 2	78	43

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
22	*Milvus migrans* (Boddaert, 1783)	Black Kite	LC	NL	Yes	Bird of Prey	VP	1	2	Flying	1, 2, 3	47	15
	X. STRIGIFORMES												
	10. Strigidae												
23	*Glaucidium cuculoides* (Vigors, 1831)	Asian Barred Owlet	LC	NL	Yes	Noctunal Birds	Transect	1	1	Perching	N/A	< 200	N/A
	XI. BUCEROTIFORMES												
	11. Upupidae												
24	*Upupa epops* Linnaeus, 1758	Eurasian Hoopoe	LC	NL	No	Canopy-birds	VP, Transect	12	17/11	Moving around	1	< 200	N/A
	XII. CORACIIFORMES												
	12. Alcedinidae												
25	*Alcedo atthis* (Linnaeus, 1758)	Common Kingfisher	LC	NL	Yes	Water-birds	VP, Transect	3	3/2	Moving around	1	< 200	N/A
26	*Halcyon smyrnensis* (Linnaeus, 1758)	White-throated Kingfisher	LC	NL	No	Water-birds	VP	2	2	Moving around	1	< 200	N/A
	13. Meropidae												
27	*Nyctyornis athertoni* (Jardine & Selby, 1830)	Blue-bearded Bee-eater	LC	NL	No	Canopy-birds	VP	1	1	Moving around	1	< 200	N/A
28	*Merops orientalis* Latham, 1802	Green Bee-eater	LC	NL	No	Canopy-birds	VP, Transect	5	21/14	Moving around	1	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
29	*Merops leschenaulti* Vieillot, 1817	Chestnut-headed Bee-eater	LC	NL	Yes	Canopy-birds	VP, Transect	4	19/11	Moving around	1	< 200	N/A
	XIII. PICIFORMES												
	14. Megalaimidae												
30	*Psilopogon lineata* (Vieillot, 1816)	Lineated Barbet	LC	NL	No	Canopy-birds	VP, Transect	13	13/11	Moving around	1	< 200	N/A
31	*Psilopogon haemacephala* Statius Muller, 1776	Coppersmith Barbet	LC	NL	No	Canopy-birds	VP, Transect	16	18/12	Moving around	1	< 200	N/A
	XIV. PSITTACIFORMES												
	15. Psittacidae												
32	*Psittacula alexandri* (Linnaeus, 1758)	Red-breasted Parakeet	NT	NL	No	Canopy-birds	VP, Transect	7	15/18	Flight over	1	< 200	N/A
33	*Psittacula finschii* (Hume, 1874)	Grey-headed Parakeet	NT	NL	Yes	Canopy-birds	VP, Transect	8	14/13	Flight over	1	< 200	N/A
	XV. PASSERIFORMES												
	16. Artamidae												
34	*Artamus fuscus* (Vieillot, 1817)	Ashy Woodswallow	LC	NL	Yes	Canopy-birds	VP, Transect	21	45/24	Moving around	1	< 200	N/A
	17. Aegithinidae												
35	*Aegithina tiphia* (Linnaeus, 1758)	Common Iora	LC	NL	No	Canopy-birds	VP, Transect	18	22/16	Moving around	1	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
	18. Campephagidae												
36	*Pericrocotus flammeus* Forster, 1781	Scarlet Minivet	LC	NL	No	Canopy-birds	VP, Transect	4	7/9	Moving around	1	< 200	N/A
37	*Lalage polioptera* (Sharpe. 1879)	Indochinese Cuckooshrike	LC	NL	No	Canopy-birds	VP, Transect	4	4/5	Moving around	1	< 200	N/A
	19. Laniidae												
38	*Lanius collurioides* Lesson, 1834	Burmese Shrike	LC	NL	Yes	Canopy-birds	VP, Transect	27	52/39	Moving around	1	< 200	N/A
	20. Dicruridae												
39	*Dicrurus macrocercus* Vieillot, 1817	Black Drongo	LC	NL	Yes	Canopy-birds	VP, Transect	16	35/29	Moving around	1	< 200	N/A
40	*Dicrurus leucophaeus* Vieillot, 1817	Ashy Drongo	LC	NL	Yes	Canopy-birds	VP, Transect	12	26/12	Moving around	1	< 200	N/A
41	*Dicrurus hottentottus* (Linnaeus, 1766)	Hair-crested Drongo	LC	NL	Yes	Canopy-birds	VP, Transect	7	9/7	Moving around	1	< 200	N/A
	21. Rhipiduridae												
42	*Rhipidura albicollis* (Vieillot, 1818)	White-throated Fantail	LC	NL	Yes	Canopy-birds	VP, Transect	8	8/6	Moving around	1	< 200	N/A
	22. Corvidae												
43	*Garrulus glandarius* Linnaeus, 1758	Eurasian Jay	LC	NL	No	Canopy-birds	VP, Transect	6	9/7	Moving around	1	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
44	*Crypsirina temia* (Daudin, 1800)	Racket-tailed Treepie	LC	NL	No	Canopy-birds	Transect	1	2	Moving around	N/A	< 200	N/A
45	*Corvus macrorhynchos* Wagler, 1827	Large-billed Crow	LC	NL	No	Canopy-birds	VP, Transect	7	13/11	Moving around	1	< 200	N/A
	23. Pycnonotidae												
46	*Pycnonotus aurigaster* (Vieillot, 1818)	Sooty-headed Bulbul	LC	NL	No	Canopy-birds	VP, Transect	27	51/32	Moving around	1	< 200	N/A
47	*Pycnonotus finlaysoni* Strickland, 1844	Stripe-throated Bulbul	LC	NL	No	Canopy-birds	VP, Transect	14	22/11	Moving around	1	< 200	N/A
48	*Hypsipetes leucocephalius* (Gmelin, 1789)	Himalayan Black Bulbul	LC	NL	No	Canopy-birds	VP, Transect	7	11/14	Moving around	1	< 200	N/A
	24. Hirundinidae												
49	*Cecropis striolata* Temminck & Schlegel, 1847	Striated Swallow	LC	NL	No	Canopy-birds	VP	2	4	Moving around	1	< 200	N/A
	25. Cisticolidae												
50	*Cisticola exilis* (Vigors & Horsfield, 1827)	Bright-headed Cisticola	LC	NL	No	Canopy-birds	VP	1	2	Moving around	1	< 200	N/A
51	*Prinia rocki* Deignan, 1957	Annam Prinia	LC	NL	No	Canopy-birds	VP, Transect	13	21/15	Moving around	1	< 200	N/A
52	*Prinia rufescens* Blyth, 1847	Rufescent Prinia	LC	NL	No	Canopy-birds	VP, Transect	6	8/9	Moving around	1	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
53	*Prinia hodgsonii* Blyth, 1844	Grey-breasted Prinia	LC	NL	Yes	Canopy-birds	VP, Transect	18	37/25	Moving around	1	< 200	N/A
54	*Prinia flaviventris* (Delessert, 1840)	Yellow-bellied Prinia	LC	NL	No	Canopy-birds	VP	1	2	Moving around	1	< 200	N/A
55	*Orthotomus atrogularis* Temminck, 1836	Dark-necked Tailorbird	LC	NL	No	Canopy-birds	VP, Transect	6	9/7	Moving around	1	< 200	N/A
56	*Orthotomus sutorius* (Pennant, 1769)	Common Tailorbird	LC	NL	No	Canopy-birds	VP, Transect	21	23/19	Moving around	1	< 200	N/A
	26. Timaliidae												
57	*Mixornis gularis* (Horsfield, 1822)	Pin-Striped Tit Babbler	LC	NL	No	Canopy-birds	VP, Transect	5	5/4	Moving around	1	< 200	N/A
	27. Sylviidae												
58	*Chrysomma sinense* (Gmelin, 1789)	Yellow-eyed Babbler	LC	NL	No	Canopy-birds	VP, Transect	12	19/11	Moving around	1	< 200	N/A
	28. Sturnidae												
59	*Acridotheres burmannicus* (Jerdon, 1862)	Vinous-breasted Starling	LC	NL	No	Canopy-birds	VP, Transect	17	27/21	Moving around	1	< 200	N/A
60	*Gracupica nigricollis* (Paykull, 1807)	Black-collared Starling	LC	NL	No	Canopy-birds	VP	6	10	Moving around	1	< 200	N/A
61	*Sturnia malabarica* (Gmelin, 1789)	Chestnut-tailed Starling	LC	NL	No	Canopy-birds	Transect	1	2	Moving around	N/A	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
62	*Acridotheres tristis* (Linnaeus, 1766)	Common Myna	LC	NL	No	Canopy-birds	VP, Transect	8	16/12	Moving around	1	< 200	N/A
	29. Muscicapidae												
63	*Copsychus saularis* (Linnaeus, 1758)	Oriental Magpie Robin	LC	NL	No	Canopy-birds	VP, Transect	5	5/4	Moving around	1	< 200	N/A
64	*Saxicola caprata* (Linnaeus, 1766)	Pied Bushchat	LC	NL	Yes	Canopy-birds	VP, Transect	12	18/13	Moving around	1	< 200	N/A
	30. Dicaeidae												
65	*Dicaeum cruentatum* (Linnaeus, 1758)	Scarlet-backed Flowerpecker	LC	NL	No	Canopy-birds	VP, Transect	5	5/6	Moving around	1	< 200	N/A
	31. Nectariniidae												
66	*Cinnyris jugularis* (Linnaeus, 1766)	Olive-backed Sunbird	LC	NL	No	Canopy-birds	VP, Transect	6	10/8	Moving around	1	< 200	N/A
	32. Passeridae												
67	*Passer montanus* (Linnaeus, 1758)	Eurasian Tree Sparrow	LC	NL	No	Canopy-birds	VP, Transect	11	27/14	Moving around	1	< 200	N/A
68	*Passer domesticus* (Linnaeus 1758)	House Sparrow	LC	NL	No	Canopy-birds	VP, Transect	14	32/27	Moving around	1	< 200	N/A
69	*Passer flaveolus* Blyth, 1844	Plain-backed Sparrow	LC	NL	No	Canopy-birds	VP, Transect	3	7/9	Moving around	1	< 200	N/A
	33. Estrildidae												

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
70	*Lonchura punctulata* (Linnaeus, 1758)	Scaly-breasted Munia	LC	NL	No	Canopy-birds	VP, Transect	9	21/18	Moving around	1	< 200	N/A
71	*Lonchura striata* (Linnaeus, 1766)	White-rumped Munia	LC	NL	No	Canopy-birds	VP	2	9	Moving around	1	< 200	N/A
	34. Motacillidae												
72	*Anthus rufulus* (Vieillot, 1818)	Paddyfield Pipit	LC	NL	No	Canopy-birds	VP, Transect	17	24/27	Moving around	1	< 200	N/A

Note: LC – Least Concern; NL – Not Listed; N/A – Not Applicable; VP – Vantage Point. Species that have large wing span (> 50 cm) are highlighted in yellow. Species that fly in flocks (>10 individuals) are highlighted in green. Species that meet both criteria are highlighted in blue.

4.1.2.1. Vantage Points (VPs)

A total of 65 different species were recorded within eight VPs (25 species recorded at VP No.1, 21 species at VP No.2, 18 species at VP No.3, 37 species at VP No.4, 16 species at VP No.5, 33 species at VP No.6, 34 species at VP No.7 and 25 species at VP No.8 (Attachment A and Figure 4.10).

Following the number of individuals recorded during the observation, 30 species have been identified as common, 14 species are fairly common, 07 uncommon and 13 rare species (Attachment A and Figure 4.11). The two NT species including the Red-breased Parakeet and the Grey-headed Parakeet are considered as common in the Project area from VP surveys. All of the rare species in the Project area identified by VP area all IUCN LC and VRDB NL species.

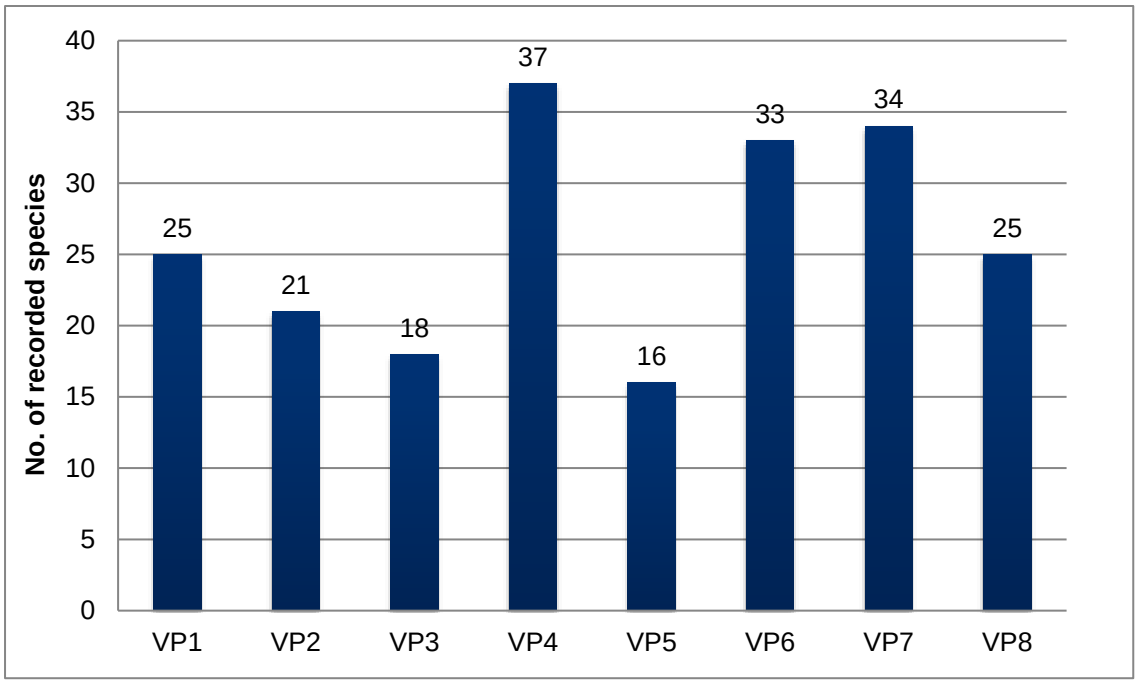


Figure 4.10 The Number of Recorded Species at Each VPs

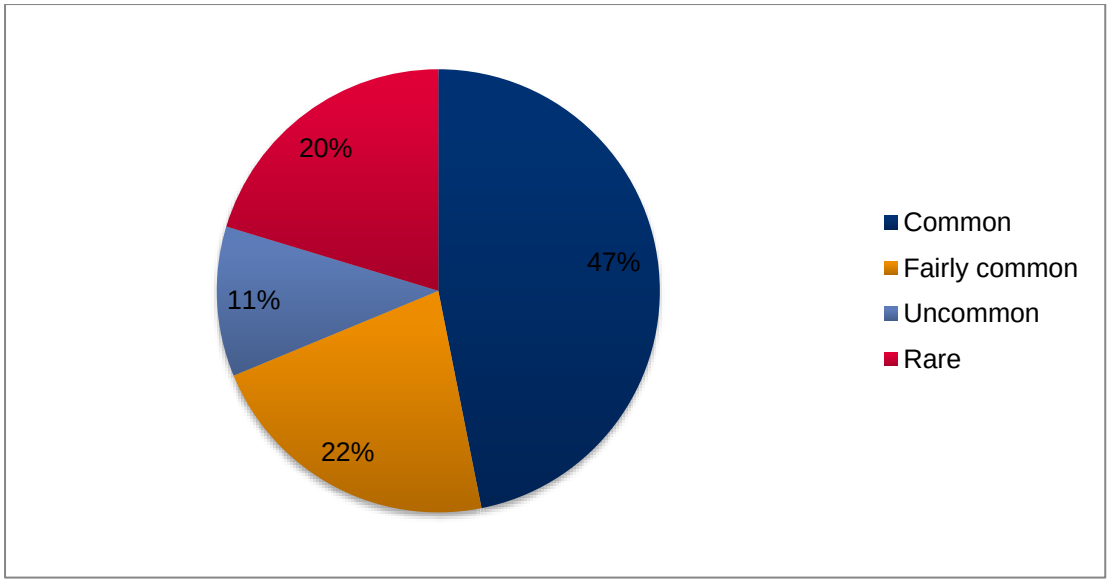


Figure 4.11 The Relative Abundance of Recorded Species of all VPs

The most ten common species are Germain's Swiftlet *Aerodramus germani* (Sum of individuals: 1,753), Zebra Dove *Geopelia striata* (54), Burmese Shrike *Lanius collurioides* (52), Sooty-headed Bulbul *Pycnonotus aurigaster* (51), Ashy Woodswallow *Artamus fuscus* (45), Grey-breasted Prinia *Prinia hodgsonii* (37), Black Drongo *Dicrurus macrocercus* (35), House Sparrow *Passer domesticus* (32), Vinous-breasted Starling *Acridotheres burmannicus* (27) and Eurasian Tree Sparrow *Passer montanus* (27) (Attachment A).

The most ten fairly common species are Ashy Drongo *Dicrurus leucophaeus* (26), Paddyfield Pipit *Anthus rufulus* (24), Common Tailorbird *Orthotomus sutorius* (23), Plaintive Cuckoo *Cacomantis merulinus* (22), Stripe-throated Bulbul *Pycnonotus finlaysoni* (22), Scaly-breasted Munia *Lonchura punctulata* (21), Annam Prinia *Prinia rocki* (21), Yellow-eyed Babbler *Chrysomma sinense* (19), Pied Bushchat *Saxicola caprata* (18) and Common Myna *Acridotheres tristis* (16) (Attachment A).

The common species that have relative abundances over 30 individuals during vantage points are Germain's Swiftlet *Aerodramus germani* (1.753 individuals), Zebra Dove *Geopelia striata* (54), Burmese Shrike *Lanius collurioides* (52), Sooty-headed Bulbul *Pycnonotus aurigaster* (51), Ashy Woodswallow *Artamus fuscus* (45), Grey-breasted Prinia *Prinia hodgsonii* (37), Black Drongo *Dicrurus macrocercus* (35), House Sparrow *Passer domesticus* (32) (Attachment A).

Thirteen species were recorded with low numbers and have been identified as rare within the Project area based on VPs survey including Eurasian Cuckoo *Cuculus canorus* (1), Red Junglefowl *Gallus gallus* (1), Chinese Francolin *Francolinus pintadeanus* (1), Blue-bearded Bee-eater *Nyctyornis athertoni* (1), White-breasted WaterHen *Amaurornis phoenicurus* (1), Lesser Coucal *Centropus bengalensis* (2), Little Cormorant *Pharacrocorax niger* (2), Shikra *Accipiter badius* (2), Black Kite *Milvus migrans* (2), Bright-headed Cisticola *Cisticola exilis* (2), Yellow-bellied Prinia *Prinia flaviventris* (2), White-throated Kingfisher *Halcyon smyrnensis* (2) and Common Kingfisher *Alcedo atthis* (3) (Attachment A). All of them is listed as LC in IUCN Red List.

Most of the species recorded from VPs are common and fairly common in Vietnam. The time of the survey occurs during the breeding season of most non-migratory birds recorded in the Project area (normally from March to June), however the numbers of indivuals are quite low. The low number found can be explained by the habitats that have been mostly converted into agriculture fields (specifically coffee plantations) which provide limited nesting habitats for them.

The Ashy Woodswallow and Germain's Swiftlet were recorded at all eight VPs, however, the Ashy Woodswallow was the most counted at VP6 and VP7 while the Germain's Swiftlet was the most seen

at VP2. In additional, these two species have multi-direction flights so most of the flight directions at the VP2, VP6 and VP7 were dominated by these two species (see the Figure 4.12).

For the other VPs, flight directions of the Ashy Woodswallow and Germain's Swiftlet were not counted in as they flied at various directions. If the flight directions of Ashy Woodswallow and Germain's Swiftlet were added into all VPs where they had been recorded, all VPs would look alike (similar to the VP2, VP6 and VP7) and not very meaningful.

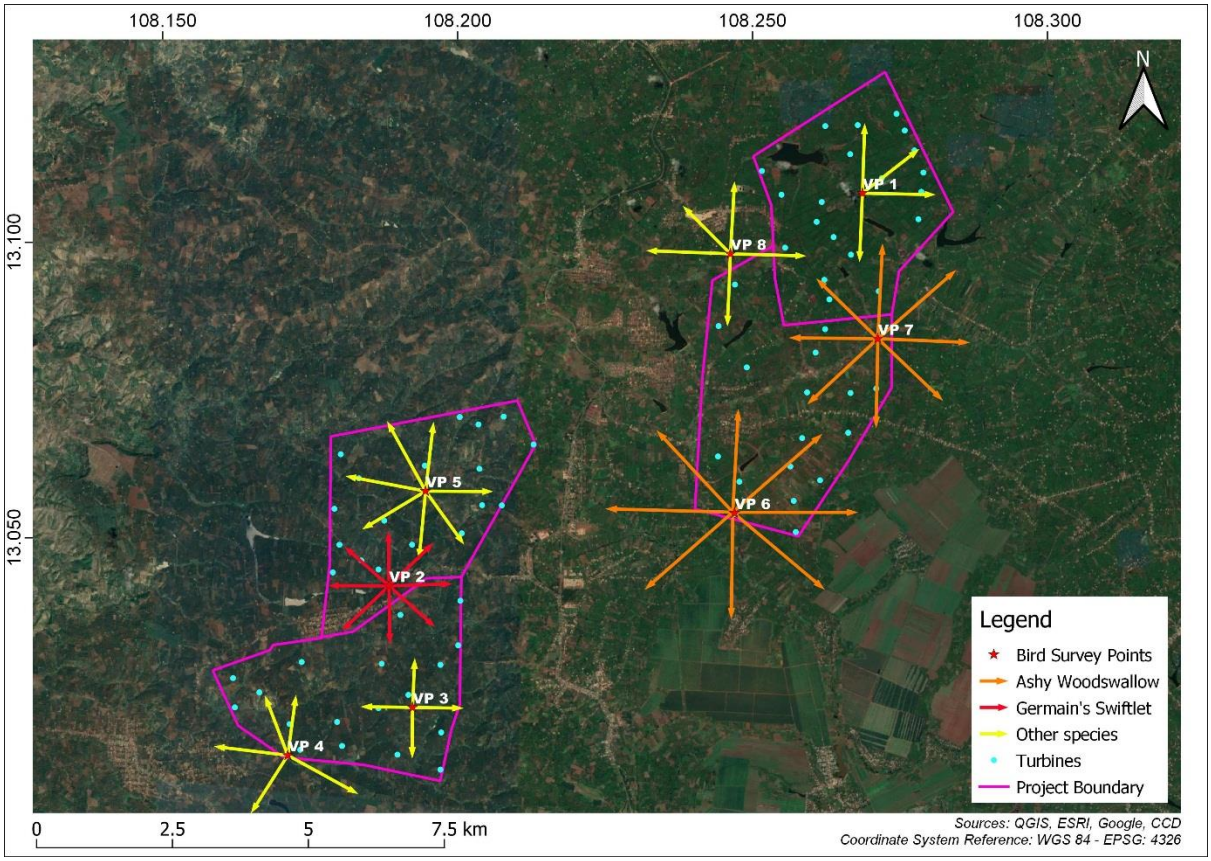


Figure 4.12 Main flight directions of bird species at eight VPs.

4.1.2.2. Transects

A total of 61 species have been recorded along four transects (44 species recorded at transect 1, 29 species at transect 2, 37 species at transect 3 and 26 species recorded at transect 4 (Attachment A and Figure 4.13).

Following the number of individuals recorded during the survey, 32 species have been identified as common, 11 species are fairly common, 08 uncommon and 11 rare species (Attachment A and Figure 4.14). The two NT species including the Red-breased Parakeet and the Grey-headed Parakeet are considered as common in the Project area from transect surveys. All of the rare species in the Project area identified by VP area all IUCN LC and VRDB NL species

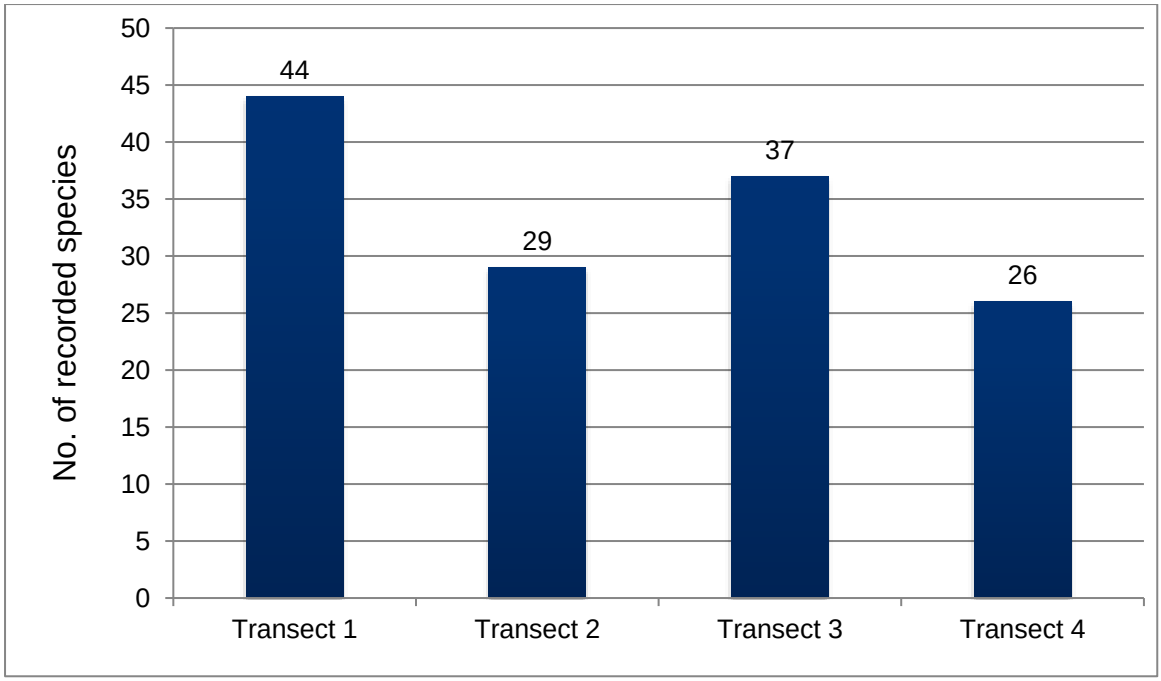


Figure 4.13 The Number of Recorded Species at Each Transects.

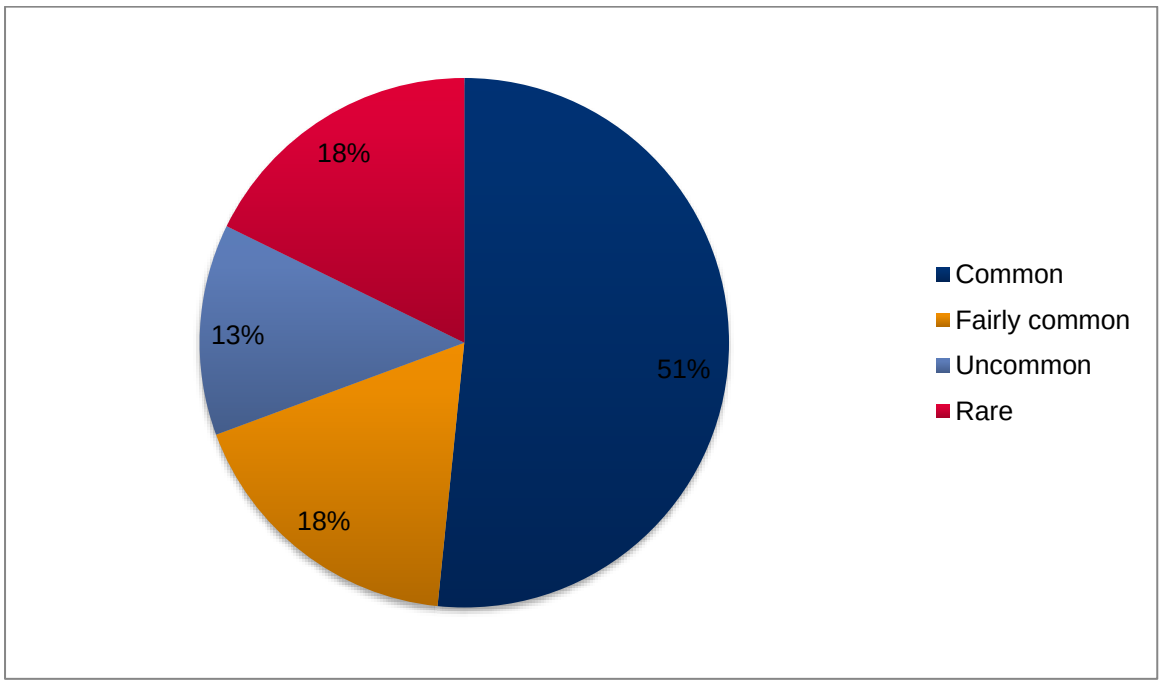


Figure 4.14 The Relative Abundance of Recorded Species of all Transects.

The most ten common species are Germain's Swiftlet (Sum of individuals: 321), Asian Palm Swift *Cypsiurus balasiensis* (49), Germain's Swiftlet (39), Sooty-headed Bulbul (32), Black Drongo (29), House Sparrow (27), Paddyfield Pipit (27), Grey-breasted Prinia (25), Ashy Woodswallow (24), Spotted Dove *Streptopelia chinensis* (23) (Attachment A).

The most ten fairly common species are Vinous-breasted Starling (21), Zebra Dove (21), Common Tailorbird (19), Scaly-breasted Munia (18), Red-breasted Parakeet (18), Common Iora *Aegithina tiphia* (16), Annam Prinia (15), Green Bee-eater *Merops orientalis* (14), Eurasian Tree Sparrow (14) and Pied Bushchat (13) (Attachment A).

Eleven species were recorded with low numbers and have been identified as rare along the transects includes: Asian Barred Owlet *Glaucidium cuculoides* (1), Red Junglefowl (1), Chinese Francolin (1), Eurasian Cuckoo (1), Little Cormorant (1), Lesser Coucal (1), Large-tailed Nightjar *Caprimulgus macrurus* (1), Racket-tailed Treepie *Crypsirina temia* (2), Silver-backed Needletail *Hirundapus cochinchinensis* (2) and Chestnut-tailed Starling *Sturnia malabarica* (2) (Attachment A).

The rarity of the rare species identifed in both VPs and transects is confirmation that the habitats around the VPs and transects are not suitable for such species or they were recorded by chance due to the high level of human modification to the natural habitats used by birds.

4.1.2.3. Species Considered being Prone to Collision

Based on the flight pattern, only three species that are considered prone to collision have been identified including Germain's Swiftlet (IUCN LC, VRDB NL) – total 2,074 individuals; Shikra (IUCN LC, VRDB NL) and Black Kite (IUCN LC, VRDB NL). The rest of 69 species were recorded at low-risk category (recorded at band 1 – below 52 m) (Attachment A).

Germain's Swiftlet was frequently recorded soaring and flying at high-risk category (band 2 from 52 to 208 m). A total time recorded at band 2 are 89,950 seconds. Germain's Swiftlet was mostly recorded at VP No.2 as there are several artificial Swiftlet's house located (Figure 4.15). Germain's Swiftlet is recently identified as common species in Vietnam and one of the most common species recorded at the site (Le et al., 2020).

Shikra and Black Kite were also recorded at high-risk category. However, the Shrika was only recorded flight within band 2 in 43 seconds and Black Kite in 15 seconds respectively (Attachment A). Moreover, both of those species were identified as uncommon to fairly common in Vietnam and rare in the surveyed area (Le et al., 2020).

Figure 4.15 The Artificial Swiftlet's House Located Close to the VP No.2

4.1.2.4. Key Species Account

4.1.2.4.1. Red-breasted Parakeet (Psittacula alexandri)

Red-breasted Parakeet was recorded in both vantages point and transect surveys. A flock of 18 individuals were observed flying over the transect No.1 on 24 May and other group of 15 individuals recorded at VP No.1 in the morning of 25 May flying at band 1 ($10^0$50'27''N; $108^0$26'10''E - WGS 84) (see Figure 4.16). Red-breasted Parakeet is recently listed in IUCN Red List as Near-threatened species. However, it was identified as fairly common in Vietnam (Le et al., 2020) and was also not listed in Vietnam Red Data, 2007 (MOST & VAST, 2007; IUCN, 2021). Red-breasted Parakeet is also listed

in appendix IIB of Decree No. 06/2019/ND – CP, dated 22 January 2019 of Vietnam Government on Management of rare and threatened Fauna, Floral and impelmentation of CITES.

Figure 4.16 Red-breasted Parakeet was flying over the VP No.1 and Transect No.1.

4.1.2.4.2. Grey-headed Parakeet (Psittacula finschii)

There groups of Grey-headed Parakeet were recorded in both vantages point and transect surveys (two groups of 22 individuals at the VP No.1 on 24 and 25 May 2021 and other group of five birds recorded along the transect No.2 on 23 May 2021) (see Figure 4.17). Grey-headed Parakeet is listed in IUCN Red List as Near-threatened species. It was identified as fairly common in Vietnam (Le et al., 2020) and was not listed in Vietnam Red Data, 2007 (MOST & VAST, 2007; IUCN, 2021). Grey-headed Parakeet is recently listed in appendix IIB of Decree No. 06/2019/ND-CP, dated 22 January 2019 of Vietnam Government on Management of rare and threatened Fauna, Floral and impelmentation of CITES.

Figure 4.17 Grey-headed Parakeet at VP No.1

4.1.2.4.3. Annam Prinia (Prinia rocki)

Annam Prinia known as Brown Prinia *(Prinia polychroa)*. However, it was recently divided taxonomically and is now recognized as an endemic species for Vietnam (Alström et al., 2020; Le et al., 2020). Annam Prinia is not listed in any Red Data Book and is identified as fairly common in Vietnam. It was common during the surveys in both VPs and transects (see Figure 4.18).

Figure 4.18 Annam Prinia was recorded in the First Survey

4.2. Bats

4.2.1. Bat Diversity

The survey has recorded six bat species (see Table 4.2). None of them is listed as threatened species in the IUCN Red List or Vietnam Red Data Book. Further details of each record of bat is presented in Table 4.3.

Table 4.2 List of Recorded Bats during the Survey

No.	Scientific name	Common name	Bat group	IUCN Red List	VN Red Data Book	Method	Count	Flight bands	O/E/MN/HT (individuals)
I	Pteropodidae	Fruit bats							
1	*Cynopterus sphinx*	Greater short-nosed fruit bat	Fruit bat	LC	NL	O	3	1 (<50m)	1/2/0/0
II	Vespertilionidae	Vespertilionid bat							
2	*Myotis muricola*	Nepalese whiskered myotis	Insect-eating	LC	NL	O, E, MN	14	1 (<50m)	12/13/1/0

No.	Scientific name	Common name	Bat group	IUCN Red List	VN Red Data Book	Method	Count	Flight bands	O/E/MN/HT (individuals)
3	*Myotis* cf. *ater*	Peters's Myotis	Insect-eating	LC	NL	O, E	3	1 (<50m)	3/3/0/0
4	*Pipistrellus* cf. *javanicus*	Java pipistrelle	Insect-eating	LC	NL	O, E	3	1 (<50m)	3/3/0/0
5	*Scotophilus heathii*	Greater Asiatic yellow bat	Insect-eating	LC	NL	O, E	5	1 (<50m)	5/5/1/0
6	*Scotophilus* cf. *kuhlii*	Lesser Asiatic yellow bat	Insect-eating	LC	NL	E	3	1 (<50m)	0/3/0/0
Total Observed (O)									**26**
Total Echolocation (E)									**27**
Total Mist net (MN)									**2**
Total Harp trap (HT)									**0**

Table 4.3 Record of bats in details

No.	Time	Date	Species	Recorded information	Quantity (individuals)	Location	Latitude (°) (WGS 84)	Longitude (°) (WGS 84)	Fly hight (m)
1	18:30	22-05-2021	*Myotis muricola* *Pipistrellus* cf. *javanicus* *Cynopterus sphinx*	O, E O,E E	2 1 1	Transect 1: Bat point 2 (near mist net 3)	13.2862	108.1636	20-30
2	18:31	22-05-2021	*Myotis muricola* *Pipistrellus* cf. *javanicus*	O,E O,E	2 1	Bat point 2	13.2862	108.1636	5
3	18:32	22-05-2021	*Pipistrellus* cf. *javanicus*	O,E	1	Bat point 2	13.2862	108.1636	6
4	18:33	22-05-2021	*Myotis muricola*	O, E	1	Bat point 2	13.2862	108.1636	6-10
5	18:34	22-05-2021	*Myotis muricola*	O, E	2	Bat point 2	13.2862	108.1636	6-10
6	18:47	22-05-2021	*Myotis muricola*	O, E	1	Bat point 2	13.2862	108.1636	6
7	19:20-19:23	22-05-2021	*Myotis muricola* *Myotis* cf. *ater*	O, E O,E	2 2	Transect 1: On the way from bat point 2 – bat point 1	13.4487	108.1968	6
8	20:50	22-05-2021	*Myotis muricola* *Cynopterus sphinx*	O,E O	1 1	Transect 1: Near bat point 1	13.0256	108.2133	4
9	4:15	23-05-2021	*Myotis* cf. *ater*	O,E	1	Transect 2: On the way from Camp site to bat point 1	13.0258	108.2131	5
10	18:22	23-05-2021	*Myotis muricola* *Scotophilus heathii*	O, E O,E	1 2	Bat point 3 (Mist net 5)	13.1094	108.2629	10-15
11	18:24	23-05-2021	*Scotophilus heathii*	O, E	1	Bat point 3 (Mist net 5)	13.1094	108.2629	10-20
12	18:31	23-05-2021	*Scotophilus heathii*	O,E	1	Bat point 3	13.1094	108.2629	10-20

No.	Time	Date	Species	Recorded information	Quantity (individuals)	Location	Latitude (º) (WGS 84)	Longitude (º) (WGS 84)	Fly hight (m)
						(Mist net 5)			
13	18:27	23-05-2021	*Myotis muricola*	E	1	Bat point 3 (mist net 5)	13.1094	108.2629	6
14	18:48	23-05-21	*Scotophilus kuhlii*	E	3	Bat point 3 (Mist net 4)	13.1086	108.2616	10-20
15	19:28	24-05-2021	*Myotis muricola*	E, MN	1	Bat point 4 (Mist net 6)	13.6163	108.2007	3
16	19:28	24-05-2021	*Scotophilus heathii* *Cynopterus sphinx*	E, MN O	1 1	Bat point 4 (Mist net 6)	13.6163	108.2007	3
	Total				**28**				

4.2.2. Species Account

4.2.2.1. Greater Short-nosed Fruit Bat *(Cynopterus sphinx*)

VRDB: Not Listed

IUCN: Least Concern (P. Bates et al., 2019)

This is common species and widely distributed from north to south of Vietnam. The Greater Short-nosed Fruit Bat is found from Pakistan to Vietnam. It is common in tropical forest and areas where fruit crops are cultivated. They can also be found in grasslands and mangrove forests. They typically nest high in palm trees. The bats chew the fronds of the palms to construct fairly simple tents. These bats are also known to construct tents by closely interweaving the leaves and twigs of creeping vines which cover buildings, but such nests are constructed only when palms are not available.

This is a species of fruit bat family, they have a low flight range, usually less than 30m because they depend on the height of vegetation or fruit trees. During the field survey, an adult male was trapped and two individuals were observed in the night time when they were flying around the coffee's farm near the Bat Point 1.

Figure 4.19 Greater Short-nosed Fruit Bat *(Cynopterus sphinx)*

Photo: Nguyen Truong Son

4.2.2.2. Nepallese Whiskered Bat *(Myotis muricola)*

VRDB: Not Listed

IUCN: Least Concern (C. Srinivasulu & Srinivasulu, 2019)

This species distributed in Indo-Malayan range, from Nepal, northern and north-east India trough Bhutan, Bangladesh, Myanmar and southern China to Vietnam, Lao PDR, Cambodia, Thailand,

Malaysia, Great Sunda and the Philippine Islands (Francis, 2019; C. Srinivasulu & Srinivasulu, 2019). In Vietnam, this is common species and widely distributed all the country (Corbet & Hill, 1992). Occurrence of this bat was confirmed for Tuyen Quang, Bac Kan, Cao Bang, Ha Noi, Hai Phong, Ninh Binh, Nghe An, Ha Tinh, Quang Tri, Thua Thien-Hue, Quang Ngai, Quang Nam, Kon Tum, Gia Lai, Dak Lak, Lam Dong, Dong Nai, Tay Ninh, Binh Phuoc, Ba Ria – Vung Tau and Kien Giang provinces (Bates et al., 1999; Dang et al., 2008; Krushop, 2013; Kruskop, 2017; Nguyen et al., 2016)

During the field survey, an adult male was trapped by a mist net set up across the way and nearby a small stream in the evening (at 19:28). To date, the species is common species in Vietnam and widely distributed in the farm area.

Figure 4.20 Nepallese Whiskered Bat *(Myotis muricola)*

Photo: Nguyen Truong Son

4.2.2.3. Peters's bat *(Myotis* cf. *ater)*

VRDB: Not Listed

IUCN: Least Concern (Wiles, 2008)

This bat has wide but sporadic known distribution across Sunda Islands (Sulawesi, Kalimantan, Maluku, and Sumatra), the Philippines, Malaysia, Thailand, Cambodia, Vietnam and Lao PDR (Francis, 2019; Wiles, 2008). In Vietnam, the Peters's Myotis was not known until late 1990 (Bates et al., 1999; Corbet & Hill, 1992). Occurrence of this species was confirmed for Tuyen Quang, Bak Kan, Ninh Binh, Nghe An, Quang Binh, Thua Thien-Hue, Quang Ngai, Gia Lai, Dak Lak, Tay Ninh, Lam Dong, Dong Nai and Ba Ria – Vung Tau provinces (Bates et al., 1999; Dang et al., 2008; Furey et al., 2010; Krushop, 2013; Kruskop, 2017; Nguyen et al., 2016; Vu, 2015).

During the field survey, the team recorded the echolocation calls of three individuals. Compared with Nguyen et al. (2016, 2021), the calls of three individuals showed that this is *Myotis cf. ater* distributed in Project area.

Figure 4.21 Peters's Bat (*Myotis cf. ater*)

Photo: Nguyen Truong Son

4.2.2.4. Greater Asiatic Yellow Bat *(Scotophilus heathii)*

VRDB: Not Listed

IUCN: Least Concern (B. Srinivasulu & Srinivasulu, 2019)

The Greater Asiatic yellow Bat is a larger species of vesper bat. It is found in Afghanistan, Bangladesh, Cambodia, China, Indian, Indonesia, Laos, Myanmar, Nepal, Pakistan, Srilanka, Thailand, and Vietnam (Dang et al., 2008; Krushop, 2013). This species is found in a variety of habitat types, including urban areas (G. Csorba pers. comm.). It roosts old forts, crevices and cracks in old buildings, among the leaves and crowns of palms, pepper trees, in hollows of trees and among leaves of banana either singly or in colonies of up to 50 individuals. It emerges late from the roosting site and is a low flyer and flies at a steady speed (B. Srinivasulu & Srinivasulu, 2019).

In Vietnam, this is common species and widely distributed from north, central to south. The species was recorded in the habitats of planted forests, regenerated forests, secondary forests and ant feeding around ponds, lakes or small streams. The species has a low range because its food can be medium-sized, low-flying insects or small animals around ponds, lakes or along streams.

During the field survey, the team captured one individual at Bat point 4 by the mist net 6 when the bat was flying across the stream to the pepper farm. The team also recorded the echolocation calls of three individuals. Compared with Nguyen et al. (2016, 2021), the calls of three individuals were *Scotophilus heathii* which distributes in the Project area.

Figure 4.22 Greater Asiatic yellow Bat *(Scotophilus heathii)*

Photo: Nguyen Truong Son

4.2.2.5. Lesser Asiatic Yellow House *(Scotophilus kuhlii)*

VRDB: Not Listed

IUCN: Least Concern (B. Srinivasulu & Srinivasulu, 2019b)

This is widely distributed species, the Extant (resident) from Bangladesh, Cambodia, China (Hong Kong, Taiwan), India, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Timor-Leste, and Viet Nam. This adaptable species is found in primary and secondary habitats, and in both rural and urban areas. It roosts in temples, caves, hollow trees, palm fronds, roofs, crevices, cracks and holes in the walls and on the roofs of old houses, dry leaves of trees in colonies of several hundred to thousands of individuals. It is an early flyer and prefers to feed on hymenopterans and dipterans (B. Srinivasulu & Srinivasulu, 2019b).

No individuals were caught during the survey period. However, the team recorded the echolocation of three individuals at $13^0$6’30.38”N, $108^0$15’40.26”E (WGS 84 GIS system). They flied about 10-20m in height.

Figure 4.23 Lesser Asiatic Yellow House *(Scotophilus kuhlii)*

Photo: Nguyen Truong Son

4.2.2.6. Javan Pipistrelle *(Pipistrellus javanicus)*

VRDB: Not Listed

IUCN: Least Concern (Kruskop et al., 2019)

This species distributed in Bangladesh, Brunei Darussalam, Cambodia, China, India; Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Thailand, Viet Nam (Kruskop et al., 2019).

In Vietnam, this is common species and widely distributed from north to south. This species is found in varied habitat types from primary and secondary forested regions, agricultural landscapes (including rubber plantations) to urban areas. It roosts in trees, crevices and cracks in walls and ceilings of houses, tiles of huts, old buildings, temples, under bark and in holes of large trees, signboards, tree hollows in small groups of few individuals (Krushop, 2013). This bat emerges early in the evening, before full darkness. Flight is moderately speed and maneuverable, sometimes fluttering (in cluttered places) as in most pipistrelles. In Ho Chi Minh, the bats were observed foraging in urban areas and city parks at about 6-15 m above ground or water (ibid.), however they were also observed much higher in the Red river valley (Krushop, 2013). Echolocation is steep to shallow FM from ca. 75 to 45 kHz (Krushop, 2013).

During the survey, no individuals were captured. However, echolocation calls of the species were recorded three times at Bat point 2. Compared with data from Krushop (2013), the calls were and identified as *Pipistrellus javanicus*.

Figure 4.24 Javan Pipistrelle (*Pipistrellus javanicus)*

Photo: Nguyen Truong Son

3. CONCLUSIONS

3.1 Habitats

There are no possible existence of biological corridors between the natural protected areas that the Proejct may be located in.

3.2 Birds

- A total of 72 bird species belonging to 15 orders and 34 families have been recorded in the Project area during the first survey. 20 of which are migratory species. Most are IUCN LC species and not listed in VRDB, except for two species, Red-breasted Parakeet and Grey-headed Parakeet, are listed in the IUCN Red List 2021 as Near Threatened.
- One species (Annam Prinia) was recorded as endemic to Vietnam;
- Three species (Germain's Swiftlet, Shikra and Black Kite) appeared flying at Band 2 and were considered to be prone to collision. The Germain's Swiftlet belongs to sky-bird group, while Shikra and Black Kite are under the bird of prey group. These species are fairly common to common in Vietnam or record at low density and rare at the Project area.
- Most of habitats at the Project are modified habitats such as gardens, scrub, clearing, farmland and plantation (e.g. coffee, jackfruit).
- Limitation of the survey is light and heavy rain occurred in two of the three survey days, which probably affected the survey results.
- Imapacts on the species will be addressed within the biodiversity impact assessment.

3.1. Bats

- The first survey in the Project area recorded six bat species belonging two families, including one species of Fruit bat (Pteropodidae Family), which is Greater short-nosed fruit bat (*Cynopterus sphinx*), and five species of Vespertilionid bat (Vespertilionidae Falimy), which are Nepallese Whiskered Bat (*Myotis muricola*), Peters's bat (*Myotis* cf. *ater*), Greater Asiatic yellow Bat (*Scotophilus heathii*); Lesser Asiatic Yellow House (*Scotophilus kuhlii*), and Javan Pipistrelle (*Pipistrellus javanicus*);
- None of species are listed as threatened species in the IUCN Red List or the Vietnam Red Data Book;
- The flight range of all recorded bats in the study area is from 3 m to less than 50 m from the ground, under the Band 1 (<50 m), therefore they are not prone to collision;
- The habitats of the survey area are mainly anthropogenic, including fruit trees and industrial crops, suitable for some species of the fruit bat and the vespertilionid bat. However, the habitats are probably changeable under the influence of humans, which may affect the bats in some extent;
- Limitation of the survey is that heavy rain occurred in two of the three survey nights, which probably affected the survey results.

4. RECOMMENDATIONS

4.1. Birds

Three LC species (Germain's Swiftlet, Shikra and Black Kite) were recorded flying at Band 2 and were considered to be prone to collision. The Project area supports a small population of two globally nearly-threatened bird species (Red-breasted Parakeet and Grey-headed Parakeet) and one IUCN LC endemic species (Annam Prinia). Twenty species of 72 recorded species from field surveys are migratory speices.

Vantage point and transect surveys (survey 2 and 3) on birds in July and August as proposed should be done in order to meet the requirements of 72 hours for vantage point survey (Scottish Natural Heritage, 2017). The additional surveys should able to provide more information about species composition within the Project area and provide more chance to spot out if there are any species that might have threatened conservative status or fly in band 2 that have not been recorded in this survey.

4.2. Bats

The survey was in a very short time and probably affected by rain, which occurred in two of the three survey nights. Another survey should be done in July as proposed to increase the survey effort to better reflect the bat diversity and richness in the Project area.

REFERENCES

Alström, P., Rasmussen, P. C., Sangster, G., Dalvi, S., Round, P. D., Zhang, R., & Lei, F. (2020). Multiple species within the Striated Prinia Prinia crinigera–Brown Prinia P. polychroa complex revealed through an integrative taxonomic approach. *Ibis*, *162*(3), 936–967.

Bates, P., Bumrungsri, S., Molur, S., & Srinivasulu, C. (2019). *Cynopterus sphinx. The IUCN Red List of Threatened Species 2019: e.T6106A22113656.* https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T6106A22113656.en

Bates, P. J. J., Hendrichsen, D. K., Walston, J. L., & Hayes, B. (1999). The review of mouse-eared bats (Chiroptera: Vespertilionidae: Myotis) from Vietnam with significant new records. *Acta Chiropterologica*, *1*(1), 47–74.

Bibby, C., Jones, M., & Marsden, S. (1998). *Expedition Field Techniques: Bird surveys*. Royal Geographical Society. http://biology.kenyon.edu/courses/biol229/fieldmanual birds.pdf

Birdlife International. (2004). *Sourcebook of Existing and Proposed Protected Areas in Vietnam* (2nd ed.). Birdlife International.

BirdLife International. (2010). *Biodiversity in Chu Yang Sin National Park, Dak Lak Province, Vietnam*.

Corbet, G. B., & Hill, J. . (1992). *Mammals of the Indomalay region. A systematic review*. Oxford University Press.

Csorba, G., Ujhelyi, P., & Thomas, N. (2003). *Horseshoe Bats of the World (Chiroptera: Rhinolophidae)*. Bishop's Castle, Shropshire: Alana Books.

Dang, N. C., Endo, H., Nguyen, Truong Son Oshida, T., Le, X. C., Dang, Huy Phuong Lunde, D. P., Kawada, S. I., Hayashida, A., & Sasaki, M. (2008). *Checklist of wild mammal species of Vietnam*. Institute of Ecology and Biological Resources.

Duckworth, J. W., & Hedges, S. (1998). *Tracking tigers: a review of the status of Tiger, Asian Elephant, Gaur and Banteng in Vietnam, Lao, Cambodia and Yunnan province (China) with recommendations for future conservation action*.

Ea So Nature Reserve. (2019). *Fauna in Ea So Nature Reserve*. http://khubttneaso.org.vn/index.php/dong-vat

Eames, J., Nguyen, D. T., Le, T. T., Dang, N. C., Ngo, V. T., Hoang, D. D., Thai, N. T., & Nguyen, T. T. H. (2004). *Biodiversity Report for Yok Don National Park, Dak Lak Province, PARC Project VIE/95/G31&031*.

Francis, C. M. (2019). *Field Guide to the Mammals of South-East Asia* (Second). Bloomsbury Publishing.

Furey, N. M., Mackie, I. J., & Racey, P. A. (2010). Bat diversity in Vietnamese limestone karst areas and the implications of forest degradation. *Biodiversity Conservation*, *19*, 1821–1838.

Global Biodiversity Information Facility. (2021). *GBIF Occurrence Download*. https://api.gbif.org/v1/occurrence/download/request/0309273-200613084148143.zip

IUCN. (2021). *The IUCN Red List of Threatened Species. Version 2021-1*. https://www.iucnredlist.org

Krushop, S. V. (2013). *Bats of Vietnam. Checklist and an Identification Manual. Biodiversity of Vietnam Series* (Second). KMK Scientific Press.

Kruskop, S. V. (2017). Between North and South: provisional data on bats (Mammalia: Chiroptera) from Gia Lai – Kon Tum plateaus. *Journal of Tropical Science and Technology*, *14*, 59–66.

Kruskop, S. V., Srinivasulu, B., & Srinivasulu, C. (2019). *Pipistrellus javanicus. The IUCN Red List of Threatened Species 2019: e. T17344A22128905*. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T17344A22128905.en

Le, M. H., Bui, D. T., Nguyen, M. H., Tang, A. P., & Nguyen, A. T. (2020). *Birds of Vietnam*. The Gioi Publishing House.

MOST, & VAST. (2007). *Vietnam Red Data Book. Part 1. Animals*. Science and Technology

Publishing House.

Nguyen, T. S., Csorba, G., Vuong, T. T., Vu, D. T., Yi, W., Masashi, H., Tatsuo, O., Hideki, E., & Masaharu, M. (2015). A new species of the genus Murina (Chiroptera: Vespertilionidae) from Kon Tum Province with a review of the subfamily Murininae in Vietnam. *Acta Chiropterologica*, *17*(2), 201–232.

Nguyen, T. S., Thomas, J. O., Jeffery, A. G., Gabor, C., Vuong, T. T., Tatsuo, O., Hideki, E., & Masaharu, M. (2016). Diversity, community structure, echolocation, and reproduction of bats (Mammalia: Chiroptera) of the southern Truong Son mountain, Vietnam, an Asian biodiversity hot-spot. *Jounral Engdanered Taxa*, *8*(7), 8953–8969.

Nguyen, T. S., Thomas, J. O., Jeffery, A. G., Nguyen, V. K., Hoang, T. T., Masaharu, M., Dang, H. P., Le, D. M., Nguyen, T. T., Tatsuo, O., Hideki, E., Tran, T. A., Bui, T. H., Ly, N. T., Vu, T. D., Chu, T. H., & Vuong, T. T. (2021). Bats (Chiroptera) of Bidoup Nui Ba National Park, Dalat Plateau, Vietnam. *Mammal Study*, *46*, 53–68.

Nguyen, T. S., & Vu, D. T. (2006). *Guideline to the bat fauna in Vietnam*. Ho Chi Minh General Publishing House.

Pham-Thanh, H., van der Linden, R., Ngo-Duc, T., Nguyen-Dang, Q., Fink, A. H., & Phan-Van, T. (2019). Predictability of the rainy season onset date in Central Highlands of Vietnam. *International Journal of Climatology*, *1–15*. https://doi.org/10.1002/joc.6383

Pham, T. A., Hoang, M. K., & Le, D. T. (1990). *Scientific report on wildlife resources in Nam Ca forest, Dak Lak province*.

Ruedi, M., Eger, J. L., & Csorba, G. (2018). A new genus and species of vespertilionid bat from the Indomalayan Region. *Journal of Mammalogy*, *99*(1), 209 – 222.

Scottish Natural Heritage. (2017). *Recommended bird survey methods to inform impact assessment of onshore wind farms. Version 2*. 37.

Sikes and the Animal Care and Use Committee of the American Society of Mammalogists. (2016). 2016 guidelines of the American Society of Mammalogists for the use of wild mammals in research and education. *Journal of Mammalogy*, *97*, 663–688.

Skowronski, M. D., & Fenton, M. B. (2008). Model-based automated detection of echolocation calls using the link detector. *Journal of the Acoustical Society of America*, *124*, 328–336.

Srinivasulu, B., & Srinivasulu, C. (2019a). *Scotophilus heathii. The IUCN Red List of Threatened Species 2019: e.T20067A22031528*. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T20067A22031528.en

Srinivasulu, B., & Srinivasulu, C. (2019b). *Scotophilus kuhlii. The IUCN Red List of Threatened Species 2019: e.T20068A22031278*. https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T20068A22031278.en

Srinivasulu, C., & Srinivasulu, B. (2019). *Myotis muricola. The IUCN Red List of Threatened Species 2019: e.T85537578A22065403.* https://dx.doi.org/10.2305/IUCN.UK.2019-3.RLTS.T85537578A22065403.en

Vu, D. T. (2015). Bats of Cat Tien national park: diversity, echolocation and taxonomic remarks. *Academia Journal of Biology*, *37*(3), 336–343.

Wiles, G. (2008). *Myotis ater. The IUCN Red List of Threatened Species 2008: e.T14144A4408913*. https://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T14144A4408913.en

Wilson, D. E., & Mittermeier, R. . (2019). *Handbook of the Mammals of the World. Vol. 9. Bats.* Bats lynx Edicions.

ATTACHMENT A BIRD SPECIES RECORDED AT PROJECT AREA

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
		I. GALLIFORMES													
		1. Phasianidae													
1	Chinese Francolin	*Francolinus pintadeanus* (Scopoli, 1786)	Re	Fc	Ra	LC	May 2021	Vp6,tr2	1/1	B				L	Gr
2	Red Junglefowl	*Gallus gallus* (Linnaeus, 1758)	Re	Fc	Ra	LC	May 2021	Vp1, Tr1	1/1	B				L	Gr
		II. CAPRIMULGIFORMES													
		2. Caprimulgidae													
3	Large-tailed Nightjar	*Caprimulgus macrurus* Hordfield, 1821	Re	Co	Ra	LC	May 2021	Tr1	01	B				L	
		III. APODIFORMES													
		3. Apodidae													
4	Germain's Swiftlet	*Aerodramus germani* Oustalet, 1876	Re	Co	Co	LC	May 2021	Vp 1,2,3,4, 5,6,7,8 Tr1,2,3,4	1.753/321	B,I,O	5-250	Fli	89.950	H	Fe
5	Silver-backed Needletail	*Hirundapus cochinchinensis* (Oustalet, 1878)	Re	Fc	Ra	LC	May 2021	Tr 2	2	B	15-35	Fli		M	
6	Asian Palm Swift	*Cypsiurus balasiensis* Gray,JE, 1829	Re	Co	Co	LC	May 2021	Tr 2,3,4	49	B	15-40	Fli		M	Fe
7	House Swift	*Apus nipalensis* (JE Gray, 1830)	Re	Co	Fc	LC	May 2021	Tr 2	09	B	5-35	Fli		M	Fe
		IV. CUCULIFORMES													
		4. Cuculidae													

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
8	Greater Coucal	*Centropus sinensis* (Stephens, 1815)	Re	Co	Fc	LC	May 2021	Vp 1,2, 3,4,6,7,8 Tr 1,2,3,4	18/13	B	0-10	Fli		L	Fe
9	Lesser Coucal	*Centropus bengalensis* (Gmelin, 1788)	Re	Fc	Ra	LC	May 2021	VP4,6, Tr1	2/1	B	O-5	Mo		L	Fe
10	Plaintive Cuckoo	*Cacomantis merulinus* (Scopoli, 1786)	Re	Co	Co	LC	May 2021	Vp 1,2,3,4, 6,7,8, Tr1,2,3,4	22/10	B	0-15	Mo		L	Fe
11	Chestnut-winged Cuckoo	*Clamator coromandus* (Linnaeus, 1766)	Re	Un	Fc	LC	May 2021	Vp5,6, Tr 3,4	7/8	B	3-15	Mo		L	Fe
12	Indian Cuckoo	*Cuculus micropterus* Gould, 1837	Re	Fc	Fc	LC	May 2021	Vp 5,7, Tr 3,4	9/8	B	3-20	Mo		L	Fe
13	Eurasian Cuckoo	*Cuculus canorus* (Linnaeus, 1758)	Re	Un	Ra	LC	May 2021	Vp6, Tr3	1/1	B	4-15	Mo		L	
14	Green-billed Malkoha	*Rhopodytes tristis* (Lesson, 1830)	Re	Co	Fc	LC	May 2021	Vp4,5, Tr 1,2,4	9/7	B	1-15	Mo		L	Fe
		V. COLUMBIFORMES													
		5. Columbidae													
15	Red-collared Dove	*Streptopelia tranquebarica* (Hermann, 1804)	Re	Co	Un	LC	May 2021	Vp5, Tr3	5/4	B	0-10	Mo		L	Fe
16	Spotted Dove	*Streptopelia chinensis* (Scopoli, 1786)	Re	Co	Co	LC	May 2021	Vp1,3,4,6,7, Tr 1,3	19/23	B	1-20	Mo		L	Fe
17	Zebra Dove	*Geopelia striata* (Linnaeus, 1766)	Re	Co	Co	LC	May 2021	Vp1,2,3,4,5,6,7,8, Tr1,2,3,4	54/21	B	1-15	Mo		L	Fe
		VI. GRUIFORMES													

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
		6. Rallidae													
18	White-breasted WaterHen	*Amaurornis phoenicurus* Pennant, 1769	Re	Co	Ra	LC	May 2021	Vp7	1	B				L	Gr
		VII. SULIFORMES													
		7. Phalacrocoracidae													
19	Little Cormorant	*Pharacrocorax niger* Vieillot, 1817	Re	Un	Ra	LC	May 2021	Vp7, Tr3	2/1	B	0-30			M	
		VIII. PELECANIFORMES													
		8. Ardeidae													
20	Little Egret	*Egretta garzetta* Linnaeus, 1766	Re	Co	Fc	LC	May 2021	Vp5	7	B	5-35	Fli		L	
		IX. ACCIPITRIFORMES													
		9. Accipitridae													
21	Shikra	*Accipiter badius* Gmelin, 1788	Re	Fc	Ra	LC, IIB/06	May 2021	Vp2	2	B,I	20-110m	So, Dis	43s	H	Fe
22	Black Kite	*Milvus migrans* (Boddaert, 1783)	Re	Un	Ra	LC, IIB/06	May 2021	Vp8	2	I,O	150-250m	So	15s	H	Fe
		X. STRIGIFORMES													
		10. Strigidae													
23	Asian Barred Owlet	*Glaucidium cuculoides* (Vigors, 1831)	Re	Fc	Ra	LC, IIB/06	May 2021	Tr 2	1	B		Per		L	
		XI. BUCEROTIFORMES													

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
		11. Upupidae													
24	Eurasian Hoopoe	*Upupa epops* Linnaeus, 1758	Re	Un	Fc	LC	May 2021	Vp1,3,4,6,7,8 Tr 1,4	17/11	B	0-25	Mo		L	Fe
		XII. CORACIIFORMES													
		12. Alcedinidae													
25	Common Kingfisher	*Alcedo atthis* (Linnaeus, 1758)	Re	Co	Ra	LC	May 2021	VP7, Tr 3	3/2	B	0-2	Per, Mo		L	
26	White-throated Kingfisher	*Halcyon smyrnensis* (Linnaeus, 1758)	Re	Co	Ra	LC	May 2021	Vp3	2	B	0-5	Per, Mo		L	
		13. Meropidae													
27	Blue-bearded Bee-eater	*Nyctyornis athertoni* (Jardine & Selby, 1830)	Re	Un	Ra	LC	May 2021	Vp6	1	B	0-4	Per, Mo		L	Fe
28	Green Bee-eater	*Merops orientalis* Latham, 1802	Re	Co	Co	LC	May 2021	Vp1,3,4,6,7,8, Tr 1,2,3	21/14	B	1-10	Fli, Mo		L	Fe
29	Chestnut-headed Bee-eater	*Merops leschenaulti* Vieillot, 1817	Re	Co	Co	LC	May 2021	Vp1,4, 7 Tr 1,3,4	19/11	B	5-30	Fli, Mo		L	Fe
		XIII. PICIFORMES													
		14. Megalaimidae													
30	Lineated Barbet	*Psilopogon lineata* (Vieillot, 1816)	Re	Co	Co	LC	May 2021	Vp1, 6,7 Tr 1,3,4	13/11	B	3-18	Per, Mo		L	
31	Coppersmith Barbet	*Psilopogon haemacephala* Statius Muller, 1776	Re	Co	Co	LC	May 2021	Vp1,4,6,7, Tr1,3	18/12	B	2-10m	Per, Mo		L	Fe
		XIV. PSITTACIFORMES													

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
		15. Psittacidae													
32	Red-breasted Parakeet	*Psittacula alexandri* (Linnaeus, 1758)	Re	Fc	Co	NT, IIB/06	May 2021	Vp1, Tr 1	15/18	B	5-35	Fli		L	
33	Grey-headed Parakeet	*Psittacula finschii* (Hume, 1874)	Re	Un	Co	NT, IIB/06	May 2021	Vp1, Tr 1	14/13	B	5-35	Fli		L	
		XV. PASSERIFORMES													
		16. Artamidae													
34	Ashy Woodswallow	*Artamus fuscus* (Vieillot, 1817)	Re	Co	Co	LC	May 2021	Vp, 1,2,3,4, 5,6,7,8 Tr 1,2,3,4	45/24	B	5-40	Fli, Mo		L	Dis, Fe
		17. Aegithinidae													
35	Common Iora	*Aegithina tiphia* (Linnaeus, 1758)	Re	Co	Co	LC	May 2021	Vp1,5,4,6,7,8, Tr1,2,3,4	22/16	B	1-3	Mo		L	Fe
		18. Campephagidae													
36	Scarlet Minivet	*Pericrocotus flammeus* Forster, 1781	Re	Co	Fc	LC	May 2021	Vp8, Tr3	7/9	B	3-15	Mo		L	Fe
37	Indochinese Cuckooshrike	*Lalage polioptera* (Sharpe. 1879)	Re	Un	Un	LC	May 2021	Vp3,5, Tr 3	4/5	B	3-20	Mo		L	Fe
		19. Laniidae													
38	Burmese Shrike	*Lanius collurioides* Lesson, 1834	Re	Fc	Co	LC	May 2021	Vp1,2,3,5,4,6,7,8, Tr1,2,3,4	52/39	B	0-5	Mo		L	Fe
		20. Dicruridae													
39	Black Drongo	*Dicrurus macrocercus* Vieillot, 1817	Re	Co	Co	LC	May 2021	Vp1,2,3,5,4,6,7,8, Tr1,2,3,4	35/29	B	3-25	Fli		L	Fe

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
40	Ashy Drongo	*Dicrurus leucophaeus* Vieillot, 1817	Re	Co	Co	LC	May 2021	Vp1,3,4,6,7,8, Tr1,2,4	26/12	B	5-15	Fli		L	Fe
41	Hair-crested Drongo	*Dicrurus hottentottus* (Linnaeus, 1766)	Re	Fc	Fc	LC	May 2021	Vp4, 6, Tr1,3	9/7	B	3-20	Mo		L	Fe
		21. Rhipiduridae													
42	White-throated Fantail	*Rhipidura albicollis* (Vieillot, 1818)	Re	Co	Fc	LC	May 2021	Vp2, 4, Tr1,4	8/6	B	0-3	Mo		L	Fe
		22. Corvidae													
43	Eurasian Jay	*Garrulus glandarius* Linnaeus, 1758	Re	Un	Fc	LC	May 2021	Vp3, 4,6,7,8, Tr 3	9/7	B	3-25	Fli, Mo		L	Fe
44	Racket-tailed Treepie	*Crypsirina temia* (Daudin, 1800)	Re	Co	Un	LC	May 2021	Tr1	2	B	3-15	Mo		L	Fe
45	Large-billed Crow	*Corvus macrorhynchos* Wagler, 1827	Re	Fc	Co	LC	May 2021	VP,1,6,7 Tr1, 3	13/11	B	3-40	Fli, Mo		L	Dis, Fe
		23. Pycnonotidae													
46	Sooty-headed Bulbul	*Pycnonotus aurigaster* (Vieillot, 1818)	Re	Co	Co	LC	May 2021	VP1,2,3,4,5,6,7,8, Tr1,2,3,4	51/32	B	0-10	Fli, Mo		L	Fe
47	Stripe-throated Bulbul	*Pycnonotus finlaysoni* Strickland, 1844	Re	Co	Co	LC	May 2021	Vp1,4,6,7 Tr1,3,4	22/11	B	1-5	Mo		L	Fe
48	Himalayan Black Bulbul	*Hypsipetes leucocephalius* (P.L.S.Müller, 1776)	Re	Fc	Co	LC	May 2021	Vp2, 4, Tr1,3	11/14	B	1-5	Mo		L	Fe
		24. Hirundinidae													

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
49	Striated Swallow	*Cecropis striolata* Temminck & Schlegel, 1847	Re	Fc	Un	LC	May 2021	Vp3	4	B	5-15	Fli		L	
		25. Cisticolidae													
50	Bright-headed Cisticola	*Cisticola exilis* (Vigors & Horsfield, 1827)	Re	Fc	Ra	LC	May 2021	Vp7	2	B	0-2	Mo		L	Fe
51	Annam Prinia	*Prinia rocki* Deignan, 1957	Re	Fc	Co	LC, endemic	May 2021	VP,1,4,8, Tr1,2,3,4	21/15	B	0-3	Mo		L	Fe
52	Rufescent Prinia	*Prinia rufescens* Blyth, 1847	Re	Co	Fc	LC	May 2021	VP6,7,8, Tr 1,2,4	8/9	B	0-3	Mo		L	Fe
53	Grey-breasted Prinia	*Prinia hodgsonii* Blyth, 1844	Re	Co	Co	LC	May 2021	VP,1,2,3,4,5,6,7,8, Tr1,2,3,4	37/25	B	0-3	Mo		L	Fe
54	Yellow-bellied Prinia	*Prinia flaviventris* (Delessert, 1840)	Re	Fc	Ra	LC	May 2021	Vp3	2	B	0-3	Mo		L	Fe
55	Dark-necked Tailorbird	*Orthotomus atrogularis* Temminck, 1836	Re	Fc	Fc	LC	May 2021	VP4,6,7, Tr3,4	9/7	B	1-3	Mo		L	Fe
56	Common Tailorbird	*Orthotomus sutorius* (Pennant, 1769)	Re	Co	Co	LC	May 2021	VP,1,2,3,4,5,6,7,8, Tr1,2,3,4	23/19	B	1-3	Mo		L	Fe
		26. Timaliidae													
57	Pin-Striped Tit Babbler	*Mixornis gularis* (Horsfield, 1822)	Re	Co	Un	LC	May 2021	Vp4,5, Tr1,3	5/4	B	1-3	Mo		L	
		27. Sylviidae													
58	Yellow-eyed Babbler	*Chrysomma sinense* (Gmelin, 1789)	Re	Fc	Co	LC	May 2021	Vp1,2,6, Tr1,2	19/11	B	1-3	Mo		L	Fe, nesting
		28. Sturnidae													

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
59	Vinous-breasted Starling	*Acridotheres burmannicus* (Jerdon, 1862)	Re	Fc	Co	LC	May 2021	Vp2,7 Tr 1,2,3	27/21	B	3-18	Fli, Mo		L	Fe, nesting
60	Black-collared Starling	*Gracupica nigricollis* (Paykull, 1807)	Re	Co	Fc	LC	May 2021	Vp4,6	10	B	3-12	Mo		L	Fe, nesting
61	Chestnut-tailed Starling	*Sturnia malabarica* (Gmelin, 1789)	Re	Fc	Ra	LC	May 2021	Tr 2	2	B	2-10	Mo		L	Fe, nesting
62	Common Myna	*Acridotheres tristis* (Linnaeus, 1766)	Re	Co	Fc	LC	May 2021	VP6,7, Tr1,3	16/12	B	3-15	Mo		L	Fe
		29. Muscicapidae													
63	Oriental Magpie Robin	*Copsychus saularis* (Linnaeus, 1758)	Re	Co	Un	LC	May 2021	Vp4,6, Tr1	5/4	B	0-3	Mo		L	Fe
64	Pied Bushchat	*Saxicola caprata* (Linnaeus, 1766)	Re	Co	Co	LC	May 2021	Vp1,4,6,8, Tr1,3	18/13	B	0-7	Fli, Mo		L	Fe
		30. Dicaeidae													
65	Scarlet-backed Flowerpecker	*Dicaeum cruentatum* (Linnaeus, 1758)	Re	Fc	Un	LC	May 2021	Vp4,8, Tr1	5/6	B		Mo		L	Fe
		31. Nectariniidae													
66	Olive-backed Sunbird	*Cinnyris jugularis* (Linnaeus, 1766)	Re	Co	Fc	LC	May 2021	Vp2,4,7 Tr1	10/8	B	1-3	Fli, Mo		L	Fe
		32. Passeridae													
67	Eurasian Tree Sparrow	*Passer montanus* (Linnaeus, 1758)	Re	Co	Co	LC	May 2021	Vp2,8, Tr1,2,4	27/14	B	1-3	Fli, Mo		L	Fe

No	English name	Scientific name	Status	Abundance		IUCN (2021) or VRDB (2007)	Surveys	Vantages/ transects	Sum of individuals (Vp/tr)	Flight behavior			Total time at risk height	Risk category	Notes on Activity/ Behaviour
				Le et al, 2020	at VPs					Flight height band (m)	Height of the flight (m)	Flight mode			
68	House Sparrow	*Passer domesticus* (Linnaeus 1758)	Re	Co	Co	LC	May 2021	Vp2,7,8 Tr1,2,3	32/27	B	1-3	Fli, Mo		L	Fe
69	Plain-backed Sparrow	*Passer flaveolus* Blyth, 1844	Re	Fc	Fc	LC	May 2021	Vp4,Tr2	7/9	B	1-10	Fli, Mo		L	Fe
		33. Estrildidae													
70	Scaly-breasted Munia	*Lonchura punctulata* (Linnaeus, 1758)	Re	Co	Co	LC	May 2021	Vp1,2,4,6,8, Tr1,2,4	21/18	B	0-5	Fli, Mo		L	Fe
71	White-rumped Munia	*Lonchura striata* (Linnaeus, 1766)	Re	Co	Fc	LC	May 2021	Vp4,7	9	B	0-5	Fli, Mo		L	Fe
		34. Motacillidae													
72	Paddyfield Pipit	*Anthus rufulus* (Vieillot, 1818)	Re	Co	Co	LC	May 2021	Vp2,8 Tr1,2,3	24/27	B	0-10	Fli, Mo		L	Fe

APPENDIX G FLORA AND FAUNA SURVEY – JULY 2021

Biodiversity survey report

The Dak Lak Wind Farm Project

6 August 2021

Prepared by Center for Nature Conservation and Development for ERM Vietnam

Document details	
Document title	Biodiversity survey report
Document subtitle	The Dak Lak Wind Farm Project
Date	6 August 2021
Version	1.0
Author	Center for Nature Conservation and Development
Client Name	ERM Vietnam

Document history

Version	Revision	Author	Reviewed by	ERM approval to issue		Comments
				Name	Date	
Draft	1.0	Le Manh Hung, Nguyen Van Luc, Tran Van Bay, Tu Van Chi, Le Duc Hien, Do Dinh Dong, Nguyen Hoang Hao, Nguyen Anh Tuan, Pham Van Thuan, Bui Thanh Tung, La Quang Trung, Lo Van Oanh, Hoang Van Chung, Do Van Truong, and Nguyen Truong Son	Name	Name	06.08.2021	Text

CONTENTS

1. INTRODUCTION 5
1.1 Purpose 5
1.2 Time of Survey 5
1.3 Project's Description 5
1.4 Scope 6

2. SUMMARY OF FIRST SURVEY RESULT 7
2.1 Habitats 7
2.2 Birds 7
2.3 Bats 7

3. DESKTOP REVIEW 8
3.1 Methodology 8
3.2 Areas of Biodiversity Conservation 9
3.3 Knowledge of Biodiversity Values from Literature 13
3.3.1 Non-volant Mammals 13
3.3.2 Birds 16
3.3.3 Bat 18
3.3.4 Reptile and Amphibian Species 21
3.4 Gaps 22
3.4.1 Non-volant Mammals 22
3.4.2 Birds 23
3.4.3 Bat 23
3.4.4 Reptile and Amphibian Species 23

4. METHODOLOGY 24
4.1 Flora Survey 24
4.1.1 Transect Survey 24
4.1.2 Plot Survey 24
4.1.3 Species Identification and Assessment of Priority Species for Conservation 25
4.2 Fauna Surveys 26
4.2.1 Interviews 26
4.2.2 Non-volant Survey 26
4.2.3 Bat Survey 30
4.2.4 Reptile and Amphibian Survey 35
4.2.5 Bird Survey 36

5. RESULT 43
5.1 Results of Flora Surveys 43
5.1.1 Vegetation Types 43
5.1.2 Species Diversity and Life Forms 44
5.1.3 Conservation Significant Species 57
5.1.4 Invasive Species 58
5.2 Results of Fauna Surveys 58
5.2.1 Non-volant Mammals 58
5.2.2 Bats 65
5.2.3 Reptiles and Amphibians 68
5.3 Birds 72
5.3.1 Habitats 72
5.3.2 Results of Surveys 74

6. CONCLUSION 82
6.1 Flora 82

6.2 Non-volant Mammals 82
6.3 Bats 82
6.4 Reptiles and Amphibians 83
6.5 Birds 83

REFERENCES 84

ATTACHMENT A BAT SURVEY FINDING IN DETAIL
ATTACHMENT B BIRD SPECIES RECORDED AT PROJECT AREA (16-18 JULY 2021)
ATTACHMENT C LIST OF RESPONDENTS
ATTACHMENT D QUESTIONAIRES FOR MAMMAL INTERVIEWS
ATTACHMENT E QUESTIONAIRES FOR REPTILE AND AMPHIBIAN INTERVIEWS

List of Tables

Table 3.1 Coordinates of Polygon Used for Data Screening on GBIF 8
Table 3.2 Information of Protected Areas within 50 km Surrounding the Project Site 11
Table 3.3 Some Threatened Mammal Species from Yok Don National Park and Ea So Nature Reserve 13
Table 3.4 Checklist of Bird Species from GBIF 16
Table 3.5 Some Threatened Birds Species from Yok Don National Park and Ea So Nature Reserve 16
Table 3.6 List of Bat Species Recorded in the Area within 50 km Radius from the Project Site 19
Table 3.7 Some Threatened Reptile and Amphibian Species from Yok Don National Park 21
Table 4.1 Summary of Survey Effort for Plant 24
Table 4.2 Summary of Transect Survey Effort for Mammals 27
Table 4.3 Summary of Cage Trap Survey Effort 28
Table 4.4 Summary of Camera Trap Surveying Efforts 29
Table 4.5 Summary of Transect Survey Effort for Bats 30
Table 4.6 Summary of Mist Net Survey Efforts 32
Table 4.7 Summary of Harp Trap Survey Efforts 33
Table 4.8 Reptile and Amphibian Survey Efforts 35
Table 4.9 Coordinates of Vantage Points 37
Table 4.10 Summary of Survey Efforts at VP 39
Table 4.11 Summary of Bird Transect Survey Efforts 41
Table 5.1 The Plant Species Recorded in the Project Area 45
Table 5.2 List of Conservation Significant Species 57
Table 5.3 Possible Mammal Species Recorded from Interviews 59
Table 5.4 List of Mammal Species Recorded along the Transects 61
Table 5.5 List of Bats Recorded within the Project Area 65
Table 5.6 List of Reptiles and Amphibians Recorded in the Project Area 69
Table 5.7 The Comparison of Species Recorded during the Surveys 75
Table 5.8 Number of Species Recorded at the Vantage Points during the First and Second Surveys 75
Table 5.9 Relative Abundance of the Species Recorded at VPs during Two Surveys 76

List of Figures

Figure 1.1 Map of Project Area 5
Figure 3.1 Map of Screening Area for GBIF Data 9
Figure 3.2 Map of Biodiversity Conservation Areas 10
Figure 4.1 Map of Flora Survey 25
Figure 4.2 Map of Interview Locations 26
Figure 4.3 Map of Mammal Survey by Transects 28
Figure 4.4 Map of Cage Trap Locations 29
Figure 4.5 Map of Camera Trap Locations 30

Figure 4.6 Map of Bat Survey Tracks 31
Figure 4.7 Map of Mist Net 33
Figure 4.8 Map of Harp Traps 34
Figure 4.9 Map of Reptile and Amphibian Transect Survey 35
Figure 4.10 Map of Bird Survey by VPs 38
Figure 4.11 Map of Bird Survey by Transects 42
Figure 5.1 Map of Location of the a Smooth-coated Otter Group Reported 58
Figure 5.2 Map of Distribution of Species Recorded from Interviews 61
Figure 5.3 Berdmore's Squirrel was Photographed by One of the Bird Survey Team Members at VP 2 62
Figure 5.4 Berdmore's Squirrel Captured by a Camera Trap 62
Figure 5.5 A Death Cambodian Striped Squirrel (third from right) 63
Figure 5.6 A Female of Pallas's Squirrel was newly Trapped 63
Figure 5.7 The Pallas's Squirrel was Rescued 63
Figure 5.8 The Rattus Nitidus was Kept in a Long Snake Trap and Gave Four Births 64
Figure 5.9 Map of Distribution of Recorded Mammal Species from Field Survey 64
Figure 5.10 Vietnamese Blue-crested Lizard (Calotes bachae) [IUCN LC] were Shot by Sling 65
Figure 5.11 Hill Long-tongued Fruit Bat Macroglobosus Sobrinus 68
Figure 5.12 Species Diversity of the Reptile and Amphibian Families 71
Figure 5.13 The Main Habitats along the Transects 72
Figure 5.14 Habitats around the VP 1 73
Figure 5.15 Habitats around the VP 2 73
Figure 5.16 Habitats around the VP 3 73
Figure 5.17 Habitats around the VP 4 73
Figure 5.18 Habitats around the VP 5 74
Figure 5.19 Habitats around the VP 6 74
Figure 5.20 Habitats around the VP 7 74
Figure 5.21 Habitats around the VP 8 74
Figure 5.22 The Number of Recorded Species at Each VPs (green – survey on May; red – Survey on July 2021) 76
Figure 5.23 The Relative Abundance of Recorded Species of all VPs 76
Figure 5.24 The Majority of the Fly Direction Recorded at Each Vantage Points 77
Figure 5.25 The Number of Recorded Species at Each Transects (green-survey in May; Red – survey in July) 78
Figure 5.26 The Relative Abundance of Recorded Species of all Transects 79
Figure 5.27 Red-breasted Parakeet was Flying Over and Perch the VP No.4 and Transect No.3 80
Figure 5.28 Grey-headed Parakeet at VP No.1 81
Figure 5.29 Annam Prinia was Recorded in the Second Survey 81

Acronyms and Abbreviations

Name	Description
a.s.l	Above sea level
CR	Critically Endangered
CRM	Collision risk model
DARD	Department of Agriculture and Rural Development
EN	Endangered
ESIA	Environmental and Social Impact Assessment
GIBF	Global Biodiversity Information Facility
IBA	Important Bird and Biodiversity Area
IFC	International Finance Corporation
IFC PS6	International Finance Corporation's Guidance Note 6: Biodiversity Conservation and Sustainable (2012)
IUCN	The International Union for Conservation of Nature
IUCN Red List	The International Union for Conservation of Nature's Red List of Threatened Species
SCHA	Species and Habitat Conservation Area
LC	Least Concern
NL	Not Listed
NT	Near Threatened
VP	Vantage points
VRDB	Vietnam Red Data Book
VU	Vulnerable

1. INTRODUCTION

1.1 Purpose

The main purpose of this report is to present the results from the field survey that fauna and flora. This is the second survey within a series of three surveys for the Dak Lak Wind farm project (hereinafter regarded as the Project). The results of these surveys serve for the Environmental and Social Impact Assessment (ESIA) prepared by Environemntal Resrouces Management Vietnam Ltd. (ERM) for the Wind Energy LLC Huadian, following the requirements from International Financial Corporation (IFC) Performance Standard 6 (PS6).

1.2 Time of Survey

The field surveys were undertaken from 16 – 18 July 2021 for birds and bats, and from 16 – 19 July 2021 for flora, non-volant mammals and herpetofauna.

1.3 Project's Description

The Dak Lak Wind Farm Project is composed by 73 wind turbines and generators distributed in four different areas with an individual capacity of 2.65 MW and associated 110 kV substation for connection to the national grid. The wind turbines consist on two types, including the EN-156 type with blade length of 76 and the EN-141 type with 68.8 m blade length. Both types have a hub height of 130m. The Project covers an area of 53.5 km2 on a low hilly topography in the northern part of Krong Buk District of the Dak Lak Province at Vietnam. The geographical coordinates are between 108° 9'54.97" – 108°17'27.36"E and 13° 7'21.18" – 13° 0'19.28"N (WGS 84).

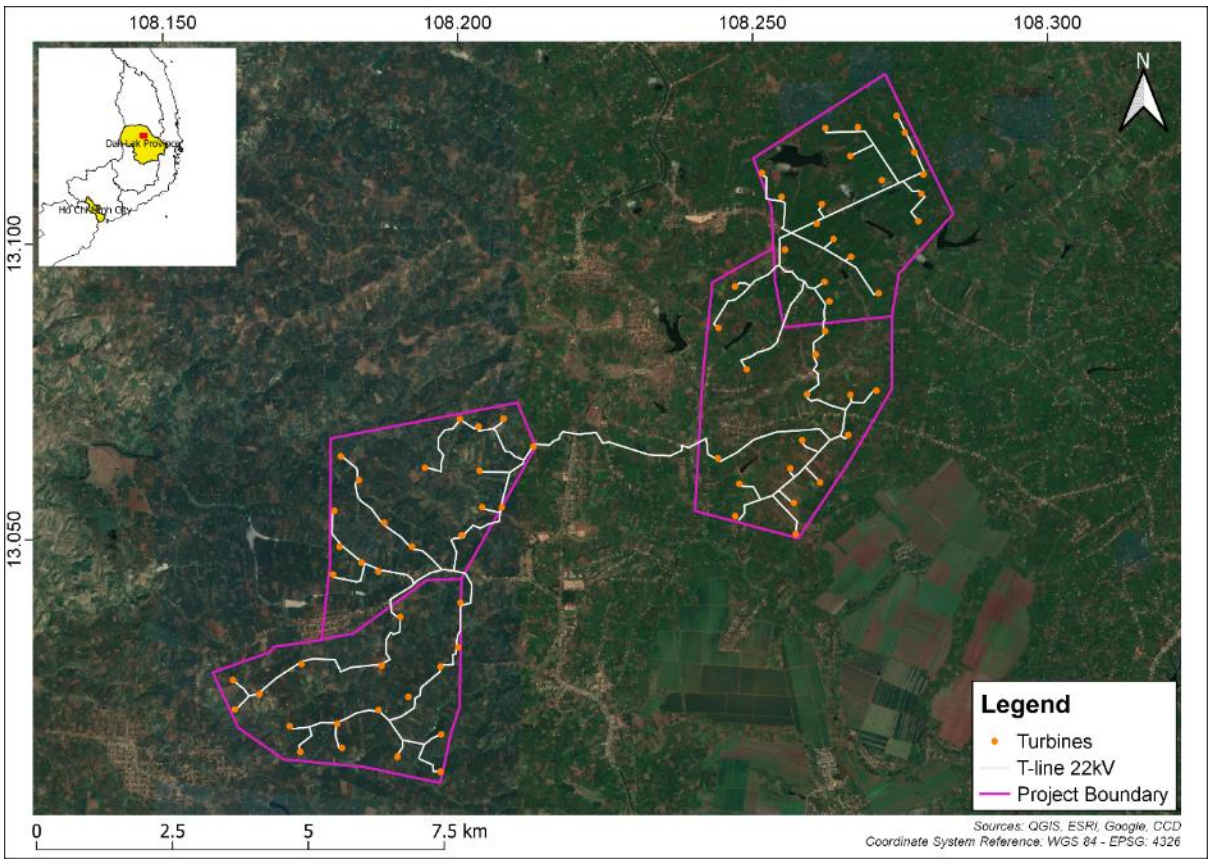


Figure 1.1 Map of Project Area

1.4 Scope

- Collect and review literatures on fauna and flora in the Project area and the radius of 50 km from the Project area.
- Conduct field survey to identify the presence of birds and bats, and their fly bands, habitats within the Project area.
- Conduct survey to identify the presence of non-volant mammals, reptiles and amphibians.
- Conduct field survey to identify the presence of vascular plant species and distribution of natural habitats.

2. SUMMARY OF FIRST SURVEY RESULT

2.1 Habitats

There are no possible existence of biological corridors between the natural protected areas that the Proejct may be located in.

2.2 Birds

- A total of 72 bird species belonging to 15 orders and 34 families have been recorded in the Project area during the first survey. 20 of which are migratory species. Most are IUCN LC species and not listed in VRDB, except for two species, Red-breasted Parakeet and Grey-headed Parakeet, are listed in the IUCN Red List 2021 as Near Threatened.
- One species (Annam Prinia) was recorded as endemic to Vietnam;
- Three species (Germain's Swiftlet, Shikra and Black Kite) appeared flying at Band 2 and were considered to be prone to collision. The Germain's Swiftlet belongs to sky-bird group, while Shikra and Black Kite are under the bird of prey group. These species are fairly common to common in Vietnam or record at low density and rare at the Project area.
- Most of habitats at the Project are modified habitats such as gardens, scrub, clearing, farmland and plantation (e.g. coffee, jackfruit).
- Limitation of the survey is light and heavy rain occurred in two of the three survey days, which probably affected the survey results.

2.3 Bats

- The first survey in the Project area recorded six bat species belonging two families, including one species of Fruit bat (Pteropodidae Family), which is Greater short-nosed fruit bat (*Cynopterus sphinx*), and five species of Vespertilionid bat (Vespertilionidae Falimy), which are Nepallese Whiskered Bat (*Myotis muricola*), Peters's bat (*Myotis* cf. *ater*), Greater Asiatic yellow Bat (*Scotophilus heathii*); Lesser Asiatic Yellow House (*Scotophilus kuhlii*), and Javan Pipistrelle (*Pipistrellus javanicus*);
- None of species are listed as threatened species in the IUCN Red List or the Vietnam Red Data Book;
- The flight range of all recorded bats in the study area is from 3 m to less than 50 m from the ground, under the Band 1 (<50 m), therefore they are not prone to collision;
- The habitats of the survey area are mainly anthropogenic, including fruit trees and industrial crops, suitable for some species of the fruit bat and the vespertilionid bat. However, the habitats are probably changeable under the influence of humans, which may affect the bats in some extent;
- Limitation of the survey is that heavy rain occurred in two of the three survey nights, which probably affected the survey results.

3. DESKTOP REVIEW

3.1 Methodology

Firstly, the survey team identified natural protected areas[1] (or special-use forests[2]) in the range of 50 km radius from the center of the Project. Then, the team contacted management boards to collect reports, publications, data or any references for literature review with the emphasis of non-volant mammals, bat, birds, and reptiles and amphibians. Additionally, researches on scientific databases were also conducted for each protected area to collect biodiversity values.

Secondly, the survey team searched the Project area[3] and its proximities in the Global Biodiversity Information Facility (GIBF) database to make a rectangle screening area[4] that its coordinates of four corners are presented in the Figure 3.1 and Table 3.1. The team ran query of that screening area to download the "Species List" in the CSV data. This type of data was opened and converted to the Excel table for analysis to find if any non-volant mammal, bats, and birds species exists.

Table 3.1 Coordinates of Polygon Used for Data Screening on GBIF

Item	Longitude (WGS 84)	Latitude (WGS 84)
Corner 1	12.96238	108.14587
Corner 2	12.96375	108.30837
Corner 3	13.15784	108.30608
Corner 4	13.15693	108.14129

[1] A Protected Area is a clearly defined geographical space, recognised, dedicated and managed to achieve the long-term conservation of nature, associated ecosystem services and cultural values (Dudley & Stolton, 2008). Under the provisions of IFC PS6, a Protected Area and Internationally Recognized area require specific management actions if development proceeds within the boundary.

[2] Special-use forests shall be mostly used to conserve natural forest ecosystems, genetic resources of forest organisms, carry out scientific research and preserve historical - cultural relics, beliefs, places of scenic beauty associated with ecotourism; hospitality and entertainment except for strictly protected sub-zones of reserve forests; and provide forest environmental services. Special-use forests include (1) National Parks; (2) Nature Reserves; (3) Species and Habitat Conservation Area; (4) Landscape protection areas; and (5) Scientific research and experiment forests (Article 5 of the 2017 Forestry Law of Vietnam).

[3] Project area is the whole development site including locations of turbines, power lines, access tracks, and other ancillary structures.

[4] https://www.gbif.org/occurrence/download/0343186-200613084148143

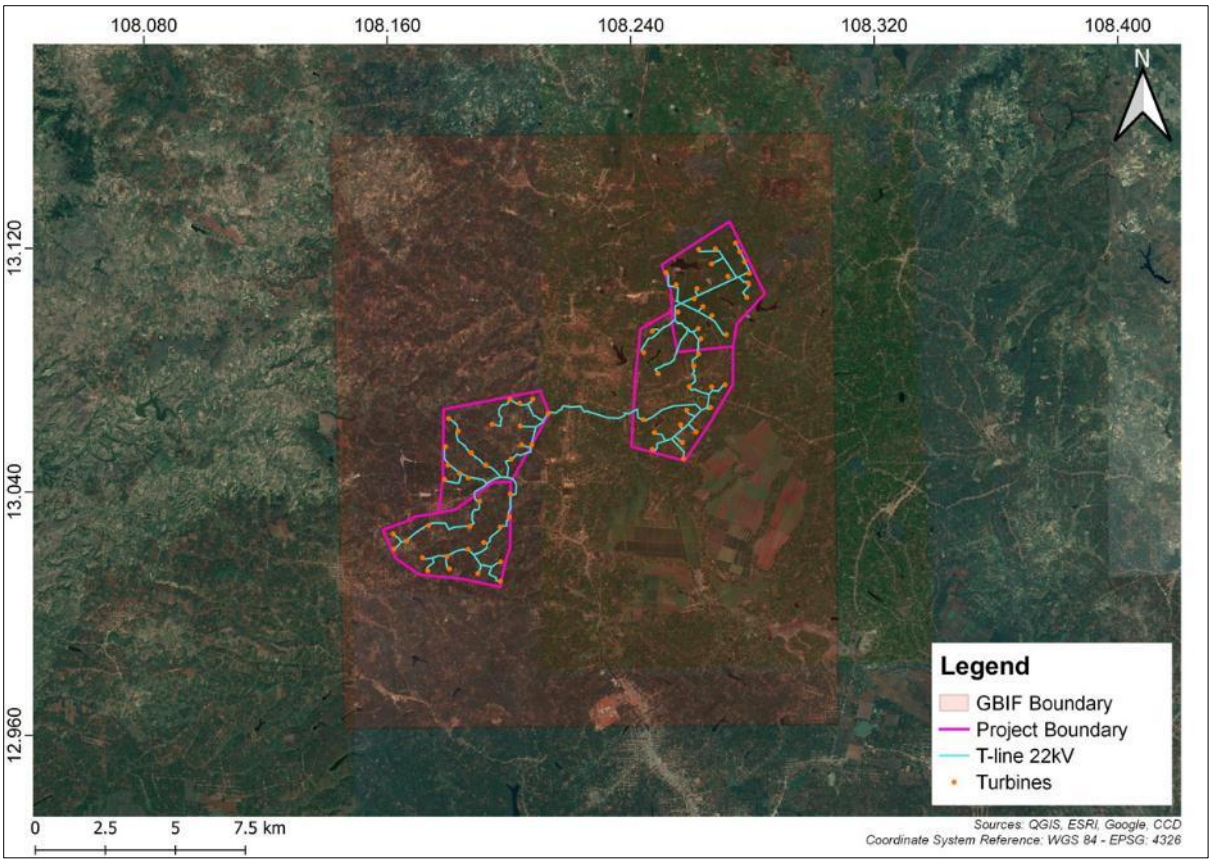


Figure 3.1 Map of Screening Area for GBIF Data

3.2 Areas of Biodiversity Conservation

The Project's development boundaries (also called as Project area), is located in Krong Buk district, which is known as the land of industrial and agricultural crops of the Dak Lak province. It is a low mountainous area with elevation of around 600-700 m a.s.l. The study area includes almost 100% farmlands composed of mainly coffee, pepper, avocado, jackfruit, papaya and acacia with the height of less than 15m. Several artificial lakes and empty land were also found in the survey area. The annual weather includes a dry, cool season from November through March, and a warm, wet season from April through October (Pham-Thanh et al., 2019).

Within a radius of 50 km, there are four protected areas including Ea So Nature Reserve (about 30 km to the east), Yok Don National Park (about 45 km to the west), Trap K'so Species and Habitat Conservation Area (about 10 km to the southeast), and Ea Ral Species and Habitat Conservation Area (about 15 km to the northwest) (see Figure 3.2). Yok Don National Park is the largest protected area amongst other three remaining protected areas. However, a small part of Yok Don National Park is located in the 50 km radius. In contrast, most of the Ea So Nature Reserve lies within the radius of 50 km. The Ea Ral Species and Habitat Conservation Area (SHCA) is smallest with only 50 ha. There are no exsiting corridors between these protected areas (see Figure 3.2).

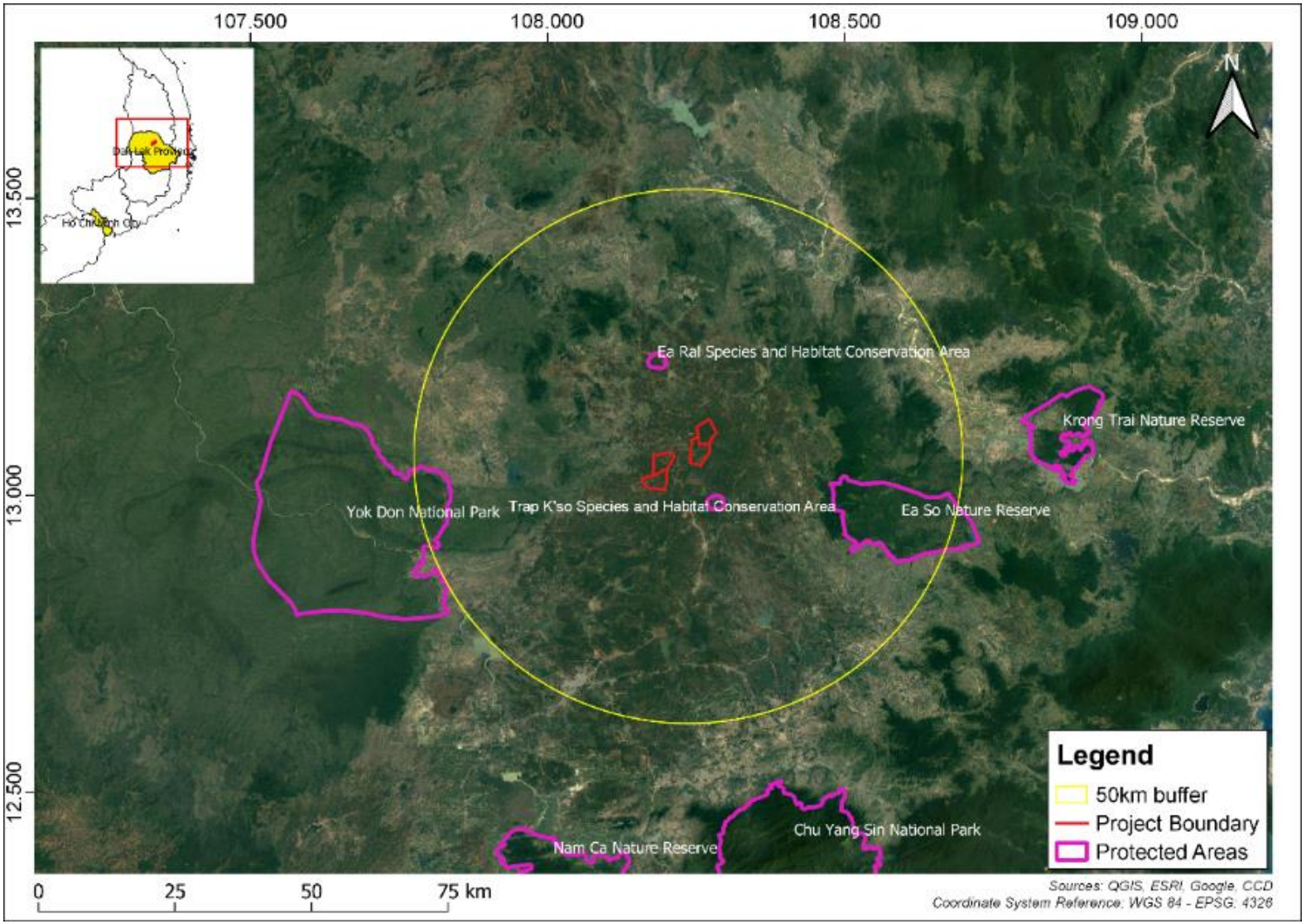


Figure 3.2 Map of Biodiversity Conservation Areas

Table 3.2 Information of Protected Areas within 50 km Surrounding the Project Site

No.	Protected Area	Approximate Distance to Project center (km)	Biodiversity	Other information	References
1	Yok Don National Park	45 km to west	■ 92 mammal species including 15 bat species; ■ 373 bird species (VRDB : 3 CR, 2 EN, 7 VU, 1 NT; IUCN: 3 CR, 3 EN, 2 VU, 14 NT) ■ 112 fish species; ■ 55 reptile and 18 amphibian species (VRDB 2007: 3 CR, 4 EN, 6 VU; IUCN 2021: 1 CR, 1 EN, 6 VU, 2 NT; 02 Endemic species) ■ 1006 plant species.	■ Country: Vietnam ■ Area size: 115,545 ha ■ Type: Special-use Forest ■ Designation: National ■ Status year: 2002 ■ Management Authority: Vietnam Administration of Forestry	(Dang et al., 2008; J. Eames et al., 2004; Eames & Tu, 2002; Krushop, 2013; Lepage, 2021; T. S. Nguyen et al., 2015; V. S. Nguyen, Ho, & Nguyen, 2009; Park, 2021; PAUWELS & GRISMER, 2016; Ruedi, Eger, & Csorba, 2018)
2	Trap Kso Species and Habitat Conservation Area	10 km to south-east	■ Contain 34 individuals of Chinese swamp cypress *(Glyptostrobus pensilis)* [IUCN CR; VRDB CR); ■ No fauna information.	■ Country: Vietnam ■ Area size: 100 ha ■ Type: Special-use Forests ■ Designation: Provincial ■ Status year: 1987 ■ Management Authority: Dak Lak DARD	(International, 2004)
3	Ea Ral Species and Habitat Conservation Area	15 km to north-west	■ Contain 220 individuals of Chinese swamp cypress *(Glyptostrobus pensilis)* [IUCN CR; VRDB CR). ■ No fauna information.	■ Country: Vietnam ■ Area size: 50 ha ■ Type: Special-use Forests ■ Designation: Provincial ■ Status year: 1994	(International, 2004)

No.	Protected Area	Approximate Distance to Project center (km)	Biodiversity	Other information	References
				■ Management Authority: Dak Lak DARD	
4	Ea So Nature Reserve	30 km to east	■ 63 mammal species; ■ 173 bird species, including globally threatened species such as: Green Peafowl *(Pavo muticus)* [IUCN EN; VRDB EN], Pale-capped Pigeon *(Columba punicea)* [IUCN VU; VRDB EN] and Germain's Peacock Pheasant *(Polyplectron germaini)* [IUCN NT; VRDB VU]; ■ 28 reptile species; 15 amphibian species (No endangered/endemic species) ■ 709 plant species.	■ Country: Vietnam ■ Area size: 21,194.9 ha ■ Type: Special-use Forests ■ Designation: Provincial ■ Status year: 2019 ■ Management Authority: Dak Lak DARD	(Reserve, 2019a)

3.3 Knowledge of Biodiversity Values from Literature

3.3.1 Non-volant Mammals

Yok Don national park has a total area of 115,545 ha and is unique place to conserve the largest dry deciduous dipterocarp forest ecosystem in Vietnam. This national park is known to preserve large mammals such as Asian Elephant *(Elephas maximus)* [IUCN VU; VNRB CR], Gaur *(Bos gaurus)* [IUCN VU; VNRB EN], Banteng *(Bos javanicus)* [IUCN EN; VNRB EN], Mainland serow *(Capricornis sumatraensis)* [IUCN VU; VNRB EN], Eld's Deer *(Rucervus eldii)* [IUCN EN; VNRB EN], in Vietnam. Mammal diversity of the Yok Don national park is very high with 92 species. 27 species (25 species are threatened under the IUCN Red List and 26 species are threatened under VNRB 2007

Ea So nature reserve has 63 mammal species[5]; 20 of them are threatened under the IUCN Red List and VNRB 2007 (see Table 3.3) especially the reserve is processing populations of Gaur *(Bos gaurus)* [IUCN VU; VNRB EN] and Banteng *(Bos javanicus)* [IUCN EN; VNRB EN].

Table 3.3 Some Threatened Mammal Species from Yok Don National Park and Ea So Nature Reserve

No	Common name	Scientific name	IUCN	VRDB	Remarks
I	**Yok Don National Park**				
1	Pygmy Slow Loris	*Nycticebus pygmaeus*	EN	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
2	Buff-cheeked Gibbon	*Nomascus gabriellae*	EN	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
3	Indochinese Silvered Langur	*Trachypithecus germaini*	EN	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
4	Black-shanked Douc Langur	*Pygathrix nigripes*	CR	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
5	Common Long-tailed Macaque	*Macaca fascicularis*	VU	LR	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
6	Northern Pig-tailed Macaque	*Macaca leonina*	VU	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
7	Stump-tailed Macaque	*Macaca arctoides*	VU	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
8	Sunda Pangolin	*Manis javanica*	CR	EN	Likely to occur in this area because the species live in secondary forests and cultivated areas (Francis, 2008).
9	Dhole	*Cuon alpinus*	EN	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
10	Sun Bear	*Helarctos malayanus*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable

[5] http://khubttneaso.org.vn/index.php/dong-vat

No	Common name	Scientific name	IUCN	VRDB	Remarks
11	Asiatic Black Bear	*Ursus thibetanus*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
12	Smooth-coated Otter	*Lutrogale perspicillata*	VU	EN	Likely to occur in this area because there are many brooks, ponds and lakes that are suitable habitats for the species (WWF, 2000).
13	Asian Small-clawed Otter	*Aonyx cinereus*	VU	VU	Likely to occur in this area because there are many brooks, ponds and lakes that are suitable habitats for the species (WWF, 2000).
14	Large-spotted Civet	*Viverra megaspila*	EN	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
15	Binturong	*Arctictis binturong*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
16	Fishing Cat	*Prionailurus viverrinus*	VU	EN	Likely to occur in the Project area because there are water bodies that are suitable habitats for the species
17	Asiatic Golden Cat	*Catopuma temminckii*	NT	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
18	Leopard	*Panthera pardus*	VU	CR	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
19	Clouded Leopard	*Neofelis nebulosa*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
20	Indochinese tiger	*Panthera tigris corbetti*	EN	CR	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
21	Asian Elephant	*Elephas maximus*	VU	CR	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
22	Gaur	*Bos gaurus*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
23	Banteng	*Bos javanicus*	EN	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
24	Mainland serow	*Capricornis sumatraensis*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
25	Eld's Deer	*Rucervus eldii*	EN	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
26	Southern Red Muntjac	*Muntiacus muntjak*	LC	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
27	Indian Giant Flying Squirrel	*Petaurista philippensis*	LC	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable

No	Common name	Scientific name	IUCN	VRDB	Remarks
II	**EA So Nature Reserve**				
1	Pygmy Slow Loris	*Nycticebus pygmaeus*	EN	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
2	Black-shanked Douc Langur	*Pygathrix nigripes*	CR	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
3	Northern Pig-tailed Macaque	*Macaca leonina*	VU	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
4	Stump-tailed Macaque	*Macaca arctoides*	VU	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
5	Dhole	*Cuon alpinus*	EN	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
6	Sun Bear	*Helarctos malayanus*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
7	Asiatic Black Bear	*Ursus thibetanus*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
8	Clouded Leopard	*Neofelis nebulosa*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
9	Marbled Cat	*Pardofelis marmorata*	NT	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
10	Large-spotted Civet	*Viverra megaspila*	EN	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
11	Binturong	*Arctictis binturong*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
12	Sunda Pangolin	*Manis javanica*	CR	EN	Likely to occur in this area because the species live in secondary forests and cultivated areas (Francis, 2008).
13	Smooth-coated Otter	*Lutrogale perspicillata*	VU	EN	Likely to occur in this area because there are many brooks, ponds and lakes that are suitable habitats for the species (WWF, 2000).
14	Asian Small-clawed Otter	*Aonyx cinerea*	VU	VU	Likely to occur in this area because there are many brooks, ponds and lakes that are suitable habitats for the species (WWF, 2000).
15	Hog deer	*Axis porcinus*	EN	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
16	Large-antlered Muntjac	*Megamuntiacus vuquangensis*	CR	VU	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
17	Eld's Deer	*Rucervus eldii*	EN	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable

No	Common name	Scientific name	IUCN	VRDB	Remarks
18	Banteng	*Bos javanicus*	EN	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
19	Gaur	*Bos gaurus*	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable
20	Mainland serow	Capricornis sumatraensis	VU	EN	Unlikely to occur in Project area because habitat of agricultural crop is not suitable

Analysis of the screening area GBIF data indicated that there are 67 species of plants and animals, of which, 59 species are plant, seven bird species and only one mammal species *Sus cristatus* [IUCN NL; VNRD NL]. No reptile or amphibian species were recorded in the screening area from the GBIF database.

3.3.2 Birds

There were limited official avifauna publicly records at the nearby Project area. 173 bird species were recorded at Ea So Nature Reserve (Ea So Nature Reserve, 2019); 373 bird species were recorded at Yok Don National Park (Park, 2021). No fauna information was found at the two SHCAs of Trap K'so and Ea Ral.

There were seven bird species found in the screening area on GIBF database (see Table 3.4).

Table 3.4 Checklist of Bird Species from GBIF

No	Scientific name	Common name	IUCN	VRDB	Number of occurrences
1	*Pericrocotus cinnamomeus* (Linnaeus, 1766)	Small Minivet	LC	NL	1
2	*Prinia rufescens* Blyth, 1847	Rufescent Prinia	LC	NL	1
3	*Picus erythropygius* (Elliot, 1865)	Black-headed Woodpecker	LC	NL	1
4	*Prinia hodgsonii* Blyth, 1844	Gray-breasted Prinia	LC	NL	4
5	*Cacomantis merulinus* (Scopoli, 1786)	Plaintive Cuckoo	LC	NL	2
6	*Spilornis cheela* (Latham, 1790)	Crested Serpent Eagle	LC	NL	1
7	*Dendrocitta vagabunda* (Latham, 1790)	Rufous Treepie	LC	NL	1

Table 3.5 Some Threatened Birds Species from Yok Don National Park and Ea So Nature Reserve

No	Scientific name	Common name	IUCN	VRDR	Remarks
	York Don National Park				

No	Scientific name	Common name	IUCN	VRDR	Remarks
1	*Pseudibis davisoni*	White-shouldered ibis	CR	CR	Not recorded - no suitable habitats at the project areas
2	*Gyps bengalensis*	White-rumped Vulture	CR	CR	Not recorded - no suitable habitats at the project areas
3	*Pseudibis gigantea*	Giant Ibis	CR	DD	Not recorded - no suitable habitats at the project areas
4	*Cairina scutulata*	White-winged Duck	EN	CR	Not recorded - no suitable habitats at the project areas
5	*Pavo muticus*	Green Peafowl	EN	EN	Not recorded - no suitable habitats at the project areas
6	*Heliopais personatus*	Masked Finfoot	EN	EN	Not recorded - no suitable habitats at the project areas
7	*Ciconia episcopus*	Woolly-necked Stork	NT	VU	Not recorded - no suitable habitats at the project areas
8	*Ephippiorhynchus asiaticus*	Black-necked stork	NT	DD	Not recorded - no suitable habitats at the project areas
9	*Polihierax insignis*	White-rumped Falcon	NT	NT	Not recorded - no suitable habitats at the project areas
10	*Icthyophaga humilis*	Lesser Fish Eagle	NT	VU	Not recorded - no suitable habitats at the project areas
11	*Haliaeetus ichthyaetus*	Gray-headed Fish-Eagle	NT	VU	Not recorded - no suitable habitats at the project areas
12	*Buceros bicornis*	Great Hornbill	NT	VU	Not recorded - no suitable habitats at the project areas
13	*Anorrhinus austeni*	Austen's Brown Hornbill	NT	VU	Not recorded - no suitable habitats at the project areas
14	*Anhinga melanogaster*	Oriental Darter	NT	N/A	Not recorded - no suitable habitats at the project areas (ponds are two small)
15	*Mulleripicus pulverulentus*	Great Slaty Woodpecker	NT	N/A	Not recorded - no suitable habitats at the project areas
16	*Psittacula eupatria*	Alexandrine Parakeet	NT	N/A	Not recorded - no suitable habitats at the project areas
17	*Psittacula roseata*	Blossom-headed Parakeet	NT	N/A	Recorded
18	*Psittacula alexandri*	Red-breasted Parakeet	NT	N/A	Not recorded - no suitable habitats at the project areas

No	Scientific name	Common name	IUCN	VRDR	Remarks
19	*Ploceus hypoxanthus*	Asian Golden Weaver	NT	N/A	Not recorded - no suitable habitats at the project areas
20	*Motacilla samveasnae*	Mekong Wagtail	NT	N/A	Not recorded - no suitable habitats at the project areas
21	*Antigone antigone*	Sarus Crane	VU	VU	Not recorded - no suitable habitats at the project areas
22	*Leptoptilos javanicus*	Lesser Adjutant Stork	VU	VU	Not recorded - no suitable habitats at the project areas
	Ea So Nature Reserve				
1	*Pavo muticus*	Green Peafowl	EN	EN	Not recorded - no suitable habitats at the project areas
2	*Columba punicea*	Pale-capped Pigeon	VU	VU	Not recorded - no suitable habitats at the project areas
3	*Sarcogyps calvus*	Red-headed Vulture	CR		Not recorded - no suitable habitats at the project areas
4	*Polyplectron germaini*	Germain's Peacock-pheasant	NT	NT	Not recorded - no suitable habitats at the project areas

3.3.3 Bat

Results of desktop review on literature and GBIF so far show that 72 bat species have been recorded in the Central Highlands. There are six new species and new subspecies for science, three firstly recorded for Vietnam, 12 species firstly recorded for Central Highlands and four species on the IUCN Red List including Dalat Tube-nosed Bat *(Murina harpioloides)* [IUCN EN; VRDB None Listed], Griffin's Leaf-nosed Bat *(Hipposideros griffin)* [IUCN NT; VRDB None Listed]; Tail-less Leaf-nosed Bat *(Coelops frithii)* [IUCN NT; VRDB None Listed], Beelzebub Tube-nosed Bat *(Murina Beelzebub)* [IUCN DD; VRDB None Listed].

However, none of those endagered species found in the Central Highlgands have been recorded within the radius of 50 km from the Project site. There are 15 species found from desktop survey, most of which is LC (see Table 3.6) and recorded in Yok Don National Park. There was not any information on bats found for other protected areas besides Yok Don. Among the 15 species, there was one DD species - Walston's tube-nosed bat (*Murina walstoni)* (VRDB NL) and one NT species - Painted Bat *Kerivoula picta* (VRDB NL).

Table 3.6 List of Bat Species Recorded in the Area within 50 km Radius from the Project Site

No	Scientific name	Common name	IUCN	VRDBB	Taxonomic notes	Source	Locality
1	*Cynopterus sphinx*	Greater short-nosed fruit bat	LC	NL		■ Nguyen Truong Son et al. 2021 ■ Le Vu Khoi et al. 2007 ■ Nguyen Truong Son, Vu Dinh Thong, 2011 ■ Kruskop, 2017 ■ Dang Ngoc Can et al. 2008 ■ Kruskop 2013	■ Lam Dong (Bi Dup-Nui Ba NP) ■ Dak Lak (Chu Yang Sin NP) ■ Kon Tum (Chu Mom Ray NP) ■ Gia Lai (Kon Ka Kinh NP) ■ Dak Lak (Yok Don NP)
2	*Cynopterus brachyotis*	Lesser short-nosed fruit bat	LC	NL	Common species	■ Kruskop 2013	■ Dak Lak (Yok Don NP)
3	*Megaderma spasma*	Lesser false vampire bat	LC	NL	Common species	■ Kruskop 2013 ■ Kruskop 2017	■ Dak Lak (Yok Don) ■ Kon Tum (Chu Mom Ray NP) ■ Gia Lai (Kon Ka Kinh)
4	*Rhinolophus chaseli*	Indochinese Horseshoe Bat	LC	NL	Common species	■ Nguyen Truong Son, ■ Vu Dinh Thong, 2011 ■ Kruskop 2013	■ Kon Tum (Chu Mom Ray NP) ■ Dak Lak (Yok Don NP)
5	*Hipposideros larvatus*	Intermediate leaf-nosed bat	LC	NL	Common species	■ Nguyen Truong Son, Vu Dinh Thong, 2011 ■ Kruskop 2013	■ Kon Tum (Chu Mom Ray NP) ■ Dak Lak (Yok Don NP) ■ Lam Dong (Chu Yang Sin NP)
6	*Cassistrellus yokdonensis*		NL	NL	New species for science	■ Ruedi et al. 2018	■ Dak Lak (Yok Don NP)
7	*Hesperoptenus tickelli*	Tickell's bat	LC	NL	First recorded for Central Highland	■ Kruskop 2013 ■ Hendrichsen et al. 2001	■ Dak Lak (Yok Don NP) ■ Gia Lai (Kon Cha Rang NR)

No	Scientific name	Common name	IUCN	VRDBB	Taxonomic notes	Source	Locality
8	*Scotophilus kuhlii*	Lesser Asiatic yellow bat	LC	NL	Common species	■ Kruskop 2013 ■ Dang Ngoc Can et al. 2008	■ Dak Lak (Yok Don NP) ■ Kon Tum ■ Gia Lai ■ Lam Dong
9	*Myotis ater*	Peters's myotis	LC	NL	Common species	■ Nguyen Truong Son et al. 2021 ■ Kruskop 2013 ■ Kruskop 2017	■ Lam Dong (Bi Dup-Nui Ba NP) ■ Dak Lak (Yok Don NP) ■ Lam Dong (Cat Loc Dis.) ■ Gia Lai (Kon Ka Kinh NR)
10	*Myotis muricola*	Wall-roosting mouse-eared bat	LC	NL	Common species	■ Abramov et al. 2009 ■ Kruskop 2013 ■ Kruskop 2017	■ Lam Dong (Da Lat Plateau) ■ Lam Dong (Bao Loc Dis.) ■ Dak Lak (Yok Don NP) ■ Gia Lai (Kon Cha Rang NR, Kon Ka Kinh NR)
11	*Pipistrellus javanicus*	Java pipistrelle	LC	NL	Common species	■ Kruskop 2013 ■ Kruskop 2017	■ Dak Lak (Yok Don NP) ■ Gia Lai (Kon Cha Rang NR, Kon Ka Kinh NR)
12	*Pipistrellus paterculus*	Mount Popa pipistrelle	LC	NL	Common species	■ Kruskop 2013	■ Dak Lak (Yok Don NP)
13	*Pipistrellus tenuis*	Least pipistrelle	LC	NL	Common species	■ Kruskop 2013	■ Dak Lak (Yok Don NP)
14	*Murina walstoni*	Walston's tube-nosed bat	DD	NL	New species for science	■ Csorba et al. 2011 ■ Nguyen Truong Son et al. 2015	■ Dak Lak (Yok Don NP)
15	*Kerivoula picta*	Painted bat	NT	NL	Rare species in the Central Highlands	■ Kruskop 2013	■ Dak Lak (Yok Don NP)

3.3.4 Reptile and Amphibian Species

There were limited official herpetofauna records from the nearby Project area. A total of 28 reptile species and 15 amphibian species (No endangered/endemic species) were recorded at Ea So Nature Reserve (Reserve, 2019b). A total of 55 species of reptiles and 18 species of amphibians have been recorded from York Don National Park. which includes 18 species are globally or nationally threatened at different levels. Red Data Book of Vietnam (2007): 13 species, with three species as CR, four species as EN, and six species as VU. IUCN Red List (2021): 10 species, with one species as CR, one species as EN, six species as VU, and two species as NT. Endemism: two species are currently known only from Vietnam (see Table 3.7).

(V. S. Nguyen et al., 2009)No reptile species and amphibian species information were found at the two SHCAs of Trap K'so and Ea Ral.

Table 3.7 Some Threatened Reptile and Amphibian Species from Yok Don National Park

No.	Scientific name	Common name	IUCN	VRDB	Endemic	Remarks
1.	*Ichthyophis nguyenorum*	Nguyen's Caecilia			+	Likely to occur in this area because the species live in secondary forests and cultivated areas
2.	*Glyphoglossus molossus*	Blunt-headed Balloon Frog	NT			Likely to occur in this area because the species live in secondary forests and cultivated areas
3.	*Kaloula mediolineata*	Middle Back-stripe Bullfrog	NT			Likely to occur in this area because the species live in secondary forests and cultivated areas
4.	*Nanohyla annamensis*	Vietnam Rice Frog	VU			Likely to occur in this area because the species live in secondary forests and cultivated areas
5.	*Calotes bachae*	Vietnamese blue-crested Lizard			+	Likely to occur in this area because the species live in secondary forests and cultivated areas
6.	*Physignathus cocincinus*	Chinese Water Dragon	VU	VU		Unlikely to occur in Project area because habitat of agricultural crop is not suitable
7.	*Gekko gecko*	Tokay Gecko		VU		Likely to occur in this area because the species live in secondary forests and cultivated areas
8.	*Varanus nebulosus*	Clouded Monitor		EN		Unlikely to occur in Project area because habitat of agricultural crop is not suitable
9.	*Varanus salvator*	Common Water Monitor		EN		Unlikely to occur in Project area because habitat of agricultural crop is not suitable

No.	Scientific name	Common name	IUCN	VRDB	Endemic	Remarks
10.	*Python bivittatus*	Burmese Python	VU	CR		Unlikely to occur in Project area because habitat of agricultural crop is not suitable
11.	*Malayopython reticulatus*	Reticulated Python		CR		Unlikely to occur in Project area because habitat of agricultural crop is not suitable
12.	*Coelognathus radiatus*	Radiated Ratsnakes		VU		Likely to occur in this area because the species live in secondary forests and cultivated areas
13.	*Ptyas korros*	Indo-Chinese Rat Snake		EN		Likely to occur in this area because the species live in secondary forests and cultivated areas
14.	*Naja siamensis*	Indo-Chinese Spitting Cobra	EN	VU		Likely to occur in this area because the species live in secondary forests and cultivated areas
15.	*Ophiophagus hannah*	King Cobra	VU	CR		Likely to occur in this area because the species live in secondary forests and cultivated areas
16.	*Indotestudo elongata*	Elongated Tortoise	CR	EN		Unlikely to occur in Project area because habitat of agricultural crop is not suitable
17.	*Manouria impressa*	Impressed Tortoise	VU	VU		Unlikely to occur in Project area because habitat of agricultural crop is not suitable
18.	*Amyda cartilaginea*	Asiatic Softshell Turtle	VU	VU		Unlikely to occur in Project area because habitat of agricultural crop is not suitable

3.4 Gaps

3.4.1 Non-volant Mammals

The Project area is located in a modified habitat, in which industrial and agricultural cropping practices are prevalant. There have not been any public mammal studies in the Project area before. Some potential species that maybe present in the Project area from desktop review include small mammals such as squirrels, tree shrews, rats, civets, cats and even otters because there are many brooks, natural and manmade ponds and lakes. Many of which could include species of conversation concern.

As part of ESIA for the Dak Lak wind farm project, it is necessary to conduct non-volant mammal surveys to understand the mammalian fauna and their conservation status and establish a database for the project.

3.4.2 Birds

There were limited surveys of avifauna at the nearby Project area. Data collected from GIBF database for the Project area and its vicinity indicated that only seven bird species could be found from there (Facility, 2021). No bird information was found at the two SHCAs of Trap K'so and Ea Ral which are very close to the Project area.

As part of ESIA for the Dak Lak wind farm project, it is necessary to conduct the avifauna where 73 wind turbines are going to be installed.

3.4.3 Bat

Dak Lak is one of the provinces in the Central Highlands that is assessed to have high biodiversity (Eames et al., 2004; BirdLife International, 2010; Birdlife International, 2004; Duckworth & Hedges, 1998; Birdlife International, 2004; Pham et al., 1990)

However, there was little studies on bats (volant mammals) in the Dak Lak province. Yok Don National Park recorded 15 bat species (Dang et al., 2008; Eames et al., 2004; Krushop, 2013; Nguyen et al., 2015; Ruedi et al., 2018). No assessment of bat diversity in Trap Kso and Ea Ral Habitat Conservation Areas, Ea So Nature Reserve and Krong Buk district were available, where the Dak Lak Wind Farm Project is going to develop. Data collected from Global Biodiversity Information Facility (2021) for Krong Buk area does not contain bat data.

3.4.4 Reptile and Amphibian Species

There are no reports of reptile and amphibian species found in the Project area on GIBF database. A total of 55 species of reptiles and 18 species of amphibians have been recorded from York Don National Park (Jonathan et al. 2002, Nguyen et al. 2009). A total of 28 species of reptiles and 15 species of amphibians have been recorded from Ea So Nature Reserve (Reserve, 2019a). The Trap K'so and Ea Ral SHCAs are very close to the Project area with distance about 10 to 15 km, but also no information is available on reptiles and amphibians. Therefore, it needs to survey the herpetofauna of the Krong Buk District before the construction of the Dak Lak Wind Farm Project.

4. METHODOLOGY

4.1 Flora Survey

4.1.1 Transect Survey

The flora survey team established transects crossing the Project area. On each transect, the survey team walked around and observed 10 m on both sides of the transect to gather botanical plant information, including species name, geographical coordinates, plant form, and photography (if needed). Specimens may also be collected for later species identification.

Total four transects of 22.71 km (see Table 4.1 and Figure 4.1) were surveyed within the Project area to record the presence of vascular plant species. These transects went through different habitat types including secondary forests, shrubs, herbs, and along the coffee, pepper, avocado, cashew, and durian plantations (see Figure 4.1).

Table 4.1 Summary of Survey Effort for Plant

No.	Transect ID	Date	Transect length (km)
1	T1	16/07/2021	5.9
2	T2	17/07/2021	3.94
3	T3	18/07/2021	7.99
4	T4	19/07/2021	4.84
	Total		22.71

4.1.2 Plot Survey

Plots were randomly established to measure plant diversity. The survey team set up four plots with an area of 1,000 m_2 (40m x 25 m)/plot based on the actual situation of the Project site (Thai, 1978).Sample plots were located in the secondary forests and coffee, pepper, avocado, cashew, and durian plantations (see Figure 4.1).

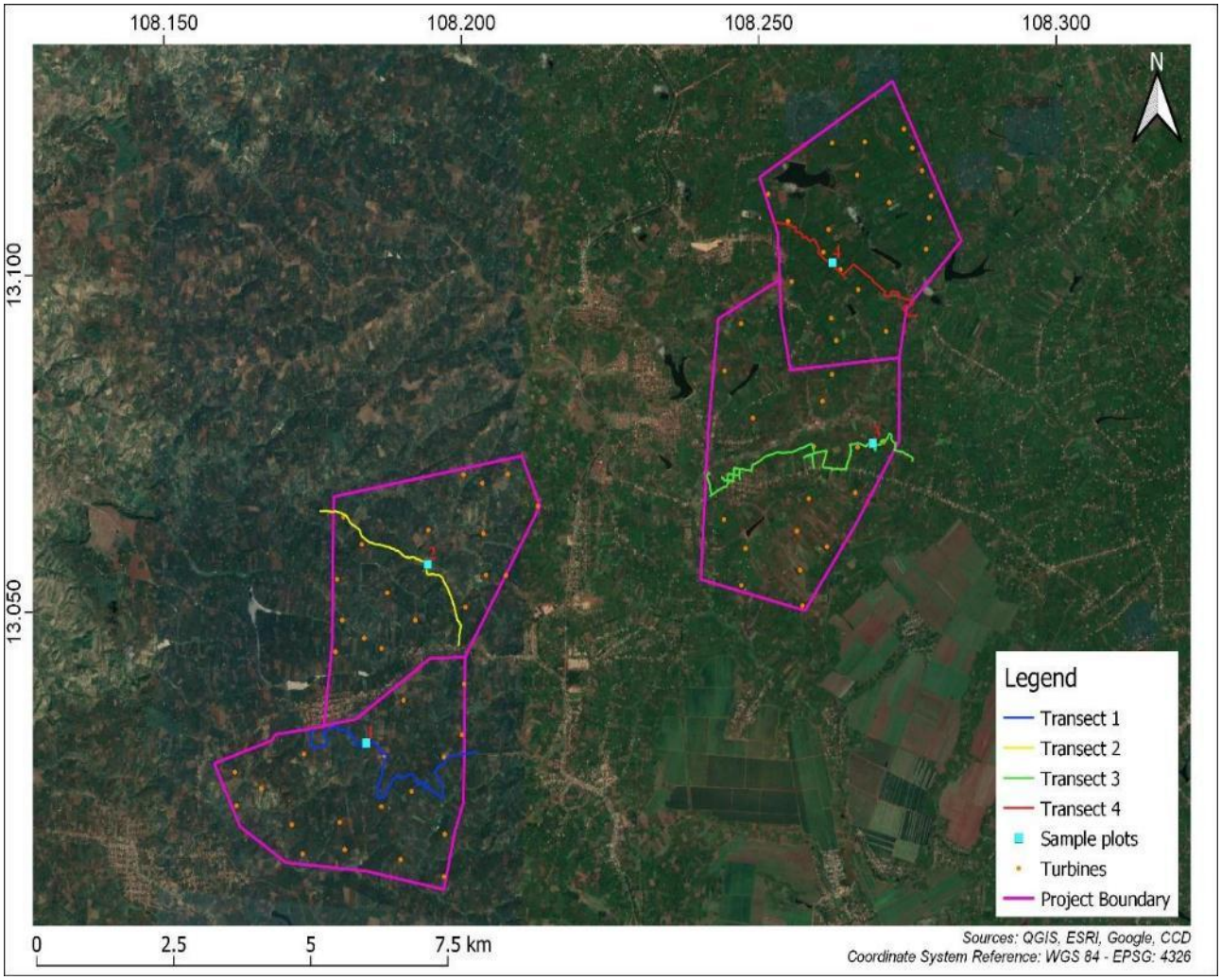


Figure 4.1 Map of Flora Survey

4.1.3 Species Identification and Assessment of Priority Species for Conservation

- The plant survey team identified species based on literature of “An illustrated flora of Vietnam” (Pham, 1999), Floras of Vietnam, Floras of China, Floras of Thailand, and other surrounding countries.
- The plant survey team built the list of plant of the surveyed areas based on the Angiosperm Phylogeny Group IV system (Chase et al., 2016).
- The plant survey team assessed the species conservation status and prioritized conservation-significant species following the IUCN Red List of Threatened Species (2021), Vietnam Red Data Book (2007).
- Invasive plant species were assessed following Decision 35/2018/TT-BTNMT of the Ministry of Natura Resources and Environment, Vietnam
- The plant survey team also determined the diversity of life forms (Nghia, 2007; Thai, 1978).
- Vietnamese species names were adjusted according to Checklist of Plant Species of Vietnam (Ban, 2005).
- Scientific names were also corrected following https://www.ipni.org/

4.2 Fauna Surveys

4.2.1 Interviews

Semi-structured interviews were carried out with 11 local people (see Attachment D and Attachment E) living in the Project area to understand the fauna (see Figure 4.2). The interviews were mainly taken on 15 July 2021.

The interviews went through the following steps. Firstly, the respondents were asked to name all the mammals (including volant and non-volant mammals, and reptiles and amphibians) living in the Project area. Secondly, they were then asked to describe the animals in detail to check species identity. Thirdly, pictures of mammals (Francis, 2008) (WWF, 2000), and reptiles and amphibians (documented in photo sheets) were shown to the respondents in order to check and confirm species of report (see Attachment E). Fourthly, mammal and herpetological species that are possibly distributed in the site were also asked if they were not mentioned by the informants. Lastly, locations and the last time of observation were also asked and recorded.

It is noted that many adult people were away from home during the day to work in the fields. Hence, it was difficult to meet them to have interviews. Five people interviewed without recorded any information relating to the fauna were not included in this report.

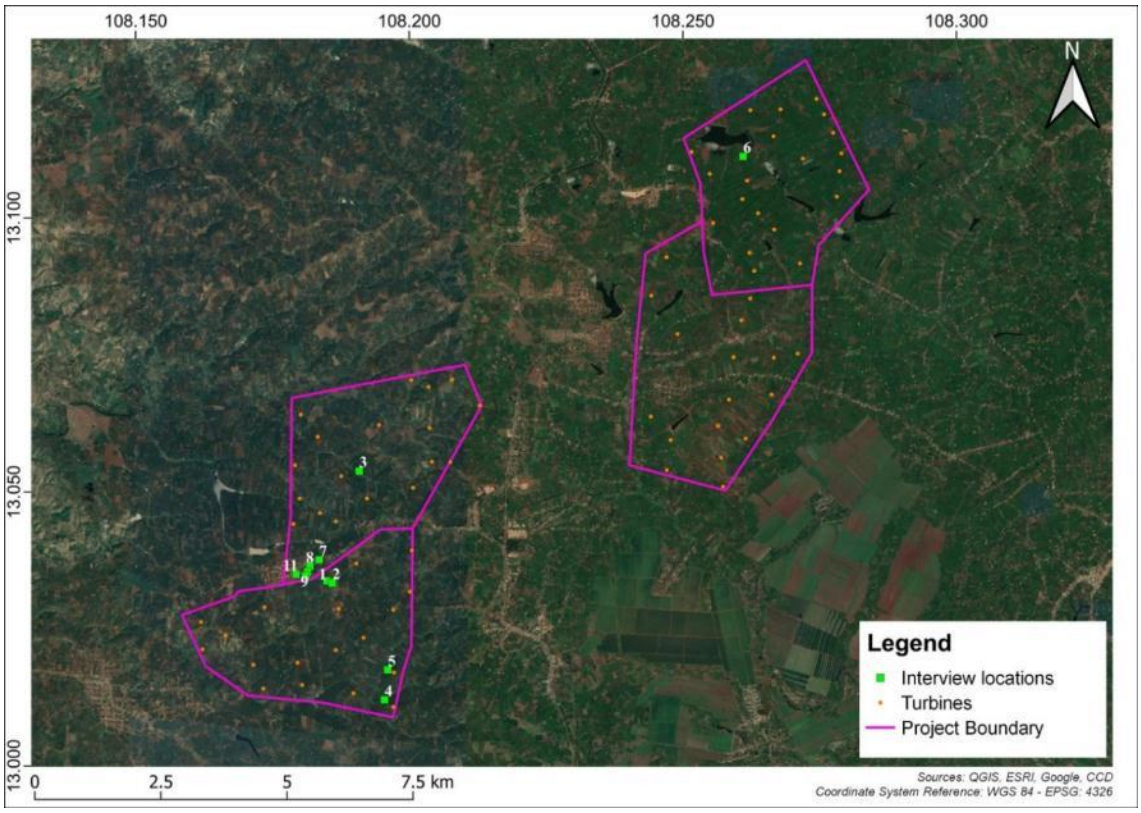


Figure 4.2 Map of Interview Locations

4.2.2 Non-volant Survey

The mammal field work was officially conducted from 16 – 19 July 2021, between from 6:00 to 18:00. Detail of the survey time was presented below. A field guide to the mammals of South-East Asia (Francis, 2008) and the Introduction of mammals of Indochina and Thailand (WWF, 2000) was used for mammal identification. A GPS Garmin 62S machine and a smart phone apps named as “Locus Map” (https://www.locusmap.app) were used to record tracks and points/locations.

In addition, mammal records such as photos and samples from the other survey teams (bat, bird, reptile and amphibian, and plant teams) in previous survey (23 – 25 May 2021) and this survey were also taken into consideration for analysis.

4.2.2.1 Transect Survey

The survey team conducted four uprepeated transect walks with a total of 76.4 km in nearly 40 hours to cover the main habitats in the Project area. The survey team observed animals about 30m on both sides of the transects. Below is the survey effort of the four transect surveys for non-volant mammals (see Table 4.2 and Figure 4.3).

Table 4.2 Summary of Transect Survey Effort for Mammals

Track	Survey date	Time of survey	Transect length (Km)	Survey effort (hours)	Habitat	Remark
Mammal transect 1	16/7/2021	08:20 – 17:45	33.6	09.42	Mainly coffee field mixed with fruit trees, a big manmade lakes and several natural brooks and pools.	The local guide hired on 15 July dropped, then the survey team had to find another one
Mammal transect 2	17/7/2021	06:39 – 16:55	9.6	10.27	Grasslands and shrubs at the beginning of the transect, the remainings are coffee field and fruit trees.	Intermittent light rain and alternating with sunshine.
Mammal transect 3	18/7/2021	08:30 – 16:54	10.1	08.40	Coffee field, fruit trees, rice field, brooks, and ponds.	Heavy rain and dense fog in the early morning making the survey team started late. Intermittent moderate rain all day.
Mammal transect 4	19/7/2021	05:25 – 17:01	23.1	11.60	Mainly coffee field and fruit trees. Some artificial ponds and lakes were found.	Intermittent moderate rain all day rain from middle of the day and carried on the entire afternoon
Total			**76.4**	**39.68**		

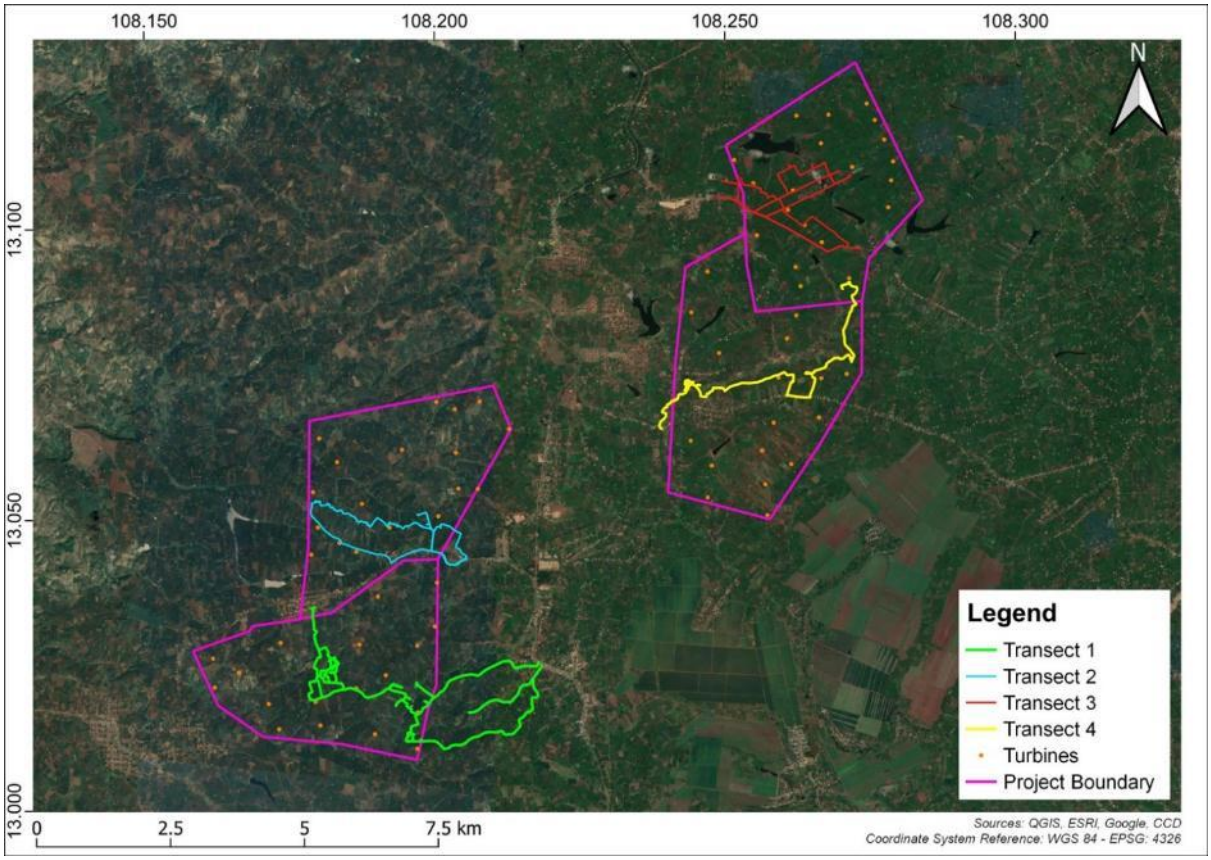


Figure 4.3 Map of Mammal Survey by Transects

4.2.2.1 Cage Trap

The survey team set up eight cage traps in the two sites of Alpha and Beta of the Project area with a total of 311 hours to detect mammals (see Table 4.3 and Figure 4.4). Cage traps were baited with dry fishes.

Table 4.3 Summary of Cage Trap Survey Effort

Name	Set-up date & time	Retrieval date & time	Duration (hours)	Limitation
Cage trap 1	15:26, 15.7.2021	09:58, 16.7.2021	18.43	Intermittent moderate rain, especially on 18 and 19 July 2021, affected the survey results because small mammals did not active during rain
Cage trap 2	15:34, 15.7.2021	09:45, 16.7.2021	18.18	
Cage trap 3	15:44, 15.7.2021	09:50, 16.7.2021	18.10	
Cage trap 4	14:45, 16.7.2021	11:25, 20.7.2021	92.67	
Cage trap 5	16:55, 18.7.2021	08:54, 19.7.2021	15.98	
Cage trap 6	16:50, 18.7.2021	08:47, 19.7.2021	15.95	
Cage trap 7	16:25, 17.7.2021	10:10, 20.7.2021	65.75	
Cage trap 8	15:44, 17.7.2021	09:40, 20.7.2021	65.93	
Total			**311.00**	

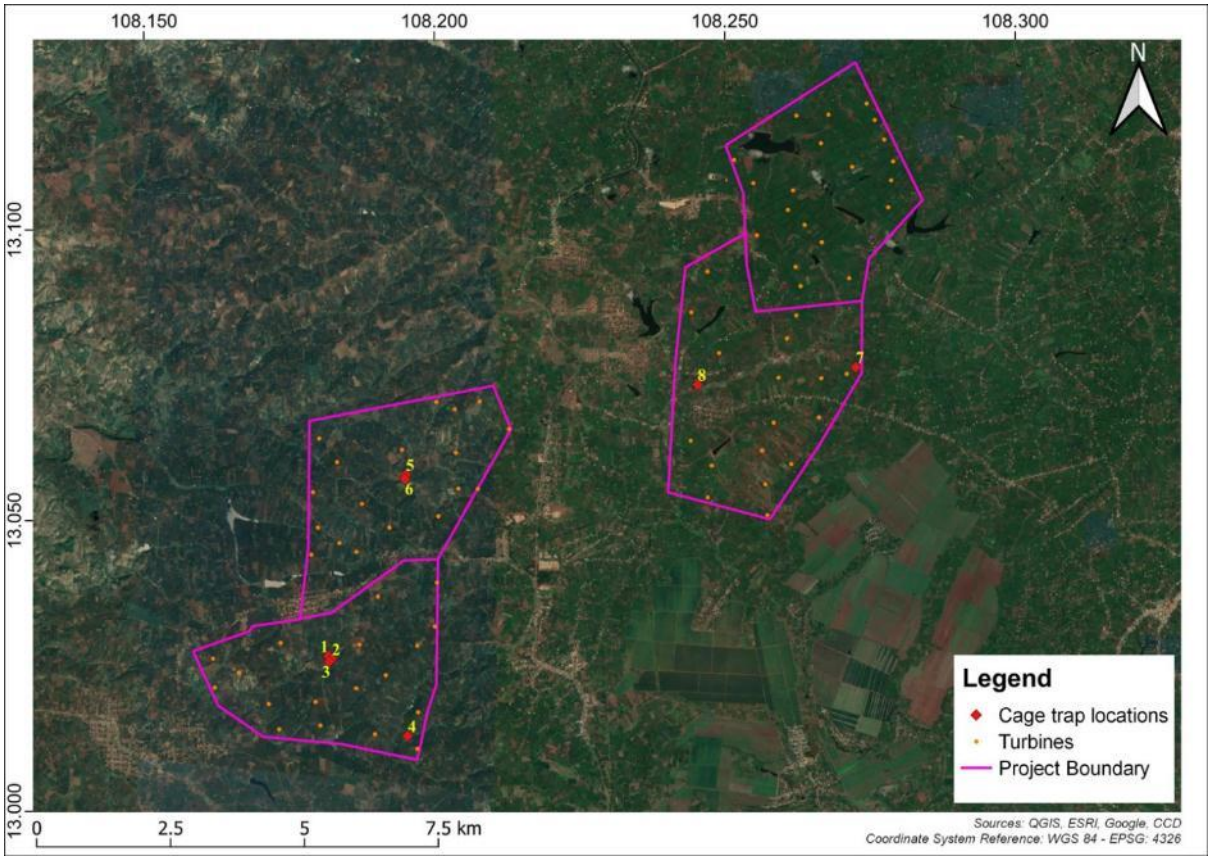


Figure 4.4 Map of Cage Trap Locations

4.2.2.2 Camera Trap

During the survey time from 16 – 19 July 2021, the team installed only eight camera traps to detect the small animals. One camera trap was installed on 15 July 2021, one day before the official survey time. Three camera traps were left until 20 July 2021. Total survey time was 2,797.63 hours (see Table 4.4 and Figure 4.5).

Table 4.4 Summary of Camera Trap Surveying Efforts

Name	Set-up date & time	Retrieval date & time	Duration (hours)	Limitations
Camera trap 1	16:15, 16.7.2021	08:49, 19.7.2021	64.57	Intermittent moderate rain, especially on 18 and 19 July 2021, affected the survey results because small mammals did not did not active during rain.
Camera trap 2	18:30, 16.7.2021	08:45, 19.7.2021	62.25	
Camera trap 3	07:10, 16.7.2021	17:30, 18.7.2021	58.33	
Camera trap 4	07:30, 16.7.2021	10:43, 18.7.2021	51.22	
Camera trap 5	14:40, 16.7.2021	11:23, 20.7.2021	92.72	
Camera trap 6	16:49, 15.7.2021	09:40, 16.7.2021	16.85	
Camera trap 7	10:01, 18.7.2021	07:52, 20.7.2021	45.85	
Camera trap 8	13:13, 18.7.2021	08:08, 20.7.2021	45.92	
Total			**437.70**	

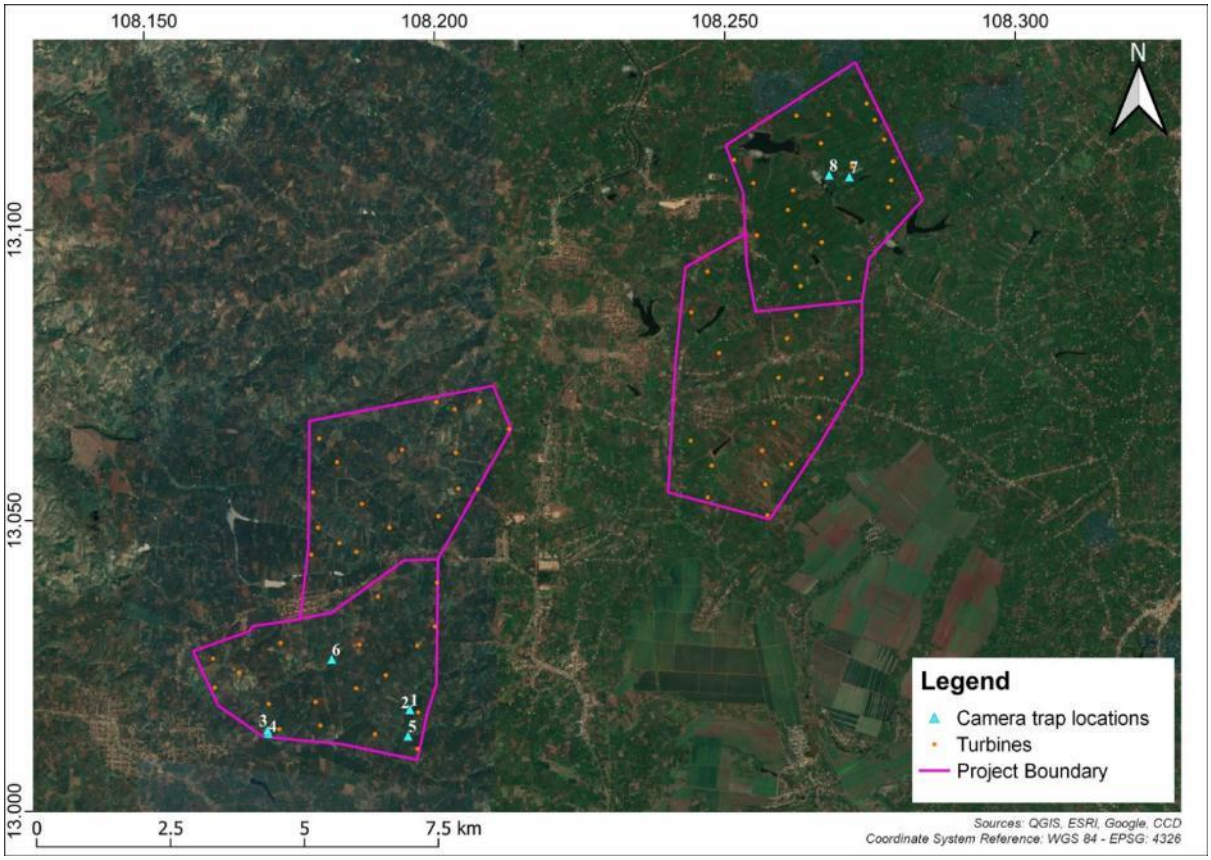


Figure 4.5 Map of Camera Trap Locations

4.2.3 Bat Survey

4.2.3.1 Transect Survey

The survey team carried out bat transect surveys in the Project area from 16th to 18th July. Surveyors moved slowly on each track to observe bats and use bat detectors (see Figure 4.6) at night-time. The team repeatedly surveyed on nine tracks with a total 35 hours (see Table 4.5).

Table 4.5 Summary of Transect Survey Effort for Bats

Bat survey track	Survey date	Time of survey	Survey effort (hours)	Track length (Km)	Description
Bat survey track 8	15 July 2021	20:00-23:00	3		Using bat detectors to detect bats at the apartment (in the town)
Bat survey track 9	16 July 2021	15:00-21:00	6	17.5	Setting harp trap 2, mist net 1, mist net 2 (at Point 1) and mist net 3 (at Point 2). 18:47-20:39. Rain but not so heavy.
Bat survey track 10	16 July 2021	18:00-21:00	3	19.64	Using bat detectors to detect bats at trap location and on the ways with slow motorbike move and walk from Point 2 to Point 1. 18:47-20:39. Rain but not so heavy and influence the move

Bat survey track	Survey date	Time of survey	Survey effort (hours)	Track length (Km)	Description
Bat survey track 11	16 July 2021	21:00-23:00	3		Using bat detectors to detect bats at the apartment (in the town). No rain
Bat survey track 12	17 July 2021	4:30-7:30	3	14.3	Using bat detectors to detect bats and retrieve the harp traps and mist nets from Point 1 to Point 2. No rain
Bat survey track 13	17 July 2021	16:30 - 20:30	4	12.4	Setting harp trap6, mist net 6 (at Bat Point 4); using bat detectors to detect bats around trap locations and on the way. 18:55 – 20:07: it rained a little.
Bat survey track 14	18 July 2021	4:00-7:30	3.5	12.95	Using bat detectors to detect bats and retrieve the harp traps and mist nets (at Point 4). 4:30 – 7:10. Heavy rain.
Bat survey track 15	18 July 2021	14:30 - 20:30	6	22.17	Setting harp trap4, mist net 4, mist net 5 at Point 3; using bat detectors to detect bats around trap locations and on the way. 15:00-16:30. Rained a little.
Bat survey track 16	19 July 2021	4:00-7:30	3.5		Using bat detectors to detect bats at the apartment (in the town)

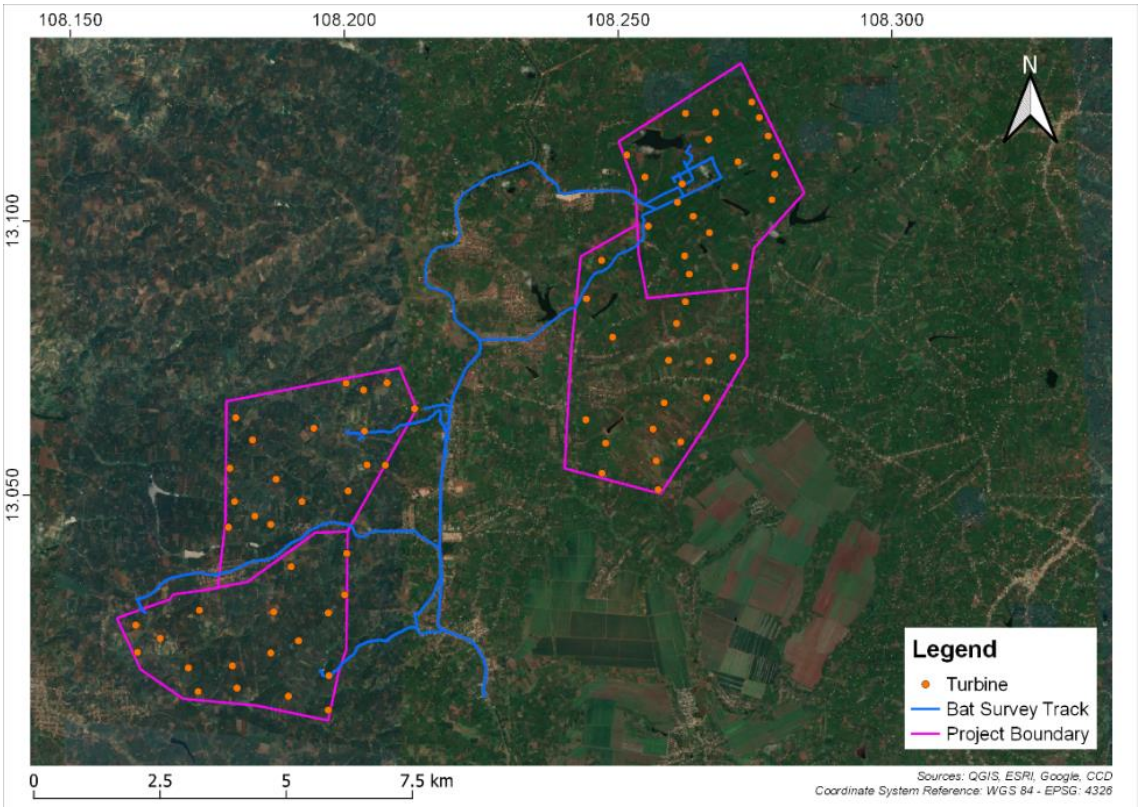


Figure 4.6 Map of Bat Survey Tracks

4.2.3.2 Bat Sampling

Bat specimens were captured using mist nets and harp traps set at ground level across trails, over small ponds, or near edges of forest and farm. Mist nets sizes are 3m, 6m, 9m, 12m, 18m, and 24m in length and were about 3.0 and 3.5m in height, whereas harp traps size is 1.6 x 1.8 m in area. Mist nets were set from 15:00 PM and open from 17:45 to 23:45 PM nightly and open again from 4:00 to 5:30 AM next early morning, whereas harp traps were left open all night.

Mist nets were set up at six points (see Figure 4.7) with a total effort of 5,410 square meter net*hours (m^2nh) in the second survey (see Table 4.6).

Table 4.6 Summary of Mist Net Survey Efforts

Mist net	Set time	Retrieval time	Survey effort (net*hours)	Net size (m^2)	Total efforts (m^2nh)	Longitude (WGS 84)	Latitude (WGS 84)	Habitat
Mist net 1	15:00, 16.7.2021	6:00, 17.7.2021	15.00	36	540	108.200731	13.061631	On the way across of coffee's farm
Mist net 2	16:30, 16.7.2021	6:00, 17.7.2021	13.30	126	1,675	108.261265	13.108484	The net is placed along the dam with a lake on one side and fruit and coffee growing on the other.
Mist net 3	18:00, 16.7.2021	7:00, 17.7.2021	13.00	63	819	108.262914	13.109354	Dry stream near coffee-durian field
Mist net 4	17:00, 18.7.2021	6:00, 19.7.2021	12.00	27	432	108.195599	13.018039	Way between fields of coffee mixing with avocado
Mist net 5	17:30, 18.7.2021	6:30, 19.7.2021	12.00	27	432	108.163635	13.028621	Way between fields of coffee mixing with avocado
Mist net 6	17:00, 17.7.2021	6:00, 18.7.2021	12.00	126	1,512	108.19588	13.017694	Coffee field
Total			77.3		5,410			

*Note: m^2nh – square-meter net*hours.*

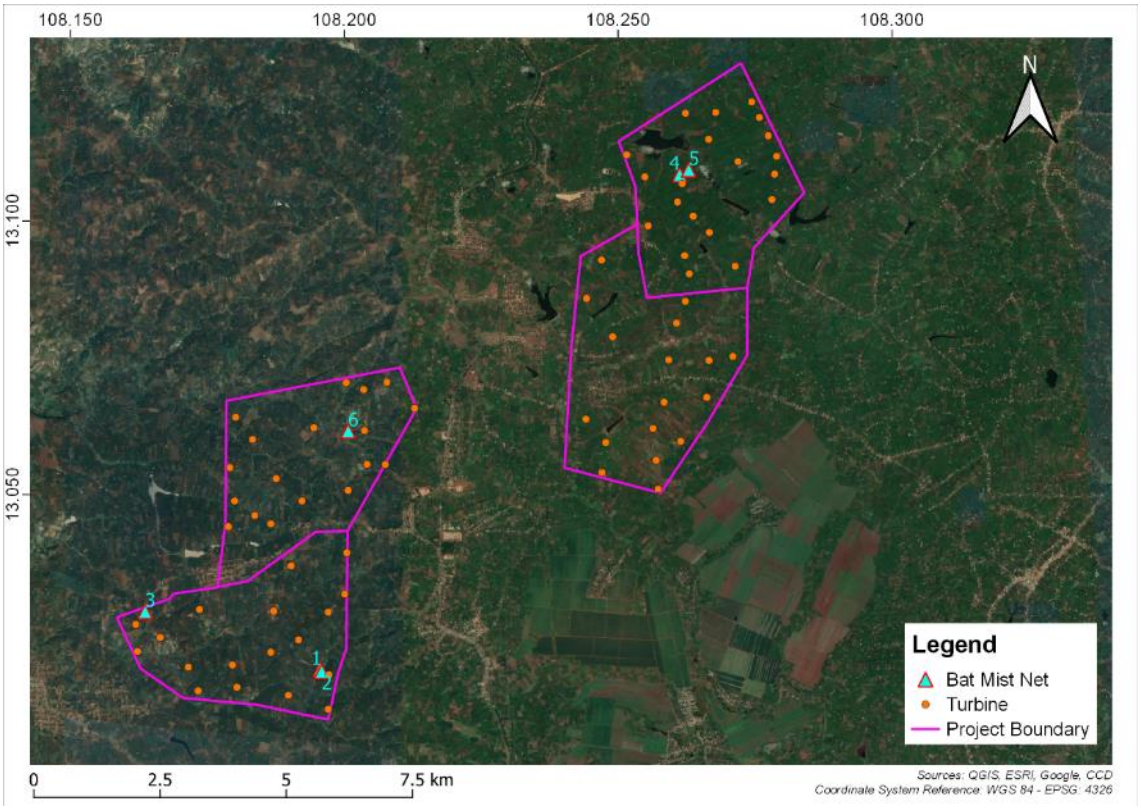


Figure 4.7 Map of Mist Net

Harp traps were also set at six points (see Figure 4.8) with total effort of 103.68 m^2trap hours in second survey (see Table 4.7).

Table 4.7 Summary of Harp Trap Survey Efforts

Harp trap	Set time	Retrieval time	Survey effort (hours)	Harp trap size (m^2)	Total efforts (m^2hth)	Longitude (WGS 84)	Latitude (WGS 84)	Habitat
Harp trap 2	18:00, 16.7.2021	6:00, 23.5.2021	12.00	2.88	34.56	108.200719	13.061852	Coffee field
Harp trap 4	18:00, 18.7.2021	6:00, 23.5.2021	12.00	2.88	34.56	108.2025	13.061288	On path in coffee and avocado field field
Harp trap 6	18:00, 17.7.2021	6:20, 24.5.2021	12.00	2.88	34.56	108.196655	13.016925	Mix coffee and avocado field
Total					**103.68**			

*Note: m^2nh – square-meter net*hours*

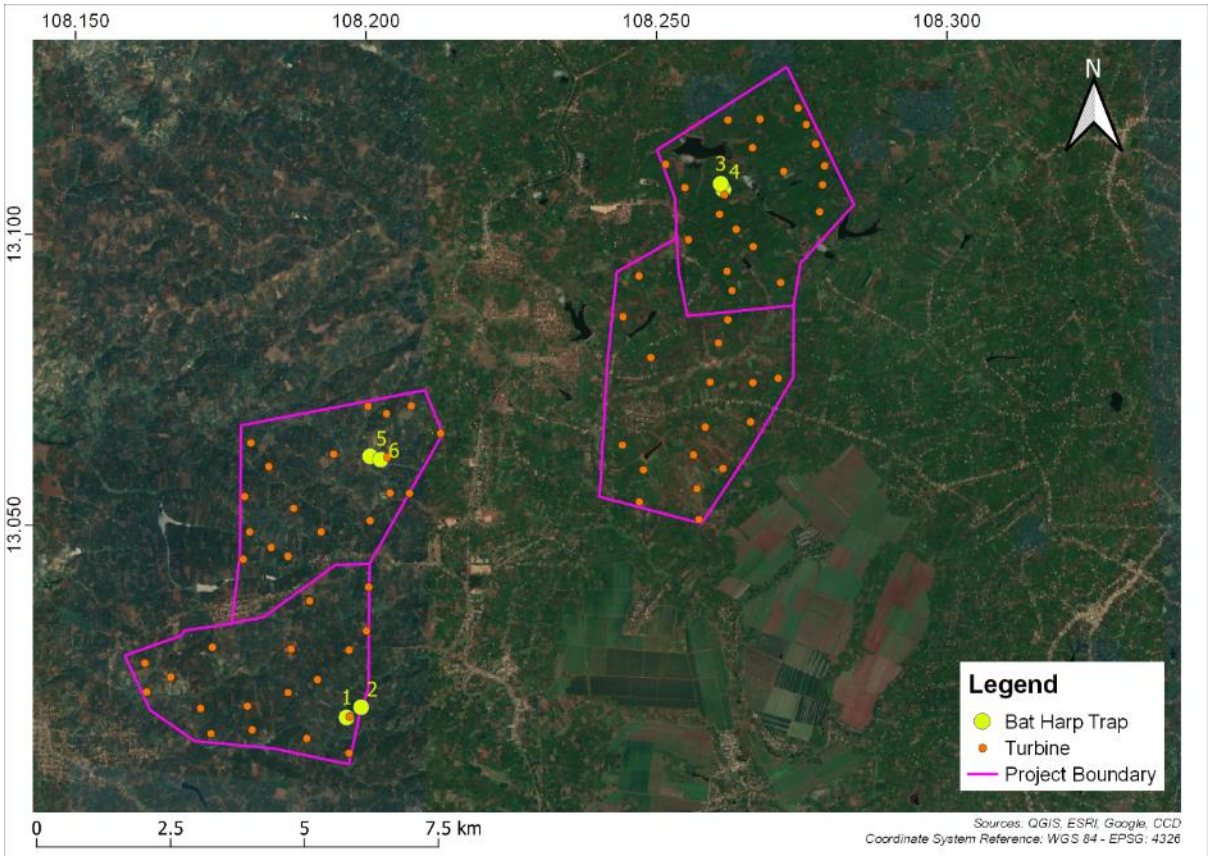


Figure 4.8 Map of Harp Traps

4.2.3.3 Echolocation Recording and Analysis

The team used an Echometer M500 digital ultrasonic recorder (Pettersson M500-384) and Echometer EM3 digital ultrasonic recorder (Wildlife Acoustics 2016) to detect and record bat echolocation calls in the site, around four bat points, trap locations and along the bat survey transects. The team recorded and analysed 38 echolocation calls as WAV files. Both bat detectors allow recording at sampling rates of 256 and 384 kHz (providing analysis of calls up to frequencies of about 192 kHz). The team analysed properties of recorded calls in Hanning windows using spectrograms, oscilloscope tracings, and power spectra features of Call Viewer software (Skowronski & Fenton, 2008).

4.2.3.4 Morphological Analysis

Morphological analyses were followed the morphological descriptions of Csorba et al. (2003), Nguyen Truong Son and Vu Dinh Thong (2006), Kruskop (2013), Francis (2019) and Wilson & Mittermeier (2019) and the following papers: Furey et al. (2009), Nguyen Truong Son et al. (2016, 2021).

All samples and voucher specimens were deposited in collections at the Department of Vertebrate Zoology, Institute for Ecological and Biological Resources at the Vietnam Academy of Sciences and Technology, Hanoi.

Collecting methods, euthanasia, and specimen preparation followed guidelines for obtaining mammal specimens as approved by the Mammal Society of Japan (http://www.mammalogy.jp/en/guideline.pdf) and the American Society of Mammalogists (Sikes and the Animal Care and Use Committee of the American Society of Mammalogists 2016).

4.2.4 Reptile and Amphibian Survey

4.2.4.1 Transect Survey

Survey transects were set up along streams, pools, or along the paths to record the presence of reptiles and amphibians. Total four transects were established during the field survey from 16 to 19 July 2021 within the Project area (see Table 4.8 and Figure 4.9).

Table 4.8 Reptile and Amphibian Survey Efforts

Date	Transect	Coordinate (WGS84)	Elevation (m asl.)	Length of the survey route (km)	Time survey
16/7	Transect 2 Start Transect 2 End	13° 01'4.1"N, 108°11'44.2"E 13° 01'58.1"N, 108°10'30.3"E	Min 353 Max 813	13.65	9.25
17/7	Transect 1 Start Transect 1 End	13° 03'0.7"N, 108°12'16.4"E 13° 03'35.0"N, 108°13'8.4"E	Min 753 Max 834	12.28	8.50
18/7	Transect 3 Start Transect 3 End	13° 04'57.4"N, 108°14'20.4"E 13° 07'18.4"N, 108°16'29.0"E	Min 712 Max 786	10.45	9.20
19/7	Transect 4 Start Transect 4 End	13° 04'4.5"N, 108°13'54.2"E 13° 03'40.5"N, 108°14'54.8"E	Min 751 Max 827	9.13	8.10

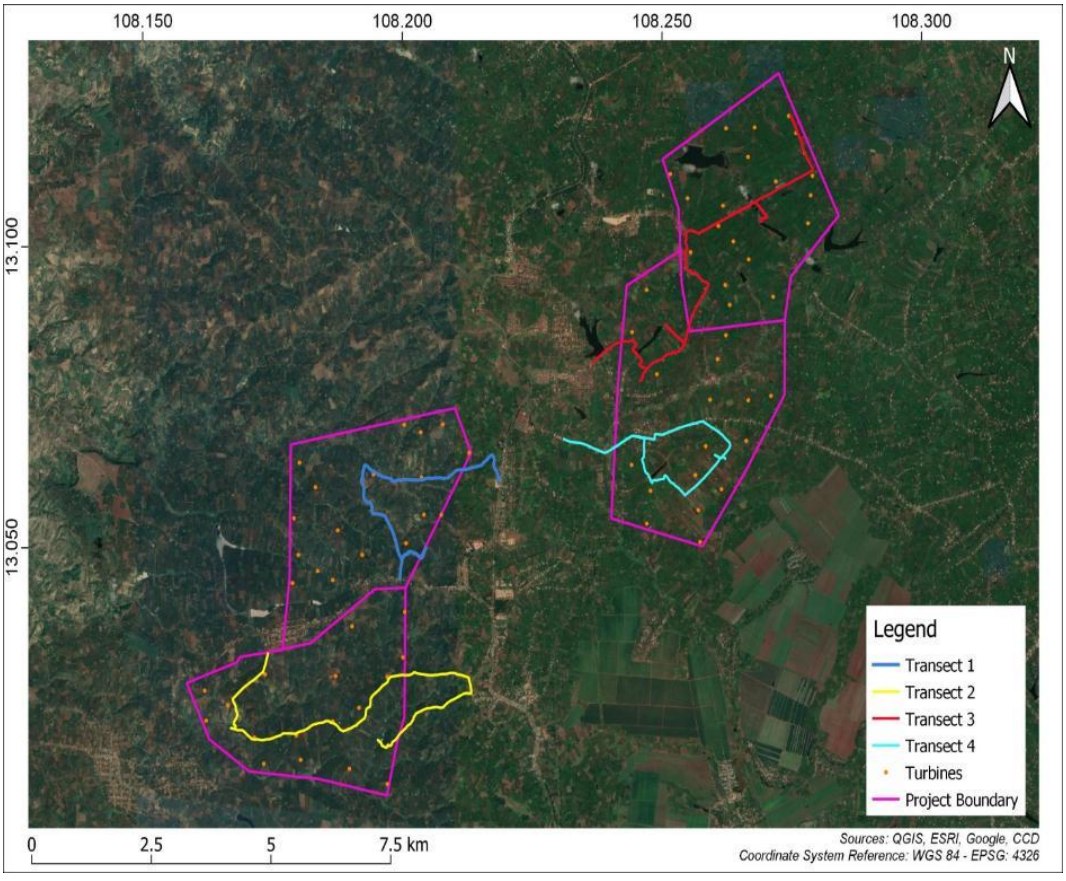


Figure 4.9 Map of Reptile and Amphibian Transect Survey

4.2.4.2 Sampling

Species of amphibians and reptiles can be found or observed during the daytime and nighttime. Therefore, the bulk of our search effort was carried out from 8:00 to 10:30 and 15:00 to 22:00. Venomous snakes were collected by snake hook or snake tong, and lizards were collected by forceps. Collected amphibians were kept in plastic bags, while snakes and lizards were kept in cloth bags. After photographing in life, species cannot be named were preserved for voucher specimens while others were released at the former location or areas with similar habitat.

Specimen preservation:

- Euthanasia: Specimens were euthanized in a closed vessel with a piece of cotton wool containing ethyl acetate (Simmons 2002). For molecular analysis, tissue samples of muscle and liver were preserved in 70% ethanol. The field tags were labeled with Indian ink, which is not ethanol- and water-soluble. Furthermore, the labels and thread were tearproof, ethanol- and waterproof. The field tags were attached with a tearproof twine at the knee bend of lizards and amphibians or around the neck in snakes.
- Fixation: Specimens were arranged in a natural position and covered by tree-cloth or blotting-paper, they were preserved in 80% ethanol for 3 - 10 hours. Specimens of reptiles and large-sized amphibians were injected with 80% ethanol with a hypodermic needle into the body cavity to prevent internal rotting processes.
- Specimen storage: Specimens were subsequently transferred into 70% ethanol for long-term storage.

4.2.4.3 Species Identification

Morphological comparisons were made with the voucher specimens that are deposited in the collections of the Institute of Ecology and Biological Resources and Vietnam National Museum of Nature in Hanoi. For taxonomic identification, we used the following documents: Pope (1935), Smith (1935, 1943), Bourret (1942), Taylor (1962, 1963, 1965), Inger et al. (1999), Nguyen Van Sang (2007), Nguyen Quang Truong (2011), Nishikawa et al. (2012), Hartmann et al. (2013), Hoang et al. (2021). Species names followed Nguyen et al. (2009), Frost (2021), Uetz et al. (2021). (Frost, 2021; V. S. Nguyen et al., 2009; Uetz, Freed, & Hošek, 2021)

4.2.5 Bird Survey

From 16 July 2021 to 18 July 2021, the survey team used vantage point count (Bibby, Jones, & Marsden, 1998; Heritage, 2017) and transect methods to survey bird species and collect biological and environmental parameters to support the assessment of collision risk for wind farm projects.

The same methods from the first survey have been applied for the second survey (both with Vps and line transects).

4.2.5.1 Vantage Point (VP) Survey

VP surveys include a number of observations from a fixed advanced location to count bird flight activities at a proposed project site to provide data to estimate the collision risk (Heritage, 2017). The observers sat at VPs to scan an arc of 180° with radius of 2km to observe birds. The VPs were set up carefully in order to achieve maximum visibility of site.

Totally, there were eight VPs established in the Project site to cover all 73 wind turbines. From 16 July 2021 to 18 July 2021, each VP was occupied by one surveyor to observe birds in 12 hours per day. The Table 4.9 presents coordinate of these VPs.

Table 4.9 Coordinates of Vantage Points

Vantage Points (VP)	Latitude (WGS 84)	Longitude (WGS 84)
VP 1	13°3'28.50"N	108°11'40.40"E
VP 2	13°2'30.75"N	108°11'18.07"E
VP 3	13°1'17.54"N	108°11'34.13"E
VP 4	13°0'47.56"N	108°10'16.36"E
VP 5	13°6'29.96"N	108°16'7.03"E
VP 6	13°3'15.14"N	108°14'48.97"E
VP 7	13°5'1.30"N	108°16'16.37"E
VP 8	13°5'53.04"N	108°14'46.47"E

During the surveys, from 5:30 am to 18:00, the observers stand at the established vantage points and, using a set of equipment including a HD Swarroski 20x80 telescope, a Nikon 5D camera and Nikon camera lens 500 – 600 mm with 1.4 and 2.0 extenders as well as a HD Swarroski 8x32 binoculars or similar quality equipment package to scan, photograph and focus sampling.

All the bird species were recorded by direct observation, photography and acoustic. The number of individuals was also recorded to identify the relative abundance of each species.

All information such as weather condition, amount of work at each VP, numbers of all recorded birds' species, target species, flight paths of each species (height of flight) were recorded. Using Nikkon Forestry Pro II to record the altitude of flight.

The species-specific activities were recorded during observations at the VPs. Following that three status of recorded birds have been identified as below, in and fly over the rotor swept zone. The rotor swept zone is calculated by subtracting and adding the length of turbine blade with the hub height The average altitude of recorded flights was divided in to three categories: below (Band 1 from 0 – 51 m), in (Band 2 from 52 – 208 m) and beyond (Band 3 >208 m) the blade swept area. The total flight time at Band 2 of all the prone to collision species were recorded to assess the collision risk of the species.

Due to the heavy rain in 18 July 2021, each vantage point was surveyed in a total of 35 hours (see Table 4.10 and Figure 4.10).

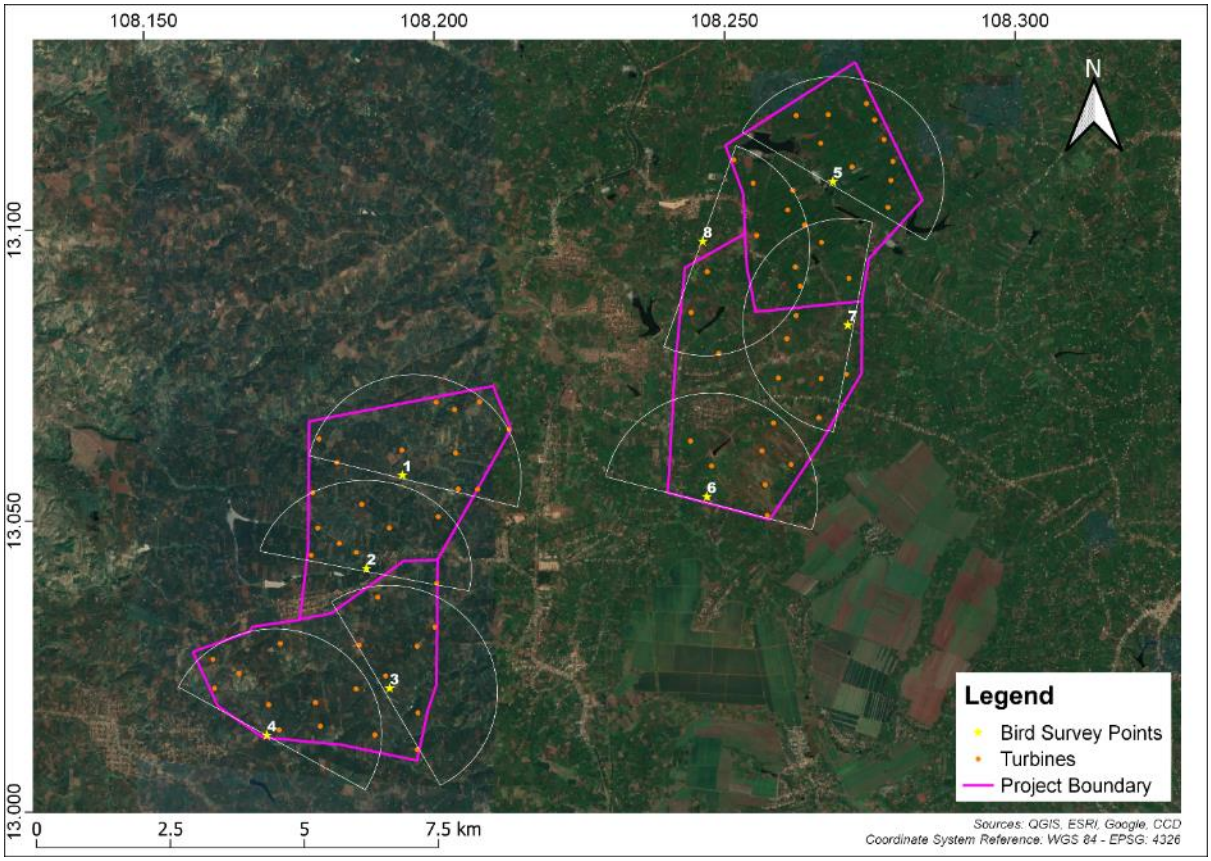


Figure 4.10 Map of Bird Survey by VPs

Table 4.10 Summary of Survey Efforts at VP

Date	Observer	VP	Start	Finish	Length of VP watch (hrs)	Habitat	Weather
16 July 2021	Pham Van Thuan	1	5:30	18:00	12.5	Plantation, coffee gardens, fruiting tree and scrubs.	Sunny, partly cloud, slight wind, temp (24 – 33^{O}C)
17 July 2021	Tu Van Chi	1	5:30	18:00	12.5		Sunny in the morning, cloudy, windy, temp (24 – 34^{O}C)
18 July 2021	Tu Van Chi	1	8:00	18:00	10		Rainy from 5:45-8:00, cloudy, temp (24-33^{O}C)
Total VP 1					**35**		
16 July 2021	Tu Van Chi	2	5:30	18:00	12.5	Coffee gardens, fruiting tree (jackfruit), scrubs and bushes	Partly cloudy, sunny, slight wind, temp (24 – 35^{O}C)
17 July 2021	Pham Van Thuan	2	5:30	18:00	12.5		Sunny, slight wind, temp (23 – 33^{O}C)
18 July 2021	Pham Van Thuan	2	8:00	18:00	10		Rainy from 5:45-8:00, cloudy, temp (24-33^{O}C)
Total VP 2					**35**		
16 July 2021	Do Dinh Dong	3	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, partly cloud in the afternoon, temp (23 – 35^{O}C)
17 July 2021	Nguyen Anh Tuan	3	5:30	18:00	12.5		Cloudy, slight wind, temp (24 – 35^{O}C)
18 July 2021	Nguyen Anh Tuan	3	8:00	18:00	10		Rainy from 5:45-8:00, cloudy, temp (24-33^{O}C)
Total VP 3					**35**		
16 July 2021	Tran Van Bay	4	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, slight wind, temp (25 – 34^{O}C)
17 July 2021	Le Duc Hien	4	5:30	18:00	12.5		Cloudy most of the day, slight wind, temp (23 – 33^{O}C)
18 July 2021	Le Duc Hien	4	8:00	18:00	10		Rainy from 5:45-8:00, cloudy, temp (24-33^{O}C)
Total VP 4					**35**		
16 July 2021	Nguyen Van Luc	5	5:30	18:00	12.5	Coffee gardens with tail trees	Sunny, slight wind, temp (25-35^{O}C)
17 July 2021	Nguyen Van Luc	5	5:30	18:00	12.5		Sunny, cloudy in the afternoon, temp (23-33^{O}C)

Date	Observer	VP	Start	Finish	Length of VP watch (hrs)	Habitat	Weather
18 July 2021	Nguyen Van Luc	5	8:00	18:00	10	located along the garden's fences.	Rainy from 5h45-8h00, cloudy, temp (24-33^{O}C)
Total VP 5					**35**		
16 July 2021	Nguyen Anh Tuan	6	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, cloudy, temp (25-35^{O}C)
17 July 2021	Do Dinh Dong	6	5:30	18:00	12.5		Cloudy, sunny, slight wind, temp (23-33^{O}C)
18 July 2021	Do Dinh Dong	6	8:00	18:00	10		Rainy from 5:45-8:00, cloudy, temp (24-33^{O}C)
Total VP 6					**35**		
16 July 2021	Nguyen Hoang Hao	7	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Cloudy, slight wind, temp (24-35^{O}C)
17 July 2021	Nguyen Hoang Hao	7	5:30	18:00	12.5		Cloudy from 5:30-7:45, sunny, slight wind, temp (22-36^{O}C)
18 July 2021	Nguyen Hoang Hao	7	8:00	18:00	10		Rainy from 5:45-8:00, cloudy, temp (24-33^{O}C)
Total VP 7					**35**		
16 July 2021	Le Duc Hien	8	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, slight wind, cloudy in the afternoon, temp (24-34^{O}C)
17 July 2021	Tran Van Bay	8	5:30	18:00	12.5		Cloudy from 5:30-15:15, slight wind, temp (25-35^{O}C)
18 July 2021	Tran Van Bay	8	8:00	18:00	10		Rainy from 5:45-8:00, cloudy, temp (24-33^{O}C)
Total VP 8					**35**		

4.2.5.2 Transect Survey

Apart from VP survey, line transects were carried out to survey birds in different habitats through the Project area. All information such as weather condition, numbers of all recorded birds' species, target species were recorded. Four transects with the total of 37.1 km long were surveyed (see Table 4.11and Figure 4.11). These transects includes:

Table 4.11 Summary of Bird Transect Survey Efforts

Transect	Time	Start point (WGS 84)	End point (WGS 84)	Length (km)
Transect 1	05:45 – 12:00 (16 July 2021)	13°3'33.69"N; 108°11'17.45"E	13°2'7.85"N; 108°10'33.55"E	7.6
Transect 2	7:30 – 12:00 (18 July 2021) 12:00 -18:00 (16 July 2021)	13°1'38.26"N; 108°10'14.47"E	13°1'16.66"N; 108°11'32.04"E	11.5
Transect 3	13:00 – 18:00 (18 July 2021)	13°6'19.06"N; 108°14'38.90"E	13°5'19.55"N; 108°16'18.92"E	7.2
Transect 4	05:30 – 18:00 (17 July 2021)	13°5'13.48"N; 108°16'21.15"E	13°3'41.47"N; 108°14'50.95"E	10.8
Total				37.1

The assessment of threatened and restricted-range species is based on the IUCN Red List (2021) and Vietnam Red Data Book (2007). The identification of bird species is followed by Le et al. (2020) (Hung, Tien, Hiep, Pau, & Tuan, 2020)

The relative abundance of the species recorded during the survey are following: Rare (less than 3 individuals); uncommon (3 – 5 individuals); fairly common (6 – 10 individuals); common (>10 individuals). The species identified by acoustic were not the subject for assessment.

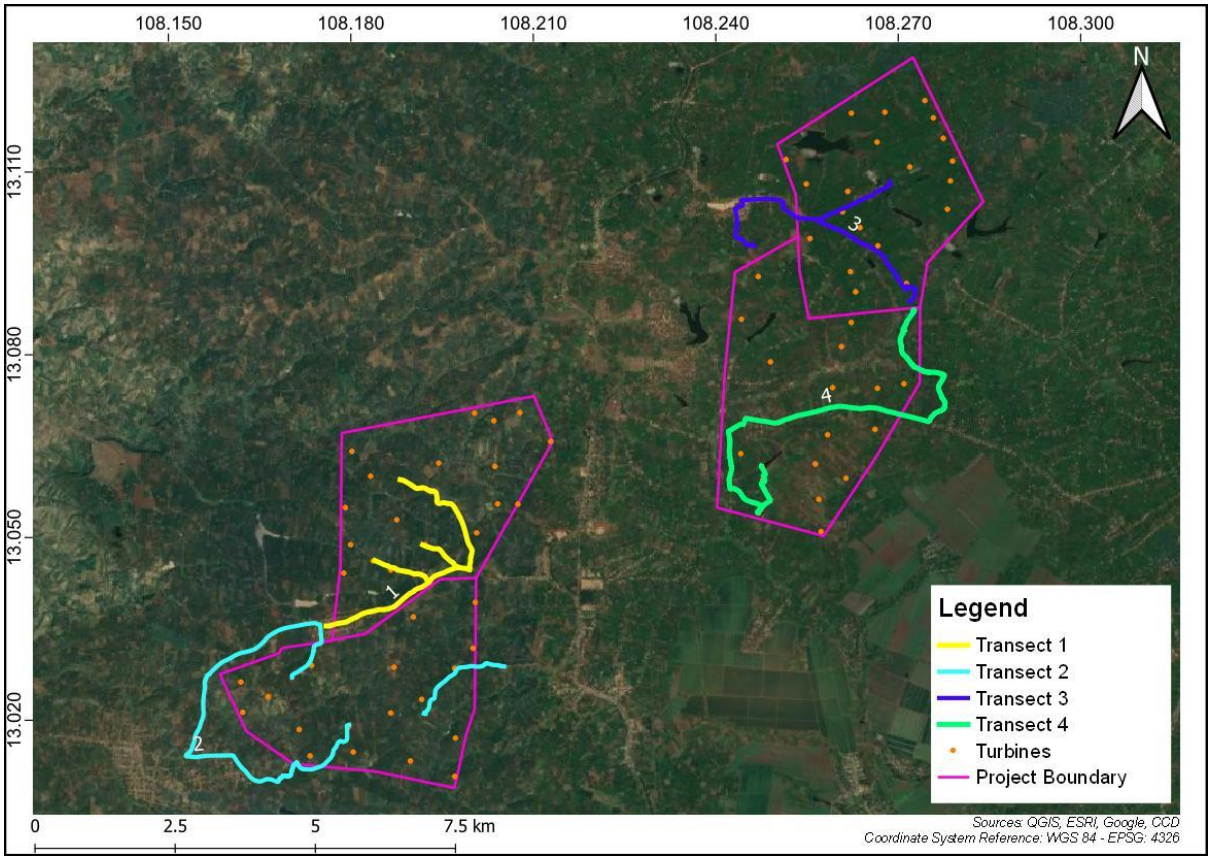


Figure 4.11 Map of Bird Survey by Transects

5. RESULT

5.1 Results of Flora Surveys

5.1.1 Vegetation Types

The survey results indicated two main types of vegetation including: secondary forest and plantations of coffee (*Coffea* ssp) mixed with pepper (*Piper nigrum*), durian (*Durio zibethinus*), avocado (*Persea americana*), and cashew (*Anacardium occidentale).* The followings are description of four surveyed transects and four sample plots:

+ Transect 1 (T1): The transect positioned along the plantations of coffee (*Coffea* ssp) mixed with durian (*Durio zibethinus*) and avocado (*Persea americana*). The survey team investigated along trails and recorded a total of 96 species, which dominated by common lianas (*Ancistrocladus tectorius*, *Desmos cochinchinensis var. fulvescens, Dioscorea bulbifera, Streptocaulon juventus, Momordica charantia)*, herbs (*Cynodon dactylon, Lophatherum gracile, Verbesina calendulacea)*, shrubs (*Chromolaena odorata, Crotalaria lanceolata, Sida acuta, Solanum torvum, Tabernaemontana bufalina*, *Wrightia dubia*), and tree (*Markhamia stipulata*, *Lithocarpus magneinii*, *Litsea glutinosa*, *Pterospermum jackianum*). On this Transect, we recorded *Dalbergia oliveri*, a rare and endangered species listed in IUCN 2021 (EN) and VRDB 2007 (EN).and 13 species listed in IUCN 2021 (LC). The rest is not listed (NL) (see Table 5.1).

+ Transect 2 (T2): This transect went through the plantations of coffee (*Coffea* ssp) mixed with durian (*Durio zibethinus*), pepper (*Piper nigrum*), avocado (*Persea americana*), and partly secondary forest. The are 81 species recorded which arecommon lianas, herbs, shrubs and tree species such as *Ancistrocladus tectorius, Antidesma montanum, Aporusa ficifolia, Bidens pilosa, Clerodendrum cyrtophyllum, Dalbergia curtisii, Desmos cochinchinensis, Grewia paniculata, Mimosa pigra, Merremia quinata, Litsea glutinosa, Phyllanthus emblica, Uvaria micrantha, Streptocaulon juventus, Wrightia dubia, Tithonia diversifolia.* Among recorded species, there are 17 species listed in IUCN 2021 (LC); and the rest is not listed (NL). None of conservation-significant species following IUCN (2021) and Vietnam Red Data Book (2007) was recorded in this Transect.

+ Transect 3 (T3): This transect went through the the plantations of coffee (*Coffea* ssp) mixed with durian (*Durio zibethinus*), pepper (*Piper nigrum*), avocado (*Persea americana*), and cashew (*Anacardium occidentale*). A total of 74 species were recorded. The vegetation consists of common lianas (*Dalbergia curtisii, Cyclea barbata, Embelia ribes, Iodes cirrhosa, Ipomoea alba, Streptocaulon juventus, Trichosanthes tricuspidata*), herbs (*Cynodon dactylon, Cyperus andreanus, Lophatherum gracile*), shrubs (*Chromolaena odorata*, *Clerodendrum cyrtophyllum*, *Flemingia grahamiana, Grewia paniculata, Mallotus paniculatus, Phyllanthus emblica, Trema orientalis*), and trees (*Pterospermum jackianum, Lithocarpus leucotrichus, Nephelium cuspidatum, Sapindus mukorossi*). On this Transect, there are 10 species listed in IUCN 2021 (LC); and the rest is not listed (NL). Only *Rauvolfia cambodiana* was listed in VRDB 2007 (VU).

+ Transect 4 (T4): The transect was set up to survey the vegetation within the coffee farms. The vegetation is covered mainly by the plantations of pure coffee (*Coffea* ssp) or mixed with some durian (*Durio zibethinus*) and avocado (*Persea americana*). We recorded 60 species occuring in this Transect, which dominated by common lianas (*Cayratia trifolia, Lygodium flexuosum, Ipomoea alba, Quamoclit pinnata, Zehneria maysorensis*), herbs (*Achyranthes aspera, Cynodon dactylon, Hedyotis pressa, Scirpus fluviatilis)*, and shrub (*Breynia glauca, Chromolaena odorata, Siegesbeckia orientalis, Sida acuta, Tabernaemontana bufalina, Trema orientalis*) were also recorded. On this Transect, , there is only *Dipterocarpus intricatus* listed in IUCN 2021 (EN); 13 other species listed in IUCN 2021 (LC); and the rest is not listed (NL). None of conservation-significant species following VRDB 2007 was recorded in this Transect.

+ Plot 1 (PL1): This is the type of Coffea canephora plantation. The vegetation, therefore, consists of some common regenerated lianas (*Ageratum conyzoides, Cayratia trifolia, Crassocephalum*

crepidioides, Cyclea barbata, Gymnopetalum integrifolium, Mimosa pudica), and small shrubs (Aporusa ficifolia, Solanum nigrum). A total of 15 species were recorded in this Plot, of which only 2 species listed in IUCN 2021 (LC); and the rest is not listed (NL). None of conservation-significant species following VRDB 2007 was recorded (see Table 5.1).

+ Plot 2 (PL2): This is the type of secondary forest. The recorded species compositions are quite diversity including lianas (*Desmos cochinchinensis, Gnetum latifolium var. funiculare, Stixis suaveolens, Streptocaulon juventus, Smilax prolifera, Tetra stigma godefroyanaum*), shrubs (*Antidesma ghaesembilla, Aporusa ficifolia, Grewia paniculata, Helicteres angustifolia, Phyllanthus emblica, Wrightia dubia*), and trees (*Archidendron clypearia, Canarium littorale Bl. var. rufum, Careya arborea, Garcinia gaudichaudii, Horsfieldia thorelii, Irvingia malayana, Lithocarpus leucotrichus*). They are growing very well in this Plot. On this Plot, we recorded 29 species, of which 6 species listed in IUCN 2021 (LC); and the rest is not listed (NL). None of conservation-significant species following VRDB 2007 was recorded (see Table 5.1).

+ Plot 3 (PL3): This is the type of Coffea canephora and Anacardium occidentale plantations. A few herbs (*Achyranthes aspera, Amaranthus viridis*), lianas (*Quamoclit pinnata, Tetracera loureiri*), and small shrubs (*Ageratum conyzoides, Aporusa ficifolia, Crotalaria lanceolata, Tabernaemontana bufalina*) were recorded. On this Plot, we recorded a total of 11 species, of which only one species listed in IUCN 2021 (LC); and the rest is not listed (NL) (see Table 5.1).

+ Plot 4 (PL4): This is the type of Coffea ssp and Persea americana plantations. The recorded species compositions, therefore, are less diversity. There are some common herbs (*Achyranthes aspera, Cheilocostus speciosus, Lophatherum gracile, Portulaca oleracea, Siegesbeckia orientalis*), lianas (*Caesalpinia latisiliqua, Quamoclit pinnata*) and small shrubs (C*lerodendrum cyrtophyllum, Maoutia puya, Wrightia coccinea*). On this Plot, we recorded a total of 17 species, of which only 2 species listed in IUCN 2021 (LC); and the rest is not listed (NL). None of conservation-significant species following VRDB 2007 was recorded (see Table 5.1).

5.1.2 Species Diversity and Life Forms

All plant species recorded in the Project area are presented in the Table 5.1.

Table 5.1 The Plant Species Recorded in the Project Area

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
I	**POLYPODIOPHYTA**	**Ngành Dương xỉ**											
	Gleicheniaceae	**Họ Guột**											
1	*Dicranopteris linearis* (Burm.f.) Underw.	Guột cứng	LC					+					Hm
	Schizaeaceae	**Họ Bòng bong**											
2	*Lygodium flexuosum* (L) Sw.	Bòng bong	NL			+		+					Lp
	Thelypteridaceae	**Họ Tàng thư dực**											
3	*Coryphopteris petelotii* (Ching) Holtt.	Ráng petelot	NL					+					Hm
II	**GYMNOSPERMAE**	**Ngành Hạt trần**											
	Gnetaceae	**Họ Gắm**											
4	*Gnetum latifolium* var. *funiculare* (Bl.) Margf.	Gắm cọng	LC			+	+	+		+			Lp
III	**ANGIOSPERMAE**	**Ngành Ngọc lan**											
	EUDICOTS	**Lớp Hai lá mầm**											
	Amaranthaceae	**Họ Rau dền**											
5	*Achyranthes aspera* L.	Cỏ xước	NL					+			+	+	Th
6	*Amaranthus viridis* L.	Dền xanh	NL			+		+			+		Th
7	*Celosia argentea* L.	Mồng gà	LC			+		+					Th
	Anacardiaceae	**Họ Xoài**											
8	*Anacardium occidentale* L.	Điều	NL		+		+				+		Mi
9	*Semecarpus cochinchinensis* Engl.	Sưng nam bộ	NL		+	+				+			Me
10	*Spondias dulcis* L.	Cóc	NL			+	+						Me
	Ancistrocladaceae	**Họ Trung quân**											
11	*Ancistrocladus tectorius* (Lour.) Merr.	Dây trung quân	NL		+	+		+					Lp
	Annonaceae	**Họ Na**											

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
12	*Desmos cochinchinensis* Lour.	Dây hoa dẻ	NL			+				+			Lp
13	*Desmos cochinchinensis* var. *fulvescens* Ban	Dây chân chim núi	NL		+			+					Lp
14	*Uvaria microcarpa* Champ. ex Benth. & Hook.f.	Bồ quả	NL		+								Na
15	*Uvaria micrantha* Hook.f. & Thoms.	Bồ quả hoa nhỏ	NL		+	+	+						Na
	Apocynaceae	**Họ Trúc đào**											
16	*Aganonerion polymorphum* Pierre ex Spire	Lá giang	NL										Lp
17	*Alstonia scholaris* (L.) R. Br.	Sữa	NL			+							Mi
18	*Heterostema acuminata* Dcne	Dị hùng Java	NL		+								Lp
19	*Rauvolfia cambodiana* Pierre ex Pit.	Ba gạc cambốt	NL	VU			+						Na
20	*Streptocaulon juventus* (Lour.) Merr.	Hà thủ ô trắng	NL		+	+	+			+			Lp
21	*Tabernaemontana bufalina* Lour.	Lài trâu lá nhỏ	NL		+			+			+		Na
22	*Tabernaemontana crispa* Roxb.	Lài trâu nhăn	NL		+								Na
23	*Wrightia dubia* (Sims) Spreng	Lòng mức ngờ	NL		+	+				+			Na
24	*Wrightia coccinea* (Roxb.) Sims	Lòng mức đỏ	NL		+			+				+	Na
	Asteraceae	**Họ Cúc**											
25	*Ageratum conyzoides* L.	Cỏ cứt lợn	NL		+	+	+	+	+	+	+	+	Th
26	*Bidens pilosa* L.	Đơn buốt	NL		+	+	+		+				Th
27	*Crassocephalum crepidioides* (Benth.) S. Moore	Rau tàu bay	NL				+		+				Th
28	*Chromolaena odorata* (L.) R.M. King & H.E. Robins	Cỏ lào	NL		+	+	+	+		+		+	Th
29	*Elephantopus tomentosus* L.	Cúc chân voi	NL		+								Th
30	*Erechtites hieracifolia* (L.) Rafin.	Hoàng thất lá hẹp	NL		+								Th
31	*Siegesbeckia orientalis* L.	Hy thiêm	NL					+				+	Th
32	*Spilanthes paniculata* Wall. ex DC.	Nụ áo chàm	NL		+			+				+	Th
33	*Sonchus oleraceus* L.	Tục đoạn rau	NL						+				Th
34	*Tithonia diversifolia* (Hemsl) A. Grey.	Dã quỳ	NL		+	+	+						Na

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
35	*Verbesina calendulacea* L.	Sài đất	NL		+								Th
	Bignoniaceae	**Họ Chùm ớt**											
36	*Markhamia stipulata* (Wall.) Seem. ex Schum.	Thiết đinh lá bẹ	LC		+								Me
37	*Markhamia stipulata* var. *pierrei* (Dop) Sant	Thiết đinh lá bẹ	NL			+							Me
	Burseraceae	**Họ Trám**											
38	*Canarium littorale* Bl. var. *rufum* (Benn.) Leenh.	Trám nâu	LC							+			Me
	Cactaceae	**Họ Xương rồng**											
39	*Pereskia grandifolia* Haw.	Diệp long lá to	LC			+							Suc
	Cannabaceae	**Họ Gai dầu**											
40	*Trema orientalis* (L.) Blume	Hu đay	LC		+	+	+	+					Mi
	Capparaceae	**Họ Màn màn**											
41	*Stixis suaveolens* Pierre	Trứng quốc	NL							+			Lp
	Clusiaceae	**Họ Bứa**											
42	*Garcinia gaudichaudii* Planch. & Triana	Vàng nghệ	NL			+				+			Mi
	Convolvulaceae	**Họ Bìm bìm**											
43	*Argyreia nasirii* D.Austin	Thảo bạc Nasir	NL				+						Th
44	*Ipomoea alba* L.	Bìm trắng	NL				+	+					Th
45	*Ipomoea obscura* (L.) Ker.-Gawl.	Bìm mờ	NL			+							Th
46	*Merremia quinata* (R.Br.) Van Ooststr.	Bìm 5 lá	NL			+							Th
47	*Quamoclit pinnata* (Desr.) Bojer	Tóc tiên dây	NL					+			+	+	Th
	Cucurbitaceae	**Họ Bầu bí**											
48	*Diplocyclos palmatus* (L.) Jeffrey	Lưỡng luân chân vịt	NL		+								Th
49	*Gymnopetalum integrifolium* (Roxb.) Kurz	Cứt quạ lá nguyên	NL		+				+				Th
50	*Momordica charantia* L.	Mướp đắng rừng	NL		+	+							Th
51	*Trichosanthes tricuspidata* Lour.	Lâu xác	NL				+						Th

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
52	*Zehneria maysorensis* (W. & A.) Arnott	Cầu quả Maysor	NL					+					Th
	Dilleniaceae	**Họ Sổ**											
53	*Dillenia indica* L.	Sổ ấn	LC			+	+						Mi
54	*Tetracera indica* (Chr. & Panz.) Merr.	Chặc chiều ấn	NL		+	+	+						Lp
55	*Tetracera loureiri* (Fin. & Gagn.) Craib	Dây chiều	NL								+		Lp
	Dipterocarpaceae	**Họ Dầu**											
56	*Dipterocarpus intricatus* Dyer	Dầu lông	EN					+					Me
	Euphorbiaceae	**Họ Thầu dầu**											
57	*Croton hirtus* L'Herit.	Cù đèn lông	NL			+							Na
58	*Euphorbia thymifolia* L.	Cỏ sữa	NL										Ch
59	*Mallotus paniculatus* (Lam.) Muell.-Arg	Ba bét Nam	NL		+	+	+	+					Mi
	Fabaceae	**Họ Đậu**											
60	*Adenanthera* aff. *pavonina* L.	Trạch quạch	NL		+								Na
61	*Archidendron clypearia* (Jack.) I.Niels.	Mán đĩa	LC					+		+			Mi
62	*Caesalpinia mimosoides* Lamk.	Điệp trinh nữ	NL		+								Na
63	*Caesalpinia latisiliqua* (Cav.) Hatt.	Vấu diều	NL			+		+				+	Lp
64	*Caesalpinia sappan* L.	Tô mộc	LC				+						Na
65	*Clitoria mariana* L.	Biếc tim	NL		+								Lp
66	*Crotalaria lanceolata* E. Meyer	Sục sạc thon	LC		+						+		Na
67	*Dalbergia discolor* Bl. ex Miq.	Trắc biến màu	NL		+					+			Mi
68	*Dalbergia curtisii* Prain	Trắc Curtis	NL			+	+						Mi
69	*Dalbergia oliveri* Gamble ex Prain	Cẩm lai	EN	EN	+								Mi
70	*Desmodium strigillosum* Schindler	Tràng quả cào	NL							+			Na
71	*Erythrina variegata* L.	Vông	LC				+						Mi
72	*Flemingia grahamiana* W. & Arn.	Tóp mỡ Graham	NL			+	+						Na

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
73	*Indigofera galegoides* DC.	Xà chàm	LC			+		+					Na
74	*Leucaena leucocephala* (Lam.) De Wit	Keo dậu	NL		+	+			+				Na
75	*Milletia pachyloba* Drake	Mát thùy dày	NL			+		+					Lp
76	*Mimosa pigra* L.	Trinh nữ nhọn	LC			+		+					Na
77	*Mimosa pudica* L.	Trinh nữ	NL		+	+			+				Na
78	*Pueraria montana* (Lour.) Merr.	Sắn dây rừng	NL			+							Lp
79	*Tephrosia candida* (Roxb.) DC.	Cốt khí	NL			+							Na
	Fagaceae	**Họ Dẻ**											
80	*Lithocarpus* aff. *magneinii* (Hick. & Cam.) A.Cam.	Dẻ the	NL		+	+		+					Me
81	*Lithocarpus leucotrichus* A.Cam.	Dẻ lông trắng	NL			+	+	+		+			Me
	Hernandiaceae	**Họ Liên đằng**											
82	*Illigera thorelii* Gagn.	Liên đằng Thorel	NL		+								Lp
	Hypericaceae	**Họ Ban**											
83	*Cratoxylum cochinchinensis* (Lour.) Bl.	Thành ngạnh nam	NL			+							Mi
	Icacinaceae	**Họ Thụ đào**											
84	*Iodes cirrhosa* Turcz.	Mộc thông	NL				+						Lp
	Irvingiaceae	**Họ Kơ nia**											
85	*Irvingia malayana* Oliv. ex Benn.	Kơ nia	LC							+			Me
	Juglandaceae	**Họ Hồ đào**											
86	*Engelhardia spicata* var. *integra* (Kurz) Manning	Chẹo ngứa				+	+						Me
	Lamiaceae	**Họ Hoa môi**											
87	*Gmelina philippensis* Cham.	Găng tu hú	LC			+							Na
88	*Ocimum tenuiflorum* L.	Hương nhu	NL				+						Na
	Lauraceae	**Họ Long não**											
89	*Cinnamomum inconspicuum* Kost.	Quế	NL		+					+			Mi

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
90	*Litsea cambodiana* Lec.	Bời lời Cam bốt	NL				+						Mi
91	*Litsea glutinosa* C. B. Rob.	Bời lời nhớt	LC		+	+	+		+				Me
92	*Litsea viridis* Liouho	Bời lời xanh	NL		+								Mi
93	*Persia americana* Miller	Bơ	NL		+			+				+	Mi
	Lecythidaceae	**Họ Lộc vừng**											
94	*Careya arborea* Roxb.	Vừng xoan	NL							+			Mi
	Loranthaceae	**Họ Tầm gửi**											
95	*Loranthus cordifolia* Wall.	Chùm gửi hình tim	NL				+						Hp
96	*Taxillus chinensis* (DC.) Dans.	Tầm gửi Trung Quốc	NL		+								Hp
	Lythraceae	**Họ Săng lẻ**											
97	*Lagerstroemia calyculata* Kurz.	Bằng lăng ổi	NL		+		+						Me
	Malvaceae	**Họ Bông**											
98	*Durio zibethinus* L.	Sầu riêng	NL		+	+	+	+					Mi
99	*Grewia paniculata* L.	Cò ke	NL		+	+	+	+		+			Mi
100	*Helicteres angustifolia* L.	Ổ kén	NL			+	+			+			Na
101	*Pterospermum argenteum* Tard.	Lòng mán bạc	NL				+						Mi
102	*Pterospermum grandifolia* Craib	Lòng mán hoa to	NL			+							Mi
103	*Pterospermum jackianum* Wall.	Mang tía	LC		+	+	+						Mi
104	*Reevesia thyrsoidae* Lindl.	Trường hùng	NL		+		+						Mi
105	*Sida acuta* Burm.f.	Chổi đực	NL		+	+	+	+		+			Na
106	*Urena lobata* L.	Ké hoa đào	NL		+	+	+						Na
	Melastomataceae	**Họ Mua**											
107	*Memecylon lilacinum* Zoll. & Morr.	Sầm	NL		+								Na
	Meliaceae	**Họ Xoan**											
108	*Melia azedarach* L.	Xoan	NL		+								Mi

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
	Menispermaceae	**Họ Tiết dê**											
109	*Cyclea barbata* Miers	Sương sâm	NL		+	+	+		+				Lp
	Moraceae	**Họ Dâu tằm**											
110	*Artocarpus nitidus* subsp. *lingnanensis* (Merr.) F. M. Jarrett	Chay lá bóng	NL		+	+							Mi
111	*Artocarpus chaplasha* Roxb.	Mít rừng	NL			+		+					Mi
112	*Artocarpus rigida* Bl.	Mít rừng	NL		+								Mi
113	*Broussonetia papyrifera* (L.) L'Hérit. ex Vent.	Dướng	NL				+						Mi
114	*Ficus geniculata* Kurz.	Sung gối	NL				+						Mi
115	*Ficus heterophylla* L.f.	Vú bò	NL		+								Na
116	*Ficus hispida* L.f. var. hispida	Sung	NL		+								Na
117	*Ficus hispida* var. *badiostrigosa* Corner	Sung đất	NL		+								Na
118	*Ficus hirta* Vahl var. *hirta*	Ngái phún	NL				+						Na
119	*Ficus hirta* var. *roxburghii* (Miq.) King	Ngái khỉ	NL							+			Na
	Myristicaceae	**Họ Máu chó**											
120	*Horsfieldia thorelii* Lec.	Xăng máu	NL			+				+			Me
	Myrtaceae	**Họ Sim**											
121	*Rhodomyrtus tomentosa* (Ait.) Hassk.	Sim	LC			+							Na
122	*Syzygium cumini* (L.) Skeels	Vối rừng	LC		+								Mi
	Oleaceae	**Họ Nhài**											
123	*Jasminum subtriplinerve* Bl.	Vằng	NL				+						Lp
	Onagraceae	**Họ Rau mương**											
124	*Ludwidgia adscendens* (L.) Hara	Rau dừa nước	NL					+					Na
	Oxalidaceae	**Họ Me đất**											
125	*Oxalis corniculata* L.	Me đất hoa vàng	NL					+				+	Ch
	Passifloraceae	**Họ Lạc tiên**											

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
126	*Passiflora foetida* L.	Lạc tiên	NL			+							Lp
	Phyllathaceae	**Họ Diệp hạ châu**											
127	*Antidesma ghaesembilla* Gaetern.	Chòi mòi	LC			+				+			Mi
128	*Antidesma montanum* Bl.	Chòi mòi núi	LC		+	+							Na
129	*Aporusa ficifolia* H.Baillon	Ngăm lông dày	NL		+	+	+		+	+	+		Mi
130	*Aporusa serrata* Gagn.	Tai nghé răng	NL			+							Mi
131	*Breynia fructicosa* (L.) Hook.f.	Bồ cu vẽ	NL		+								Na
132	*Breynia coriacea* Beille	Bồ cu vòi xòe	NL		+	+							Na
133	*Breynia glauca* Craib	Dé mốc	NL				+	+					Na
134	*Fluggea virosa* (Roxb. ex Willd.) Royle	Bỏng nổ trắng	NL		+								Na
135	*Phyllanthus emblica* L.	Me rừng	LC		+	+	+			+			Mi
136	*Sauropus androgynus* (L.) Merr.	Bồ ngót	NL					+					Na
	Phytolacaceae	**Họ Thương lục**											
137	*Phytolacca americana* L.	Thương lục Mỹ	NL				+						Na
	Piperaceae	**Họ Hồ tiêu**											
138	*Piper nigrum* L.	Tiêu	NL		+	+	+						Lp
	Plantaginaceae	**Họ Mã đề**											
139	*Plantago major* L.	Lá mã đề	LC					+					Ch
	Polygonaceae	**Họ Thồm lồm**											
140	*Polygonum chinensis* L.	Nghể Trung Quốc	NL			+							Hm
141	*Polygonum orientale* L.	Nghể bà	NL				+						Hm
	Portulacaceae	**Họ Rau sam**											
142	*Portulaca oleracea* L.	Rau sam	LC					+				+	Hm
	Primulaceae	**Họ Anh thảo**											
143	*Embelia henryi* Walker	Rè Henry	NL			+							Lp

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
144	*Embelia ribes* Burm.f.	Chua ngút	NL				+						Lp
145	*Maesa subdentata* A.DC.	Đồng trâm	NL				+						Na
	Rhamnaceae	**Họ Táo**											
146	*Zizyphus funiculosa* Ham. ex Laws	Táo lào	NL			+				+			Na
	Rosaceae	**Họ Hoa hồng**											
147	*Rubus pinnatisepalus* Hems.	Dum lá đài xẻ	NL				+	+					Na
148	*Rubus trianthus* Focke	Dum 3 hoa	NL		+								Na
	Rubiaceae	**Họ Cà phê**											
149	*Caelospermum truncatum* (Wall.) Baill. ex K.Schum.	Khắc tử	NL				+						Lp
150	*Catunaregam spinosa* (Thunb.) Tirving.	Găng tu hú	NL					+					Na
151	*Coffea arabica* L.	Cà phê chè	NL		+	+	+	+				+	Na
152	*Coffea canephora* Pierre ex A.Froehner	Cà phê vối	NL		+	+	+	+	+		+	+	Na
153	*Fagerlindia depauperata* (Drake) Tirv.	Găng nghèo	NL		+								Na
154	*Hedyotis multiglomerulata* (Pit.) Phamhoang	An điền nhiều chụm	NL				+						Ch
155	*Hedyotis pressa* Pierre ex Pit.	An điền sát	NL		+			+					Ch
156	*Psychotria cephalophora* Merr.	Lấu mang đầu	NL		+								Na
157	*Wendlandia glabrata* DC.	Huân lang nhẵn	NL			+	+			+			Na
	Rutaceae	**Họ Cam**											
158	*Acronychia pedunculata* (L.) Miq.	Bưởi bung	LC		+			+					Mi
159	*Clausena danniana* Levl. & Fedde	Hồng bì	NL				+						Mi
160	*Euodia lepta* (Spreng.) Merr.	Ba chạc	NL				+						Na
161	*Glycormis pentaphylla* (Retz.) Corr.	Cơm rượu	NL		+								Na
162	*Glycormis cyanocarpa* (Bl.) Spr. var. *cymosa* Kurz	Cơm rượu trái xanh	NL		+								Na
163	*Harrisonia perforata* (Bl.) Merr.	Đa đa	LC			+							Na
	Sapindaceae	**Họ Bồ hòn**											

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
164	*Nephelium cuspidatum* Bl.	Vải rừng	NL		+		+						Me
165	*Sapindus mukorossi* Gaertn.	Bồ hòn	NL		+		+						Me
	Simaroubaceae	**Họ Thanh thất**											
166	*Brucea javanica* (L.) Merr.	Xoan rừng	LC		+	+	+						Na
	Solanaceae	**Họ Cà**											
167	*Physalis angulata* L.	Thù lù cạnh	LC					+					Na
168	*Solanum americanum* Mill.	Lu lu đực	NL				+						Na
169	*Solanum erianthum* D.Don	Cà hoa lông	NL				+						Na
170	*Solanum indicum* L.	Cà ấn độ	LC		+								Na
171	*Solanum nigrum* L. .	Lu lu đực	NL		+				+				Na
172	*Solanum torvum* Swartz.	Cà hoa trắng	NL		+								Na
	Styracaceae	**Họ Bồ đề**											
173	*Styrax benjoin* Dryand.	An tức	NL		+		+						Mi
	Symplocaceae	**Họ Dung**											
174	*Symplocos guillauminii* Merr.	Dung guillaumin	NL				+						Mi
	Urticaceae	**Họ Gai**											
175	*Maoutia puya* (Hook.) Wedd.	Gai ráp	NL		+			+				+	Na
	Verbenaceae	**Họ Cỏ roi ngựa**											
176	*Clerodendrum cyrtophyllum* Turcz.	Đắng cẩy	NL		+	+	+	+				+	Na
177	*Clerodendrum squamatum* (Vent.) Willd	Xích đồng nam	NL		+	+		+					Na
178	*Clerodendrum serratum* (L.) Moon.	Ngọc nữ răng	NL			+	+	+					Na
179	*Stachytarphela jamaicencis* (L.) Vahl.	Cỏ đuôi chuột	NL			+							Na
180	*Vitex pinnata* L.	Bình linh cánh	LC		+			+					Na
	Vitaceae	**Họ Nho**											
181	*Cayratia trifolia* (L.) Domino	Dây vác	NL		+			+	+				Lp

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
182	*Cissus modeccoides* Pl.	Chìa vôi	NL					+					Lp
183	*Tetrastigma godefroyanaum* Pl.	Tứ thư	NL					+		+			Lp
184	*Tetrastigma petelotii* Gagn.	Tứ thư Petelot	NL				+	+					Lp
	MONOCOTS	**Lớp Một lá mầm**											
	Arecaceae	**Họ Cau dừa**											
185	*Arenga pinnata* (Wurmb) Merr.	Bung báng	NL					+					Mi
	Commelinaceae	**Họ Thài lài**											
186	*Commelina diffusa* Burm. f.	Thài lài trắng	LC				+						Ch
187	*Commelina bengalensis* L.	Trai an	NL										Ch
	Cyperaceae	**Họ Cói**											
188	*Courtoisia cyperoides* Nees	Cói bông cầu	NL		+								Th
189	*Cyperus cyperoides* (L.) O.Ktze	Lác đuôi chồn	LC						+				Th
190	*Cyperus andreanus* Maury	Cói	NL				+	+					Th
191	*Scirpus fluviatilis* (Torr.) Gray ex Phamh.	Cói giùi sông	NL		+			+					Th
	Dioscoreaceae	**Họ Củ mài**											
192	*Dioscorea bulbifera* L.	Khoai dái	NL		+								Cr
193	*Dioscorea craibiana* Prain & Burk.	Từ Craib	NL				+						Cr
194	*Dioscorea depauperata* Prain & Burk.	Từ nghèo	NL		+								Cr
195	*Dioscorea kratica* Prain & Burk.	Khoai mọi	NL			+							Cr
190	*Dioscorea pentaphylla* L.	Từ 5 lá	NL		+	+							Cr
	Poaceae	**Họ Hòa thảo**											
197	*Cynodon dactylon* (L.) Pers.	Cỏ gà	NL		+	+	+	+					Cr
198	*Lophatherum gracile* Brongn	Cỏ lá tre	NL		+	+	+		+			+	Cr
199	*Pennisetum setaceum* (Forssk.) Chiov.	Cỏ đuôi chồn	NL		+								Cr
	Smilacaceae	**Họ Cậm cang**											

No	Scientific name	Common name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4	Life form
200	*Smilax pottingeri* Prain	Kim cang Pottinger	NL		+						+		Cr
201	*Smilax prolifera* Roxb. ex Kunth.	Cậm cang sanh sôi	NL			+				+			Cr
	Zingiberaceae	**Họ Gừng**											
202	*Cheilocostus speciosus* (J. Konig) C. Specht	Mía dò	LC		+	+		+				+	Cr

Note: IUCN red list categories: EN = Endangered; LC = Least concern; NL = Not listed

Vietnam Red Data Book categories: EN = Endangered; VU = Vunerable

Life forms: Me (Mesophanerophytes); Mi (Microphanerophytes); Na (Nanophanerophytes); Hp (Hemiparasite); Suc (Succulentes); Lp (Lianophanerophytes); Ch (Chamaephytes); Hm (Hemicryptophytes); Cr (Cryptophytes); Hy (Hydrophytes); Th (Therophytes).

Species diversity: A total of of 202 vascular plant species belonging to 155 genera, 70 families, and three phyla (Polypodiophyta, Gymnospermae, and Angiospermae) were recorded in fours transects and fours plots in the secondary forests and on land surrounding coffee, pepper, avocado, durian, and cashew plantations blocks within the Project area.

Life forms: Among 202 recorded species, most species are Nanophanerophytes (67 species); followed by Microphanerophytes (39 species); Lianophanerophytes (28 species); Therophytes (27 species); Mesophanerophytes (15 species); Cryptophytes (11 species); Chamaephytes (7 species); Hemicryptophytes (5 species); Hemiparasite (2 species); and Succulentes (1 species).

5.1.3 Conservation Significant Species

There are three species are listed as conservation significant in national and global red lists (see Table 5.2).

Table 5.2 List of Conservation Significant Species

No.	Scientific name	Common name	IUCN	VNRB	Description
1	*Dalbergia oliveri*	Cẩm lai	EN	EN	Two mature individuals and a few seedlings of *Dalbergia oliveri* was found in Transect 1 (01 (WGS84): 13.032147, 108.177669; 02 (WGS84): 13.024155, 108.194439). They are scatteredly distributed in the secondary forest patches and on land surrounding coffee, pepper, avocado, durian and cashew plantations blocks. This species is found in primary and secondary forest, mixed deciduous forest, tropical evergreen or semi-deciduous forest, along streams, at alt. up to 1,200 metres. The species distributes in Quang Tri, Da Nang, Kon Tum, Giai Lai, Dak Lak, Dak Nong, Lam Dong, Dong Nai, Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, Binh Phuoc, Tay Ninh, Ba Ria-Vung Tau provinces. It is also reported for the Floras of Myanmar, Thailand, Lao PDR, and Cambodia.
2	*Dipterocarpus intricatus*	Dầu lông	EN	NL	Only two individuals of *Dipterocarpus intricatus*was found in the Transect 4 (01 (WGS 84): 13.100467, 108264602; 02 (WGS 84): 13.101137, 108265633). They are scatteredly distributed in the secondary forest patches and on land surrounding coffee, , avocado, and durian and plantations blocks. This species is found in dense deciduous forests and clear forests. It is often met in pure stands in deciduous, periodically flooded lowland forests, but can also be found in dense forest at alt. up to 1300 m. The species distributes in Kon Tum, Giai Lai, Dak Lak, Ninh Thuan, Binh Duong, Tay Ninh, Dong Nai, Ba Ria-Vung Tau, Kien Giang provinces. It is also reported for the Floras of Thailand, Lao PDR, and Cambodia.
3	*Rauvolfia cambodiana*	Ba gạc cam bốt	NL	VU	Many individuals and seedlings of *Rauvolfia cambodiana* was found in the Transetc 3 ((WGS84)13.073315, 108.251577). They are scatteredly distributed in the secondary forest patches surrounding the plantations. This species grows on yellowish brown soils on basaltic rocks in the secondary forest and burnt-over land, alt. 400-800 m. The species distributes in Quang Tri, Thua Thien Hue, Quang Nam, Quang Ngai, Binh Dinh, Kon Tum, Giai Lai, Dak Lak, Dak Nong, Lam Dong provinces. It is also reported for the Floras of Lao PDR and Cambodia.

5.1.4 Invasive Species

Three invasive species according to Decision 35/2018/TT-BTNMT have been recorded in the Project area. Of which, two species (*Chromolaena odorata* and *Mimosa pigra*) are listed in Appendix I and one species (*Ageratum conyzoides*) is listed in Appendix II. They are commonly distributed on all surveyed transects and plots.

5.2 Results of Fauna Surveys

5.2.1 Non-volant Mammals

5.2.1.1 Interviews

The informants reported 14 non-volant mammal species, however, the survey team could identify nine possible species (see Table 5.3 and Figure 5.2). These species are believed to exist in the Project area (see Figure 5.1).

Eight of the total nine species are least concern (LC) under the IUCN Red List of Threatened Species and not listed (NL) in 2007 Vietnam Red Data Book. Only one species, which is thought as Smooth-coated Otter (Lutrogale perspicillata) [IUCN VU; VNRB EN] based on description of the informant and description and distribution of this species (WWF, 2000). According to Mr. Dang Minh Hai, who is Quang Ngai person moving to Cư K'Bô commune, Krong Buk district of the Dak Lak province to do agriculture cultivation (mainly growing coffee) that the fur of otter is black, and its weight is from 7 – 8 kg. One group of four Smooth-coated Otters is still surviving in this region. They often come to the lakes beside his coffee field in March or April every year when the water level of the lakes come down to catch fish. In 2019, a guy – who is from Ha Tinh province – cultivating coffee and fruit trees close to Mr. Hai's field caught and killed one otter of the five-individual otter group to eat with his friends. That is why the group remains four individuals only.

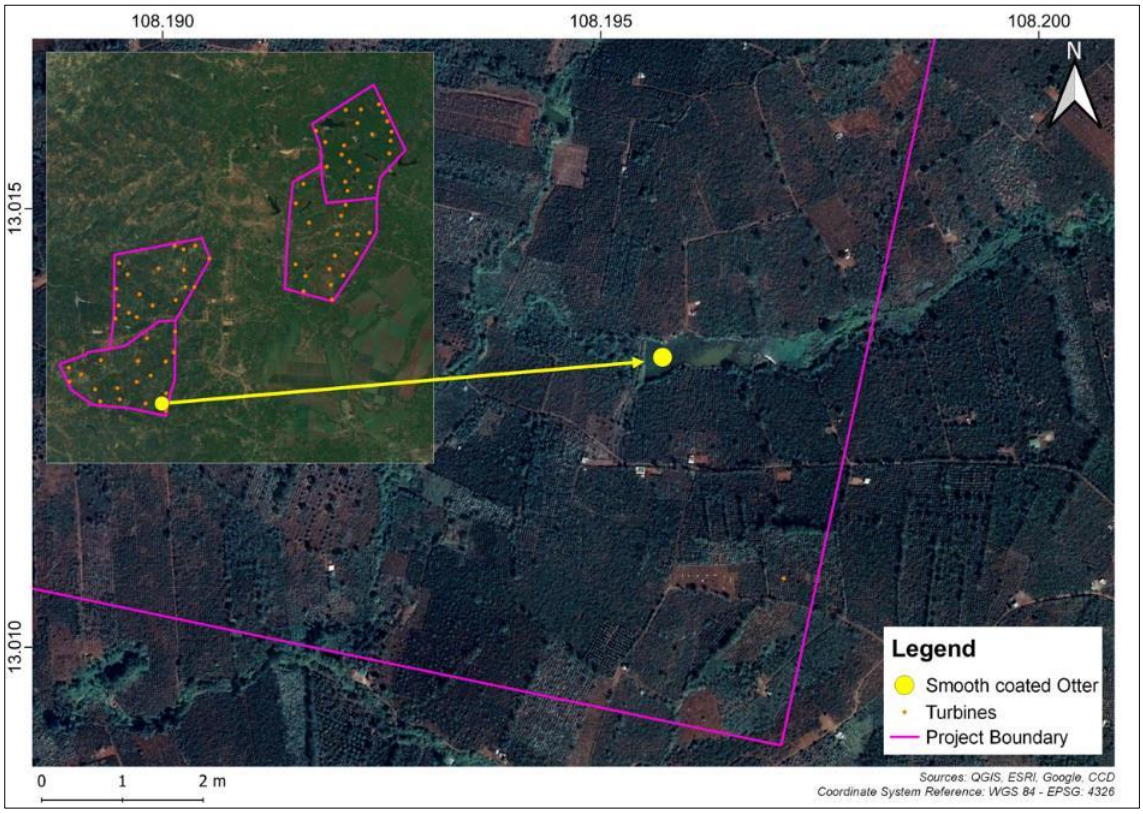


Figure 5.1 Map of Location of the a Smooth-coated Otter Group Reported

Table 5.3 Possible Mammal Species Recorded from Interviews

No.	Common name	Latin name	IUCN	VNRB	Locations of respondents	Assessment of species identity
	TREESHREW	SCANDENTIA				
	Treeshrews	Tupaiidae				
1	Northern tree shrew	*Tupaia belangeri*	*LC*	*NL*	13.03475; 108.18083	Based on respondent's description and photo identification from A field guide to the mammals of South - East Asia (Francis, 2008).
	CARNIVORES	CARNIVORA				
	Mustelids	Mustelidae				
2	Large-toothed Ferret Badger	*Melogale personata*	*LC*	*NL*	13.03514; 108.17938 13.012093; 108.195476 13.03559; 108.18127 13.03475; 108.18083	Based on respondent's description and Introduction of mammals of Indochina and Thailand (WWF, 2000).
3	Smooth-coated Otter	*Lutrogale perspicillata*	*VU*	*EN*	13.012902; 108.195455	Based on respondent's description and Introduction of mammals of Indochina and Thailand (WWF, 2000).
	Viverrids	Viverridae				
4	Common Palm Civet or Small Indian Civet	*Paradoxurus hermaphroditus* or *Viverricula indica*	*LC*	*NL*	13.11122; 108.26099 13.033805; 108.184941	Based on respondent's description and Introduction of mammals of Indochina and Thailand (WWF, 2000).
5	Masked palm civet	*Paguma larvata*	*LC*	*NL*	13.03559; 108.18127	Based on respondent's description and photo identification from A field guide to the mammals of South - East Asia (Francis, 2008).
	Mongoose	Herpestidae				
6	Small Indian Mongoose	*Herpestes auropunctatus*	*LC*	*NL*	13.033805; 108.184941	Based on respondent's description and Introduction of mammals of Indochina and Thailand (WWF, 2000).
	Cats	Felidae				

No.	Common name	Latin name	IUCN	VNRB	Locations of respondents	Assessment of species identity
7	Leopard cat	*Prionailurus bengalensis*	*LC*	*NL*	13.03657; 108.18174 13.03475; 108.18083	Based on respondent's description and photo identification from A field guide to the mammals of South - East Asia (Francis, 2008).
	RODENTS	RODENTIA				
	Squirrels	Sciuridae				
8	Berdmore's squirrel	*Menetes berdmorei*	*LC*	*NL*	13.03475; 108.18083 13.037888; 108.183373 13.033805; 108.184941 13.012093; 108.195476 13.03774; 108.18265 13.03657; 108.18174 13.03559; 108.18127	Based on respondent's description, samples and records documented by the volant mammal group in the 1st survey in May 2021 and field survey this time.
9	Cambodian striped squirrel	*Tamiops rodolphii*	*LC*	*NL*	13.037888; 108.183373 13.033422; 108.185918 13.012093; 108.195476 13.11122; 108.26099 13.03514; 108.17938	Based on respondent's description, samples and records documented by the volant mammal group in the 1st survey in May 2021 and field survey this time.

Note: LC = Least Concern; NL = Not Listed; VU = Vulnerable; EN = Endagered.

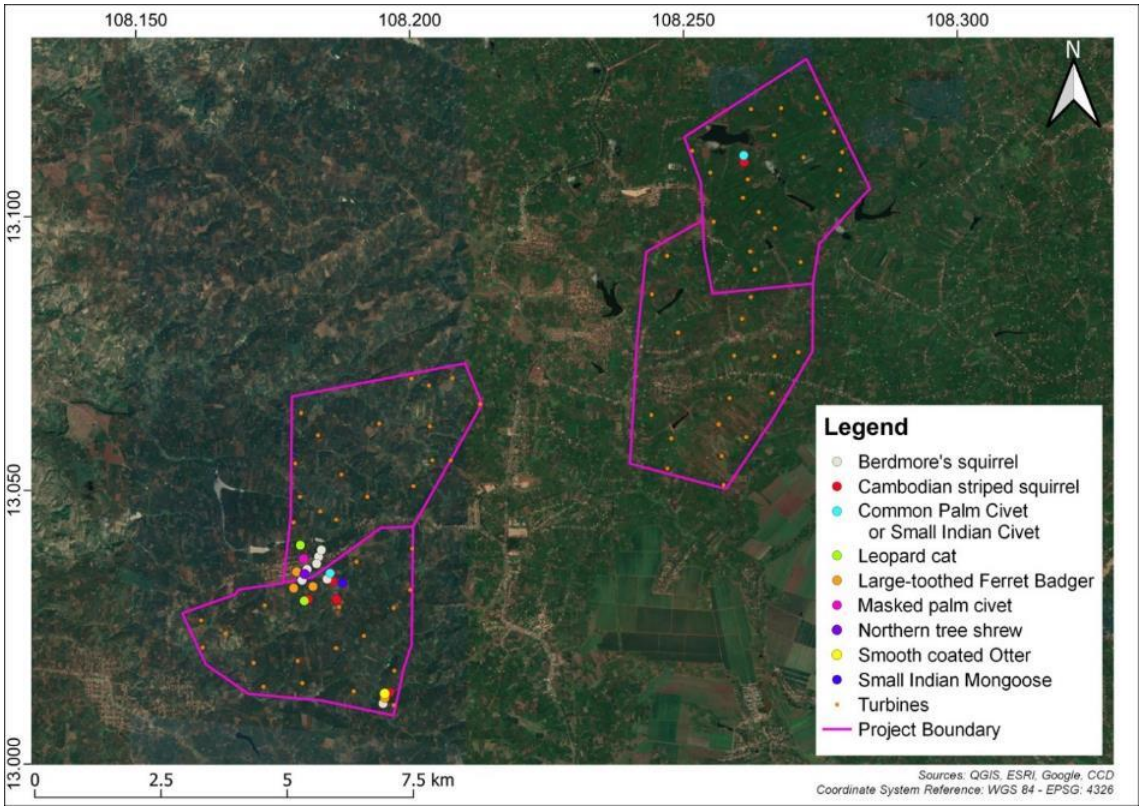


Figure 5.2 Map of Distribution of Species Recorded from Interviews

5.2.1.2 Field Survey

The field mammal surveys by transect, cage traps and camera traps recorded the presence of at least five species including Northern Treeshrew *(Tupaia belangeri)* [IUCN LC; VNRB NL], Cambodian striped squirrel *(Tamiops rodolphii)* [IUCN LC; VNRB NL], Berdmore's squirrel *(Menetes berdmorei)* [IUCN LC; VNRB NL], a subspecies of Pallas's Squirrel *(Callosciurus erythraeus flavimanus)* [IUCN LC; VNRB NL], Rattus nitidus *(Rattus nitidus)* [IUCN LC; VNRB NL], and other unidentified species of rats (see Table 5.4).

Table 5.4 List of Mammal Species Recorded along the Transects

No.	Common name	Scientific name	Sight	Sum of number	IUCN	VNRB (2007)
I	**TREESHREW**	**SCANDENTIA**				
1	**Treeshrews**	**Tupaiidae**				
1	Northern Treeshrew	*Tupaia belangeri*	O	5	LC	NL
II	**RODENTS**	**RODENTIA**				
2	**Squirrels**	**Sciuridae**				
2	Cambodian striped squirrel	*Tamiops rodolphii*	S	7	LC	NL
3	Berdmore's squirrel	*Menetes berdmorei*	O, Ca	10	LC	NL

No.	Common name	Scientific name	Sight	Sum of number	IUCN	VNRB (2007)
4	Pallas's Squirrel	*Callosciurus erythraeus flavimanus*	O, Ph	1	LC	NL
3	**Murids**	**Muridae**				
5	Rattus nitidus	*Rattus nitidus*	O, Ph	5	LC	NL
6	Rats	*Ratus* sp.	S, Ca	12		

Notes: LC = Least Concern; O = Observation; Ca = Camera trap; Ph = Photograph; S = Sample; NL = Not Listed;

Berdmore's squirrel: Two individuals captured by one camera trap near VP4, one died individual amongst a mess of death animals shot by a local person from the first bat and bird survey in May 2021, two individuals photographed by a member of the bird survey team at VP2, and five others observed by the survey team (see Figure 5.3 and Figure 5.4).

Figure 5.3 Berdmore's Squirrel was Photographed by One of the Bird Survey Team Members at VP 2

Figure 5.4 Berdmore's Squirrel Captured by a Camera Trap

Cambodian striped squirrel: One died individual amongst a mess of death animals shot by a local person from the first bat and bird survey in May 2021, and six others were observed by the survey teams (see Figure 5.5).

Figure 5.5 A Death Cambodian Striped Squirrel (third from right)

Pallas's Squirrel: A female of a subspecies of the Pallas's squirrel was seen to be newly trapped hanging on a low branch of a falling tree (see Figure 5.7 and Figure 5.6). The survey team has quickly taken photographs of that individual, rescued and released her back to the habitat. The trap was taken away and destroyed.

Figure 5.6 A Female of Pallas's Squirrel was newly Trapped

Figure 5.7 The Pallas's Squirrel was Rescued

Rattus nitidus: A female of the *Rattus nitidus* was detected to keep in a snake trap. The rat has just given birth of four babies (see Figure 5.8). All of them were released after taking photographs.

Figure 5.8 The Rattus Nitidus was Kept in a Long Snake Trap and Gave Four Births

Species distribution: The Berdmore's squirrels were seen to distribute in the low part of the Project area while the Pallas's squirrels were seen only in the upper part of the Project area. The Northern tree shrews was in both parts (see Figure 5.9).

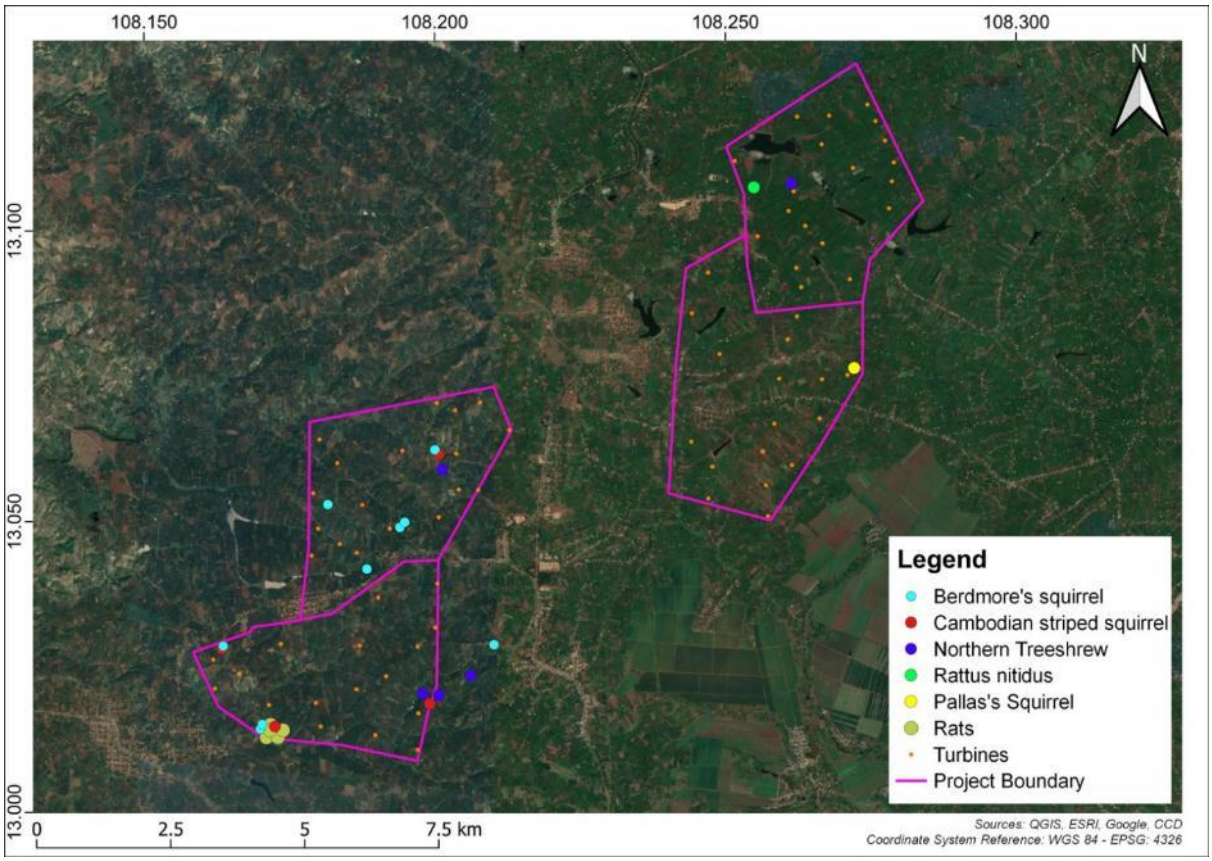


Figure 5.9 Map of Distribution of Recorded Mammal Species from Field Survey

5.2.1.3 Threats

The non-volant mammal species have been facing a number of threats, e.g loss of habitat due to agriculture cultivation activities, pesticide spraying for coffee and fruit tree fields, trapping and slingging. During the 1st bat and bird surveys (23 – 25 May 2021) and the 1st mammal survey (16 – 19 July), the

survey team met the cases that local people using slings to shoot wild animals including birds, mammals and reptiles and trap them (see Figure 5.10).

Figure 5.10 Vietnamese Blue-crested Lizard (Calotes bachae) [IUCN LC] were Shot by Sling

5.2.2 Bats

5.2.2.1 Bat Diversity

The second survey recorded a total of 25 individuals, of which 17 individuals were directly observed, 17 individuals were recorded ultrasound, and 3 individuals collected by mist nets directly. Based on analysis of collected data, five species of bats were recorded during this survey.

Combine to the first survey, total seven bat species were found within the Project area (see Table 5.5).

Table 5.5 List of Bats Recorded within the Project Area

No.	Scientific name	Common name	Bat group	IUCN	VRDB	1st survey	2nd survey			
							Method	Count	Flight bands	O/E/MN/HT (individuals)
I	**Pteropodidae**	**Fruit bats**								
1	*Cynopterus sphinx*	Greater short-nosed fruit bat	Fruit bat	LC	NL	+	O/MN	3	1 individual	2/0/1/0

No.	Scientific name	Common name	Bat group	IUCN	VRDB	1st survey	2nd survey			
							Method	Count	Flight bands	O/E/MN/HT (individuals)
									(<50m)	
2	*Macroglobosus sobrinus*	Hill Long-tongued Fruit Bat	Fruit bat	LC	NL		O/MN	2	2 individuals (<50m)	1/0/1/0
II	**Vespertilionidae**	Vespertilionid bat								
3	*Myotis muricola*	Nepalese whiskered myotis	Insect-eating	LC	NL	+	O, E, MN	4	4 individuals (<50m)	0/3/0/0
4	*Myotis* cf. *ater*	Peters's Myotis	Insect-eating	LC	NL	+	-	-	-	-
5	*Pipistrellus javanicus*	Java pipistrelle	Insect-eating	LC	NL	+	O, E	13	13 individuals (<50m)	13/13/0/0
6	*Scotophilus heathii*	Greater Asiatic yellow bat	Insect-eating	LC	NL	+	O, E	3	1 individual (<50m)	1/1/1/0
7	*Scotophilus* cf. *kuhlii*	Lesser Asiatic yellow bat	Insect-eating	LC	NL	+	-	-	-	-
	Total Observed (O)									17
	Total Echolocation (E)									17
	Total Mist net (MN)									3
	Harp trap (HT)									0
	Total 2nd survey (individual)							25		

Note: LC = Least Concern; NL = Not Listed; O = Observation; MN = Mist net; HT = Harp trap; E = Echolocation.

None of recorded species is listed as threatened species in the IUCN Red List or Vietnam's Red Data Book.

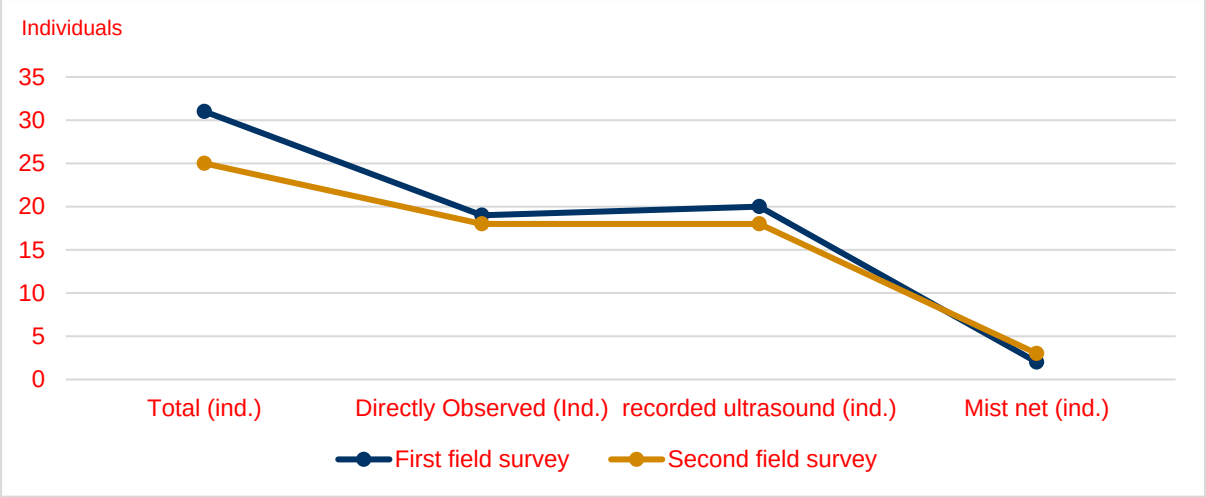


Figure 5.1 Comparision of Recorded Individuals by Different Methods

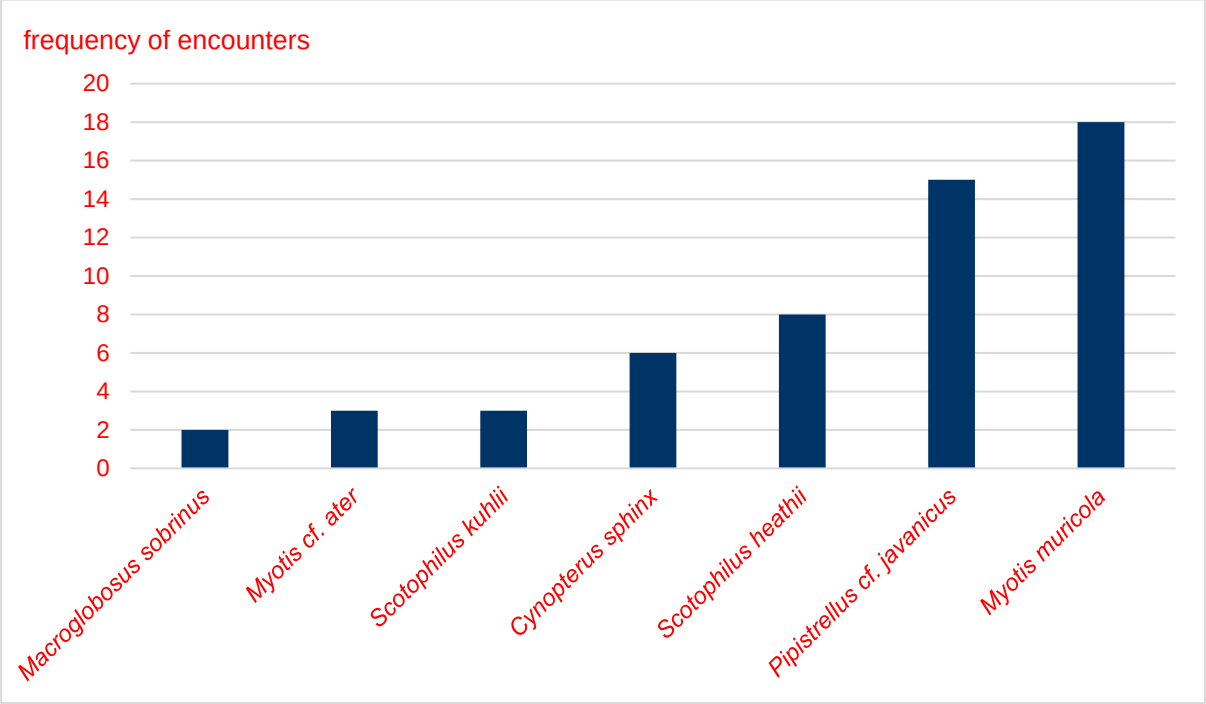


Figure 5.2 Quantity of Species Recorded from both Field Survey

5.2.2.2 Species Account

There is one new recorded species for the Project area during the second survey - Hill Long-tongued Fruit Bat *Macroglossus sobrinus* (IUCN LC; VNRB NL) (see Figure 5.11).

This species ranges from northeastern South Asia and southern China Mengla (Xishuangbanna and Yunnan) (Smith and Xie 2008), and Southeast Asia (Hutson et al. 2021). In South Asia it is found in India (Molur et al. 2002). In Southeast Asia, it ranges from Myanmar in the west, through Thailand, Lao PDR, Viet Nam, Cambodia and Peninsular Malaysia, and from here occurs in Indonesia (Hutson et al. 2021). It has been recorded from elevations of up to 2,000 m a.s.l (Hutson et al. 2021). During the second survey, only one male was collected at 4:30, at net site 1 of point 1 when flying bats crossed the dam, where bat nets were placed to enter the fruit growing area.

Figure 5.11 Hill Long-tongued Fruit Bat Macroglobosus Sobrinus

5.2.3 Reptiles and Amphibians

5.2.3.1 Species Diversity

Based on specimen identification and direct observation in the field, we recorded a total of 27 species, comprising 12 species of reptiles in six families and two sub-orders of one order and 12 species of amphibians in six families and two orders from Krong Buk District, Dak Lak Province (see Table 5.6).

In terms of species diversity, Colubridae is the most diverse family (six recorded species), followed by Microhylidae (five species); Scincidae (three species); Gekkonidae, Elapidae, Dicroglossidae, and Rhacophoridae (two species each); Agamidae, Xenopeltidae, Bufonidae, Ranidae, and Ichthyophiidae (one species each) (see Figure 5.12).

We recorded some species that have a high frequency of occurrence (encountered more than 10 individuals) such as: Vietnamese blue-crested Lizard (*Calotes bachae*) [IUCN LC], Butler's Narrow-mouth Frog (*Microhyla butleri*) [IUCN LC], Dak Lak Narrow-mouth Frog (*Microhyla daklakensis*) [IUCN

NL], Mukhlesur's Narrow-mouthed Frog (*Microhyla mukhlesuri*) [IUCN NL], Beautiful Pygmy Frog (*Microhyla pulchra*) [IUCN LC], Marten's Frog (*Occidozyga martensii*) [IUCN LC], Taipei Frog (*Hylarana taipehensis*) [IUCN LC], and Nongkhor Pigmy Tree Frog (*Chirixalus nongkhorensis*) [IUCN LC]. It is noted that one unidentified species is still under examination (e.g., *Sphenomorphus* sp. and *Oligodon* sp.) (see Table 5.6).

Table 5.6 List of Reptiles and Amphibians Recorded in the Project Area

No	Scientific name	Common name	IUCN	VNRB	Transect	Sum of number
	REPTILIA	**REPTILES**				
	Squamata	**Squamata**				
	Sauria	**Lizards**				
	Agamidae	**Agamid Lizards**				
1.	*Calotes bachae* Hartmann, Geissler, Poyarkov, Ihlow, Galoyan, Rödder & Böhme, 2013*	Vietnamese blue-crested Lizard	LC	NL	1, 2, 3, 4,	> 10
	Gekkonidae	**Geckos**				
2.	*Hemidactylus frenatus* Schlegel in Duméril & Bibron, 1836	Common House Gecko	LC	NL	3	2
3.	*Gekko gecko* (Linnaeus, 1758)	Tokay Gecko	NL	NL	2	2
	Scincidae	**Skinks**				
4.	*Eutropis macularia* (Blyth, 1853)	Grass Sun Skink	NL	NL	1, 2	2
5.	*Sphenomorphus maculatus* (Blyth, 1853)	Spotted Forest Skink	NL	NL	1, 2	2
6.	*Sphenomorphus* sp.	Forest Skink	NL	NL	1, 2	2
	Serpentes	**Snakes**				
	Colubridae	**Colubrids**				
7.	*Boiga multomaculata* (Boie, 1827)	Many-spotted Cat Snake	NL	NL	1,2	2
8.	*Coelognathus radiatus* (Boie, 1827)	Radiated Ratsnakes,	LC	VU	4, 3, 4	3
9.	*Dendrelaphis ngansonensis* (Bourret, 1935)	Nganson Bronzeback Tree Snake	LC	NL	1, 2	2
10.	*Oligodon* sp.	Kukri Snake	NL	NL	2	1
11.	*Ptyas korros* (Schlegel, 1837)	Indo-Chinese Rat Snake	NL	EN	1, 2	2
12.	*Rhabdophis subminiatus* (Schlegel, 1837)	Red-necked Keelback	LC	NL	2	1
	Xenopeltidae	**Sunbeam snakes**				
13.	*Xenopeltis unicolor* Reinwardt, 1827	Asian Sunbeam Snake	LC	NL	2, 3, 4	3
	Elapidae	**Kraits**				
14.	*Bungarus candidus* (Linnaeus, 1758)	Malayan Krait	LC	NL	1, 2	2
15.	*Ophiophagus hannah* (Cantor, 1836)	King Cobra	VU	CR	4	1
	AMPHIBIA	**AMPHIBIANS**				
	Anura	**Frogs**				
	Bufonidae	**Toads**				
1.	*Duttaphrynus melanostictus* (Schneider, 1799)	Asian Common Toad	LC	NL	1, 2, 3, 4	4

No	Scientific name	Common name	IUCN	VNRB	Transect	Sum of number
	Microhylidae	**Rice frogs**				
2.	*Microhyla butleri* Boulenger, 1900	Butler's Narrow-mouth Frog	LC	NL	1, 2, 3, 4	> 10
3.	*Microhyla daklakensis* Hoang, Nguyen, Ninh, Luong, Pham, Nguyen, Orlov, Chen, Wang, Ziegler & Jiang, 2021*	Dak Lak Narrow-mouth Frog	NL	NL	1, 2, 3, 4	> 10
4.	*Microhyla mukhlesuri* Hasan, Islam, Kuramoto, Kurabayashi & Sumida, 2014	Mukhlesur's Narrow-mouthed Frog	NL	NL	1, 2, 3, 4	> 10
5.	*Microhyla pulchra* (Hallowell, 1861)	Beautiful Pygmy Frog	LC	NL	2, 3, 4	> 10
6.	*Kaloula pulchra* Gray, 1831	Banded Bullfrog	LC	NL	3, 4	2
	Dicroglossidae	**Fork-tongued frogs**				
7.	*Fejervarya limnocharis* (Gravenhost, 1829)	Grass Frog	LC	NL	3, 4	2
8.	*Occidozyga martensii* (Peters, 1867)	Marten's Frog	LC	NL	2, 3, 4	> 10
	Ranidae	**True Frogs**				
9.	*Hylarana taipehensis* (Van Denburgh, 1909)	Taipei Frog	LC	NL	1, 2, 3, 4	> 10
	Rhacophoridae	**Flying Frogs**				
10.	*Chirixalus nongkhorensis* (Cochran, 1927)	Nongkhor Pigmy Tree Frog	LC	NL	1, 2, 3, 4	> 10
11.	*Polypedates mutus* (Smith, 1940)	Burmese Whipping Frog	LC	NL	3, 4	2
	Gymnophiona					
	Ichthyophiidae	**Caecilian**				
12.	*Ichthyophis nguyenorum* Nishikawa, Matsui & Orlov, 2012*	Nguyen's Caecilia	LC	NL	2	2

***Note**: DD = Data Deficient, CR = Critically Endangered, EN = Endangered, VU = Vulnerable, LC = Least Concern; NL = Not Listed;*

- ** = Species is currently known only from Vietnam;*
- *VNRB (2007) = Vietnam Red Data Book.*
- *IUCN (2021) = The IUCN Red List of Threatened Species;*

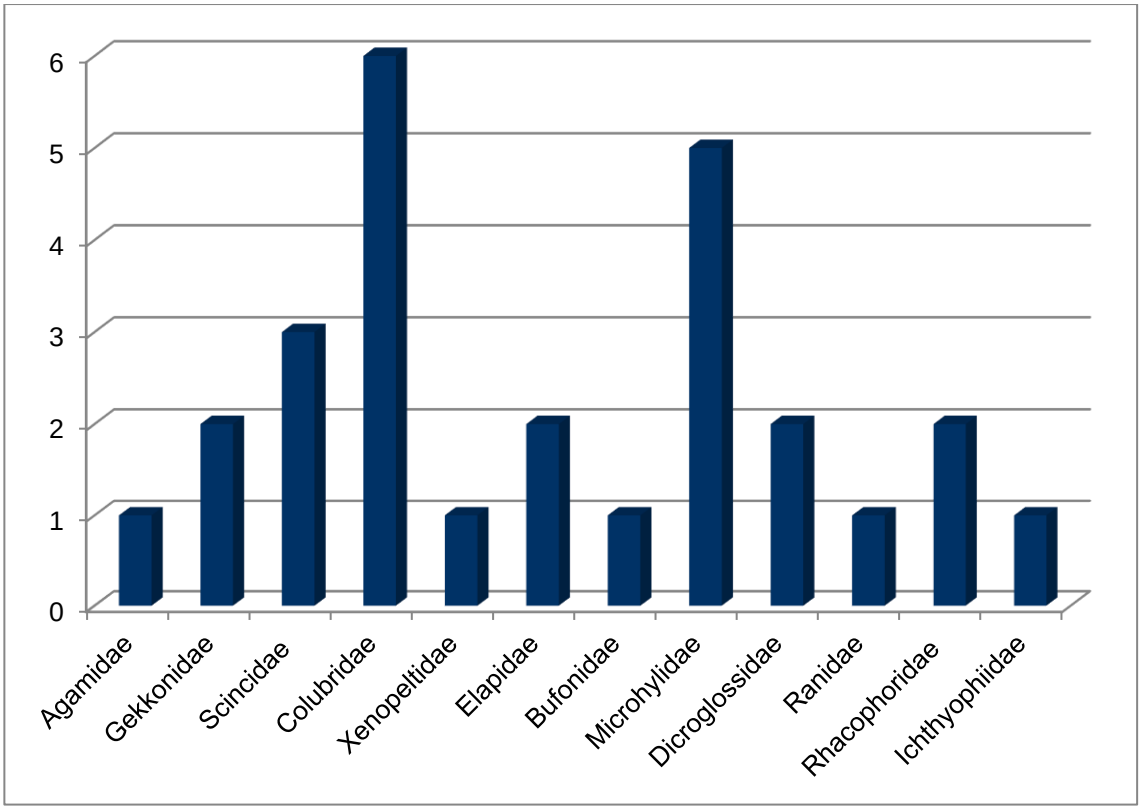


Figure 5.12 Species Diversity of the Reptile and Amphibian Families

5.2.3.2 Species of Conservation Concern

Among 27 recorded species of reptiles and amphibians from Krong Buk District, Dak Lak Province, seven species are globally or nationally threatened at different levels (see Table 5.6):

- Red Data Book of Vietnam (2007): Four species, namely Tokay Gecko (*Gekko gecko*) [VU], Radiated Ratsnakes (*Coelognathus radiatus*) [VU], Indo-Chinese Rat Snake (*Ptyas korros*) [EN], and King Cobra (*Ophiophagus hannah*) [CR].
- IUCN Red List (2021): One species, namely King Cobra (Ophiophagus hannah) [VU].
- Endemism: Three species including Vietnamese Blue-crested Lizard (*Calotes bachae*), Dak Lak Narrow-mouth Frog (*Microhyla daklakensis*), and Nguyen's Caecilia (*Ichthyophis nguyenorum*) are currently known only from Vietnam.

Calotes bachae Hartmann, Geissler, Poyarkov, Ihlow, Galoyan, Rödder & Böhme, 2013 / Vietnamese Blue-crested Lizard:

Habitat: In Vietnam, the species is found on tree branches, along forest paths in evergreen forest, South Vietnam. In project area, the species is found on hedges of shrubs on farmland.

Populations status: Common

Distribution: Dak Lak, Dak Nong, Lam Dong, Dong Nai, Phu Yen, Ninh Thuan, and Binh Thuan provinces.

Microhyla daklakensis Hoang, Nguyen, Ninh, Luong, Pham, Nguyen, Orlov, Chen, Wang, Ziegler & Jiang, 2021 / Dak Lak Narrow-mouth Frog:

Habitat: In Vietnam, the species is found on the bank of small streams and around puddles and ponds in evergreen forest. In project area, the species is found on the ground near the farmland the banks of small temporary ponds formed after heavy rain, along the edges of the forest and on the sides of a recently constructed road next to the devastated forests.

Populations status: Common

Distribution: Dak Lak

Ichthyophis nguyenorum Nishikawa, Matsui, and Orlov, 2012 / Nguyen's Caecilia:

Habitat: In Vietnam, the species usually lives under the layer of decaying leaves, along small streams or around puddles in evergreen forest, Central Highlands. This species is found on the forest floor after rain only. In project area, the species is found on the farmland formed from devastated forests.

Populations status: Quite rare

Distribution: Kon Tum, Gia Lai, Dak Lak, and Lam Dong provinces.

5.3 Birds

5.3.1 Habitats

As both field surveys were conducted closely, there were no change on the status of all of the habitats along the transects and around vantage points.

5.3.1.1 Habitats along the Transects

The main kind of habitats at along the transects of proposed wind farm are gardens (coffee, jackfruit, mango etc.), scrubs and plantation (see Figure 5.13).

Figure 5.13 The Main Habitats along the Transects

5.3.1.2 Habitats around the Vantage Points

The figures at each VP are presented from Figure 5.14 and Figure 5.15. Habitats at VP No.1 are plantation, coffee gardens, fruiting tree and scrubs; at VP No.2 are coffee gardens, fruiting tree (jackfruit), scrubs and bushes; and at VP No.5 are coffee gardens with tail trees located along the garden's fences. The habitats at VP No.3, VP No.4, VP No.6 to VP No.8 are coffee gardens and fruiting trees.

Figure 5.14 Habitats around the VP 1

Photo: Le Duc Hien

Figure 5.15 Habitats around the VP 2

Photo: Nguyen Van Thuan

Figure 5.16 Habitats around the VP 3

Photo: Le Duc Hien

Figure 5.17 Habitats around the VP 4

Photo: Tran Van Bay

Figure 5.18 Habitats around the VP 5

Photo: Nguyen Van Luc

Figure 5.19 Habitats around the VP 6

Photo: Do Dinh Dong

Figure 5.20 Habitats around the VP 7

Photo: Do Dinh Dong

Figure 5.21 Habitats around the VP 8

Photo: Tran Van Bay

5.3.2 Results of Surveys

A total of 63 bird species belonging to 11 orders and 31 families have been recorded during the second survey. Among 63 recorded species, two species are listed in the IUCN Red List 2021 as Near Threatened including Red-breasted Parakeet (*Psittacula alexandri)*, Grey-headed Parakeet (*Psittacula finschii)* and 61 species listed as Least Concern. Particularly, one endemic species Annam Prinia *(Prinia rocki)* was recorded. None of the recorded species are listed in the Vietnam Red Data Book 2007. Furthermore, six species are listed in appendix IIB of Decree No. 06/2019/ND – CP, dated 22 January 2019 of Vietnam Government on Management of rare and threatened Fauna, Floral and impelmentation of CITES including Red-breasted Parakeet, Grey-headed Parakeet, Black-shouldered Kite (*Elanus caeruleus*), Shrika *(Accipiter badius)*; Black Baza (*Aviceda leuphotes*) and Asia-barred Owlet *(Glaucidium cuculoides)* (Attachment B).

Among 63 recorded species, 59 species were recorded within the vantage points and 52 species during the line transects. Furthermore, 48 species were recorded in both vantage points and during the transects, while 4 other species were only recorded along the transects and 11 species recorded only

in vantage points. As in the first survey, Red-breasted Parakeet, Grey-headed Parakeet and Annam Prinia were both recorded at the vantage points and the transects.

As the second survey was conducted out of migratory season, all of the recorded species were identified as resident populations. There are two migartion seasons in Vietnam including autumn migration season (from September to end of November) and spring migration season (end of February to early May). Species recorded during transects did not have their flight band recorded, which is not a requirement of the method itself.

Due to of bad weather condition as well as out of breeding and migration season, both the total of number recorded, the species recorded at vantage points and along the transects during the second survey are less than the first survey (Table 5.7)

Table 5.7 The Comparison of Species Recorded during the Surveys

Surveys	Total	Orders	Families	VPs	Transects
May 2021	72	15	34	65	61
July 2021	63	11	31	59	52

5.3.2.1 Vantage Points (VPs)

A total of 59 different species were recorded within eight VPs (20 species recorded at VP No.1, 20 species at VP No.2, 29 species at VP No.3, 32 species at VP No.4, 25 species at VP No.5, 34 species at VP No.6, 31 species at VP No.7 and 31 species at VP No.8 (Table 5.8 and Figure 5.22). Four species had been recorded flying at band 2 during the survey including Germain's Swiftlet (IUCN LC, VRDB NL), Shikra (IUCN LC, VRDB NL), Black-shouldered Kite and Black Baza (IUCN LC, VRDB NL).

Table 5.8 Number of Species Recorded at the Vantage Points during the First and Second Surveys

Surveys	VP1	VP2	VP3	VP4	VP5	VP6	VP7	VP8
May 2021	25	21	18	37	16	33	34	25
July 2021	20	20	29	32	25	34	31	31

The number of species recorded at the Vps in both surveys are fairy consistent except the number recorded at the VP3, VP5 and VP8 (Figure 5.22). There is a explaination for such different as the changing of observers in such Vps during second survey.

Following the number of individuals recorded during the observation, 19 species have been identified as common, 11 species are fairly common, 16 uncommon and 13 rare species. The two NT species including the Red-breased Parakeet and the Grey-headed Parakeet are considered as common in the Project area from VP surveys. All of the rare species in the Project area identified by VP area all IUCN LC and VRDB NL species.

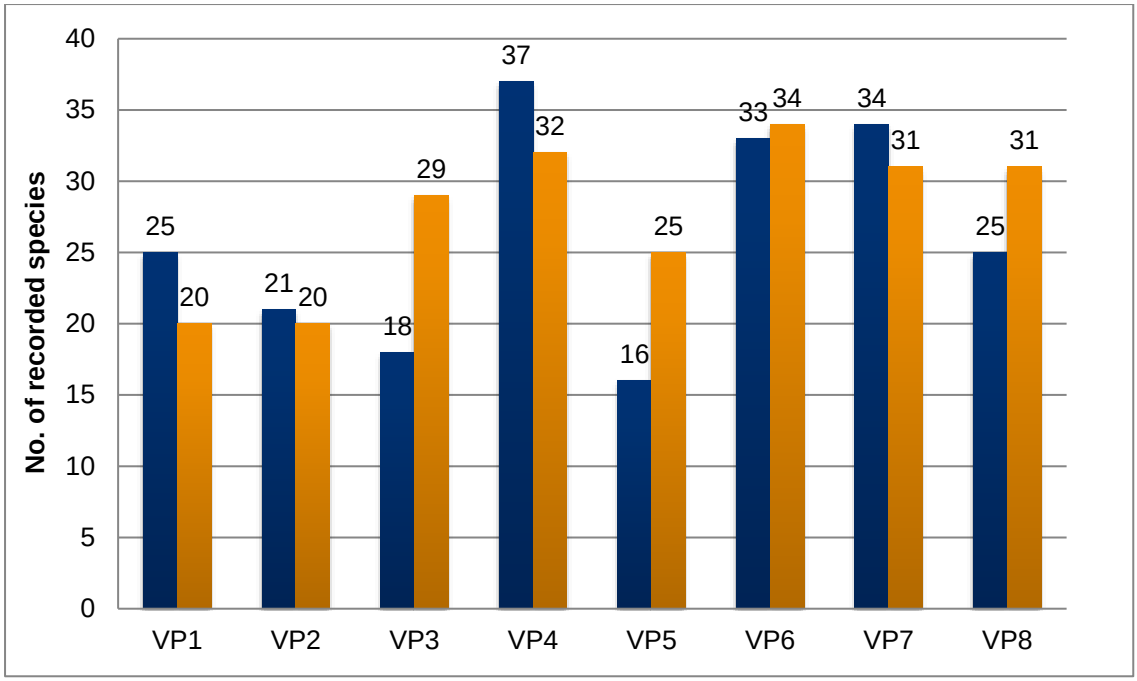


Figure 5.22 The Number of Recorded Species at Each VPs (green – survey on May; red – Survey on July 2021)

Table 5.9 Relative Abundance of the Species Recorded at VPs during Two Surveys

Survey/Abundance	Common	Fairly common	Uncommon	Rare	Total
May 2021	30	14	07	13	64
July 2021	19	11	16	13	59

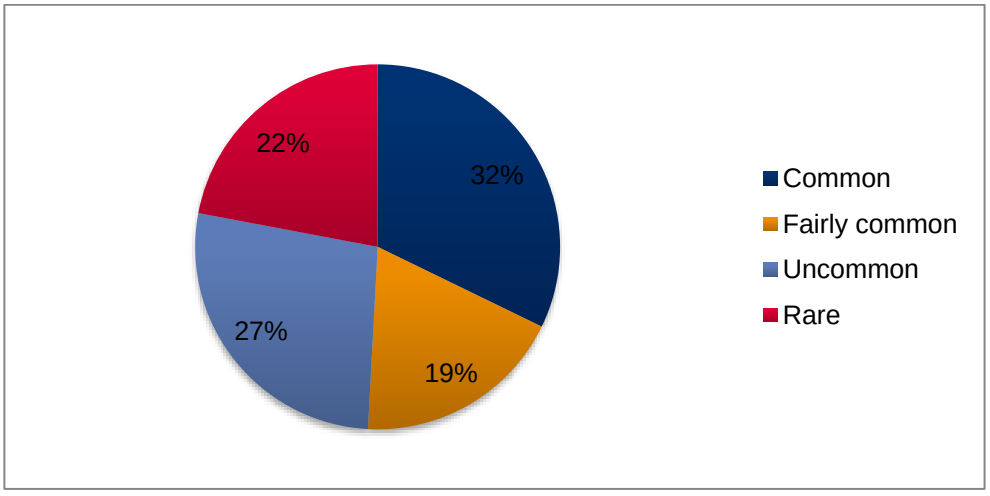


Figure 5.23 The Relative Abundance of Recorded Species of all VPs

The most ten common species are Germain's Swiftlet *Aerodramus germani* (Sum of individuals: 931), House Sparrow *Passer domesticus* (38), Grey-headed Parakeet (34); Sooty-headed Bulbul *Pycnonotus aurigaster* (31), Burmese Shrike *Lanius collurioides* (27), Ashy Woodswallow *Artamus fuscus* (21),

Black Drongo *Dicrurus macrocercus* (18), Zebra Dove *Geopelia striata* (18), Scaly-breasted Munia *Lonchura punctulata* (17) and Red-breasted Parakeet (16).

The most ten fairly common species are Coppersmith Barbet *Psilopogon haemacephala* (10), Plaintive Cuckoo *Cacomantis merulinus* (9), Pied Bushchat *Saxicola caprata* (8); Striated Swallow *Cecropis striolata* (8), Lineated Barbet *Psilopogon lineata* (8), Little Cormorant *Pharacrocorax niger* (8); Annam Prinia *Prinia rocki* (7), Stripe-throated Bulbul *Pycnonotus finlaysoni* (7), Green Bee-eater *Merops orientalis* (7) and White-rumped Munia *Lonchura striata* (7).

Thirteen species were recorded with low numbers and have been identified as rare within the Project area based on VPs survey including Laced Woodpecker *Picus vittatus* (1), Yellow-bellied Prinia *Prinia flaviventris* (1), Blue-bearded Bee-eater *Nyctyornis athertoni* (1), Indochinese Cuckooshrike *Lalage polioptera* (1), Common Kingfisher *Alcedo atthis* (1), Oriental Magpie Robin *Copsychus saularis* (1), Chestnut-capped Babbler *Timalia pileata* (1), Scarlet-backed Flowerpecker *Dicaeum cruentatum* (2), Black Baza (2), Shikra (2), Yellow-eyed Babbler *Chrysomma sinense* (2), Pin-Striped Tit Babbler *Mixornis gularis* (2), and Black-shouldered Kite (2). All of them are listed as LC in IUCN Red List. Most of the species recorded from VPs are common and fairly common in Vietnam.

Similar with the first survey, the Ashy Woodswallow and Germain's Swiftlet were recorded at all eight VPs. Ashy Woodswallow was the most counted at VP6 and VP7 while the Germain's Swiftlet was the most seen at VP2. In additional, these two species have multi-direction flights so most of the flight directions at the VP2, VP6 and VP7 were dominated by these two species.

For the other VPs, flight directions of the Ashy Woodswallow and Germain's Swiftlet were not counted in as they flied at various directions. If the flight directions of Ashy Woodswallow and Germain's Swiftlet were added into all VPs where they had been recorded, all VPs would look alike (similar to the VP2, VP6 and VP7) and not very meaningful.

Based on the majority of the fly direction recorded at each vantage points, the main fly direction are; VP1 - West-East; VP2 - West-East; VP3 – North-south; VP4 – East-West; VP5 – North-east; VP6-West-east; VP7-South-east and VP8 – North-east (see Figure 5.24)

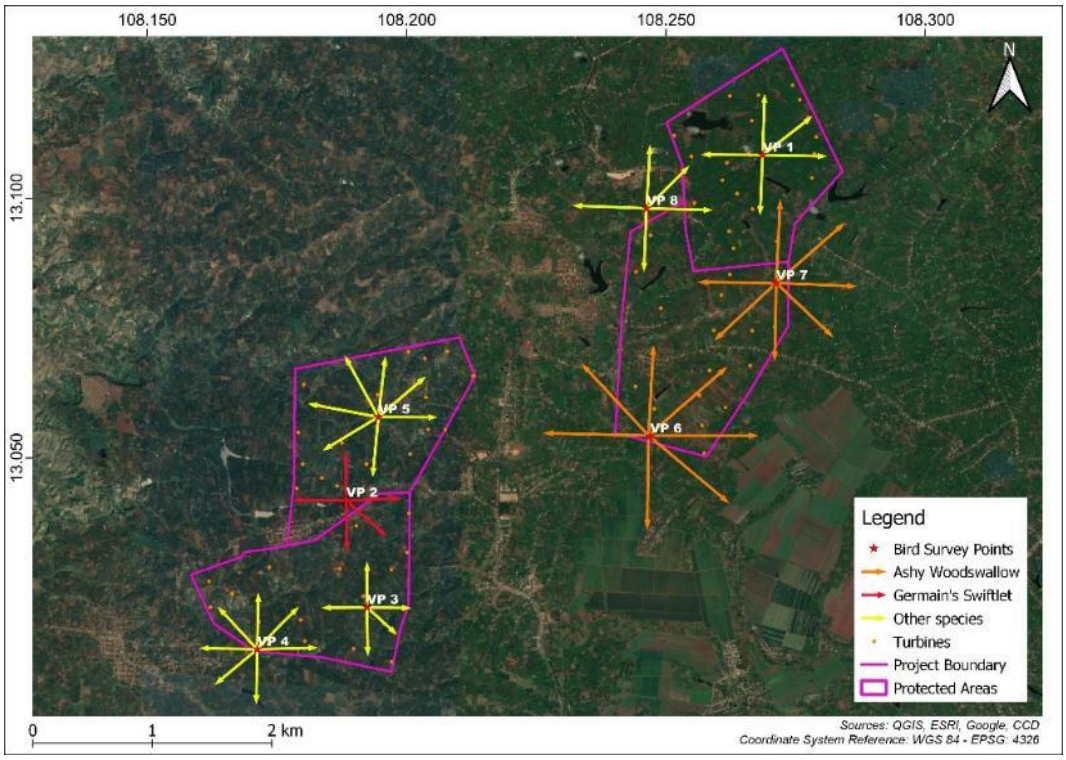


Figure 5.24 The Majority of the Fly Direction Recorded at Each Vantage Points

5.3.2.2 Transects

A total of 52 species have been recorded along four transects (41 species recorded at transect 1, 26 species at transect 2, 38 species at transect 3 and 24 species recorded at transect 4. The results of second survey are fairly consistent with the first survey but mostly decline in both total of number recorded and at each line transects (Figure 5.25).

Table 5.1 The Number of Species Recorded in the Line Transects Surveys

Survey/transects	Total	Transect 1	Transect 2	Transect 3	Transect 4
May 2021	61	44	29	37	26
July 2021	52	41	26	38	24

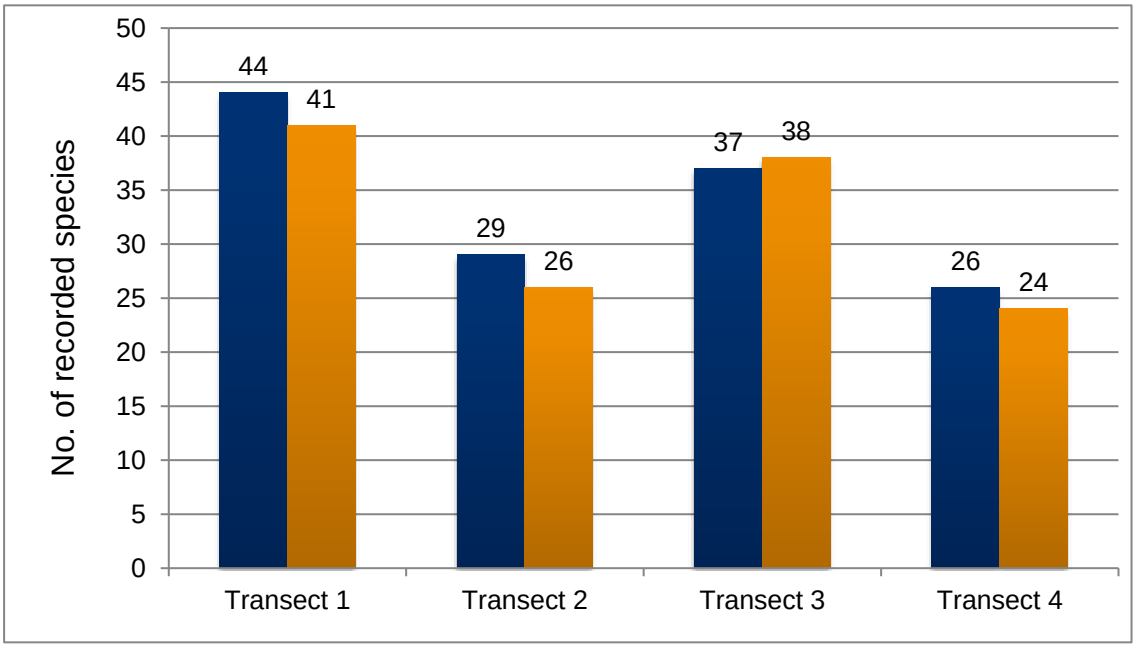


Figure 5.25 The Number of Recorded Species at Each Transects (green-survey in May; Red – survey in July)

Following the number of individuals recorded during the survey, 17 species have been identified as common, 09 species are fairly common, 08 uncommon and 18 rare species (Table 5.9). The two NT species including the Red-breased Parakeet and the Grey-headed Parakeet are considered as common in the Project area from transect surveys. All of the rare species in the Project area identified by VP area all IUCN LC and VRDB NL species.

The Table 5.9 showed the different between the first and second survey. Following that the number of common species highly declined in the second survey while the rare species were increased. Two main reasons can be explained for that: (1) the birds may finish their breeding season and most of the individuals dispersed to the larger areas; (2) the weathers were mostly cloudy and rain during the survey, the activies of bird were limited.

Table 5.2 Relative Abundance of the Species Recorded at Transects during Two Surveys

Survey/Abundance	Common	Fairly common	Uncommon	Rare	Total
May 2021	32	10	08	11	61
July 2021	17	10	08	17	52

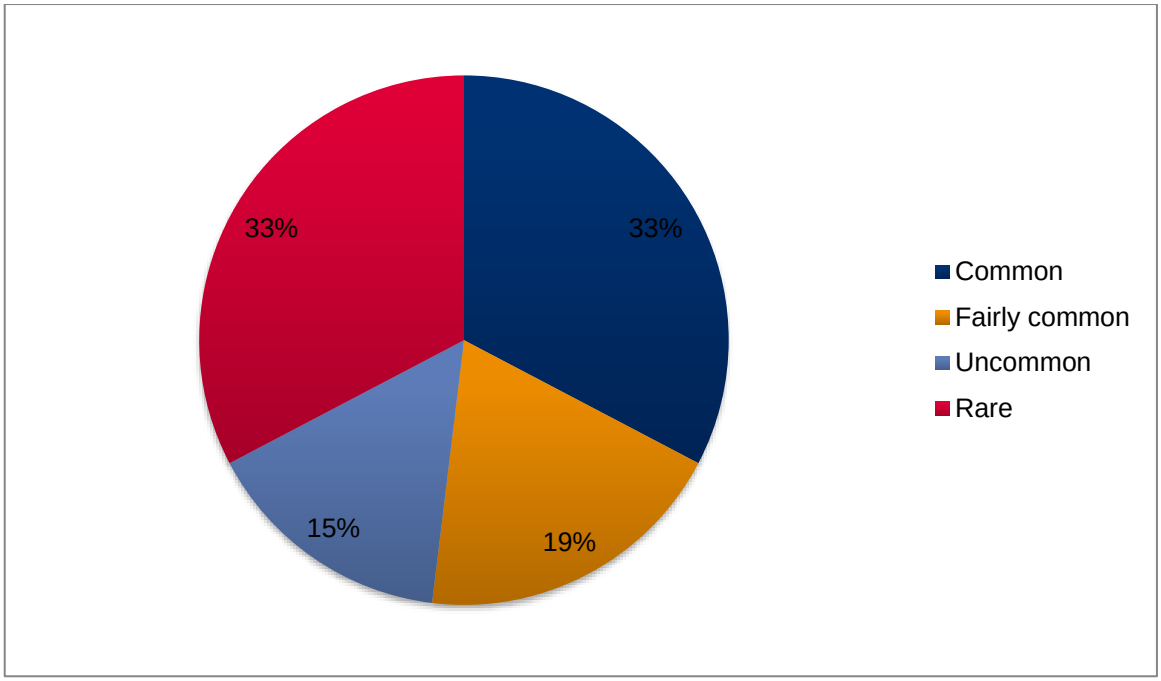


Figure 5.26 The Relative Abundance of Recorded Species of all Transects

The most ten common species are Germain's Swiftlet (Sum of individuals: 133), House Sparrow (72), Grey-headed Parakeet (38), Burmese Shrike (34), Ashy Woodswallow (25), Sooty-headed Bulbul (18), Greater Coucal (16), Zebra Dove (15), Scaly-breasted Munia (15) and Plain-backed Sparrow *Passer flaveolus* (15).

The most ten fairly common species are: Common Iora *Aegithina tiphia* (10), Eurasian Tree Sparrow *Passer montanus* (9), Green Bee-eater *Merops orientalis* (9), Grey-breasted Prinia *Prinia hodgsonii* (8), Asian Palm Swift *Cypsiurus balasiensis* (8), Common Tailorbird *Orthotomus sutorius* (8), Paddyfield Pipit *Anthus rufulus* (7), Large-billed Crow *Corvus macrorhynchos* (7), Plaintive Cuckoo *Cacomantis merulinus* (7) and Little Cormorant *Phalacrocorax niger* (7).

Seventeen species were recorded with low numbers and have been identified as rare along the transects includes: Asian Barred Owlet *Glaucidium cuculoides* (1), House Swift *Apus nipalensis* (1), Red-collared Dove *Streptopelia tranquebarica* (1), Common Kingfisher (1), Indochinese Cuckooshrike (1), Pin-Striped Tit Babbler (1), Scarlet-backed Flowerpecker (1), Yellow-eyed Babbler (1), White-throated Fantail *Rhipidura albicollis* (1), Coppersmith Barbet *Psilopogon haemacephala* (2), Olive-backed Sunbird *Cinnyris jugularis* (2), Green-billed Malkoha (2), Racket-tailed Treepie *Crypsirina temia* (2), Chestnut-headed Bee-eater *Merops leschenaulti* (2), Himalayan Black Bulbul *Hypsipetes leucocephalius* (2), Common Myna *Acridotheres tristis* (2) and Oriental Magpie Robin *Copsychus saularis* (2).

One again, the rarity of the rare species identifed in both VPs and transects is confirmation that the habitats around the VPs and transects are not suitable for such species or they were recorded by chance due to the high level of human modification to the natural habitats used by birds.

5.3.2.3 Species Considered being Prone to Collision

Based on the flight pattern, four species that are considered prone to collision have been recorded during this survey, including Germain's Swiftlet (IUCN LC, VRDB NL) – total 1,064 individuals; Shikra (IUCN LC, VRDB NL), Black-shouldered Kite and Black Baza (IUCN LC, VRDB NL). The rest of 59 species were recorded at low-risk category (recorded at band 1 – below 52 m).

The same with the first survey, Germain's Swiftlet was frequently recorded soaring and flying at high-risk category (band 2 from 52 to 208 m). A total time recorded at band 2 are 332,917 seconds. Germain's

Swiftlet was mostly recorded at VP No.2 as there are several artificial Swiftlet's house located. Germain's Swiftlet is recently identified as common species in Vietnam and one of the most common species recorded at the site (Hung et al., 2020).

Shikra Black-shouldered Kite and Black Baza were also recorded at high-risk category. However, the Shrika was only recorded flight within band 2 in 81 seconds, Black-shouldered Kite in 16 seconds and Black Baza in 15 seconds respectively. Moreover, both of those species were identified as uncommon to fairly common in Vietnam and rare in the surveyed area (Hung et al., 2020)

5.3.2.4 Key Species Account

a) Red-breasted Parakeet *(Psittacula alexandri)*

Red-breasted Parakeet was recorded in both vantages point and transect surveys. A flock of 12 individuals were observed flying over the transect No.3 on 18 July 2021 (13°6'19.06"N; 108°14'38.90"E-WGS 84) and two other groups of 7 and 9 individuals recorded at VP No.4 in the morning of 17 and 18 July flying at band 1 (13^{0}0'47.56''N; 108°10'16.36"E - WGS 84). Red-breasted Parakeet is recently listed in IUCN Red List as Near-threatened species. However, it was identified as fairly common in Vietnam (Hung et al., 2020) and was also not listed in Vietnam Red Data, 2007 (MOST & VAST, 2007). Red-breasted Parakeet is also listed in appendix IIB of Decree No. 06/2019/ND – CP, dated 22 January 2019 of Vietnam Government on Management of rare and threatened Fauna, Floral and impelmentation of CITES.

Figure 5.27 Red-breasted Parakeet was Flying Over and Perch the VP No.4 and Transect No.3

b) Grey-headed Parakeet *(Psittacula finschii)*

A total of four groups (34 individuals) of Grey-headed Parakeet were recorded in vantages points (9 on VP8 on 16 July, 7 on VP3 on 16 July, 10 on VP4 on 18 July, 8 on VP5 on 16 July) and three groups (38 individuals) recorded along transect surveys (18 individuals recorded along the transect No.1 on 16 July, 10 at transect No.3 on 18 July and 8 at transect No.4 on 17 July 2021). Grey-headed Parakeet is listed in IUCN Red List as Near-threatened species. It was identified as fairly common in Vietnam and was not listed in Vietnam Red Data, 2007 (MOST & VAST, 2007). Grey-headed Parakeet is recently listed in appendix IIB of Decree No. 06/2019/ND-CP, dated 22 January 2019 of Vietnam Government on Management of rare and threatened Fauna, Floral and impelmentation of CITES.

Grey-headed Parakeet was recorded with fairly higher number in both vantage points and transects during the second surveys (total of 27 individuals during the first survey and 72 individuals during the second survey).

Figure 5.28 Grey-headed Parakeet at VP No.1

c) Annam Prinia *(Prinia rocki)*

Annam Prinia known as Brown Prinia *(Prinia polychroa)*. However, it was recently divided taxonomically and is now recognized as an endemic species for Vietnam (Le, Bui, Nguyen, Tang, & Nguyen, 2020). Annam Prinia is not listed in any Red Data Book and is identified as fairly common in Vietnam. It was common during both surveys (in both VPs and transects).

Figure 5.29 Annam Prinia was Recorded in the Second Survey

6. CONCLUSION

6.1 Flora

- The flora survey was conducted on four transects and four sample plots. The survey findings indicated a total of 202 plant species belonging to 155 genera, 70 families, and three phyla in the Project area.
- There are two out of 202 species, *Dalbergia oliveri* and *Dipterocarpus intricatus,* listed as Endangered (EN) and 34 out of 202 species listed as Least Concern (LC) in IUCN Red list (2021).
- There is one species, *Dalbergia oliveri,* classified as Endangered (EN); and one species, *Rauvolfia cambodiana,* classified as Vunerable (VU) by Vietnam Red Data Book.
- *Dalbergia oliveri* is also listed in Appendix IIA by Decree 06/2019/ NĐ-CP and Appendix II by CITES.
- None of recorded species is classified as significant species for conservation by Decree 64/2019 NĐ-CP.
- There are three invasive plant species recorded in the Project area according to Decision 35/2018/TT-BTNMT. They are commonly distributed on all surveyed transects and plots.

6.2 Non-volant Mammals

- Interview findings showed that there is possible a group of Smooth-coated Otter surviving in the Project area. Further survey efforts in the dry season (between March and April) should be conducted to get confirmation.
- The field survey has recorded at least six mammal species belonging to two orders and three families. None of them are species of conservation concern.
- Due to the rain in two days out of the total four days of fieldwork that might affect the survey results because non-volant mammals do not appear in the rain.
- Wild animals including non-volant mammals are suffering from local people's threats.
- The field result has filled in the gaps of lacking non-volant mammal data in the Project area and can be used as baseline data for the Project monitoring.

6.3 Bats

- The survey recorded seven bat species belonging two families, including two species of Fruit bat (Pteropodidae Family), which are Greater short-nosed fruit bat (Cynopterus sphinx), Hill Long-tongued Fruit Bat (Macroglobosus sobrinus), and five species of Vespertilionid bat (Vespertilionidae Falimy), which, are Nepallese Whiskered Bat (Myotis muricola), Peters's bat (Myotis cf. ater), Greater Asiatic yellow Bat (Scotophilus heathii); Lesser Asiatic Yellow House (Scotophilus cf. kuhlii), and Javan Pipistrelle (Pipistrellus cf. javanicus). All bat species recorded in the study area are recorded in York Don National Park, of which 4 species have been recorded in most areas of Dak Lak, Lam Dong and KonTum province. Thus, the habitat of the project area is not only a place to maintain a source of food and shelter for stationary bats, but it can also be an area for bats in other areas to come and feed with other species which they are have a wide range of activity.
- Bats appearing in the survey area can be from neighboring areas and stay in the survey area. The nature forest is important for roosting of bats. on et al. (2021) indicated the significant diversity of bats from difference habitat such as around each bat capture site as agricultural and disturbed, broadleaf forest, coniferous forest, mixed broadleaf and coniferous forest, and bamboo and mixed forest. During both field survey, the observed habitats were single or homogeneous indicating that the bat diversity in field area was very low.

- The species recorded in the study area are common and widely distributed. They are not listed as threatened species in the IUCN Red List or the Vietnam Red Data Book.
- The flight range of the recorded bats in the study area is from 3m to less than 50m from the ground, which belongs to Band 1 (<50m).
- The habitats of the survey area are mainly anthropogenic, including fruit trees and industrial crops, suitable for some species of the fruit bat and the vespertilionid bat. However, the habitats are probably changeable under the influence of humans, which may affect the bats in some extent.
- It is worth mentioning that it was a short survey (eight days and six nights) in rainy season (May and July 2021). It rained heavily in five of six survey nights and early morning, which was the limitation, probably affecting the survey results.

6.4 Reptiles and Amphibians

- A total of 27 species (15 species of reptiles and 12 species of amphibians) were recorded in the Project area.
- There are seven conservation significant species, comprising four species listed in the Vietnam Red Data Book (2007), one species listed in the IUCN Red List (2021), and three species are currently known only from Vietnam.
- The reptiles and amphibians and reptiles are mainly common species in the project area. The diversity of herpetofauna is lower when compared to other areas in the Central Highlands because the habitats are gardens (coffee, avocado, durian etc.), shrubs, and plantations, not suitable for reptiles and amphibian's species.

6.5 Birds

A total of 63 bird species belonging to 11 orders and 31 families have been recorded during the second survey.

- Two species are listed in the IUCN Red List 2021 as Near Threatened including Red-breasted Parakeet, Grey-headed Parakeet and 61 species listed as Least Concern.
- One endemic species Annam Prinia was recorded. None of the recorded species are listed in the Vietnam Red Data Book 2007. Furthermore, six species are listed in appendix IIB of Decree No. 06/2019/ND – CP, dated 22 January 2019 of Vietnam Government on Management of rare and threatened Fauna, Floral and impelmentation of CITES including Red-breasted Parakeet, Grey-headed Parakeet, Black-shouldered Kite, Shrika, Black Baza and Asia-barred Owlet.
- Four LC species (Germain's Swiftlet, Shikra, Black-shouldeded Kite and Black Baza) were recorded flying at Band 2 and were considered to be prone to collision. The Project area supports a small population of two globally nearly- threatened bird species (Red-breasted Parakeet and Grey-headed Parakeet) and one IUCN LC endemic species (Annam Prinia). All recorded species are resident populations as the survey conducted out of migration season in Vietnam.
- The same with the first survey, Germain's Swiftlet was frequently recorded soaring and flying at high-risk category (band 2 from 52 to 208 m). A total time recorded at band 2 are 332,917 seconds. Germain's Swiftlet was mostly recorded at VP No.2 as there are several artificial Swiftlet's house located.

REFERENCES

Ban, N. T. (2005). *Checklist of Plant Species of Vietnam*: Agriculture Publishing House.

Bibby, C., Jones, M., & Marsden, S. (1998). Expedition Field Techniques: Bird surveys. 137.

Chase, M. W., Christenhusz, M., Fay, M., Byng, J., Judd, W. S., Soltis, D., . . . Stevens, P. F. (2016). An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. *Botanical Journal of the Linnean Society, 181*(1), 1-20.

Dang, N. C., Endo, H., Nguyen, T. S. O., T., Le, X. C., Dang, H. P. L., D.P., Kawada, S. I., . . . Sasaki, M. (2008). Checklist of wild mammal species of Vietnam. 356.

Eames, J., Nguyen, D. T., Le, T. T., Dang, N. C., Ngo, V. T., Hoang, D. D., . . . Nguyen, T. T. H. (2004). *Biodiversity Report for Yok Don National Park, Dak Lak Province, PARC Project VIE/95/G31&031*, Ha Noi.

Eames, J., & Tu, N. D. (2002). An interim biodiversity report for Yok Don National Park, Dak Lak province, Vietnam. *Unpublished report to the Vietnam PARC Project. Yok Don Component, Hanoi*.

Eames, J., Tu, N. D., Le Trong Trai, D. N. C., Van Tri, N., Dat, H. D., Tri, T. N., & He, N. T. T. (2004). Draft Final Biodiversity Report for Yok Don National Park, Dak Lak Province. *PARC Project VIE/95/G31&031, Government of Viet Nam (FPD)/UNOPS/UNDP/Scott Wilson Asia-Pacific Ltd., Ha Noi, 104pp*.

Facility, G. B. I. (2021). GBIF Occurrence Download.

Francis, C. M. (2008). A field guide to the mammals of South-East Asia. 392.

Frost, D. (2021). Amphibian Species of the World: an Online Reference. Version 6.1 (15.04. 2020). Electronic Database accessible at https. *amphibiansofheworld. amnh. org/index. php. American Museum of Natural History, New York, USA.(Accessed on 25 February 2021)*.

Heritage, S. N. (2017). Recommended bird survey methods to inform impact assessment of onshore wind farms. Version 2. 37.

Hung, L. M., Tien, B. D., Hiep, N. M., Pau, T. A., & Tuan, T. A. (2020). *Birds of Vietnam*. Hanoi: The Gioi Publishing House.

International, B. (2004). Sourcebook of Existing and Proposed Protected Areas in Vietnam.

Krushop, S. V. (2013). Bats of Vietnam. Checklist and an Identification Manual. Biodiversity of Vietnam Series. 300.

Le, M. H., Bui, D. T., Nguyen, M. H., Tang, A. P., & Nguyen, A. T. (2020). Birds of Vietnam. 821.

Lepage, D. (2021). Avibase - Bird Checklists of the World - Yok Don National Park. Birdlife Data Zone (species).

MOST, & VAST. (2007). Vietnam Red Data Book. Part 1. Animals. 210.

Nghia, N. H. (2007). Forest Rehabilitation in Vietnam. *Keep Asia Green, 1*, 20-21.

Nguyen, T. S., Csorba, G., Vuong, T. T., Vu, D. T., Yi, W., Masashi, H., . . . Masaharu, M. (2015). A new species of the genus Murina (Chiroptera: Vespertilionidae) from Kon Tum Province with a review of the subfamily Murininae in Vietnam. *Acta Chiropterologica, 17*, 201-232.

Nguyen, V. S., Ho, T. C., & Nguyen, Q. T. (2009). Herpetofauna of Vietnam. 768.

Park, Y. D. N. (2021). Avibase - Bird Checklists of the World - Yok Don National Park. *Birdlife Data Zone (species).* from https://avibase.bsc-eoc.org/checklist.jsp?lang=EN&p2=1&list=clements&synlang=&region=VN05dc01&version=images&lifelist=&highlight=0

PAUWELS, O. S., & GRISMER, L. (2016). A Photographic Field Guide to the Amphibians and Reptiles of the Lowland Monsoon Forests of Southern Vietnam. *Herpetological Review, 47*(4), 700-701.

Pham-Thanh, H., van der Linden, R., Ngo-Duc, T., Nguyen-Dang, Q., Fink, A. H., & Phan-Van, T. (2019). Predictability of the rainy season onset date in Central Highlands of Vietnam. *International Journal of Climatology, 1-15*. doi: 10.1002/joc.6383

Pham, H. H. (1999). An illustrated Flora of Vietnam (in Vietnamese).

Reserve, E. S. N. (2019a). Fauna in Ea So Nature Reserve.

Reserve, E. S. N. (2019b). Fauna in Ea So Nature Reserve. 2019, from http://khubttneaso.org.vn/index.php/dong-vat

Ruedi, M., Eger, J. L., & Csorba, G. (2018). A new genus and species of vespertilionid bat from the Indomalayan Region. *Journal of Mammalogy, 99*, 209 - 222.

Skowronski, M. D., & Fenton, M. B. (2008). Model-based automated detection of echolocation calls using the link detector. *Journal of the Acoustical Society of America*, 328-336.

Thai, V. T. (1978). Forest vegetation of Vietnam (in Vietnamese).

Uetz, P., Freed, P., & Hošek, J. (2021). Species numbers by higher taxa. *The Reptile Database*.
WWF. (2000). Introduction of mammals of Indochina and Thailand (in Vietnamese). 256.

ATTACHMENT A BAT SURVEY FINDING IN DETAIL

No.	Time	Date	Species	Recorded information	Quantity (individuals)	Location	Latitude (º) (WGS 84)	Longitude (º) (WGS 84)	Fly hight (m)
First survey									
1	18:30	22-05-2021	*Myotis muricola* *Pipistrellus* cf. *javanicus* *Cynopterus sphinx*	O, E O, E O	2 1 1	Transect 1: Bat point 2 (near mist net)	13.2862	108.1636	20-30
2	18:31	22-05-2021	*Myotis muricola* *Pipistrellus* cf. *javanicus*	O, E O, E	2 1	Bat point 2	13.2862	108.1636	5
3	18:32	22-05-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 2	13.2862	108.1636	6
4	18:33	22-05-2021	*Myotis muricola*	O, E	1	Bat point 2	13.2862	108.1636	6-10
5	18:34	22-05-2021	*Myotis muricola*	O, E	2	Bat point 2	13.2862	108.1636	6-10
6	18:47	22-05-2021	*Myotis muricola*	O, E	1	Bat point 2	13.2862	108.1636	6
7	19:20-19:23	22-05-2021	*Myotis muricola* *Myotis* cf. *ater*	O, E O, E	2 2	Transect 1: On the way from bat point 2 – bat point 1	13.4487	108.1968	6
8	20:50	22-05-2021	*Myotis muricola* *Cynopterus sphinx*	O, E O	1 1	Transect 1: Near bat point 1	13.0256	108.2133	4
9	4:15	23-05-2021	*Myotis* cf. *ater*	O, E	1	Transect 2: On the way from Camp site to bat point 1	13.0258	108.2131	5
10	18:22	23-05-2021	*Myotis muricola* *Scotophilus heathii*	O, E O, E	1 2	Bat point 3 (Mt net 5)	13.1094	108.2629	10-15
11	18:24	23-05-2021	*Scotophilus heathii*	O, E	1	Bat point 3 (Mist net 5)	13.1094	108.2629	10-20
12	18:31	23-05-2021	*Scotophilus heathii*	O, E	1	Bat point 3	13.1094	108.2629	10-20

No.	Time	Date	Species	Recorded information	Quantity (individuals)	Location	Latitude (º) (WGS 84)	Longitude (º) (WGS 84)	Fly hight (m)
						(mist net 5)			
13	18:27	23-05-2021	*Myotis muricola*	E	1	Bat point 3 (mist net 5)	13.1094	108.2629	6
14	18:48	23-05-21	*Scotophilus kuhlii*	E	3	Bat point 3 (mist net 4)	13.1086	108.2616	10-20
15	19:28	24-05-2021	*Myotis muricola*	E, MN	1	Bat point 4 (Mist net 6)	13.6163	108.2007	3
16	19:28	24-05-2021	*Scotophilus heathii* *Cynopterus sphinx*	E, MN O	1 1	Bat point 4 (Mist net 6)	13.6163	108.2007	3
Total					**31**				
Second survey									
17		16-07-2021	*Cynopterus sphinx*	O	1	Bat point 1	108.261265	13.108484	10
18	18:59	16-07-2021	*Cynopterus sphinx*	MN	1	Bat point 1	108.261265	13.108484	6
19	19:10	16-07-2021	*Cynopterus sphinx*	O	1	Bat point 1	108.261265	13.108484	12
20	18:59	16-07-2021	*Scotophilus heathii*	O, E	1	Bat point 1	108.261265	13.108484	10
21	19:10	16-07-2021	*Scotophilus heathii*	O	1	Bat point 1	108.261265	13.108484	8
22	19:45	16-07-2021	*Scotophilus heathii*	MN	1	Bat point 1	108.261265	13.108484	3
23	19:45	16-07-2021	*Macroglobosus sobrinus*	O	1	Bat point 1	108.261265	13.108484	8
24	19:10	17-07-2021	*Myotis muricola*	O, E	1	Bat point 1	108.261265	13.108484	7
25	19:28	17-07-2021	*Myotis muricola*	O, E	1	Bat point 1	108.261265	13.108484	8
26	19:47	17-07-2021	*Myotis muricola*	O, E	1	Bat point 2	108.262914	13.109354	6

No.	Time	Date	Species	Recorded information	Quantity (individuals)	Location	Latitude (º) (WGS 84)	Longitude (º) (WGS 84)	Fly hight (m)
27	05:20	17-07-2021	*Macroglobosus sobrinus*	MN	1	Bat point 1	108.261265	13.108484	3
28	19:10	17-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 1	108.261265	13.108484	7
29	19:45	17-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 1	108.261265	13.108484	8
30	19:55	17-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 1	108.261265	13.108484	8
31	20:05	18-07-2021	*Myotis* cf. *muricola*	E	1	Bat point 1	108.261265	13.108484	3
32	18:45	18-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 3	108.163635	13.028621	6
33	18:52	18-07-2021	*Pipistrellus* cf. *javanicus*	E	1	Bat point 3	108.163635	13.028621	8
34	19:10	18-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 3	108.163635	13.028621	9
35	19:25	18-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 3	108.163635	13.028621	4
36	19:37	18-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 3	108.163635	13.028621	8
37	19:42	18-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 3	108.163635	13.028621	7
38	19:50	18-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 3	108.163635	13.028621	6
39	20:01	18-07-2021	*Pipistrellus* cf. *javanicus*	E	1	Bat point 3	108.163635	13.028621	10
40	20:10	18-07-2021	*Pipistrellus* cf. *javanicus*	O, E	1	Bat point 3	108.163635	13.028621	9
41	20:15	18-07-2021	*Pipistrellus* cf. *javanicus*	E	1	Bat point 3	108.163635	13.028621	9
Total					**25**				

ATTACHMENT B BIRD SPECIES RECORDED AT PROJECT AREA (16-18 JULY 2021)

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
	I. APODIFORMES												
	1. Apodidae												
1	*Aerodramus germani*	Germain's Swiftlet	LC	NL	No	Sky-birds	VP, Transect	421	931/133	Soaring, feeding	1, 2, 3	729,269	332,917
2	*Cypsiurus balasiensis*	Asian Palm Swift	LC	NL	No	Sky-birds	Transect	4	4/8	Soaring, feeding	N/A	< 200	N/A
3	*Apus nipalensis*	House Swift	LC	NL	No	Sky-birds	Transect	1	1	Soaring, feeding	N/A	< 200	N/A
	II. CUCULIFORMES												
	2. Cuculidae												
4	*Centropus sinensis*	Greater Coucal	LC	NL	No	Canopy-birds	VP, Transect	22	12/16	Moving around	1	< 200	N/A
5	*Cacomantis merulinus*	Plaintive Cuckoo	LC	NL	No	Canopy-birds	VP, Transect	14	9/7	Moving around	1	< 200	N/A
6	*Rhopodytes tristis*	Green-billed Malkoha	LC	NL	No	Canopy-birds	VP, Transect	5	3/2	Moving around	1	< 200	N/A
	III. COLUMBIFORMES												
	3. Columbidae												
7	*Streptopelia tranquebarica*	Red-collared Dove	LC	NL	No	Canopy-birds	VP, Transect	3	3/1	Moving around	1	< 200	N/A
8	*Streptopelia chinensis*	Spotted Dove	LC	NL	No	Canopy-birds	VP, Transect	17	13/12	Moving around	1	< 200	N/A
9	*Geopelia striata*	Zebra Dove	LC	NL	No	Canopy-birds	VP, Transect	19	18/15	Moving around	1	< 200	N/A
10	*Treron phoenicoptera*	Yellow-footed Green Pigeon	LC	NL	No	Canopy-birds	VP	1	12	Moving around	1	< 200	N/A
	IV. SULIFORMES												
	4. Phalacrocoracidae												
11	*Phalacrocorax niger*	Little Cormorant	LC	NL	No	Water-birds	VP, Transect	4	8/7	Moving around	1	< 200	N/A
	V. ACCIPITRIFORMES												
	5. Accipitridae												

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
12	*Elanus caeruleus*	Black-shouldered Kite	LC	NL	No	Bird of Prey	VP	2	2	Flying	1,2	28	16
13	*Accipiter badius*	Shikra	LC	NL	No	Bird of Prey	VP	1	2	Soaring and displaying	1, 2	146	81
14	*Aviceda leuphotes*	Black Baza	LC	NL	No	Bird of Prey	VP	2	2	Flying	1, 2	47	15
	VI. STRIGIFORMES												
	6. Strigidae												
15	*Glaucidium cuculoides*	Asian Barred Owlet	LC	NL	No	Noctunal Birds	Transect	1	1	Perching	N/A	< 200	N/A
	VII. BUCEROTIFORMES												
	7. Upupidae												
16	*Upupa epops*	Eurasian Hoopoe	LC	NL	No	Canopy-birds	VP, Transect	7	6/3	Moving around	1	< 200	N/A
	VIII. CORACIIFORMES												
	8. Alcedinidae												
17	*Alcedo atthis*	Common Kingfisher	LC	NL	No	Water-birds	VP, Transect	2	1/1	Moving around	1	< 200	N/A
18	*Halcyon smyrnensis*	White-throated Kingfisher	LC	NL	No	Water-birds	VP	3	3	Moving around	1	< 200	N/A
	9. Meropidae												
19	*Nyctyornis athertoni*	Blue-bearded Bee-eater	LC	NL	No	Canopy-birds	VP	1	1	Moving around	1	< 200	N/A
20	*Merops orientalis*	Green Bee-eater	LC	NL	No	Canopy-birds	VP, Transect	7	7/9	Moving around	1	< 200	N/A
21	*Merops leschenaulti*	Chestnut-headed Bee-eater	LC	NL	No	Canopy-birds	VP, Transect	3	4/2	Moving around	1	< 200	N/A
	IX. PICIFORMES												
	10. Picidae												

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
22	Picus vittatus	Laced Woodpecker	LC	NL	No	Canopy-birds	VP	1	1	Moving around	1	< 200	N/A
	11. Megalaimidae												
23	*Psilopogon lineata*	Lineated Barbet	LC	NL	No	Canopy-birds	VP, Transect	9	8/3	Moving around	1	< 200	N/A
24	*Psilopogon haemacephala*	Coppersmith Barbet	LC	NL	No	Canopy-birds	VP, Transect	11	10/2	Moving around	1	< 200	N/A
	X. PSITTACIFORMES												
	12. Psittacidae												
25	*Psittacula alexandri*	Red-breasted Parakeet	NT	NL	No	Canopy-birds	VP, Transect	3	16/12	Flight over	1	< 200	N/A
26	*Psittacula finschii*	Grey-headed Parakeet	NT	NL	No	Canopy-birds	VP, Transect	9	34/38	Flight over	1	< 200	N/A
	XI. PASSERIFORMES												
	13. Artamidae												
27	*Artamus fuscus*	Ashy Woodswallow	LC	NL	No	Canopy-birds	VP, Transect	28	21/25	Moving around	1	< 200	N/A
	14. Aegithinidae												
28	*Aegithina tiphia*	Common Iora	LC	NL	No	Canopy-birds	VP, Transect	19	12/10	Moving around	1	< 200	N/A
	15. Campephagidae												
29	*Pericrocotus flammeus*	Scarlet Minivet	LC	NL	No	Canopy-birds	VP, Transect	3	3/5	Moving around	1	< 200	N/A
30	*Lalage polioptera*	Indochinese Cuckooshrike	LC	NL	No	Canopy-birds	VP, Transect	2	1/1	Moving around	1	< 200	N/A
	16. Laniidae												
31	*Lanius collurioides*	Burmese Shrike	LC	NL	No	Canopy-birds	VP, Transect	36	27/34	Moving around	1	< 200	N/A
	17. Dicruridae												

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
32	*Dicrurus macrocercus*	Black Drongo	LC	NL	No	Canopy-birds	VP, Transect	21	18/13	Moving around	1	< 200	N/A
33	*Dicrurus leucophaeus*	Ashy Drongo	LC	NL	No	Canopy-birds	VP, Transect	17	15/13	Moving around	1	< 200	N/A
	18. Rhipiduridae												
34	*Rhipidura albicollis*	White-throated Fantail	LC	NL	No	Canopy-birds	VP, Transect	5	4/1	Moving around	1	< 200	N/A
	19. Corvidae												
35	*Garrulus glandarius*	Eurasian Jay	LC	NL	No	Canopy-birds	VP, Transect	7	5/3	Moving around	1	< 200	N/A
36	*Crypsirina temia*	Racket-tailed Treepie	LC	NL	No	Canopy-birds	Transect	2	2	Moving around	N/A	< 200	N/A
37	*Corvus macrorhynchos*	Large-billed Crow	LC	NL	No	Canopy-birds	VP, Transect	8	5/7	Moving around	1	< 200	N/A
	20. Pycnonotidae												
38	*Pycnonotus aurigaster*	Sooty-headed Bulbul	LC	NL	No	Canopy-birds	VP, Transect	29	31/18	Moving around	1	< 200	N/A
39	*Pycnonotus finlaysoni*	Stripe-throated Bulbul	LC	NL	No	Canopy-birds	VP, Transect	9	7/4	Moving around	1	< 200	N/A
40	*Hypsipetes leucocephalius*	Himalayan Black Bulbul	LC	NL	No	Canopy-birds	VP, Transect	3	4/2	Moving around	1	< 200	N/A
	21. Hirundinidae												
41	*Cecropis striolata*	Striated Swallow	LC	NL	No	Canopy-birds	VP	5	8	Moving around	1	< 200	N/A
	22. Cisticolidae												
42	*Prinia rocki*	Annam Prinia	LC	NL	No	Canopy-birds	VP, Transect	16	7/11	Moving around	1	< 200	N/A
43	*Prinia rufescens*	Rufescent Prinia	LC	NL	No	Canopy-birds	VP, Transect	7	4/3	Moving around	1	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
44	*Prinia hodgsonii*	Grey-breasted Prinia	LC	NL	No	Canopy-birds	VP, Transect	20	13/8	Moving around	1	< 200	N/A
45	*Prinia flaviventris*	Yellow-bellied Prinia	LC	NL	No	Canopy-birds	VP	1	1	Moving around	1	< 200	N/A
46	*Orthotomus atrogularis*	Dark-necked Tailorbird	LC	NL	No	Canopy-birds	VP, Transect	9	5/4	Moving around	1	< 200	N/A
47	*Orthotomus sutorius*	Common Tailorbird	LC	NL	No	Canopy-birds	VP, Transect	18	13/8	Moving around	1	< 200	N/A
	23. Timaliidae												
48	*Mixornis gularis*	Pin-Striped Tit Babbler	LC	NL	No	Canopy-birds	VP, Transect	3	2/1	Moving around	1	< 200	N/A
49	*Timalia pileata*	Chestnut-capped Babbler	LC	NL	No	Canopy-birds	VP	1	1	Moving around	1	< 200	N/A
	24. Sylviidae												
50	*Chrysomma sinense*	Yellow-eyed Babbler	LC	NL	No	Canopy-birds	VP, Transect	3	2/1	Moving around	1	< 200	N/A
	25. Sturnidae												
51	*Acridotheres burmannicus*	Vinous-breasted Starling	LC	NL	No	Canopy-birds	VP, Transect	6	3/4	Moving around	1	< 200	N/A
52	*Gracupica nigricollis*	Black-collared Starling	LC	NL	No	Canopy-birds	VP	4	4	Moving around	1	< 200	N/A
53	*Acridotheres tristis*	Common Myna	LC	NL	No	Canopy-birds	VP, Transect	6	4/2	Moving around	1	< 200	N/A
	26. Muscicapidae												
54	*Copsychus saularis*	Oriental Magpie Robin	LC	NL	No	Canopy-birds	VP, Transect	3	1/2	Moving around	1	< 200	N/A
55	*Saxicola caprata*	Pied Bushchat	LC	NL	No	Canopy-birds	VP, Transect	15	8/11	Moving around	1	< 200	N/A
	27. Dicaeidae												

No	Scientific name	Common Name	IUCN	VRDB	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight bands	Total fly time (s)	Time in band 2 (s)
56	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	LC	NL	No	Canopy-birds	VP, Transect	3	2/1	Moving around	1	< 200	N/A
	28. Nectariniidae												
57	*Cinnyris jugularis*	Olive-backed Sunbird	LC	NL	No	Canopy-birds	VP, Transect	5	3/2	Moving around	1	< 200	N/A
	29. Passeridae												
58	*Passer montanus*	Eurasian Tree Sparrow	LC	NL	No	Canopy-birds	VP, Transect	5	12/9	Moving around	1	< 200	N/A
59	*Passer domesticus*	House Sparrow	LC	NL	No	Canopy-birds	VP, Transect	8	38/72	Moving around	1	< 200	N/A
60	*Passer flaveolus*	Plain-backed Sparrow	LC	NL	No	Canopy-birds	VP, Transect	6	6/15	Moving around	1	< 200	N/A
	30. Estrildidae												
61	*Lonchura punctulata*	Scaly-breasted Munia	LC	NL	No	Canopy-birds	VP, Transect	13	17/15	Moving around	1	< 200	N/A
62	*Lonchura striata*	White-rumped Munia	LC	NL	No	Canopy-birds	VP, Transect	7	7/5	Moving around	1	< 200	N/A
	31. Motacillidae												
63	*Anthus rufulus*	Paddyfield Pipit	LC	NL	No	Canopy-birds	VP, Transect	11	4/7	Moving around	1	< 200	N/A

Note: The bird that have large wing span (> 50 cm) are highlighted in yellow. The bird that fly in flocks (>10 individuals) are highlighted in n. The bird that meet both criteria are highlighted in blue.

ATTACHMENT C LIST OF RESPONDENTS

No.	Name	Gender	Age	Address	GPS Coordinate (WGS84)		Remarks
1	Y Vốc (A Ma Vai)	Male	63	Cư H'Riết village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.037888	108.183373	Interview at his house
2	Trần Dũng	Male	51	Pơng Drang village, Krong Buk district, Dak Lak province	13.033805	108.184941	Live in Pơng Drang but move to Cư H'Riết village for agriculture cultivation
3	Lê Quang Mai	Male	55	Village 6, Cư Né commune, Krong Buk district, Dak Lak province	13.033422	108.185918	Live in Ha Tinh province but move to Krong Buk for agriculture cultivation
4	Ho Viet Phuc	Male	24	Cư K'Bô commune, Krong Buk district, Dak Lak province	13.017585	108.196057	Live in Ha Tinh province but move to Krong Buk for agriculture cultivation
5	Dang Minh Hai	Male	37	Cư K'Bô commune, Krong Buk district, Dak Lak province	13.012093	108.195476	He is from Quang Ngai province coming to this place for agriculture cultivation (mainly coffee)
6	Y Dih (Ma Sa Na)	Male	38	Đrao village, Cư Né commune, Krong Buk district, Dak Lak province	13.111220	108.260990	Interview at his coffee field
7	Hơ Mỹ Vài	Female	48	EaBrơ village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.037740	108.182650	Interview at her small shop
8	Y Tăng Nia	Male	35	EaBrơ village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.036570	108.181740	Interview at his house
9	Y Chơ Nê	Male	45	Cư H'Riết village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.035590	108.181270	Interview at his house
10	Y Đơk	Male	32	Cư H'Riết village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.034750	108.180830	Interview at his house
11	Y A Miên	Male	51	Cư H'Riết village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.035140	108.179380	Interview at his house

ATTACHMENT D QUESTIONAIRES FOR MAMMAL INTERVIEWS

Phiếu số: | | |

PHIẾU PHỎNG VẤN THÚ

Khu vực nghiên cứu:

Người phỏng vấn:

Ngày tháng năm:

1. THÔNG TIN NGƯỜI ĐƯỢC PHỎNG VẤN

Họ và tên: Giới tính: Năm sinh/tuổi:

Địa chỉ

2. THÔNG TIN VỀ ĐỘNG VẬT (THÚ) TRONG KHU VỰC

2.1. Từ trước tới nay, khu vực của mình có những loài động vật (thú) hoang dã nào? Ông/bà vui lòng kể tên các loài?

STT	Loài	Khu vực	Số lượng	Thời gian gặp gần đây nhất (tháng/năm)	Ghi chú (Nghe người khác nói lại)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

2.2. Hỏi về một số loài cụ thể có thể có trong vùng nếu chưa được kể ở trên

STT.	Câu hỏi	Trả lời	Ghi chú
1	Ở đây có mèo hoang dã không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài?		

STT.	Câu hỏi	Trả lời	Ghi chú
2	Ở đây có Sóc không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài?		
3	Ở đây có cầy/ chồn không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài?		
4	Ở đây có Culi (Khỉ gió/Cù lần) không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài?		
5	Ở đây có khỉ không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài?		
6	Ở đây có chuột không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài?		
7	Ở đây có Rái cá không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài?		
8			
9			
10			

Người thực hiện phỏng vấn đưa ra một số hình ảnh về các loài động vật (thú) để hỏi người được phỏng vấn để tìm thông tin về phân bố?

Phiếu số: | | |

PHIẾU PHỎNG VẤN DƠI

Khu vực nghiên cứu:

Người phỏng vấn:

Ngày tháng năm:

1. THÔNG TIN NGƯỜI ĐƯỢC PHỎNG VẤN

Họ và tên: Giới tính: Năm sinh/tuổi:

Địa chỉ:

Câu 1: Ông/bà có nhìn thấy Dơi quanh nhà không?

a. Có
b. Không

Câu 2: Ông/bà có gặp Dơi có về ăn trái cây không?

a. Có Mùa nào:…….
b. Không

Câu 3: Theo ông/bà, có mấy loài Dơi khác nhau?

a. 1
b. 2
c. 3
d. Khác: …..

Câu 4: Ông/bà vui lòng mô tả từng loài Dơi để xem chúng khác nhau những điểm gì?

a. Loài 1: ……
b. Loài 2: ……
c. Loài 3: ……
d. Loài n: ……

Câu 5: Ông/bà có bẫy Dơi không?

a. Có Mục đích bẫy Dơi để làm gì:…….
b. Không

Câu 6: Theo ông/bà, Dơi có lợi hay hại?

a. Lợi
b. Hại

ATTACHMENT E QUESTIONAIRES FOR REPTILE AND AMPHIBIAN INTERVIEWS

BIỂU ĐIỀU TRA, THU THẬP THÔNG TIN
VỀ BÒ SÁT VÀ ẾCH NHÁI

Ngày..... tháng …… năm 2021

Phiếu số: ……

Địa điểm: .....

Thông tin chung	
Tên người được phỏng vấn:	Giới tính: .....
Nghề nghiệp:	Tuổi: .....

Các loài ếch nhái thường gặp khu vực	
Thường gặp bao nhiều loài (dạng) ếch nhái (mô tả nhận dạng): …… ……	Sinh cảnh thường gặp: Trên mặt đất ☐ Trên cây ☐ Dưới nước ☐
Mùa thường gặp: Mùa mưa ☐ Mùa khô ☐	Thời gian bắt gặp : Ngày ☐ Đêm ☐ Ngày và Đêm ☐
Tần suất bắt gặp: Thường xuyên ☐ Không thường xuyên ☐	Công dụng và tác dụng: Thực phẩm ☐ Làm thuốc ☐ Khác ☐

Các loài rắn thường gặp ở quanh khu vực	
Thường gặp bao nhiều loài rắn (tả sơ lược về màu sắc, kích thước ….):……..	Sinh cảnh thường gặp: Trên mặt đất ☐ Trên cây ☐

……	Dưới nước ☐
Mùa thường gặp: Mùa mưa ☐ Mùa khô ☐	Thời gian bắt gặp: Ngày ☐ Đêm ☐ Ngày và Đêm ☐
Tần suất bắt gặp: Thường xuyên ☐ Không thường xuyên ☐	Công dụng và tác dụng: Thực phẩm ☐ Làm thuốc ☐ Khác ☐
Loài có độc hay không?.....	Có bị săn bắt làm thực phẩm và buôn bán không? ……..

Các loài thằn lằn thường gặp ở quanh khu vực	
Thường gặp bao nhiêu loài thằn lằn (tả sơ lược về nhận dạng, màu sắc, kích thước...): ……. ……	Sinh cảnh thường gặp: Trên mặt đất ☐ Trên cây ☐
Mùa thường gặp: Mùa mưa ☐ Mùa khô ☐	Thời gian bắt gặp : Ngày ☐ Đêm ☐ Ngày và Đêm ☐
Tần suất bắt gặp: Thường xuyên ☐ Không thường xuyên ☐	Công dụng và tác dụng: Thực phẩm ☐ Làm thuốc ☐ Khác ☐
Các loài này có được nuôi nhốt trong khu vực không? Mục đích nuôi nhốt? ……	Có bị săn bắt làm thực phẩm và buôn bán không? ……..

…… ……	

Thông tin khác (ghi rõ, nếu có)
....

Xem hình ảnh một số loài bò sát và ếch nhái. Người được phỏng vấn nhận diện loài nào có phân bố ở khu vực nghiên cứu?
....

Người phỏng vấn: .....

Ngoé

ễnh ương

Cóc nhà

Nhái bầu

Rắn cạp nia

Nhông Bách

APPENDIX H BIRD SURVEY – DECEMBER 2021

Biodiversity Survey Report

The Dak Lak Wind Farm Project

14 January 2022

Prepared by Center for Nature Conservation and Development for ERM Vietnam

Document details	
Document title	Biodiversity Survey Report
Document subtitle	The Dak Lak Wind Farm Project
Date	14 January 2022
Version	1.0
Author	Center for Nature Conservation and Development
Client Name	ERM Vietnam

CONTENTS

1. INTRODUCTION 2
1.1 Purpose 2
1.2 Scope of Survey 2
1.3 Project's Description 2

2. METHODOLOGY 3
2.1 Vantage Point (VP) Survey 3
2.2 Transect Survey 7

3. RESULT 9
3.1 Habitats 9
3.1.1 Habitats along the Transects 9
3.1.2 Habitats around the Vantage Points 9
3.2 Results of 3rd Survey 11
3.2.1 Vantage Points (VPs) 12
3.2.2 Transects 14
3.2.3 Key Species Account 15
3.2.4 Species Considered being Prone to Collision 15
3.3 Compiled Results from all Surveys 16
3.3.1 Vantage Points (VPs) 17
3.3.2 Transects 20

4. CONCLUSION 22

REFERENCES 23

ATTACHMENT A BIRD SPECIES RECORDED DURING THE THIRD SURVEY (10-12 DECEMBER 2021)

ATTACHMENT B BIRD SPECIES RECORDED IN THREE SURVEYS

List of Tables

Table 2.1 Coordinates of Vantage Points 3
Table 2.2 Summary of Survey Efforts at VP 5
Table 2.3 Summary of Bird Transect Survey Efforts 7
Table 3.1 Structure of Diversity of Birds in the Study Areas 11
Table 3.2 The Abundance of Birds Detected in the Vantage Point Areas in this Survey 12
Table 3.3 Relative Abundance of Recorded Birds along the Transects from the Third Survey 14
Table 3.4 Species Presented in Band 2 from the Vantage Point Surveys 16
Table 3.5 The Comparison of Species Recorded during the Surveys 16
Table 3.6 Two NT Species were Recorded in The Project Area 17
Table 3.7 Relative Abundance of the Species Recorded at VPs from Three Surveys 18
Table 3.8 Three Most Common Species Detected from the Vantage Point Surveys 18
Table 3.9 Species in Band 2 18
Table 3.10 Spececies Detected in the Vantage Point Areas with Large Wing-span and in Big Flock 19
Table 3.11 Species of Conservation Concern Recorded in Transects 20
Table 3.12 Relative Abundance of the Species Recorded at Transects during Three Surveys 20
Table 3.13 Three Most Common Species along the Transects 21

List of Figures

Figure 1.1 Map of Project Area 2
Figure 2.1 Map of Bird Survey by VPs 4
Figure 2.2 Map of Bird Survey by Transects 8
Figure 3.1 The Main Habitats along the Transects 9
Figure 3.2 Habitats around the VP 1 10
Figure 3.3 Habitats around the VP 2 10
Figure 3.4 Habitats around the VP 3 10
Figure 3.5 Habitats around the VP 4 10
Figure 3.6 Habitats around the VP 5 10
Figure 3.7 Habitats around the VP 6 10
Figure 3.8 Habitats around the VP 7 11
Figure 3.9 Habitats around the VP 8 11
Figure 3.10 The Relative Abundance of Recorded Species of all VPs from the Third Survey 12
Figure 3.11 The Fly Direction Recorded at each VP 13
Figure 3.12 The Relative Abundance of Recorded Species of all Transects 14
Figure 3.13 Artificial Swiftlet's House Located Close to the VP2 17
Figure 3.14 The Number of Recorded Species at Each VPs 18
Figure 3.15 The Number of Recorded Species at Each Transects 21

Acronyms and Abbreviations

Name	Description
a.s.l	Above sea level
CR	Critically Endangered
CRM	Collision risk model
EN	Endangered
ESIA	Environmental and Social Impact Assessment
IFC	International Finance Corporation
IFC PS6	International Finance Corporation’s Guidance Note 6: Biodiversity Conservation and Sustainable (2012)
IUCN	The International Union for Conservation of Nature
IUCN Red List	The International Union for Conservation of Nature's Red List of Threatened Species
LC	Least Concern
NL	Not Listed
NT	Near Threatened
VP	Vantage points
VRDB	Vietnam Red Data Book
VU	Vulnerable

1. INTRODUCTION

1.1 Purpose

The main purpose of this report is to present the results from the third survey within a series of three surveys for the Dak Lak Wind farm project (hereinafter regarded as the Project). The results of these surveys serve for the Environmental and Social Impact Assessment (ESIA) prepared by Environemntal Resrouces Management Vietnam Ltd. (ERM) for the Wind Energy LLC Huadian, following the requirements from International Financial Corporation (IFC) Performance Standard 6 (PS6).

1.2 Scope of Survey

The field survey was undertaken between 10 – 12 December 2021. The scope of the third survey is to gather supplementary data regarding bird diversity, abundances and their activities (e.g. flight bands, flight direction) within the Project area.

1.3 Project's Description

The Dak Lak Wind Farm Project is composed by 73 wind turbines and generators distributed in four different areas with an individual capacity of 2.65 MW, and an associated 110 kV substation for connection to the national grid. The wind turbines consist of two types, including the EN-156 type with blade length of 76 and the EN-141 type with 68.8 m blade length. Both types have a hub height of 130m. The Project covers an area of 53.5 km2 on a low hilly topography in the northern part of Krong Buk District of the Dak Lak Province at Vietnam. The geographical coordinates are between 108° 9'54.97" – 108°17'27.36"E and 13° 7'21.18" – 13° 0'19.28"N (WGS 84).

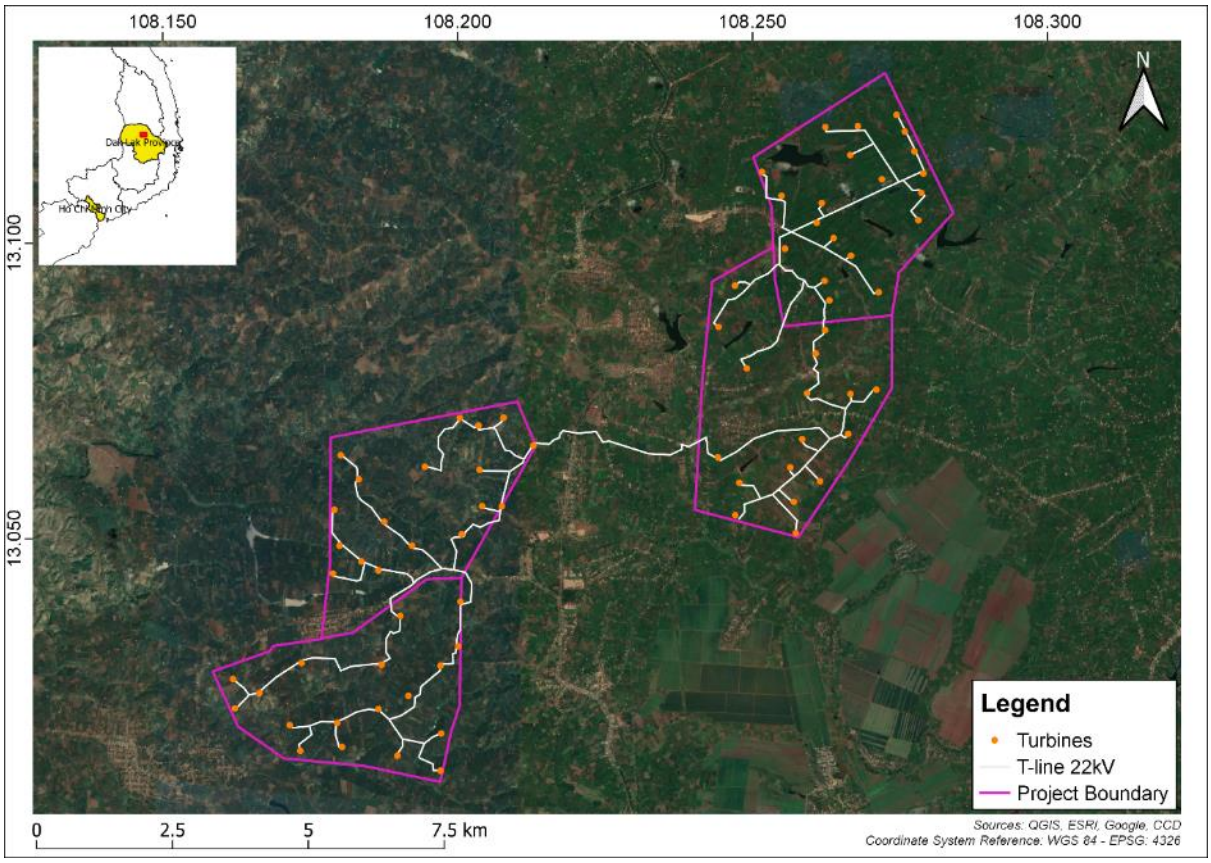


Figure 1.1 Map of Project Area

2. METHODOLOGY

The same methods like those in the first and second survey were applied for the third survey targetting aves. This included line transect (Bibby et al., 2003) and vantage point (VP) methods (Heritage 2017).

2.1 Vantage Point (VP) Survey

VP survey is designed to quantify the level of flight activity and its distribution over the survey area (Heritage, 2017). At each VP, the observer scans an arc of 180° with 2 km radius for birds. Before the VP survey, the team conducted a site visit to the VPs location that were pre-defined on Google Earth and adjusted if necessary to achieve maximum visibility to the sky.

Totally, there were eight VPs established in the Project site to cover all 73 wind turbines (see Table 2.1) presents coordinate of these VPs. Each VP was surveyed at least 12 hours per day (36 hours in total) from 10 to 12 December 2021 (Table 2.2).

Table 2.1 Coordinates of Vantage Points

Vantage Points (VP)	Latitude (WGS 84)	Longitude (WGS 84)
VP 1	13°3'28.50"N	108°11'40.40"E
VP 2	13°2'30.75"N	108°11'18.07"E
VP 3	13°1'17.54"N	108°11'34.13"E
VP 4	13°0'47.56"N	108°10'16.36"E
VP 5	13°6'29.96"N	108°16'7.03"E
VP 6	13°3'15.14"N	108°14'48.97"E
VP 7	13°5'1.30"N	108°16'16.37"E
VP 8	13°5'53.04"N	108°14'46.47"E

During the survey period, the observer sat at a vantage point from 5:30 to 18:00 daily. In order to collect data effectively, a set of equipment such as a HD Swarroski 20x80 telescope, a Nikon D500 camera with lens 500 – 600 mm, and a HD Swarroski 8x32 binoculars or a similar quality equipment package was used.

The rotor swept zone is calculated by subtracting and adding the length of turbine blade with the hub height. With respect to the rotor swept zone, bird flights was divided in to three categories: below (Band 1 from 0 – 51 m), in (Band 2 from 52 – 208 m) and beyond (Band 3 >208 m). The total flight time at Band 2 of all the prone to collision species were recorded to assess the collision risk of the species.

Besides, all information such as weather condition, amount of work at each VP, numbers of all recorded birds' species, target species, flight paths of each species (height of flight) was recorded (see Table 2.2). The height of the flight was evaluated using the Nikkon Forestry Pro II.

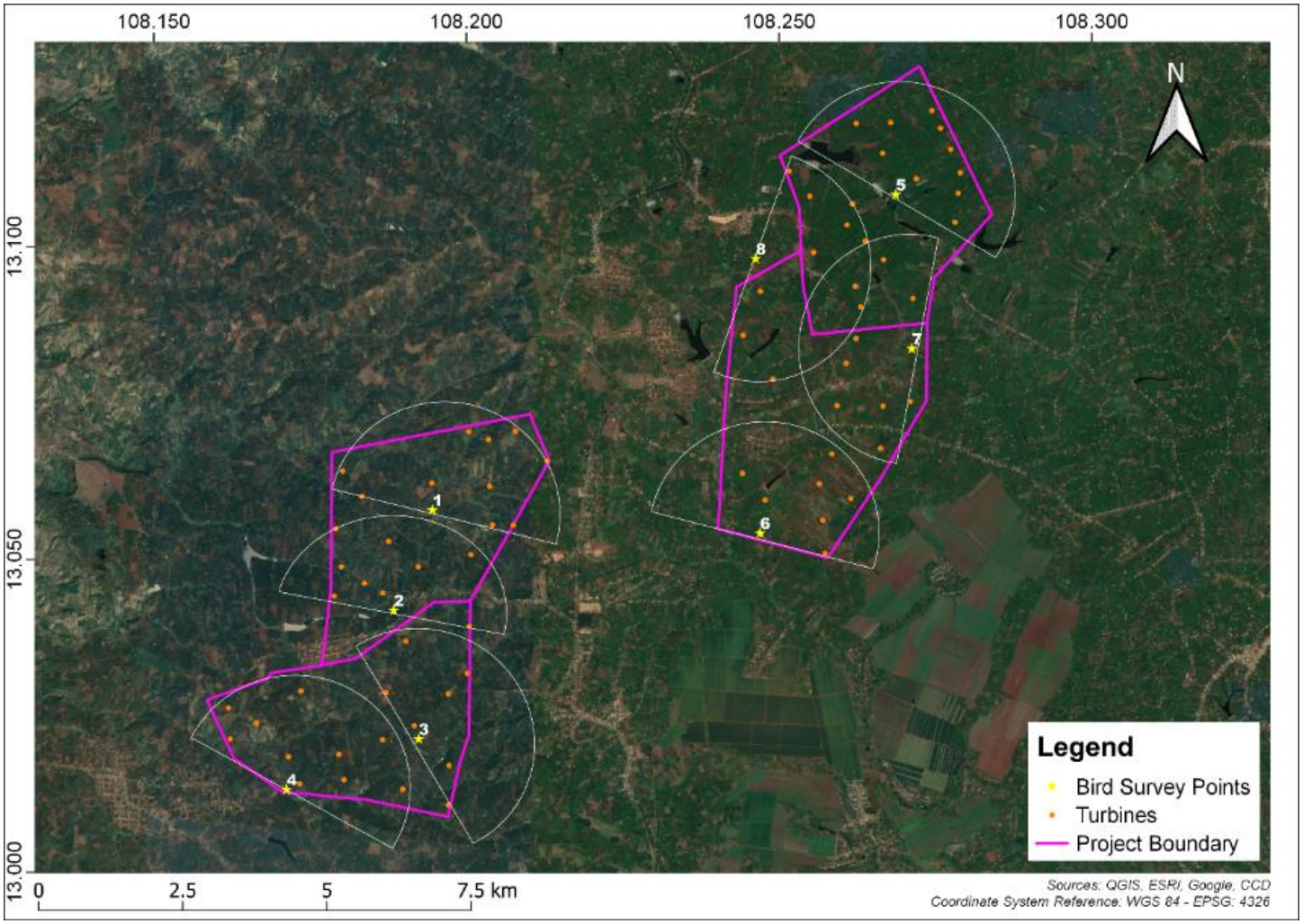


Figure 2.1 Map of Bird Survey by VPs

Table 2.2 Summary of Survey Efforts at VP

VPs	Date	Surveyors	Start time	Finish time	Length of VP watch (Hrs)	Habitat	Weather
VP1	10122021	Vo Rin	5:30	18:00	12.5	Plantation, coffee gardens, fruiting tree and scrubs.	Sunny, partly cloud, light breeze in eraly morning but gentle breeze later (after 9:00), temp (15 - 24^{0}C).
	11122021	Vo Rin	5:30	18:00	12.5		Cloudy all day, slight rain in the morning, light breeze in the morning but moderate breeze in the afternoon, temp (16 - 24^{0}C)
	12122021	Vo Rin	5:30	18:00	12.5		Sunny, partly cloud, light air in the morning but moderate breeze in the afternoon, slight rain from 16h00 to 18h00, temp (16 - 24^{0}C)
VP2	10122021	Nguyen Thuy Linh	5:30	18:00	12.5	Coffee gardens, fruiting tree (jackfruit), scrubs and bushes	Sunny, partly cloud, light breeze in eraly morning but gentle breeze later (after 9:00), temp (15 - 24^{0}C)
	11122021	Nguyen Thuy Linh	5:30	18:00	12.5		Cloudy all day, slight rain in the morning, light breeze in the morning but moderate breeze in the afternoon, temp (16 - 24^{0}C)
	12122021	Nguyen Thuy Linh	5:30	18:00	12.5		Sunny, partly cloud, light air in the morning but moderate breeze in the afternoon, slight rain from 16h00 to 18h00, temp (16 - 24^{0}C)
VP3	10122021	Lo Van Oanh	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, partly cloud, light breeze in eraly morning but gentle breeze later (after 9:00), temp (15 - 24^{0}C)
	11122021	Lo Van Oanh	5:30	18:00	12.5		Cloudy all day, slight rain in the morning, light breeze in the morning but moderate breeze in the afternoon, temp (16 - 24^{0}C)
	12122021	Lo Van Oanh	5:30	18:00	12.5		Sunny, partly cloud, light air in the morning but moderate breeze in the afternoon, slight rain from 16h00 to 18h00, temp (16 - 24^{0}C)
VP4	10122021	Pham The Linh	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, partly cloud, light breeze in eraly morning but gentle breeze later (after 9:00), temp (15 - 24^{0}C)
	11122021	Tu Van Chi	5:30	18:00	12.5		Cloudy all day, slight rain in the morning, light breeze in the morning but moderate breeze in the afternoon, temp (16 - 24^{0}C)
	12122021	Pham The Linh	5:30	18:00	12.5		Sunny, partly cloud, light air in the morning but moderate breeze in the afternoon, slight rain from 16h00 to 18h00, temp (16 - 24^{0}C)

VPs	Date	Surveyors	Start time	Finish time	Length of VP watch (Hrs)	Habitat	Weather
VP5	10122021	Le Thanh An	5:30	18:00	12.5	Coffee gardens with tail trees located along the garden's fences.	Sunny, partly cloud, slight rain from 5h30 to 7h00, light breeze in eraly morning but gentle breeze later (after 9:00), temp (15 - 24^{0}C)
	11122021	Pham The Linh	5:30	18:00	12.5		Cloudy all day, slight rain in the morning, light breeze in the morning but moderate breeze in the afternoon, temp (16 - 24^{0}C)
	12122021	Tu Van Chi	5:30	18:00	12.5		Sunny, partly cloud, light air in the morning but moderate breeze in the afternoon, slight rain from 16h00 to 18h00, temp (16 - 24^{0}C)
VP6	10122021	Le Duc Hien	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, partly cloud, light breeze in eraly morning but gentle breeze later (after 9:00), temp (15 - 24^{0}C)
	11122021	Le Duc Hien	5:30	18:00	12.5		Cloudy all day, slight rain in the morning, light breeze in the morning but moderate breeze in the afternoon, temp (16 - 24^{0}C)
	12122021	Le Duc Hien	5:30	18:00	12.5		Sunny, partly cloud, light air in the morning but moderate breeze in the afternoon, slight rain from 16h00 to 18h00, temp (16 - 24^{0}C)
VP7	10122021	Nguyen Anh Tuan	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, partly cloud, light breeze in eraly morning but gentle breeze later (after 9:00), temp (15 - 24^{0}C)
	11122021	Le Thanh An	5:30	18:00	12.5		Cloudy all day, slight rain in the morning, light breeze in the morning but moderate breeze in the afternoon, temp (16 - 24^{0}C)
	12122021	Le Thanh An	5:30	18:00	12.5		Sunny, partly cloud, light air in the morning but moderate breeze in the afternoon, slight rain from 16h00 to 18h00, temp (16 - 24^{0}C)
VP8	10122021	Tu Van Chi	5:30	18:00	12.5	Coffee gardens and fruiting trees.	Sunny, partly cloud, light breeze in eraly morning but gentle breeze later (after 9:00), temp (15 - 24^{0}C)
	11122021	Nguyen Anh Tuan	5:30	18:00	12.5		Cloudy all day, slight rain in the morning, light breeze in the morning but moderate breeze in the afternoon, temp (16 - 24^{0}C)
	12122021	Nguyen Anh Tuan	5:30	18:00	12.5		Sunny, partly cloud, light air in the morning but moderate breeze in the afternoon, slight rain from 16h00 to 18h00, temp (16 - 24^{0}C)

2.2 Transect Survey

The line transects were surveyed to detect all bird species present in different habitats through the Project area. All bird species were recorded using both auditory and visual detection. The number of individuals of each bird species was also recorded to identify its relative abundance in the Project area.

Relative abundance of the species recorded during the survey was evaluated as followed:

- Rare (less than 3 individuals)
- Uncommon (3 – 5 individuals)
- Fairly common (6 – 10 individuals)
- Common (>10 individuals).

The identification of birds was referred to the guide book "*Birds of Vietnam*". In addition, their abundant and migratory status in Vietnam also followed the reference of Craik et al. (2018). The conservation status of bird species in the world and in Vietnam followed IUCN Red List (2021) and Vietnam Red Data Book (2007), respectively.

In addition, other information such as weather condition, survey efforts, locations of the transects were recorded. Four transects with the total of 37.1 km long were surveyed (Table 2.3 and Figure 2.2).

Table 2.3 Summary of Bird Transect Survey Efforts

Transect	Time	Start point (WGS 84)	End point (WGS 84)	Length (km)
Transect 1	05:45 – 12:00 (10 December 2021)	13°3'33.69"N; 108°11'17.45"E	13°2'7.85"N; 108°10'33.55"E	7.6
Transect 2	■ 12:00 -18:00 (10 December 2021) ■ 7:30 – 12:00 (11 December 2021)	13°1'38.26"N; 108°10'14.47"E	13°1'16.66"N; 108°11'32.04"E	11.5
Transect 3	13:00 – 18:00 (11 December 2021)	13°6'19.06"N; 108°14'38.90"E	13°5'19.55"N; 108°16'18.92"E	7.2
Transect 4	05:30 – 18:00 (12 December 2021)	13°5'13.48"N; 108°16'21.15"E	13°3'41.47"N; 108°14'50.95"E	10.8
Total				**37.1**

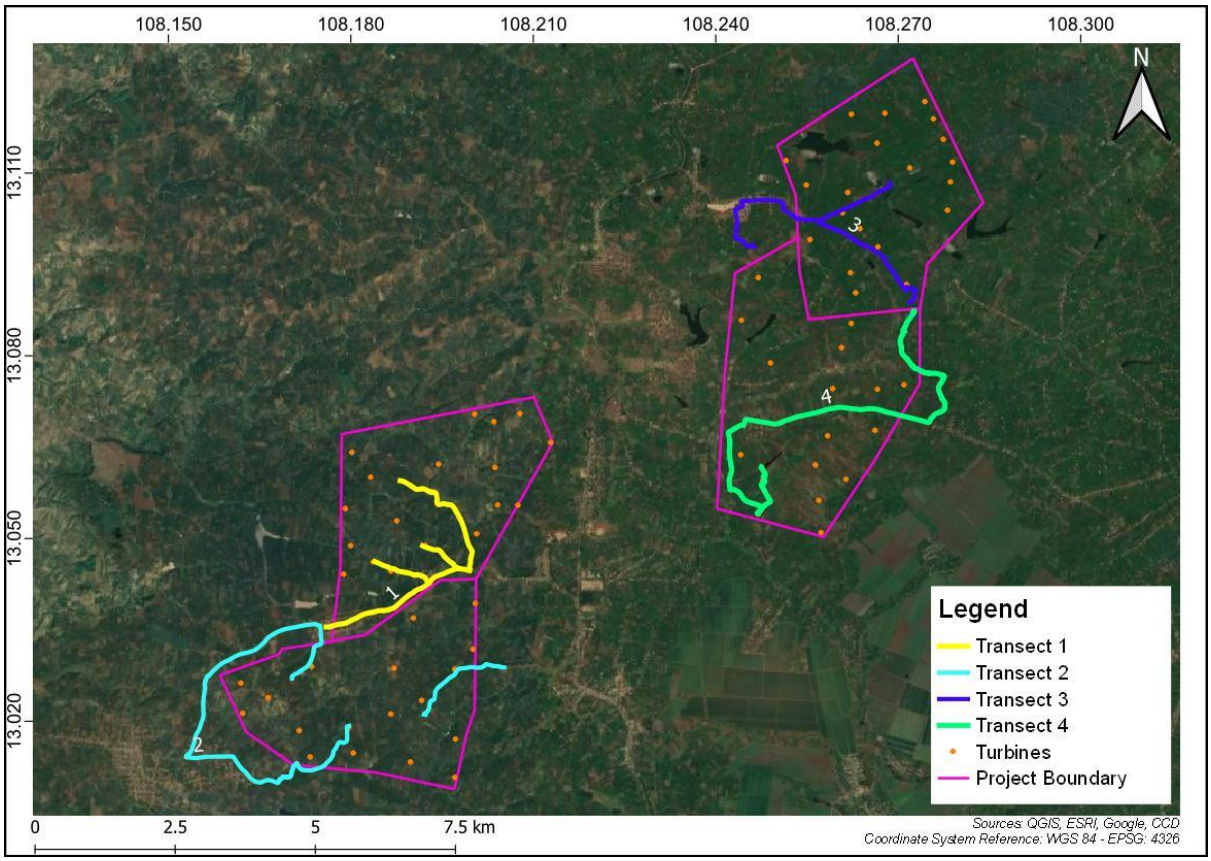


Figure 2.2 Map of Bird Survey by Transects

3. RESULT

3.1 Habitats

There were not much changes of the habitat types surrounding the vantage points and along the transects compared to the last surveys. However, there were more human activities, including coffee planting and harvesting surrounding the vantage points and along the transects than the previous surveys. Moreover, there were some activities related to road building within the Project areas during the third survey, although these activities were not in close proximity to the VPs.

3.1.1 Habitats along the Transects

The main kind of habitats along the transects of proposed wind farm are gardens (coffee, jackfruit, mango etc.), scrubs and plantation (see Figure 3.1).

Figure 3.1 The Main Habitats along the Transects

3.1.2 Habitats around the Vantage Points

The figures at each VP are presented from Figure 3.2 to Figure 3.9. Habitats at the VPs are:

- VP 1: plantation, coffee gardens, fruiting tree and scrubs
- VP 2: coffee gardens, fruiting tree (jackfruit), scrubs and bushes
- VP 5: coffee gardens with tail trees located along the garden's fences.
- VP 3, 4, 6 to 8: coffee gardens and fruiting trees.

Figure 3.2 Habitats around the VP 1

Photo: Le Duc Hien

Figure 3.3 Habitats around the VP 2

Photo: Nguyen Van Thuan

Figure 3.4 Habitats around the VP 3

Photo: Le Duc Hien

Figure 3.5 Habitats around the VP 4

Photo: Tran Van Bay

Figure 3.6 Habitats around the VP 5

Photo: Nguyen Van Luc

Figure 3.7 Habitats around the VP 6

Photo: Do Dinh Dong

Figure 3.8 Habitats around the VP 7

Photo: Do Dinh Dong

Figure 3.9 Habitats around the VP 8

Photo: Tran Van Bay

3.2 Results of 3rd Survey

There were 65 bird species belonging to 10 orders and 33 families recorded during the third survey. Among those, one species, Grey-headed Parakeet *Psittacula finschii* is listed in the IUCN Red List 2021 as Near Threatened (NT) and the rest are listed as Least Concern (LC). None of the recorded species are listed in the Vietnam Red Data Book 2007. Furthermore, three species are listed in appendix IIB of Decree No. 06/2019/ND – CP, dated 22 January 2019 of Vietnam Government on Management of rare and threatened fauna and flora: Black-winged Kite *Elanus caeruleus* (IUCN LC), Rufous-winged Buzzard *Butastur liventer* (IUCN LC) and Grey-faced Buzzard *Butastur indicus* (IUCN LC) (Attachment A).

Among 65 recorded species, 56 species were recorded within the vantage points and 42 species during line transects. Furthermore, 33 species were recorded from both vantage point and transect surveys, while 9 other species were only recorded along the transects and 23 species recorded only in vantage points. The Grey-headed Parakeet was only recorded at VP8. Species recorded during transects did not have their flight band recorded, which is not a requirement of the method itself (Attachment A).

Table 3.1 Structure of Diversity of Birds in the Study Areas

No	Order	Number of Family	Number of species
1	ACCIPITRIFORMES	1	3
2	BUCEROTIFORMES	1	1
3	CAPRIMULGIFORMES	1	1
4	COLUMBIFORMES	1	2
5	CORACIIFORMES	2	2
6	CUCULIFORMES	1	4
7	PASSERIFORMES	22	47
8	PELECANIFORMES	1	1
9	PICIFORMES	2	3
10	PSITTACIFORMES	1	1
Total		**33**	**65**

3.2.1 Vantage Points (VPs)

A total of 56 different species were recorded within eight VPs (26 species recorded at VP1, 23 species at VP2, 11 species at VP3, 21 species at VP4, 14 species at VP5, 12 species at VP6, 16 species at VP7 and 16 species at VP8).

There were 13 species recorded in Band 2, including Black-winged Kite, Rufous-winged Buzzard, Grey-faced Buzzard, Edible-nest Swiftlet, Barn Swallow, Black-naped Oriole, Eurasian Jay, Large-billed Crow, Sooty-headed Bulbul, Black-collared Starling, White-shouldered Starling, Vinous-breasted Myna, Chinese Pond-heron.

Regarding the relative abundances, 22 species have been identified as common, 14 species are fairly common, 8 uncommon and 12 rare species (Table 3.2 and Figure 3.10). In this survey, the Grey-headed Parakeet was relatively considered as rare, whereas in previous surveys they were regarded as common.

Table 3.2 The Abundance of Birds Detected in the Vantage Point Areas in this Survey

Abundant categogies	Number of specis	%
Common	22	40
Fairly common	14	25
Uncommon	8	14
Rare	12	21

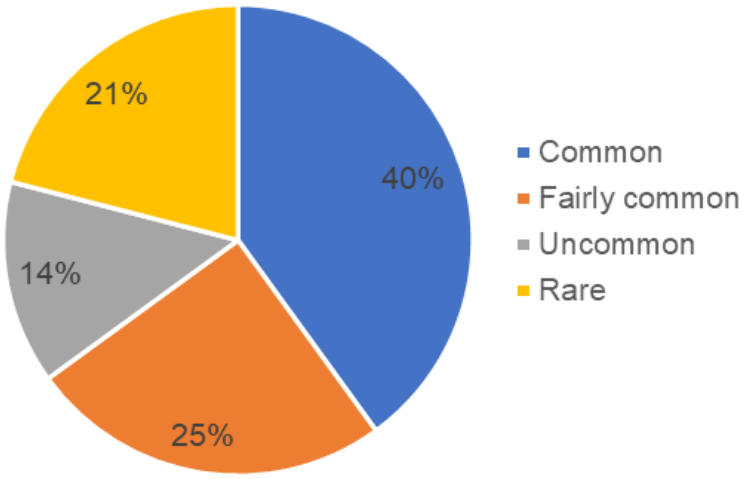


Figure 3.10 The Relative Abundance of Recorded Species of all VPs from the Third Survey

The most ten common species are Edible-nest Swiftlet *Aerodramus fuciphagus* (129), Sooty-headed Bulbul *Pycnonotus aurigaster* (116), Scaly-breasted Munia *Lonchura punctulata* (42), Ashy Drongo *Dicrurus leucophaeus* (36), Barn Swallow *Hirundo rustica* (33), Stripe-throated Bulbul *Pycnonotus finlaysoni* (29), Black Drongo *Dicrurus macrocercus* (27), Black Bulbul *Hypsipetes leucocephalus* (23), Common Iora *Aegithina tiphia* (21), Vinous-breasted Myna *Acridotheres leucocephalus* (19).

The most ten fairly common species with their number of individuals are Asian Green Bee-eater *Merops orientalis* (9), Common Tailorbird *Orthotomus sutorius* (9), Yellow-eyed Babbler *Chrysomma*

sinense (8), Zebra Dove *Geopelia striata* (8), Asian Fairy-bluebird *Irena puella* (8), Yellow-browed Warbler *Phylloscopus inornatus* (7), Common Hoopoe *Upupa epops* (7), Green-billed Malkoha *Phaenicophaeus tristis* (6), White-crested Laughingthrush *Garrulax leucolophus* (6), Black-winged Kite *Elanus caeruleus* (6).

Eight uncommon species with their number of individuals are Olive-backed Sunbird *Cinnyris jugularis* (4), Dark-necked Tailorbird *Orthotomus atrogularis* (4), Scarlet Minivet *Pericrocotus flammeus* (4), Chestnut-capped Babbler *Timalia pileata* (4), Pied Bushchat *Saxicola caprata* (3), Common Myna *Acridotheres tristis* (3), Black-naped Oriole *Oriolus chinensis* (3), Coppersmith Barbet *Psilopogon haemacephalus* (3).

And twelve species were recorded with low number of individuals and identified as rare species within the Project area based on VPs survey including Eastern Crowned *Warbler Phylloscopus coronatus* (2), Pin-striped Tit-babbler *Mixornis gularis* (2), Chestnut-tailed Starling *Sturnia malabarica* (2), Indian Cuckoo *Cuculus micropterus* (1), Tiger Shrike *Lanius tigrinus* (1), Asian Brown Flycatcher *Muscicapa dauurica* (1), Plaintive Cuckoo *Cacomantis merulinus* (1), Grey-headed Parakeet *Psittacula finschii* (1), Pale Blue-flycatcher *Cyornis unicolor* (1), White-breasted Kingfisher *Halcyon smyrnensis* (1), Lineated Barbet *Psilopogon lineatus* (1), Black-headed Bulbul *Brachypodius atriceps* (1). All of them are listed as LC in IUCN Red List (2021). Most of rare species recorded from VPs are common and fairly common in Vietnam.

The results of surveys at the vantage points showed that all species appeared in the vantage point areas from all different directions, not any specific direction (Figure 3.11).

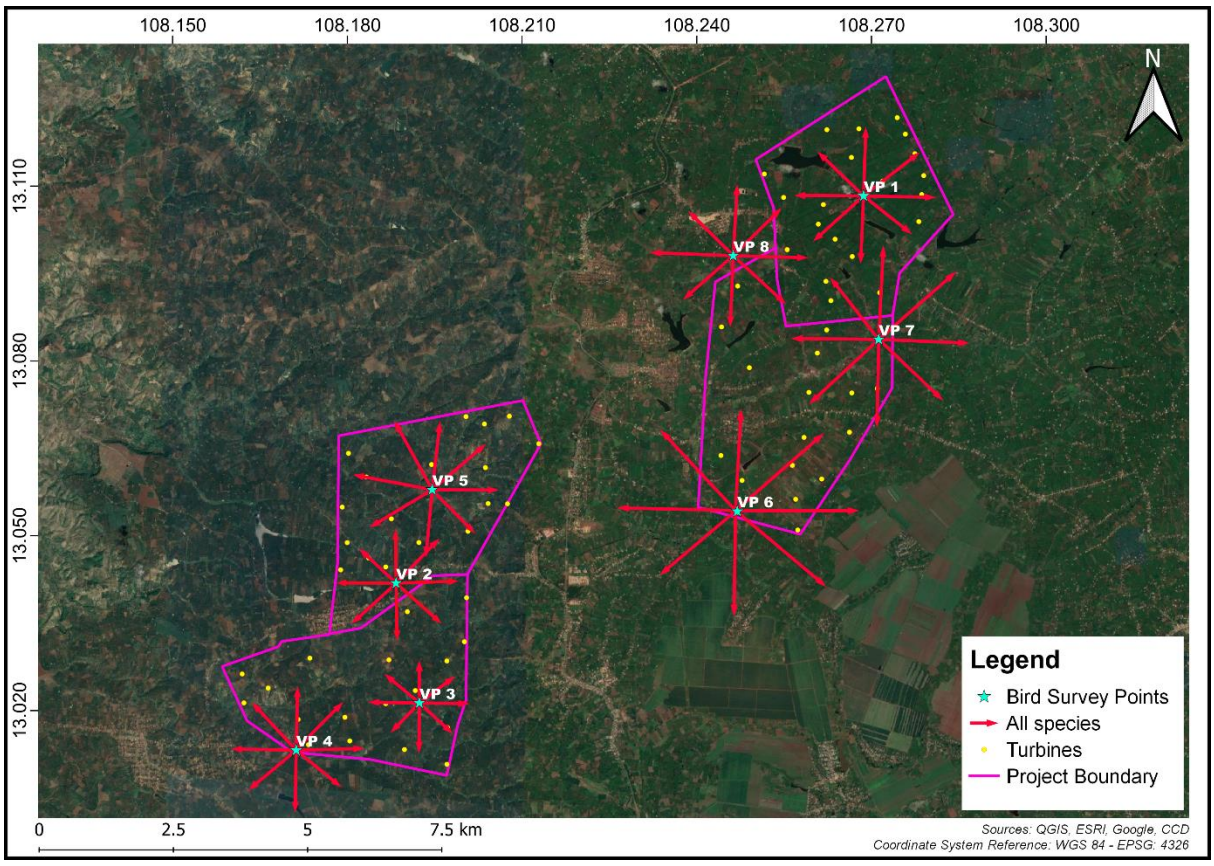


Figure 3.11 The Fly Direction Recorded at each VP

3.2.2 Transects

A total of 42 species were recorded along four transects (26 species recorded at transect 1, 21 species at transect 2, 30 species at transect 3 and 28 species recorded at transect 4). Among these 42 species, 39 species (92%) are common species, the remains are uncommon species in Vietnam including Siberian Rubythroat *Calliope calliope* (IUCN LC, VRDB NL), Hair-crested Drongo *Dicrurus hottentottus* (IUCN LC, VRDB NL), and Asian Brown Flycatcher *Muscicapa dauurica* (IUCN LC, VRDB NL). The result from the third survey was partially different from the previous surveys regarding diversity. Two main reasons could be used to explain for this difference: (1) more human activities, such as coffee harvesting and planting, road building; (2) less favourable weather: colder temperature (from 15-24^{0}C) and more wind.

Following the number of individuals of 42 species recorded during the survey, 13 species have been identified as common, 07 species are fairly common, 05 uncommon, and 17 rare species (Table 3.3 and Figure 3.12).

Table 3.3 Relative Abundance of Recorded Birds along the Transects from the Third Survey

Abundant categogies	Number of specis	%
Common	13	31
Fairly common	7	17
Uncommon	5	12
Rare	17	40

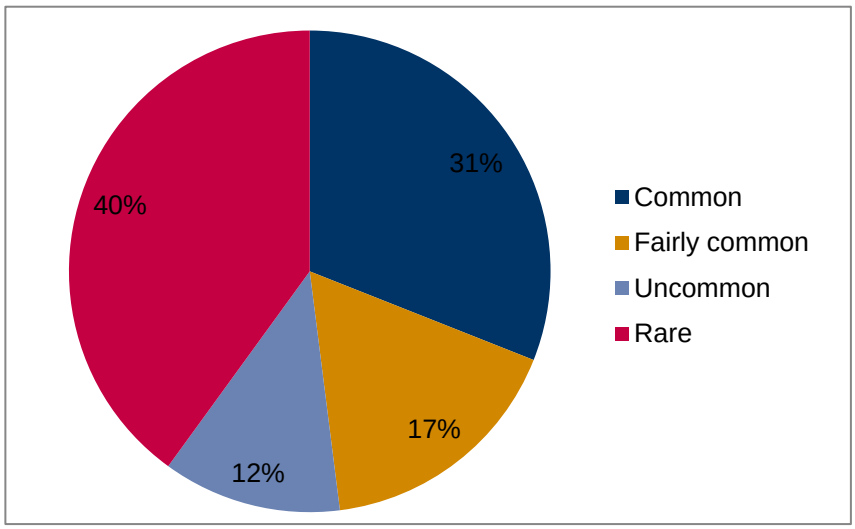


Figure 3.12 The Relative Abundance of Recorded Species of all Transects

The most ten common species with their number of individuals are Sooty-headed Bulbul *Pycnonotus aurigaster* (92), Edible-nest Swiftlet *Aerodramus fuciphagus* (60), Asian Green Bee-eater *Merops orientalis* (50), Scaly-breasted Munia *Lonchura punctulata* (31), Grey-breasted Prinia *Prinia hodgsonii* (30), Vinous-breasted Myna *Acridotheres leucocephalus* (30), Black Bulbul *Hypsipetes leucocephalus* (22), Burmese Shrike *Lanius collurioides* (20), Plain-backed Sparrow *Passer flaveolus* (17), Pin-striped Tit-babbler *Mixornis gularis* (12).

The seven fairly common species with their number of individuals are Zebra Dove *Geopelia striata* (8), Barn Swallow *Hirundo rustica* (7), Scarlet-backed *Flowerpecker Dicaeum cruentatum* (7), Black Drongo *Dicrurus macrocercus* (6), Black-collared Starling *Gracupica nigricollis* (6), Red-whiskered Bulbul *Pycnonotus jocosus* (6), Yellow-browed Warbler *Phylloscopus inornatus* (5).

Five uncommon species with their number of individuals are Stripe-throated Bulbul *Pycnonotus finlaysoni* (4), Chinese Pond-heron *Ardeola bacchus* (4), Common Iora *Aegithina tiphia* (3), Dark-necked Tailorbird *Orthotomus atrogularis* (3), Asian Brown Flycatcher *Muscicapa dauurica* (3).

Seventeen species recorded with low number of individuals were identified as rare species along the transects, including: Yellow-eyed Babbler *Chrysomma sinense* (2), Pied Bushchat *Saxicola caprata* (2), Olive-backed Sunbird *Cinnyris jugularis* (2), Paddyfield Pipit *Anthus rufulus* (2), Brown Shrike *Lanius cristatus* (2), Rufous Woodpecker *Micropternus brachyurus* (2), Siberian Rubythroat *Calliope calliope* (1), Green-billed Malkoha *Phaenicophaeus tristis* (1), Common Myna *Acridotheres tristis* (1), Black-naped Oriole *Oriolus chinensis* (1), Grey-faced Buzzard *Butastur indicus* (1), Eastern Spotted Dove *Spilopelia chinensis* (1), White-breasted Kingfisher *Halcyon smyrnensis* (1), Racquet-tailed Treepie *Crypsirina temia* (1), Radde's Warbler *Phylloscopus schwarzi* (1), Dusky Warbler *Phylloscopus fuscatus* (1), Hair-crested Drongo *Dicrurus hottentottus* (1). All of the rare species in the Project area identified from the transect surveys are listed as LC in the IUCN Red List (2021) and NL species in the VRDB (2007). Among these 17 rare species, 15 species (88%) are common species and 2 species (12%) are uncommon species in Vietnam.

Once again, unsuitable habitats surrounding vantage point areas and along the transects, high levels of human activities and bad weather during the third survey could be main reasons, helping to explain the rarity of the rare species identifed in both VPs and transects of this survey.

3.2.3 Key Species Account

In this survey, one species, Grey-headed Parakeet was recorded at only VP8 with one individual. This species is forest specialist and Its habitats are mixed-deciduous, pine, and open broadleaved evergreen forest, secondary growth, gardens, and farm edge; visits cultication. It is often seen in flock. This species is listed as NT in the IUCN Red List (2021) and NL (not listed) in VRDB (2007).

3.2.4 Species Considered being Prone to Collision

Based on the flight patterns of detected species from vantage points of this survey, third-teen species are considered being prone to collision (see). However, the levels of risk of collision are different among species because of other factors such as flight modes, total time in the band2, and the sighting times of the species when presented in the vantage point areas.

Regarding Black-naped Oriole, Eurasian Jay, Large-billed Crow, Sooty-headed Bulbul, Black-collared Starling, White-shouldered Starling, Vinous-breasted Myna, amd Chinese Pond-heron, they are canopy-birds and most of their activities occur on the ground or in canopies. As a result, these species appeared in the band 2 of these vantage points one time only in such a short period, except Large-billed Crow (4 times). This suggested that they were probably detected in the band 2 of the vantage points by chance when moving across for foraging.

Edible-nest Swiftlet and Barn Swallow are sky-birds, often foraging in the sky. In this survey, they were detected in the band 2 of the vantage points but not many times.

Black-winged Kite, Rufous-winged Buzzard, and Grey-faced Buzzard are Bird of Prey group with wing-span greater than 50cm. Among these species, the Grey-faced Buzzard is a migratory species, widely detected in study area (at VP2,4,5,7) with total 10 times in the band 2 of the Vps. This species is classified as a common species in both Vietnam in the study areas in this survey. The other two species, Black-winged Kite and Rufous-winged Buzzard are resident species. They were detected at Vp1, Vp2,7 with a short times in the band 2. Because of these three species' behaviors, often soaring

in the sky when foraging, their risk of collision could be higher than that of the others detected in the band 2 in this survey.

Table 3.4 Species Presented in Band 2 from the Vantage Point Surveys

No.	Loài	Bird-groups	Flight modes	Total time in Band 2	Sighting times in band2	Sum of individuals when in band 2	VPs
1	Black-winged Kite	Bird of Prey	F, G	310	3	4	2,7
2	Rufous-winged Buzzard	Bird of Prey	S	300	2	3	1
3	Grey-faced Buzzard	Bird of Prey	F, G	1890	10	13	2,4,5,7
4	Edible-nest Swiftlet	Sky-birds	F	2820	6	35	3,4,5,7
5	Barn Swallow	Sky-birds	F	600	1	4	1,3,4,6,8
6	Black-naped Oriole	Canopy-birds	F, Mo	20	1	1	2,4,6
7	Eurasian Jay	Canopy-birds	F, Mo	300	1	7	6,7
8	Large-billed Crow	Canopy-birds	F, G	210	4	9	2,3,6
9	Sooty-headed Bulbul	Canopy-birds	F, Mo	120	1	1	1,2,3,4,5,6,7
10	Black-collared Starling	Canopy-birds	F, Mo	180	1	1	4,8
11	White-shouldered Starling	Canopy-birds	F, Mo	30	1	13	2,8
12	Vinous-breasted Myna	Canopy-birds	F, Mo	40	1	11	1,2,4,6
13	Chinese Pond-heron	Water-birds	F, Mo	120	1	5	7

3.3 Compiled Results from all Surveys

The number of bird species recorded from three surveys is presented in Table 3.5.

Table 3.5 The Comparison of Species Recorded during the Surveys

Surveys	Total number of species	Orders	Families	Number of species from VPs	Number of species from Transects
May 2021	72	15	34	65	61
July 2021	63	11	31	59	52
December 2021	65	10	33	56	42

The result of the surveys suggested that the number of species and species composition (number of families and orders) are not significantly different across surveys (Table 3.5).

Totally, there were 100 bird species belonging to 14 orders and 40 families recorded after three surveys. Among these species, two species, Grey-headed Parakeet (*Psittacula finschii)* and Red-breasted Parakeet (*Psittacula alexandri*) are listed in the IUCN Red List (2021) as Near Threatened (NT) and the others are listed as Least Concern (LC). None of the recorded species are listed in the Vietnam Red Data Book (2007).

Regarding abundant status in Vietnam, 89 of 100 detected species are fairly common to common species, and the other 11 species are uncommon including Silver-backed Needletail *Hirundapus cochinchinensis* (IUCN LC, VRDB NL), Brown Prinia *Prinia polychroa* (IUCN LC, VRDB NL), Chestnut-winged Cuckoo *Clamator coromandus* (IUCN LC, VRDB NL), Hair-crested Drongo *Dicrurus*

hottentottus, Asian Brown Flycatcher *Muscicapa dauurica,* Siberian Rubythroat *Calliope calliope,* Black Baza *Aviceda leuphotes* (IUCN LC, VRDB NL)*,* Rufous-winged Buzzard *Butastur liventer* (IUCN LC, VRDB NL)*,* Collared Sand Martin *Riparia riparia* (IUCN LC, VRDB NL)*,* Tiger Shrike *Lanius tigrinus* (IUCN LC, VRDB NL)*,* Black-headed Bulbul *Brachypodius atriceps* (IUCN LC, VRDB NL) (Craik et al., 2018). From 100 speies, 13 are migratory species, 87 are residents; 63 species were detected in one or two surveys, and the other 37 species were detected in all three surveys (ATTACHMENT B). Among these 63 species, 43 species are rare and uncommon in the project are, even though they are recorded as common or fairly common species in Vietnam. This suggested that the habitats within the projects area are not suitable for avifauna due to the high porportion of lands for coffe plantations and other agricultural purposes, with many human activities occuring regularly. In conclusion, the richness of birds within the project areas is not capable to sustainably support a high diversity of birds.

Table 3.6 Two NT Species were Recorded in The Project Area

No	Common Name	IUCN 2021	VRDB 2007	Mig. Status	S1	S2	S3	Methods	Total sighting times (VPs)	Total Individuals (VPs)	Abundance category
1	Red-breasted Parakeet	NT	NL	R	x	x		VP	10	31	Common
2	Grey-headed Parakeet	NT	NL	R	x	x	x	VP	18	49	Commonb

Note: VRDB 2007: NL (not listed); Mig. Status: migratory status; S1,2,3: survey 1, 2, 3.; Method: VP – vantage point

From the three surveys, there were some unexpected factors that could affect the results of the surveys such as rain in the second survey, cold weather and windy in the third survey.

3.3.1 Vantage Points (VPs)

Totally, eight VPs were surveyed three times (May, July, and December) and each VP has 110 survey hours in total. There were 89 species detected by VPs, in which the three most common species were Edible-nest Swiftlet, Sooty-headed Bulbul, and Burmese Shrike (Table 3.8). Among these three most common species, most population of the Edible-nest Swiftlet concentrated surrounding the VP2. This could be a result of two swiftlet houses located along the road near VP2. However, the other two species randomly distributed within project area.

Figure 3.13 Artificial Swiftlet's House Located Close to the VP2

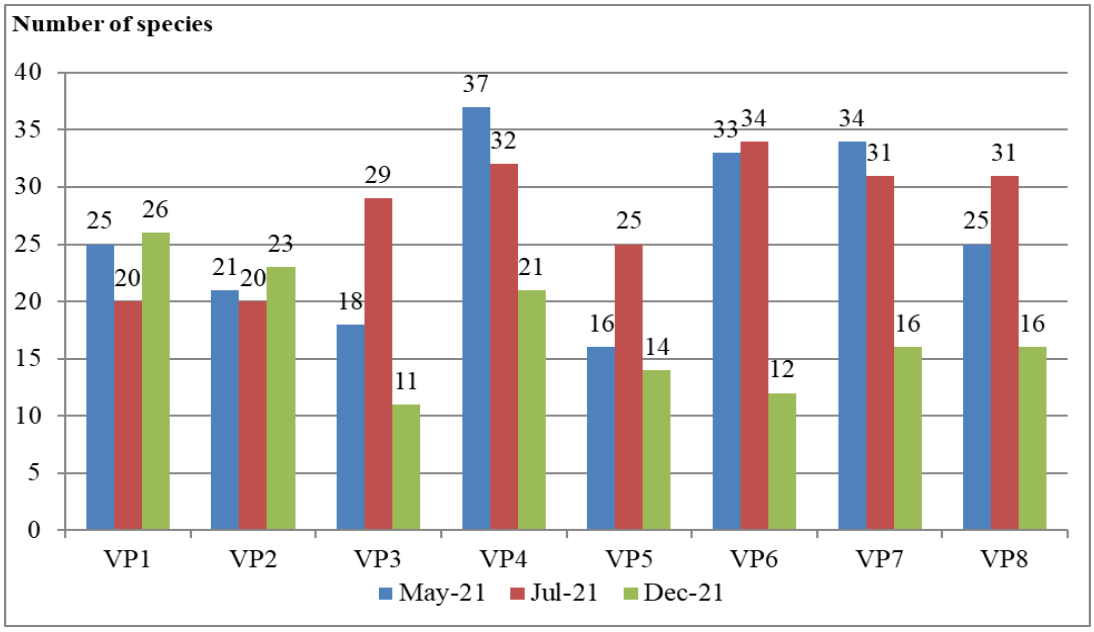


Figure 3.14 The Number of Recorded Species at Each VPs

Table 3.7 Relative Abundance of the Species Recorded at VPs from Three Surveys

Survey/ Abundance	Common	Fairly common	Uncommon	Rare	Total
May-21	30	14	7	13	64
Jul-21	19	11	16	13	59
Dec-21	22	14	8	12	56

Table 3.8 Three Most Common Species Detected from the Vantage Point Surveys

Common name	Scientific name	Total sighting times	Total individuals	Average number of individials
Edible-nest Swiftlet	*Aerodramus fuciphagus*	988	2813	937.67
Sooty-headed Bulbul	*Pycnonotus aurigaster*	97	198	66.00
Burmese Shrike	*Lanius collurioides*	83	90	30.00

There were 16 species flying over the band 2 from all three surveys with detail information regarding abundance (total individuals), total flying time, and total flying time in band 2 (Table 3.9)

Table 3.9 Species in Band 2

No	Common names	Total numbers from three surveys	Total numbers saw in band 2	Average	Total flying time (s)	Total flying time in band 2 (s)
1	Edible-nest Swiftlet	3327	2813	937.67	900674	425687
2	Shikra	9	4	1.33	224	124

No	Common names	Total numbers from three surveys	Total numbers saw in band 2	Average	Total flying time (s)	Total flying time in band 2 (s)
3	Black Kite	8	2	0.67	47	15
4	Eurasian Jay	2	24	8.00	350	300
5	Large-billed Crow	4	28	9.33	250	210
6	Sooty-headed Bulbul	2	198	66.00	150	120
7	Vinous-breasted Myna	5	49	16.33	60	40
8	Black-collared Starling	17	24	8.00	200	180
9	Black-winged Kite	4	8	2.67	508	326
10	Black Baza	34	2	0.67	47	15
11	Rufous-winged Buzzard	46	5	1.67	540	300
12	Barn Swallow	40	33	11.00	2500	600
13	Black-naped Oriole	340	3	1.00	25	20
14	Grey-faced Buzzard	30	16	5.33	2150	1890
15	Chinese Pond-heron	14	5	1.67	180	120
16	White-shouldered Starling	104	14	4.67	45	30

Among 89 species detected within the vantage point areas, 28 species have large wing-span and in flock (number of individual >10) (Table 3.10).

Table 3.10 Spececies Detected in the Vantage Point Areas with Large Wing-span and in Big Flock

No	Common name	Scientific name	Species with wing span > 50cm	Species in flock >= 10
1	Edible-nest Swiftlet	*Aerodramus fuciphagus*		X
2	Asian Palm-swift	*Cypsiurus balasiensis*		X
3	Little Swift	*Apus affinis*		X
4	Greater Coucal	*Centropus sinensis*	X	
5	Green-billed Malkoha	*Phaenicophaeus tristis*	X	
6	Little Cormorant	*Microcarbo niger*	X	X
7	Shikra	*Accipiter badius*	X	
8	Asian Green Bee-eater	*Merops orientalis*		X
9	Chestnut-headed Bee-eater	*Merops leschenaulti*		X
10	Red-breasted Parakeet	*Psittacula alexandri*		X
11	Grey-headed Parakeet	*Psittacula finschii*		X

No	Common name	Scientific name	Species with wing span > 50cm	Species in flock >= 10
12	Large-billed Crow	*Corvus macrorhynchos*	X	
13	Sooty-headed Bulbul	*Pycnonotus aurigaster*		X
14	Black Bulbul	*Hypsipetes leucocephalus*		X
15	Red-rumped Swallow	*Cecropis daurica*		X
16	Vinous-breasted Myna	*Acridotheres leucocephalus*		X
17	Chestnut-tailed Starling	*Sturnia malabarica*		X
18	Eurasian Tree Sparrow	*Passer montanus*		X
19	House Sparrow	*Passer domesticus*		X
20	Plain-backed Sparrow	*Passer flaveolus*		X
21	Scaly-breasted Munia	*Lonchura punctulata*		X
22	Black-winged Kite	*Elanus caeruleus*	X	
23	Black Baza	*Aviceda leuphotes*	X	
24	Rufous-winged Buzzard	*Butastur liventer*	X	
25	Barn Swallow	*Hirundo rustica*		X
26	Grey-faced Buzzard	*Butastur indicus*	X	
27	Chinese Pond-heron	*Ardeola bacchus*	X	
28	White-shouldered Starling	*Sturnia sinensis*		X

3.3.2 Transects

Totally, 110.9 km transectes were walked after three survyes in the project areas. There were 76 species detected along the transects from all three surveys in which two species are listed as NT in the IUCN Red List (2021).

Table 3.11 Species of Conservation Concern Recorded in Transects

No	Common Name	IUCN	VRDB	Mig. status	S1	S2	Methods	Total Individuals	Abundance category
1	Red-breasted Parakeet	NT	NL	R	x	x	Transect	30	Common
2	Grey-headed Parakeet	NT	NL	R	x	x	Transect	51	Common

Table 3.12 Relative Abundance of the Species Recorded at Transects during Three Surveys

Survey/ Abundance	Common	Fairly common	Uncommon	Rare	Total
May-21	32	10	8	11	61

Survey/ Abundance	Common	Fairly common	Uncommon	Rare	Total
Jul-21	17	10	8	17	52
Dec-21	13	7	5	17	42

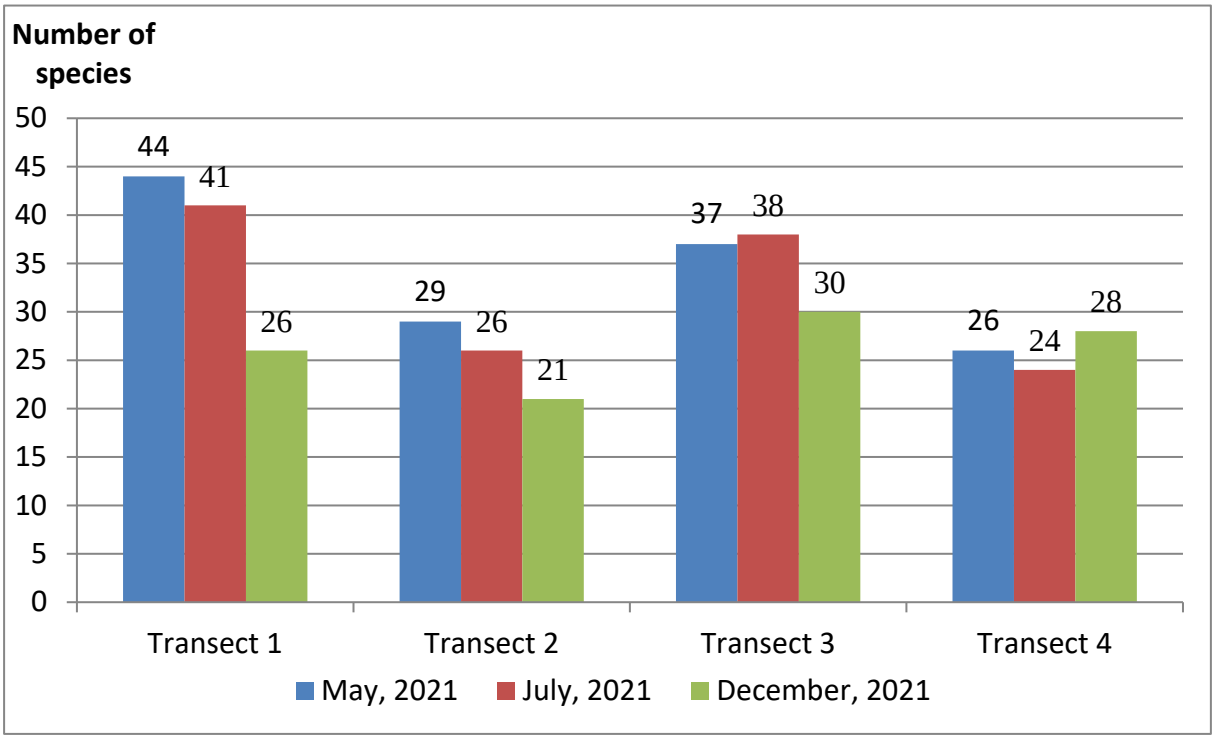


Figure 3.15 The Number of Recorded Species at Each Transects

Based on abundance of each species, there were three most common species detected along the transect as in the Table 3.13.

Table 3.13 Three Most Common Species along the Transects

Common name	Scientific name	Total individuals	Average number of individuals
Edible-nest Swiftlet	*Aerodramus fuciphagus*	514	171.33
Sooty-headed Bulbul	*Pycnonotus aurigaster*	142	47.33
Burmese Shrike	*Lanius collurioides*	99	33.00

4.
4.

4. CONCLUSION

- The richness of bird species in the Project area was not high due to unsuitable habitats.
- There were two species listed as NT in the IUCN Red list 2021.
- The most dominant species were Edible-nest Swiftlet, Sooty-headed Bulbul, and Burmese Shrike.
- There were two swiftlet houses located along the roads.
- 16 species were recorded flying in band 2.

REFERENCES

Anonymous. 2007. Red Data Book of Vietnam (Animals). Science and Technical Publishing, Ha Noi, Vietnam.

Bibby, C. J., M. Jones, and S. Marsden. 2003. Kỹ thuật điều tra thực địa khảo sát khu hệ chim. Mũi Cà Mau, Hà Nội.

BirdLife International. 2020. Handbook of the Birds of the World and BirdLife International digital checklist of the birds of the world (Version 9.1). International BirdLife

BirdLife International. 2021. IUCN Red List for birds. BirdLife International.

Craik, R., Q. M. Lê, C. Bradshaw, and R. Allen. 2018. Birds of Vietnam. Lynx.

Heritage, S. N. 2017. Recommended bird survey methods to inform impact assessment of onshore wind farms (Version 2). SNH Guidance. Scottish Natural Heritage, Battleby:37.

Bibby, C. J., Jones, M., & Marsden, S. (2003). *Kỹ thuật điều tra thực địa khảo sát khu hệ chim*. Hà Nội: Mũi Cà Mau.

Craik, R., Lê, Q. M., Bradshaw, C., & Allen, R. (2018). *Birds of Vietnam*: Lynx.

Heritage, S. N. (2017a). Recommended bird survey methods to inform impact assessment of onshore wind farms (Version 2). *SNH Guidance. Scottish Natural Heritage, Battleby*, 37.

Heritage, S. N. (2017b). Recommended bird survey methods to inform impact assessment of onshore wind farms. Version 2. 37.

ATTACHMENT A BIRD SPECIES RECORDED DURING THE THIRD SURVEY (10-12 DECEMBER 2021)

	Scientific names	Common Names	IUCN 2021	VRDB 2007	Migratory	Bird groups	Method	Sighting times	Sum of individuals (Vp/tr)	Flight modes	Flight height band (m)	Total fly time (s)	Time in band 2 (s)
	COLUMBIFORMES												
	Columbidae												
1	*Spilopelia chinensis*	Eastern Spotted Dove	LC	NL	No	Canopy-birds	Vp, Transect	6	11/1	F, Mo	1	< 200	N/A
2	*Geopelia striata*	Zebra Dove	LC	NL	No	Canopy-birds	Vp, Transect	13	8/8	F, Mo	1	< 200	N/A
	CAPRIMULGIFORMES												
	Apodidae												
3	*Aerodramus fuciphagus*	Edible-nest Swiftlet	LC	NL	No	Sky-birds	Vp, Transect	35	129/60	F	1, 2	5460	2820
	CUCULIFORMES												
	Cuculidae												
4	*Centropus sinensis*	Greater Coucal	LC	NL	No	Canopy-birds	Vp, Transect	12	5/10	F, Mo	1	< 200	N/A
5	*Phaenicophaeus tristis*	Green-billed Malkoha	LC	NL	No	Canopy-birds	Vp, Transect	7	6/1	F, Mo	1	< 200	N/A
6	*Cacomantis merulinus*	Plaintive Cuckoo	LC	NL	No	Canopy-birds	Vp	1	1	F, Mo	1	< 200	N/A
7	*Cuculus micropterus*	Indian Cuckoo	LC	NL	No	Canopy-birds	Vp	1	1	F	1	< 200	N/A
	PELECANIFORMES												
	Ardeidae												
8	*Ardeola bacchus*	Chinese Pond-heron	LC	NL	No	Water-birds	Vp, Transect	3	5/4	F, Mo	2	180	120
	ACCIPITRIFORMES												
	Accipitridae												

	Scientific names	Common Names	IUCN 2021	VRDB 2007	Migratory	Bird groups	Method	Sighting times	Sum of individuals (Vp/tr)	Flight modes	Flight height band (m)	Total fly time (s)	Time in band 2 (s)
9	*Elanus caeruleus*	Black-winged Kite	LC	NL	No	Bird of Prey	Vp	4	6	F, G	1, 2	480	310
10	*Butastur liventer*	Rufous-winged Buzzard	LC	NL	No	Bird of Prey	Vp	3	5	S	2, 3	540	300
11	*Butastur indicus*	Grey-faced Buzzard	LC	NL	Yes	Bird of Prey	Vp, Transect	13	16/1	F, G	1, 2	2150	1890
	BUCEROTIFORMES												
	Upupidae												
12	*Upupa epops*	Common Hoopoe	LC	NL	No	Canopy-birds	Vp	4	7	F	1	< 200	N/A
	CORACIIFORMES												
	Meropidae												
13	*Merops orientalis*	Asian Green Bee-eater	LC	NL	No	Canopy-birds	Vp, Transect	8	9/50	F	1	< 200	N/A
	Alcedinidae												
14	*Halcyon smyrnensis*	White-breasted Kingfisher	LC	NL	No	Canopy-birds	Vp, Transect	2	1/1	F	1	< 200	N/A
	PICIFORMES												
	Megalaimidae												
15	*Psilopogon haemacephalus*	Coppersmith Barbet	LC	NL	No	Canopy-birds	Vp	2	3	F	1	< 200	N/A
16	*Psilopogon lineatus*	Lineated Barbet	LC	NL	No	Canopy-birds	Vp	1	1	F	1	< 200	N/A
	Picidae												
17	*Micropternus brachyurus*	Rufous Woodpecker	LC	NL	No	Canopy-birds	Transect	1	2	F, Mo	N/A		N/A
	PSITTACIFORMES												

	Scientific names	Common Names	IUCN 2021	VRDB 2007	Migratory	Bird groups	Method	Sighting times	Sum of individuals (Vp/tr)	Flight modes	Flight height band (m)	Total fly time (s)	Time in band 2 (s)
	Psittacidae												
18	*Psittacula finschii*	Grey-headed Parakeet	NT	NL	No	Canopy-birds	Vp	1	1	F	1	< 200	N/A
	PASSERIFORMES												
	Oriolidae												
19	*Oriolus chinensis*	Black-naped Oriole	LC	NL	No	Canopy-birds	Vp, Transect	4	3/1	F, Mo	1, 2	25	20
	Campephagidae												
20	*Pericrocotus flammeus*	Scarlet Minivet	LC	NL	No	Canopy-birds	Vp	2	4	F	1	< 200	N/A
	Aegithinidae												
21	*Aegithina tiphia*	Common Iora	LC	NL	No	Canopy-birds	Vp, Transect	13	21/3	F, Mo	1	< 200	N/A
	Dicruridae												
22	*Dicrurus macrocercus*	Black Drongo	LC	NL	No	Canopy-birds	Vp, Transect	20	27/6	F, Mo	1	< 200	N/A
23	*Dicrurus leucophaeus*	Ashy Drongo	LC	NL	No	Canopy-birds	Vp, Transect	24	36/10	F, Mo	1	< 200	N/A
24	*Dicrurus hottentottus*	Hair-crested Drongo	LC	NL	No	Canopy-birds	Transect	1	1	Mo	N/A	< 200	N/A
	Laniidae												
25	*Lanius tigrinus*	Tiger Shrike	LC	NL	Yes	Canopy-birds	Vp	1	1	F	1	< 200	N/A
26	*Lanius cristatus*	Brown Shrike	LC	NL	Yes	Canopy-birds	Transect	1	2	F, Mo	N/A	< 200	N/A
27	*Lanius collurioides*	Burmese Shrike	LC	NL	No	Canopy-birds	Vp, Transect	20	11/20	F, Mo	1	< 200	N/A
	Corvidae												

	Scientific names	Common Names	IUCN 2021	VRDB 2007	Migratory	Bird groups	Method	Sighting times	Sum of individuals (Vp/tr)	Flight modes	Flight height band (m)	Total fly time (s)	Time in band 2 (s)
28	*Crypsirina temia*	Racquet-tailed Treepie	LC	NL	No	Canopy-birds	Transect	1	1	F, Mo	N/A	< 200	N/A
29	*Garrulus glandarius*	Eurasian Jay	LC	NL	No	Canopy-birds	Vp	3	10/	F, Mo	1, 2	350	300
30	*Corvus macrorhynchos*	Large-billed Crow	LC	NL	No	Canopy-birds	Vp	5	10/	F, G	1, 2	250	210
	Cisticolidae												
31	*Prinia hodgsonii*	Grey-breasted Prinia	LC	NL	no	Canopy-birds	Vp, Transect	12	18/30	F, Mo	1	< 200	N/A
32	*Orthotomus sutorius*	Common Tailorbird	LC	NL	No	Canopy-birds	Vp, Transect	14	9/11	F, Mo	1	< 200	N/A
33	*Orthotomus atrogularis*	Dark-necked Tailorbird	LC	NL	No	Canopy-birds	Vp, Transect	4	4/3	F	1	< 200	N/A
	Hirundinidae												
34	*Hirundo rustica*	Barn Swallow	LC	NL	Yes	Sky-birds	Vp, Transect	12	33/7	F	1, 2	2500	600
35	*Riparia riparia*	Collared Sand Martin	LC	NL	Yes	Sky-birds	Vp	3	15	F	1	< 200	N/A
	Pycnonotidae												
36	*Hypsipetes leucocephalus*	Black Bulbul	LC	NL	No	Canopy-birds	Vp, Transect	5	23/22	F	1	< 200	N/A
37	*Rubigula flaviventris*	Black-crested Bulbul	LC	NL	No	Canopy-birds	Vp	1	5	F	1	< 200	N/A
38	*Pycnonotus jocosus*	Red-whiskered Bulbul	LC	NL	No	Canopy-birds	Transect	2	6	F, Mo	N/A	< 200	N/A
39	*Pycnonotus aurigaster*	Sooty-headed Bulbul	LC	NL	No	Canopy-birds	Vp, Transect	41	116/92	F, Mo	1, 2	150	120
40	*Pycnonotus finlaysoni*	Stripe-throated Bulbul	LC	NL	No	Canopy-birds	Vp, Transect	16	29/4	F, Mo	1	< 200	N/A
41	*Brachypodius atriceps*	Black-headed Bulbul	LC	NL	No	Canopy-birds	Vp	1	1	F, Mo	1	< 200	N/A
	Phylloscopidae												

	Scientific names	Common Names	IUCN 2021	VRDB 2007	Migratory	Bird groups	Method	Sighting times	Sum of individuals (Vp/tr)	Flight modes	Flight height band (m)	Total fly time (s)	Time in band 2 (s)
42	*Phylloscopus inornatus*	Yellow-browed Warbler	LC	NL	Yes	Canopy-birds	Vp, Transect	10	7/5	F	1	< 200	N/A
43	*Phylloscopus fuscatus*	Dusky Warbler	LC	NL	Yes	Canopy-birds	Transect	1	1	F, Mo	N/A	< 200	N/A
44	*Phylloscopus schwarzi*	Radde's Warbler	LC	NL	Yes	Canopy-birds	Transect	1	1	F, Mo	N/A	< 200	N/A
45	*Phylloscopus coronatus*	Eastern Crowned Warbler	LC	NL	Yes	Canopy-birds	Vp	2	2	F, Mo	1	< 200	N/A
	Sylviidae												
46	*Chrysomma sinense*	Yellow-eyed Babbler	LC	NL	No	Canopy-birds	Vp, Transect	4	8/2	F, Mo	1	< 200	N/A
	Zosteropidae												
47	*Zosterops palpebrosus*	Indian White-eye	LC	NL	No	Canopy-birds	Vp	4	10/	F, Mo	1	< 200	N/A
	Timaliidae												
48	*Timalia pileata*	Chestnut-capped Babbler	LC	NL	No	Canopy-birds	Vp	1	4	F	1	< 200	N/A
49	*Mixornis gularis*	Pin-striped Tit-babbler	LC	NL	No	Canopy-birds	Vp, Transect	6	2/12	F	1	< 200	N/A
	Leiotrichidae												
50	*Garrulax leucolophus*	White-crested Laughingthrush	LC	NL	No	Canopy-birds	Vp	1	6	F, Mo	1	< 200	N/A
	Sturnidae												
51	*Gracupica nigricollis*	Black-collared Starling	LC	NL	No	Canopy-birds	Vp, Transect	7	10/6	F, Mo	1, 2	200	180
52	*Sturnia sinensis*	White-shouldered Starling	LC	NL	Yes	Canopy-birds	Vp	2	14	F, Mo	1, 2	45	30
53	*Sturnia malabarica*	Chestnut-tailed Starling	LC	NL	No	Canopy-birds	Vp	1	2	F	1	< 200	N/A
54	*Acridotheres tristis*	Common Myna	LC	NL	No	Canopy-birds	Vp, Transect	2	3/1	Mo	1	< 200	N/A

	Scientific names	Common Names	IUCN 2021	VRDB 2007	Migratory	Bird groups	Method	Sighting times	Sum of individuals (Vp/tr)	Flight modes	Flight height band (m)	Total fly time (s)	Time in band 2 (s)
55	*Acridotheres leucocephalus*	Vinous-breasted Myna	LC	NL	No	Canopy-birds	Vp, Transect	7	19/30	F, Mo	1, 2	60	40
	Muscicapidae												
56	*Muscicapa dauurica*	Asian Brown Flycatcher	LC	NL	Yes	Canopy-birds	Vp, Transect	3	1/3	F	1	< 200	N/A
57	*Cyornis unicolor*	Pale Blue-flycatcher	LC	NL	No	Canopy-birds	Vp	1	1	F, Mo	1	< 200	N/A
58	*Calliope calliope*	Siberian Rubythroat	LC	NL	Yes	Canopy-birds	Vp, Transect	7	10/1	F, Mo	1	< 200	N/A
59	*Saxicola caprata*	Pied Bushchat	LC	NL	no	Canopy-birds	Vp, Transect	3	3/2	F, Mo	1	< 200	N/A
	Irenidae												
60	*Irena puella*	Asian Fairy-bluebird	LC	NL	No	Canopy-birds	Vp	2	8	F, Mo	1	< 200	N/A
	Dicaeidae												
61	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	LC	NL	No	Canopy-birds	Vp, Transect	12	13/7	F, Mo	1	< 200	N/A
	Nectariniidae												
62	*Cinnyris jugularis*	Olive-backed Sunbird	LC	NL	No	Canopy-birds	Vp, Transect	5	4/2	F, Mo	1	< 200	N/A
	Estrildidae												
63	*Lonchura punctulata*	Scaly-breasted Munia	LC	NL	No	Canopy-birds	Vp, Transect	6	42/31	F, Mo	1	< 200	N/A
	Passeridae												
64	*Passer flaveolus*	Plain-backed Sparrow	LC	NL	No	Canopy-birds	Transect	2	17	F, Mo	N/A	< 200	N/A
	Motacillidae												
65	*Anthus rufulus*	Paddyfield Pipit	LC	NL	No	Canopy-birds	Transect	1	2	F, Mo	N/A	< 200	N/A

Note: The bird that have large wing span (> 50 cm) are highlighted in yellow. The bird that fly in flocks (>10 individuals) are highlighted in green.

ATTACHMENT B BIRD SPECIES RECORDED IN THREE SURVEYS

No.	Scientific name	Common name	Surveys	IUCN 2021	VRDB 2007	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight height band	Total fly time (s)	Time in band 2 (s)
	GALLIFORMES													
	Phasianidae													
1	*Francolinus pintadeanus*	Chinese Francolin	1	LC	NL	No	Ground birds	VP, Transect	2	1/1		1	< 200	N/A
2	*Gallus gallus*	Red Junglefowl	1	LC	NL	No	Ground birds	VP, Transect	2	1/1		1	< 200	N/A
	COLUMBIFORMES													
	Columbidae													
3	*Streptopelia tranquebarica*	Red Turtle-dove	1, 2	LC	NL	No	Canopy-birds	VP, Transect	5	8/5	Mo	1	< 400	N/A
4	*Spilopelia chinensis*	Eastern Spotted Dove	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	35	43/36	F, Mo	1	< 600	N/A
5	*Geopelia striata*	Zebra Dove	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	53	80/44	F, Mo	1	< 600	N/A
6	*Treron phoenicopterus*	Yellow-footed Green-pigeon	2	LC	NL	No	Canopy-birds	VP	1	12/	Mo	1	< 200	N/A
	CAPRIMULGIFORMES													
	Caprimulgidae													
7	*Caprimulgus macrurus*	Large-tailed Nightjar	1	LC	NL	No	Canopy-birds	Transect	1	1/	G	N/A	N/A	N/A
	Apodidae													
8	*Hirundapus cochinchinensis*	Silver-backed Needletail	1	LC	NL	Yes	Sky-birds	Transect	1	2/	F	N/A	N/A	N/A
9	*Aerodramus fuciphagus*	Edible-nest Swiftlet	1, 2, 3	LC	NL	No	Sky-birds	VP, Transect	988	2813/514	F, S, Fe	1, 2, 3	900674	425687
10	*Cypsiurus balasiensis*	Asian Palm-swift	1, 2	LC	NL	No	Sky-birds	Transect	11	53/8	F, S, Fe	N/A	N/A	N/A
11	*Apus affinis*	Little Swift	1, 2	LC	NL	No	Sky-birds	Transect	3	10/	F, S, Fe	N/A	N/A	N/A
	CUCULIFORMES													

No.	Scientific name	Common name	Surveys	IUCN 2021	VRDB 2007	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight height band	Total fly time (s)	Time in band 2 (s)
	Cuculidae													
12	*Centropus sinensis*	Greater Coucal	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	65	35/39	F, Mo	1	< 600	N/A
13	*Centropus bengalensis*	Lesser Coucal	1	LC	NL	No	Canopy-birds	VP, Transect	2	2/1	Mo	1	< 200	N/A
14	*Phaenicophaeus tristis*	Green-billed Malkoha	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	20	18/10	F, Mo	1	< 600	N/A
15	*Clamator coromandus*	Chestnut-winged Cuckoo	1	LC	NL	Yes	Canopy-birds	VP, Transect	7	7/8	Mo	1	< 200	N/A
16	*Cacomantis merulinus*	Plaintive Cuckoo	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	35	32/17	F, Mo	1	< 600	N/A
17	*Cuculus micropterus*	Indian Cuckoo	1, 3	LC	NL	No	Canopy-birds	VP, Transect	10	10/8	F, Mo	1	< 400	N/A
18	*Cuculus canorus*	Common Cuckoo	1	LC	NL	yes	Canopy-birds	VP, Transect	2	1/1	Mo	1	< 200	N/A
	GRUIFORMES													
	Rallidae													
19	*Amaurornis phoenicurus*	White-breasted Waterhen	1	LC	NL	No	Water-birds	VP	1	1/		1	< 200	N/A
	PELECANIFORMES													
	Ardeidae													
20	*Ardeola bacchus*	Chinese Pond-heron	3	LC	NL	No	Water-birds	VP, Transect	3	5/4	F, Mo	2	180	120
21	*Egretta garzetta*	Little Egret	1	LC	NL	No	Water-birds	VP	2	7/	F	1	< 200	N/A
	SULIFORMES													
	Phalacrocoracidae													
22	*Microcarbo niger*	Little Cormorant	1, 2	LC	NL	No	Water-birds	VP, Transect	6	10/8	Mo	1	< 400	N/A
	STRIGIFORMES													
	Strigidae													

No.	Scientific name	Common name	Surveys	IUCN 2021	VRDB 2007	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight height band	Total fly time (s)	Time in band 2 (s)
23	*Glaucidium cuculoides*	Asian Barred Owlet	1, 2	LC	NL	No	Noctunal Birds	Transect	2	2/	Per	N/A	N/A	N/A
	ACCIPITRIFORMES													
	Accipitridae													
24	*Elanus caeruleus*	Black-winged Kite	2, 3	LC	NL	No	Bird of Prey	VP	6	8/	F, G	1, 2	508	326
25	*Aviceda leuphotes*	Black Baza	2	LC	NL	No	Bird of Prey	VP	2	2/	F	1, 2	47	15
26	*Accipiter badius*	Shikra	1, 2	LC	NL	No	Bird of Prey	VP	2	4/	S, Dis	1, 2	224	124
27	*Milvus migrans*	Black Kite	1	LC	NL	No	Bird of Prey	VP	1	2/	S	1, 2, 3	47	15
28	*Butastur liventer*	Rufous-winged Buzzard	3	LC	NL	No	Bird of Prey	VP	3	5/	S	2, 3	540	300
29	*Butastur indicus*	Grey-faced Buzzard	3	LC	NL	Yes	Bird of Prey	VP, Transect	13	16/1	F, G	1, 2	2150	1890
	BUCEROTIFORMES													
	Upupidae													
30	*Upupa epops*	Common Hoopoe	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	23	30/14	F, Mo	1	< 600	N/A
	CORACIIFORMES													
	Meropidae													
31	*Nyctyornis athertoni*	Blue-bearded Bee-eater	1, 2	LC	NL	No	Canopy-birds	VP	2	2/	Per, Mo	1	< 400	N/A
32	*Merops orientalis*	Asian Green Bee-eater	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	20	37/73	F, Mo	1	< 600	N/A
33	*Merops leschenaulti*	Chestnut-headed Bee-eater	1, 2	LC	NL	No	Canopy-birds	VP, Transect	7	23/13	F, Mo	1	< 400	N/A
	Alcedinidae													
34	*Alcedo atthis*	Common Kingfisher	1, 2	LC	NL	Yes	Water-birds	VP, Transect	5	4/3	Per, Mo	1	< 400	N/A
35	*Halcyon smyrnensis*	White-breasted Kingfisher	1, 2, 3	LC	NL	No	Water-birds,Canopy-birds	VP, Transect	7	6/1	Per, Mo, F	1	< 600	N/A

No.	Scientific name	Common name	Surveys	IUCN 2021	VRDB 2007	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight height band	Total fly time (s)	Time in band 2 (s)
	PICIFORMES													
	Megalaimidae													
36	*Psilopogon haemacephalus*	Coppersmith Barbet	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	29	31/14	Per, Mo, F	1	< 600	N/A
37	*Psilopogon lineatus*	Lineated Barbet	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	23	22/14	Per, Mo, F	1	< 600	N/A
	Picidae													
38	*Micropternus brachyurus*	Rufous Woodpecker	3	LC	NL	No	Canopy-birds	Transect	1	/2	F, Mo	N/A	N/A	N/A
39	*Picus vittatus*	Laced Woodpecker	2	LC	NL	No	Canopy-birds	VP	1	1/	Mo	1	< 200	N/A
	PSITTACIFORMES													
	Psittacidae													
40	*Psittacula finschii*	Grey-headed Parakeet	1, 2, 3	**NT**	NL	**No**	Canopy-birds	VP, Transect	18	49/51	F	1	< 600	N/A
41	*Psittacula alexandri*	Red-breasted Parakeet	1, 2	**NT**	NL	**No**	Canopy-birds	VP, Transect	10	31/30	F	1	< 400	N/A
	PASSERIFORMES													
	Oriolidae													
42	*Oriolus chinensis*	Black-naped Oriole	3	LC	NL	No	Canopy-birds	VP, Transect	4	3/1	F, Mo	1, 2	25	20
	Campephagidae													
43	*Pericrocotus flammeus*	Scarlet Minivet	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	9	14/14	F, Mo	1	< 600	N/A
44	*Lalage polioptera*	Indochinese Cuckooshrike	1, 2	LC	NL	No	Canopy-birds	VP, Transect	6	5/6	Mo	1	< 400	N/A
	Artamidae													
45	*Artamus fuscus*	Ashy Woodswallow	1, 2	LC	NL	No	Canopy-birds	VP, Transect	49	66/49	F, Mo	1	< 400	N/A
	Aegithinidae													

No.	Scientific name	Common name	Surveys	IUCN 2021	VRDB 2007	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight height band	Total fly time (s)	Time in band 2 (s)
46	*Aegithina tiphia*	Common Iora	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	50	55/29	F, Mo	1	< 600	N/A
	Rhipiduridae													
47	*Rhipidura albicollis*	White-throated Fantail	1, 2	LC	NL	No	Canopy-birds	VP, Transect	13	12/7	Mo	1	< 400	N/A
	Dicruridae													
48	*Dicrurus macrocercus*	Black Drongo	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	57	80/48	F, Mo	1	< 600	N/A
49	*Dicrurus leucophaeus*	Ashy Drongo	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	53	77/35	F, Mo	1	< 600	N/A
50	*Dicrurus hottentottus*	Hair-crested Drongo	1, 3	LC	NL	No	Canopy-birds	VP, Transect	8	9/8	Mo	1	< 400	N/A
	Laniidae													
51	*Lanius tigrinus*	Tiger Shrike	3	LC	NL	Yes	Canopy-birds	VP	1	1/	F	1	< 200	N/A
52	*Lanius cristatus*	Brown Shrike	3	LC	NL	Yes	Canopy-birds	Transect	1	/2	F, Mo	N/A	N/A	N/A
53	*Lanius collurioides*	Burmese Shrike	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	83	90/93	F, Mo	1	< 600	N/A
	Corvidae													
54	*Crypsirina temia*	Racquet-tailed Treepie	1, 2, 3	LC	NL	No	Canopy-birds	Transect	4	4/1	F, Mo	N/A	N/A	N/A
55	*Garrulus glandarius*	Eurasian Jay	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	16	24/10	F, Mo	1, 2	350	300
56	*Corvus macrorhynchos*	Large-billed Crow	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	20	28/18	F, Mo, G	1, 2	250	210
	Cisticolidae													
57	*Cisticola exilis*	Golden-headed Cisticola	1	LC	NL	No	Canopy-birds	VP	1	2/	Mo	1	< 200	N/A
58	*Prinia polychroa*	Brown Prinia	1, 2	LC	NL	No	Canopy-birds	VP, Transect	29	28/26	Mo	1	< 400	N/A
59	*Prinia rufescens*	Rufescent Prinia	1, 2	LC	NL	No	Canopy-birds	VP, Transect	13	12/12	Mo	1	< 400	N/A
60	*Prinia hodgsonii*	Grey-breasted Prinia	1, 2, 3	LC	NL	no	Canopy-birds	VP, Transect	50	68/63	F, Mo	1	< 600	N/A

No.	Scientific name	Common name	Surveys	IUCN 2021	VRDB 2007	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight height band	Total fly time (s)	Time in band 2 (s)
61	*Prinia flaviventris*	Yellow-bellied Prinia	1, 2	LC	NL	No	Canopy-birds	VP	2	3/	Mo	1	< 400	N/A
62	*Orthotomus sutorius*	Common Tailorbird	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	53	45/38	F, Mo	1	< 600	N/A
63	*Orthotomus atrogularis*	Dark-necked Tailorbird	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	19	18/14	F, Mo	1	< 600	N/A
	Hirundinidae													
64	*Cecropis daurica*	Red-rumped Swallow	1, 2	LC	NL	yes	Canopy-birds	VP	7	12/	F, Mo	1	< 400	N/A
65	*Hirundo rustica*	Barn Swallow	3	LC	NL	Yes	Sky-birds	VP, Transect	12	33/7	F	1, 2	2500	600
66	*Riparia riparia*	Collared Sand Martin	3	LC	NL	Yes	Sky-birds	VP	3	15/	F	1	< 200	N/A
	Pycnonotidae													
67	*Hypsipetes leucocephalus*	Black Bulbul	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	15	38/38	F, Mo	1	< 600	N/A
68	*Rubigula flaviventris*	Black-crested Bulbul	3	LC	NL	No	Canopy-birds	VP	1	5/	F	1	< 200	N/A
69	*Pycnonotus jocosus*	Red-whiskered Bulbul	3	LC	NL	No	Canopy-birds	Transect	2	/6	F, Mo	N/A	N/A	N/A
70	*Pycnonotus aurigaster*	Sooty-headed Bulbul	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	97	198/142	F, Mo	1, 2	150	120
71	*Pycnonotus finlaysoni*	Stripe-throated Bulbul	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	39	58/19	F, Mo	1	< 600	N/A
72	*Brachypodius atriceps*	Black-headed Bulbul	3	LC	NL	No	Canopy-birds	VP	1	1/	F, Mo	1	< 200	N/A
73	*Phylloscopus inornatus*	Yellow-browed Warbler	3	LC	NL	Yes	Canopy-birds	VP, Transect	10	7/5	F	1	< 200	N/A
74	*Phylloscopus fuscatus*	Dusky Warbler	3	LC	NL	Yes	Canopy-birds	Transect	1	/1	F, Mo	N/A	N/A	N/A
75	*Phylloscopus schwarzi*	Radde's Warbler	3	LC	NL	Yes	Canopy-birds	Transect	1	/1	F, Mo	N/A	N/A	N/A
76	*Phylloscopus coronatus*	Eastern Crowned Warbler	3	LC	NL	Yes	Canopy-birds	VP	2	2/	F, Mo	1	< 200	N/A
	Sylviidae													
77	*Chrysomma sinense*	Yellow-eyed Babbler	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	19	29/14	F, Mo	1	< 600	N/A

No.	Scientific name	Common name	Surveys	IUCN 2021	VRDB 2007	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight height band	Total fly time (s)	Time in band 2 (s)
	Zosteropidae													
78	*Zosterops palpebrosus*	Indian White-eye	3	LC	NL	No	Canopy-birds	VP	4	10/	F, Mo	1	< 200	N/A
	Timaliidae													
79	*Timalia pileata*	Chestnut-capped Babbler	2, 3	LC	NL	No	Canopy-birds	VP	2	5/	F, Mo	1	< 400	N/A
80	*Mixornis gularis*	Pin-striped Tit-babbler	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	14	9/17	F, Mo	1	< 600	N/A
	Leiotrichidae													
81	*Garrulax leucolophus*	White-crested Laughingthrush	3	LC	NL	No	Canopy-birds	VP	1	6/	F, Mo	1	< 200	N/A
	Sturnidae													
82	*Gracupica nigricollis*	Black-collared Starling	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	17	24/6	F, Mo	1, 2	200	180
83	*Sturnia sinensis*	White-shouldered Starling	3	LC	NL	Yes	Canopy-birds	VP	2	14/	F, Mo	1, 2	45	30
84	*Sturnia malabarica*	Chestnut-tailed Starling	1, 3	LC	NL	No	Canopy-birds	VP, Transect	2	4/	F, Mo	1	< 400	N/A
85	*Acridotheres tristis*	Common Myna	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	16	23/15	Mo	1	< 600	N/A
86	*Acridotheres leucocephalus*	Vinous-breasted Myna	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	30	49/55	F, Mo	1, 2	60	40
	Muscicapidae													
87	*Copsychus saularis*	Oriental Magpie-robin	1, 2	LC	NL	No	Canopy-birds	VP, Transect	8	6/6	Mo	1	< 400	N/A
88	*Muscicapa dauurica*	Asian Brown Flycatcher	3	LC	NL	Yes	Canopy-birds	VP, Transect	3	1/3	F	1	< 200	N/A
89	*Cyornis unicolor*	Pale Blue-flycatcher	3	LC	NL	No	Canopy-birds	VP	1	1/	F, Mo	1	< 200	N/A
90	*Calliope calliope*	Siberian Rubythroat	3	LC	NL	Yes	Canopy-birds	VP, Transect	7	10/1	F, Mo	1	< 200	N/A
91	*Saxicola caprata*	Pied Bushchat	1, 2, 3	LC	NL	no	Canopy-birds	VP, Transect	30	29/26	F, Mo	1	< 600	N/A
	Irenidae													

No.	Scientific name	Common name	Surveys	IUCN 2021	VRDB 2007	Migratory	Bird group	Method	Sighting times	Sum of individuals (Vp/tr)	Flight mode	Flight height band	Total fly time (s)	Time in band 2 (s)
92	*Irena puella*	Asian Fairy-bluebird	3	LC	NL	No	Canopy-birds	VP	2	8/	F, Mo	1	< 200	N/A
	Dicaeidae													
93	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	20	20/14	F, Mo	1	< 600	N/A
	Nectariniidae													
94	*Cinnyris jugularis*	Olive-backed Sunbird	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	16	17/12	F, Mo	1	< 600	N/A
	Estrildidae													
95	*Lonchura striata*	White-rumped Munia	1, 2	LC	NL	No	Canopy-birds	VP, Transect	9	16/5	F, Mo	1	< 400	N/A
96	*Lonchura punctulata*	Scaly-breasted Munia	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	28	80/64	F, Mo	1	< 600	N/A
	Passeridae													
97	*Passer domesticus*	House Sparrow	1, 2	LC	NL	No	Canopy-birds	VP, Transect	22	70/99	F, Mo	1	< 400	N/A
98	*Passer flaveolus*	Plain-backed Sparrow	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	11	13/41	F, Mo	1	< 600	N/A
99	*Passer montanus*	Eurasian Tree Sparrow	1, 2	LC	NL	No	Canopy-birds	VP, Transect	16	39/23	F, Mo	1	< 400	N/A
	Motacillidae													
100	*Anthus rufulus*	Paddyfield Pipit	1, 2, 3	LC	NL	No	Canopy-birds	VP, Transect	29	28/36	F, Mo	1	< 600	N/A

APPENDIX I COMPILED LIST OF IDENTIFIED SPECIES FROM FIELD SURVEYS

List of flora species

No	Scientific name	Vietnamese name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4
1	*Dicranopteris linearis*	Guột cứng	LC	NL				+				
2	*Lygodium flexuosum*	Bòng bong	NL	NL		+		+				
3	*Coryphopteris petelotii*	Ráng petelot	NL	NL				+				
4	*Gnetum latifolium var. funicular*	Gắm cọng	LC	NL		+	+	+		+		
5	*Achyranthes aspera*	Cỏ xước	NL	NL				+			+	+
6	*Amaranthus viridis*	Dền xanh	NL	NL		+		+			+	
7	*Celosia argentea*	Mồng gà	LC	NL		+		+				
8	*Anacardium occidentale*	Điều	NL	NL	+		+				+	
9	*Semecarpus cochinchinensis*	Sưng nam bộ	NL	NL	+	+				+		
10	*Spondias dulcis*	Cóc	NL	NL		+	+					
11	*Ancistrocladus tectorius*	Dây trung quân	NL	NL	+	+		+				
12	*Desmos cochinchinensis*	Dây hoa dẻ	NL	NL		+				+		
13	*Desmos cochinchinensis*	Dây chân chim núi	NL	NL	+			+				
14	*Uvaria microcarpa*	Bồ quả	NL	NL	+							
15	*Uvaria micrantha*	Bồ quả hoa nhỏ	NL	NL	+	+	+					
16	*Aganonerion polymorphum*	Lá giang	NL	NL								
17	*Alstonia scholaris*	Sữa	NL	NL		+						
18	*Heterostema acuminata*	Dị hùng Java	NL	NL	+							
19	*Rauvolfia cambodiana*	Ba gạc cambốt	NL	VU			+					
20	*Streptocaulon juventus*	Hà thủ ô trắng	NL	NL	+	+	+			+		
21	*Tabernaemontana bufalina*	Lài trâu lá nhỏ	NL	NL	+			+			+	
22	*Tabernaemontana crispa*	Lài trâu nhăn	NL	NL	+							
23	*Wrightia dubia*	Lòng mức ngờ	NL	NL	+	+				+		
24	*Wrightia coccinea*	Lòng mức đỏ	NL	NL	+			+				+
25	*Ageratum conyzoides*	Cỏ cứt lợn	NL	NL	+	+	+	+	+	+	+	+
26	*Bidens pilosa*	Đơn buốt	NL	NL	+	+	+		+			
27	*Crassocephalum crepidioides*	Rau tàu bay	NL	NL			+		+			
28	*Chromolaena odorata*	Cỏ lào	NL	NL	+	+	+	+		+		+
29	*Elephantopus tomentosus*	Cúc chân voi	NL	NL	+							
30	*Erechtites hieracifolia*	Hoàng thất lá hẹp	NL	NL	+							
31	*Siegesbeckia orientalis*	Hy thiêm	NL	NL				+				+
32	*Spilanthes paniculata*	Nụ áo chàm	NL	NL	+			+				+

No	Scientific name	Vietnamese name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4
33	*Sonchus oleraceus*	Tục đoạn rau	NL	NL					+			
34	*Tithonia diversifolia*	Dã quỳ	NL	NL	+	+	+					
35	*Verbesina calendulacea*	Sài đất	NL	NL	+							
36	*Markhamia stipulata*	Thiết đinh lá bẹ	LC	NL	+							
37	*Markhamia stipulata var. pierre*	Thiết đinh lá bẹ	NL	NL		+						
38	*Canarium littorale Bl. var. rufum*	Trám nâu	LC	NL						+		
39	*Pereskia grandifolia*	Diệp long lá to	LC	NL		+						
40	*Trema orientalis*	Hu đay	LC	NL	+	+	+	+				
41	*Stixis suaveolens*	Trứng quốc	NL	NL						+		
42	*Garcinia gaudichaudii*	Vàng nghệ	NL	NL		+				+		
43	*Argyreia nasirii*	Thảo bạc Nasir	NL	NL			+					
44	*Ipomoea alba*	Bìm trắng	NL	NL			+	+				
45	*Ipomoea obscura*	Bìm mờ	NL	NL		+						
46	*Merremia quinata*	Bìm 5 lá	NL	NL		+						
47	*Quamoclit pinnata*	Tóc tiên dây	NL	NL				+			+	+
48	*Diplocyclos palmatus*	Lưỡng luân chân vịt	NL	NL	+							
49	*Gymnopetalum integrifolium*	Cứt quạ lá nguyên	NL	NL	+				+			
50	*Momordica charantia*	Mướp đắng rừng	NL	NL	+	+						
51	*Trichosanthes tricuspidata*	Lâu xác	NL	NL			+					
52	*Zehneria maysorensis*	Cầu quả Maysor	NL	NL				+				
53	*Dillenia indica*	Sổ ấn	LC	NL		+	+					
54	*Tetracera indica*	Chặc chiều ấn	NL	NL	+	+	+					
55	*Tetracera loureiri*	Dây chiều	NL	NL							+	
56	*Dipterocarpus intricatus*	Dầu lông	EN	NL				+				
57	*Croton hirtus*	Cù đèn lông	NL	NL		+						
58	*Euphorbia thymifolia*	Cỏ sữa	NL	NL								
59	*Mallotus paniculatus*	Ba bét Nam	NL	NL	+	+	+	+				
60	*Adenanthera aff*	Trạch quạch	NL	NL	+							
61	*Archidendron clypearia*	Mán đĩa	LC	NL				+		+		
62	*Caesalpinia mimosoides*	Điệp trinh nữ	NL	NL	+							
63	*Caesalpinia latisiliqua*	Vấu diều	NL	NL		+		+				+
64	*Caesalpinia sappan*	Tô mộc	LC	NL			+					
65	*Clitoria mariana*	Biếc tim	NL	NL	+							

No	Scientific name	Vietnamese name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4
66	*Crotalaria lanceolata*	Sục sạc thon	LC	NL	+						+	
67	*Dalbergia discolor*	Trắc biến màu	NL	NL	+					+		
68	*Dalbergia curtisii*	Trắc Curtis	NL	NL		+	+					
69	*Dalbergia oliveri*	Cẩm lai	EN	EN	+							
70	*Desmodium strigillosum*	Tràng quả cào	NL	NL						+		
71	*Erythrina variegata*	Vông	LC	NL			+					
72	*Flemingia grahamiana*	Tóp mỡ Graham	NL	NL		+	+					
73	*Indigofera galegoides*	Xà chàm	LC	NL		+		+				
74	*Leucaena leucocephala*	Keo dậu	NL	NL	+	+			+			
75	*Milletia pachyloba*	Mát thùy dày	NL	NL		+		+				
76	*Mimosa pigra*	Trinh nữ nhọn	LC	NL		+		+				
77	*Mimosa pudica*	Trinh nữ	NL	NL	+	+			+			
78	*Pueraria montana*	Sắn dây rừng	NL	NL		+						
79	*Tephrosia candida*	Cốt khí	NL	NL		+						
80	*Lithocarpus aff. magneinii*	Dẻ the	NL	NL	+	+		+				
81	*Lithocarpus leucotrichus*	Dẻ lông trắng	NL	NL		+	+	+		+		
82	*Illigera thorelii*	Liên đằng Thorel	NL	NL	+							
83	*Cratoxylum cochinchinensis*	Thành ngạnh nam	NL	NL		+						
84	*Iodes cirrhosa*	Mộc thông	NL	NL			+					
85	*Irvingia malayana*	Kơ nia	LC	NL						+		
86	*Engelhardia spicata var. integra*	Chẹo ngứa		NL		+	+					
87	*Gmelina philippensis*	Găng tu hú	LC	NL		+						
88	*Ocimum tenuiflorum*	Hương nhu	NL	NL			+					
89	*Cinnamomum inconspicuum*	Quế	NL	NL	+					+		
90	*Litsea cambodiana*	Bời lời Cam bốt	NL	NL			+					
91	*Litsea glutinosa*	Bời lời nhớt	LC	NL	+	+	+		+			
92	*Litsea viridis*	Bời lời xanh	NL	NL	+							
93	*Persia americana*	Bơ	NL	NL	+			+				+
94	*Careya arborea*	Vừng xoan	NL	NL						+		
95	*Loranthus cordifolia*	Chùm gửi hình tim	NL	NL			+					
96	*Taxillus chinensis*	Tầm gửi Trung Quốc	NL	NL	+							
97	*Lagerstroemia calyculata*	Bằng lăng ổi	NL	NL	+		+					

No	Scientific name	Vietnamese name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4
98	*Durio zibethinus*	Sầu riêng	NL	NL	+	+	+	+				
99	*Grewia paniculata*	Cò ke	NL	NL	+	+	+	+		+		
100	*Helicteres angustifolia*	Ổ kén	NL	NL		+	+			+		
101	*Pterospermum argenteum*	Lòng mán bạc	NL	NL			+					
102	*Pterospermum grandifolia*	Lòng mán hoa to	NL	NL		+						
103	*Pterospermum jackianum*	Mang tía	LC	NL	+	+	+					
104	*Reevesia thyrsoidae*	Trường hùng	NL	NL	+		+					
105	*Sida acuta*	Chổi đực	NL	NL	+	+	+	+		+		
106	*Urena lobata*	Ké hoa đào	NL	NL	+	+	+					
107	*Memecylon lilacinum*	Sầm	NL	NL	+							
108	*Melia azedarach*	Xoan	NL	NL	+							
109	*Cyclea barbata*	Sương sâm	NL	NL	+	+	+		+			
110	*Artocarpus nitidus*	Chay lá bóng	NL	NL	+	+						
111	*Artocarpus chaplasha*	Mít rừng	NL	NL		+		+				
112	*Artocarpus rigida*	Mít rừng	NL	NL	+							
113	*Broussonetia papyrifera*	Dướng	NL	NL			+					
114	*Ficus geniculata*	Sung gối	NL	NL			+					
115	*Ficus heterophylla*	Vú bò	NL	NL	+							
116	*Ficus hispida*	Sung	NL	NL	+							
117	*Ficus hispida*	Sung đất	NL	NL	+							
118	*Ficus hirta*	Ngái phún	NL	NL			+					
119	*Ficus hirta var. roxburghii*	Ngái khỉ	NL	NL						+		
120	*Horsfieldia thorelii*	Xăng máu	NL	NL		+				+		
121	*Rhodomyrtus tomentosa*	Sim	LC	NL		+						
122	*Syzygium cumini*	Vối rừng	LC	NL	+							
123	*Jasminum subtriplinerve*	Vằng	NL	NL			+					
124	*Ludwidgia adscendens*	Rau dừa nước	NL	NL				+				
125	*Oxalis corniculata*	Me đất hoa vàng	NL	NL				+				+
126	*Passiflora foetida*	Lạc tiên	NL	NL		+						
127	*Antidesma ghaesembilla*	Chòi mòi	LC	NL		+				+		
128	*Antidesma montanum*	Chòi mòi núi	LC	NL	+	+						
129	*Aporusa ficifolia*	Ngăm lông dày	NL	NL	+	+	+		+	+	+	
130	*Aporusa serrata*	Tai nghé răng	NL	NL		+						

No	Scientific name	Vietnamese name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4
131	*Breynia fructicosa*	Bồ cu vẽ	NL	NL	+							
132	*Breynia coriacea*	Bồ cu vòi xòe	NL	NL	+	+						
133	*Breynia glauca*	Dé mốc	NL	NL			+	+				
134	*Fluggea virosa*	Bỏng nổ trắng	NL	NL	+							
135	*Phyllanthus emblica*	Me rừng	LC	NL	+	+	+			+		
136	*Sauropus androgynus*	Bồ ngót	NL	NL				+				
137	*Phytolacca americana*	Thương lục Mỹ	NL	NL			+					
138	*Piper nigrum*	Tiêu	NL	NL	+	+	+					
139	*Plantago major*	Lá mã đề	LC	NL				+				
140	*Polygonum chinensis*	Nghể Trung Quốc	NL	NL		+						
141	*Polygonum orientale*	Nghể bà	NL	NL			+					
142	*Portulaca oleracea*	Rau sam	LC	NL				+				+
143	*Embelia henryi*	Rè Henry	NL	NL		+						
144	*Embelia ribes*	Chua ngút	NL	NL			+					
145	*Maesa subdentata*	Đồng trâm	NL	NL			+					
146	*Zizyphus funiculosa*	Táo lào	NL	NL		+				+		
147	*Rubus pinnatisepalus*	Dum lá đài xẻ	NL	NL			+	+				
148	*Rubus trianthus*	Dum 3 hoa	NL	NL	+							
149	*Caelospermum truncatum*	Khắc tử	NL	NL			+					
150	*Catunaregam spinosa*	Găng tu hú	NL	NL				+				
151	*Coffea arabica*	Cà phê chè	NL	NL	+	+	+	+				+
152	*Coffea canephora*	Cà phê vối	NL	NL	+	+	+	+	+		+	+
153	*Fagerlindia depauperata*	Găng nghèo	NL	NL	+							
154	*Hedyotis multiglomerulata*	An điền nhiều chụm	NL	NL			+					
155	*Hedyotis pressa*	An điền sát	NL	NL	+			+				
156	*Psychotria cephalophora*	Lấu mang đầu	NL	NL	+							
157	*Wendlandia glabrata*	Huân lang nhẵn	NL	NL		+	+			+		
158	*Acronychia pedunculata*	Bưởi bung	LC	NL	+			+				
159	*Clausena danniana*	Hồng bì	NL	NL			+					
160	*Euodia lepta*	Ba chạc	NL	NL			+					
161	*Glycormis pentaphylla*	Cơm rượu	NL	NL	+							
162	*Glycormis cyanocarpa*	Cơm rượu trái xanh	NL	NL	+							

No	Scientific name	Vietnamese name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4
163	*Harrisonia perforata*	Đa đa	LC	NL		+						
164	*Nephelium cuspidatum*	Vải rừng	NL	NL	+		+					
165	*Sapindus mukorossi*	Bồ hòn	NL	NL	+		+					
166	*Brucea javanica*	Xoan rừng	LC	NL	+	+	+					
167	*Physalis angulata*	Thù lù cạnh	LC	NL				+				
168	*Solanum americanum*	Lu lu đực	NL	NL			+					
169	*Solanum erianthum*	Cà hoa lông	NL	NL			+					
170	*Solanum indicum*	Cà ấn độ	LC	NL	+							
171	*Solanum nigrum*	Lu lu đực	NL	NL	+				+			
172	*Solanum torvum*	Cà hoa trắng	NL	NL	+							
173	*Styrax benjoin*	An tức	NL	NL	+		+					
174	*Symplocos guillauminii*	Dung guillaumin	NL	NL			+					
175	*Maoutia puya*	Gai ráp	NL	NL	+			+				+
176	*Clerodendrum cyrtophyllum*	Đắng cẩy	NL	NL	+	+	+	+				+
177	*Clerodendrum squamatum*	Xích đồng nam	NL	NL	+	+		+				
178	*Clerodendrum serratum*	Ngọc nữ răng	NL	NL		+	+	+				
179	*Stachytarphela jamaicencis*	Cỏ đuôi chuột	NL	NL		+						
180	*Vitex pinnata*	Bình linh cánh	LC	NL	+			+				
181	*Cayratia trifolia*	Dây vác	NL	NL	+			+	+			
182	*Cissus modeccoides*	Chìa vôi	NL	NL				+				
183	*Tetrastigma godefroyanaum*	Tứ thư	NL	NL				+		+		
184	*Tetrastigma petelotii*	Tứ thư Petelot	NL	NL			+	+				
185	*Arenga pinnata*	Bung báng	NL	NL				+				
186	*Commelina diffusa*	Thài lài trắng	LC	NL			+					
187	*Commelina bengalensis*	Trai an	NL	NL								
188	*Courtoisia cyperoides*	Cói bông cầu	NL	NL	+							
189	*Cyperus cyperoides*	Lác đuôi chồn	LC	NL					+			
190	*Cyperus andreanus*	Cói	NL	NL			+	+				
191	*Scirpus fluviatilis*	Cói giùi sông	NL	NL	+			+				
192	*Dioscorea bulbifera*	Khoai dái	NL	NL	+							
193	*Dioscorea craibiana*	Từ Craib	NL	NL			+					
194	*Dioscorea depauperata*	Từ nghèo	NL	NL	+							
195	*Dioscorea kratica*	Khoai mọi	NL	NL		+						

No	Scientific name	Vietnamese name	IUCN	VRDB	T1	T2	T3	T4	PL1	PL2	PL3	PL4
190	*Dioscorea pentaphylla*	Từ 5 lá	NL	NL	+	+						
197	*Cynodon dactylon*	Cỏ gà	NL	NL	+	+	+	+				
198	*Lophatherum gracile*	Cỏ lá tre	NL	NL	+	+	+		+			+
199	*Pennisetum setaceum*	Cỏ đuôi chồn	NL	NL	+							
200	*Smilax pottingeri*	Kim cang Pottinger	NL	NL	+						+	
201	*Smilax prolifera*	Cậm cang sanh sôi	NL	NL		+				+		
202	*Cheilocostus speciosus*	Mía dò	LC	NL	+	+		+				+

Notes

In IUCN and VRDB columns : EN = Endangered; VU = Vulnerable; LC = Least Concern; NL = Not listed

T = Transects (T1 = Transect 1); PL = Plot sampling (PL1 = Plot sampling 1)

List of bird species (1st survey - May 2021)

No	Scientific name	Common Name	IUCN	VRDB	Method	Sighting times	Sum of individual	Flight bands	Total fly time (s)	Time in band 2 (s)
1	*Francolinus pintadeanus*	Chinese Francolin	LC	NL	VP, Transect	2	2	1	< 200	N/A
2	*Gallus gallus*	Red Junglefowl	LC	NL	VP, Transect	2	2	1	< 200	N/A
3	*Caprimulgus macrurus*	Large-tailed Nightjar	LC	NL	Transect	1	1	N/A	< 200	N/A
4	*Aerodramus germani*	Germain's Swiftlet	LC	NL	VP, Transect	532	2,074	1, 2, 3	165,945	89,950
5	*Hirundapus cochinchinensis*	Silver-backed Needletail	LC	NL	Transect	1	2	N/A	< 200	N/A
6	*Cypsiurus balasiensis*	Asian Palm Swift	LC	NL	Transect	7	49	N/A	< 200	N/A
7	*Apus nipalensis*	House Swift	LC	NL	Transect	2	9	N/A	< 200	N/A
8	*Centropus sinensis*	Greater Coucal	LC	NL	VP, Transect	31	31	1	< 200	N/A
9	*Centropus bengalensis*	Lesser Coucal	LC	NL	VP, Transect	2	3	1	< 200	N/A
10	*Cacomantis merulinus*	Plaintive Cuckoo	LC	NL	VP, Transect	20	32	1	< 200	N/A
11	*Clamator coromandus*	Chestnut-winged Cuckoo	LC	NL	VP, Transect	7	15	1	< 200	N/A
12	*Cuculus micropterus*	Indian Cuckoo	LC	NL	VP, Transect	9	17	1	< 200	N/A
13	*Cuculus canorus*	Eurasian Cuckoo	LC	NL	VP, Transect	2	2	1	< 200	N/A
14	*Rhopodytes tristis*	Green-billed Malkoha	LC	NL	VP, Transect	8	16	1	< 200	N/A
15	*Streptopelia tranquebarica*	Red-collared Dove	LC	NL	VP, Transect	2	9	1	< 200	N/A
16	*Streptopelia chinensis*	Spotted Dove	LC	NL	VP, Transect	12	42	1	< 200	N/A
17	*Geopelia striata*	Zebra Dove	LC	NL	VP, Transect	21	75	1	< 200	N/A
18	*Amaurornis phoenicurus*	White-breasted WaterHen	LC	NL	VP	1	1	1	< 200	N/A
19	*Phalacrocorax niger*	Little Cormorant	LC	NL	VP, Transect	2	3	1	< 200	N/A
20	*Egretta garzetta*	Little Egret	LC	NL	VP	2	7	1	< 200	N/A
21	*Accipiter badius*	Shikra	LC	NL	VP	1	2	1, 2	78	43
22	*Milvus migrans*	Black Kite	LC	NL	VP	1	2	1, 2, 3	47	15
23	*Glaucidium cuculoides*	Asian Barred Owlet	LC	NL	Transect	1	1	N/A	< 200	N/A
24	*Upupa epops*	Eurasian Hoopoe	LC	NL	VP, Transect	12	28	1	< 200	N/A
25	*Alcedo atthis*	Common Kingfisher	LC	NL	VP, Transect	3	5	1	< 200	N/A
26	*Halcyon smyrnensis*	White-throated Kingfisher	LC	NL	VP	2	2	1	< 200	N/A
27	*Nyctyornis athertoni*	Blue-bearded Bee-eater	LC	NL	VP	1	1	1	< 200	N/A
28	*Merops orientalis*	Green Bee-eater	LC	NL	VP, Transect	5	35	1	< 200	N/A
29	*Merops leschenaulti*	Chestnut-headed Bee-eater	LC	NL	VP, Transect	4	30	1	< 200	N/A
30	*Psilopogon lineata*	Lineated Barbet	LC	NL	VP, Transect	13	24	1	< 200	N/A
31	*Psilopogon haemacephala*	Coppersmith Barbet	LC	NL	VP, Transect	16	30	1	< 200	N/A
32	*Psittacula alexandri*	Red-breasted Parakeet	NT	NL	VP, Transect	72	33	1	< 200	N/A
33	*Psittacula finschii*	Grey-headed Parakeet	NT	NL	VP, Transect	83	27	1	< 200	N/A
34	*Artamus fuscus*	Ashy Woodswallow	LC	NL	VP, Transect	21	69	1	< 200	N/A
35	*Aegithina tiphia*	Common Iora	LC	NL	VP, Transect	18	38	1	< 200	N/A
36	*Pericrocotus flammeus*	Scarlet Minivet	LC	NL	VP, Transect	4	16	1	< 200	N/A
37	*Lalage polioptera*	Indochinese Cuckooshrike	LC	NL	VP, Transect	4	9	1	< 200	N/A
38	*Lanius collurioides*	Burmese Shrike	LC	NL	VP, Transect	27	91	1	< 200	N/A

No	Scientific name	Common Name	IUCN	VRDB	Method	Sighting times	Sum of individual	Flight bands	Total fly time (s)	Time in band 2 (s)
39	*Dicrurus macrocercus*	Black Drongo	LC	NL	VP, Transect	16	64	1	< 200	N/A
40	*Dicrurus leucophaeus*	Ashy Drongo	LC	NL	VP, Transect	12	38	1	< 200	N/A
41	*Dicrurus hottentottus*	Hair-crested Drongo	LC	NL	VP, Transect	7	16	1	< 200	N/A
42	*Rhipidura albicollis*	White-throated Fantail	LC	NL	VP, Transect	8	14	1	< 200	N/A
43	*Garrulus glandarius*	Eurasian Jay	LC	NL	VP, Transect	6	16	1	< 200	N/A
44	*Crypsirina temia*	Racket-tailed Treepie	LC	NL	Transect	1	2	N/A	< 200	N/A
45	*Corvus macrorhynchos*	Large-billed Crow	LC	NL	VP, Transect	7	24	1	< 200	N/A
46	*Pycnonotus aurigaster*	Sooty-headed Bulbul	LC	NL	VP, Transect	27	83	1	< 200	N/A
47	*Pycnonotus finlaysoni*	Stripe-throated Bulbul	LC	NL	VP, Transect	14	33	1	< 200	N/A
48	*Hypsipetes leucocephalius*	Himalayan Black Bulbul	LC	NL	VP, Transect	7	25	1	< 200	N/A
49	*Cecropis striolata*	Striated Swallow	LC	NL	VP	2	4	1	< 200	N/A
50	*Cisticola exilis*	Bright-headed Cisticola	LC	NL	VP	1	2	1	< 200	N/A
51	*Prinia rocki*	Annam Prinia	LC	NL	VP, Transect	13	36	1	< 200	N/A
52	*Prinia rufescens*	Rufescent Prinia	LC	NL	VP, Transect	6	17	1	< 200	N/A
53	*Prinia hodgsonii*	Grey-breasted Prinia	LC	NL	VP, Transect	18	62	1	< 200	N/A
54	*Prinia flaviventris*	Yellow-bellied Prinia	LC	NL	VP	1	2	1	< 200	N/A
55	*Orthotomus atrogularis*	Dark-necked Tailorbird	LC	NL	VP, Transect	6	16	1	< 200	N/A
56	*Orthotomus sutorius*	Common Tailorbird	LC	NL	VP, Transect	21	42	1	< 200	N/A
57	*Mixornis gularis*	Pin-Striped Tit Babbler	LC	NL	VP, Transect	5	9	1	< 200	N/A
58	*Chrysomma sinense*	Yellow-eyed Babbler	LC	NL	VP, Transect	12	30	1	< 200	N/A
59	*Acridotheres burmannicus*	Vinous-breasted Starling	LC	NL	VP, Transect	17	48	1	< 200	N/A
60	*Gracupica nigricollis*	Black-collared Starling	LC	NL	VP	6	10	1	< 200	N/A
61	*Sturnia malabarica*	Chestnut-tailed Starling	LC	NL	Transect	1	2	N/A	< 200	N/A
62	*Acridotheres tristis*	Common Myna	LC	NL	VP, Transect	8	28	1	< 200	N/A
63	*Copsychus saularis*	Oriental Magpie Robin	LC	NL	VP, Transect	5	9	1	< 200	N/A
64	*Saxicola caprata*	Pied Bushchat	LC	NL	VP, Transect	12	31	1	< 200	N/A
65	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	LC	NL	VP, Transect	5	11	1	< 200	N/A
66	*Cinnyris jugularis*	Olive-backed Sunbird	LC	NL	VP, Transect	6	18	1	< 200	N/A
67	*Passer montanus*	Eurasian Tree Sparrow	LC	NL	VP, Transect	11	41	1	< 200	N/A
68	*Passer domesticus*	House Sparrow	LC	NL	VP, Transect	14	59	1	< 200	N/A
69	*Passer flaveolus*	Plain-backed Sparrow	LC	NL	VP, Transect	3	16	1	< 200	N/A
70	*Lonchura punctulata*	Scaly-breasted Munia	LC	NL	VP, Transect	9	39	1	< 200	N/A
71	*Lonchura striata*	White-rumped Munia	LC	NL	VP	2	9	1	< 200	N/A
72	*Anthus rufulus*	Paddyfield Pipit	LC	NL	VP, Transect	17	51	1	< 200	N/A

Notes

In IUCN and VRDB columns : NT = Near Threatened; LC = Least Concern; NL = Not listed

In Method column : VP = Vantage Point

Flight bands : 1 = < 51 m (below Rotor Swept Zone - RSZ) ; 2 = 52 -208m (within RSZ); 3 = > 208 m (above RSZ)

List of bird species (2nd survey - July 2021)

No	Scientific Name	Common Name	IUCN	VRDB	Migratory	Method	Sighting times	Sum of individuals	Flight bands	Total fly time (s)	Time in band 2 (s)
1	*Aerodramus germani*	Germain's Swiftlet	LC	NL	No	VP, Transect	421	1064	1, 2, 3	729,269	332,917
2	*Cypsiurus balasiensis*	Asian Palm Swift	LC	NL	No	Transect	4	12	N/A	< 200	N/A
3	*Apus nipalensis*	House Swift	LC	NL	No	Transect	1	1	N/A	< 200	N/A
4	*Centropus sinensis*	Greater Coucal	LC	NL	No	VP, Transect	22	28	1	< 200	N/A
5	*Cacomantis merulinus*	Plaintive Cuckoo	LC	NL	No	VP, Transect	14	16	1	< 200	N/A
6	*Rhopodytes tristis*	Green-billed Malkoha	LC	NL	No	VP, Transect	5	5	1	< 200	N/A
7	*Streptopelia tranquebarica*	Red-collared Dove	LC	NL	No	VP, Transect	3	4	1	< 200	N/A
8	*Streptopelia chinensis*	Spotted Dove	LC	NL	No	VP, Transect	17	25	1	< 200	N/A
9	*Geopelia striata*	Zebra Dove	LC	NL	No	VP, Transect	19	33	1	< 200	N/A
10	*Treron phoenicoptera*	Yellow-footed Green Pigeon	LC	NL	No	VP	1	12	1	< 200	N/A
11	*Phalacrocorax niger*	Little Cormorant	LC	NL	No	VP, Transect	4	15	1	< 200	N/A
12	*Elanus caeruleus*	Black-shouldered Kite	LC	NL	No	VP	2	2	1,2	28	16
13	*Accipiter badius*	Shikra	LC	NL	No	VP	1	2	1, 2	146	81
14	*Aviceda leuphotes*	Black Baza	LC	NL	No	VP	2	2	1, 2	47	15
15	*Glaucidium cuculoides*	Asian Barred Owlet	LC	NL	No	Transect	1	1	N/A	< 200	N/A
16	*Upupa epops*	Eurasian Hoopoe	LC	NL	No	VP, Transect	7	9	1	< 200	N/A
17	*Alcedo atthis*	Common Kingfisher	LC	NL	No	VP, Transect	2	2	1	< 200	N/A
18	*Halcyon smyrnensis*	White-throated Kingfisher	LC	NL	No	VP	3	3	1	< 200	N/A
19	*Nyctyornis athertoni*	Blue-bearded Bee-eater	LC	NL	No	VP	1	1	1	< 200	N/A
20	*Merops orientalis*	Green Bee-eater	LC	NL	No	VP, Transect	7	16	1	< 200	N/A
21	*Merops leschenaulti*	Chestnut-headed Bee-eater	LC	NL	No	VP, Transect	3	6	1	< 200	N/A
22	*Picus vittatus*	Laced Woodpecker	LC	NL	No	VP	1	1	1	< 200	N/A
23	*Psilopogon lineata*	Lineated Barbet	LC	NL	No	VP, Transect	9	11	1	< 200	N/A
24	*Psilopogon haemacephala*	Coppersmith Barbet	LC	NL	No	VP, Transect	11	12	1	< 200	N/A
25	*Psittacula alexandri*	Red-breasted Parakeet	NT	NL	No	VP, Transect	3	28	1	< 200	N/A
26	*Psittacula finschii*	Grey-headed Parakeet	NT	NL	No	VP, Transect	9	72	1	< 200	N/A
27	*Artamus fuscus*	Ashy Woodswallow	LC	NL	No	VP, Transect	28	46	1	< 200	N/A
28	*Aegithina tiphia*	Common Iora	LC	NL	No	VP, Transect	19	22	1	< 200	N/A
29	*Pericrocotus flammeus*	Scarlet Minivet	LC	NL	No	VP, Transect	3	8	1	< 200	N/A
30	*Lalage polioptera*	Indochinese Cuckooshrike	LC	NL	No	VP, Transect	2	2	1	< 200	N/A
31	*Lanius collurioides*	Burmese Shrike	LC	NL	No	VP, Transect	36	61	1	< 200	N/A
32	*Dicrurus macrocercus*	Black Drongo	LC	NL	No	VP, Transect	21	31	1	< 200	N/A
33	*Dicrurus leucophaeus*	Ashy Drongo	LC	NL	No	VP, Transect	17	28	1	< 200	N/A
34	*Rhipidura albicollis*	White-throated Fantail	LC	NL	No	VP, Transect	5	5	1	< 200	N/A
35	*Garrulus glandarius*	Eurasian Jay	LC	NL	No	VP, Transect	7	8	1	< 200	N/A
36	*Crypsirina temia*	Racket-tailed Treepie	LC	NL	No	Transect	2	2	N/A	< 200	N/A
37	*Corvus macrorhynchos*	Large-billed Crow	LC	NL	No	VP, Transect	8	12	1	< 200	N/A
38	*Pycnonotus aurigaster*	Sooty-headed Bulbul	LC	NL	No	VP, Transect	29	49	1	< 200	N/A
39	*Pycnonotus finlaysoni*	Stripe-throated Bulbul	LC	NL	No	VP, Transect	9	11	1	< 200	N/A
40	*Hypsipetes leucocephalius*	Himalayan Black Bulbul	LC	NL	No	VP, Transect	3	6	1	< 200	N/A
41	*Cecropis striolata*	Striated Swallow	LC	NL	No	VP	5	8	1	< 200	N/A

No	Scientific Name	Common Name	IUCN	VRDB	Migratory	Method	Sighting times	Sum of individuals	Flight bands	Total fly time (s)	Time in band 2 (s)
42	*Prinia rocki*	Annam Prinia	LC	NL	No	VP, Transect	16	18	1	< 200	N/A
43	*Prinia rufescens*	Rufescent Prinia	LC	NL	No	VP, Transect	7	7	1	< 200	N/A
44	*Prinia hodgsonii*	Grey-breasted Prinia	LC	NL	No	VP, Transect	20	21	1	< 200	N/A
45	*Prinia flaviventris*	Yellow-bellied Prinia	LC	NL	No	VP	1	1	1	< 200	N/A
46	*Orthotomus atrogularis*	Dark-necked Tailorbird	LC	NL	No	VP, Transect	9	9	1	< 200	N/A
47	*Orthotomus sutorius*	Common Tailorbird	LC	NL	No	VP, Transect	18	21	1	< 200	N/A
48	*Mixornis gularis*	Pin-Striped Tit Babbler	LC	NL	No	VP, Transect	3	3	1	< 200	N/A
49	*Timalia pileata*	Chestnut-capped Babbler	LC	NL	No	VP	1	1	1	< 200	N/A
50	*Chrysomma sinense*	Yellow-eyed Babbler	LC	NL	No	VP, Transect	3	3	1	< 200	N/A
51	*Acridotheres burmannicus*	Vinous-breasted Starling	LC	NL	No	VP, Transect	6	7	1	< 200	N/A
52	*Gracupica nigricollis*	Black-collared Starling	LC	NL	No	VP	4	4	1	< 200	N/A
53	*Acridotheres tristis*	Common Myna	LC	NL	No	VP, Transect	6	6	1	< 200	N/A
54	*Copsychus saularis*	Oriental Magpie Robin	LC	NL	No	VP, Transect	3	3	1	< 200	N/A
55	*Saxicola caprata*	Pied Bushchat	LC	NL	No	VP, Transect	15	19	1	< 200	N/A
56	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	LC	NL	No	VP, Transect	3	3	1	< 200	N/A
57	*Cinnyris jugularis*	Olive-backed Sunbird	LC	NL	No	VP, Transect	5	5	1	< 200	N/A
58	*Passer montanus*	Eurasian Tree Sparrow	LC	NL	No	VP, Transect	5	21	1	< 200	N/A
59	*Passer domesticus*	House Sparrow	LC	NL	No	VP, Transect	8	110	1	< 200	N/A
60	*Passer flaveolus*	Plain-backed Sparrow	LC	NL	No	VP, Transect	6	21	1	< 200	N/A
61	*Lonchura punctulata*	Scaly-breasted Munia	LC	NL	No	VP, Transect	13	32	1	< 200	N/A
62	*Lonchura striata*	White-rumped Munia	LC	NL	No	VP, Transect	7	12	1	< 200	N/A
63	*Anthus rufulus*	Paddyfield Pipit	LC	NL	No	VP, Transect	11	11	1	< 200	N/A

Notes

In IUCN and VRDB columns : NT = Near Threatened; LC = Least Concern; NL = Not listed

In Method column : VP = Vantage Point

Flight bands : 1 = < 51 m (below Rotor Swept Zone - RSZ) ; 2 = 52 -208m (within RSZ); 3 = > 208 m (above RSZ)

List of bird species (3rd survey - Dec 2021)

No	Scientific Name	Common Name	IUCN	VRDB	Migratory	Method	Sighting times	Sum of individuals	Flight height band	Total fly time	Time in band 2
1	*Spilopelia chinensis*	Eastern Spotted Dove	LC	NL	No	VP, Transect	6	12	1	< 200	N/A
2	*Geopelia striata*	Zebra Dove	LC	NL	No	VP, Transect	13	16	1	< 200	N/A
3	*Aerodramus germani*	Germain's Swiftlet	LC	NL	No	VP, Transect	35	189	1, 2	5460	2820
4	*Centropus sinensis*	Greater Coucal	LC	NL	No	VP, Transect	12	15	1	< 200	N/A
5	*Phaenicophaeus tristis*	Green-billed Malkoha	LC	NL	No	VP, Transect	7	7	1	< 200	N/A
6	*Cacomantis merulinus*	Plaintive Cuckoo	LC	NL	No	VP	1	1	1	< 200	N/A
7	*Cuculus micropterus*	Indian Cuckoo	LC	NL	No	VP	1	1	1	< 200	N/A
8	*Ardeola bacchus*	Chinese Pond-heron	LC	NL	No	VP, Transect	3	9	2	180	120
9	*Elanus caeruleus*	Black-winged Kite	LC	NL	No	VP	4	6	1, 2	480	310
10	*Butastur liventer*	Rufous-winged Buzzard	LC	NL	No	VP	3	5	2, 3	540	300
11	*Butastur indicus*	Grey-faced Buzzard	LC	NL	Yes	VP, Transect	13	17	1, 2	2150	1890
12	*Upupa epops*	Common Hoopoe	LC	NL	No	VP	4	7	1	< 200	N/A
13	*Merops orientalis*	Asian Green Bee-eater	LC	NL	No	VP, Transect	8	59	1	< 200	N/A
14	*Halcyon smyrnensis*	White-breasted Kingfisher	LC	NL	No	VP, Transect	2	2	1	< 200	N/A
15	*Psilopogon haemacephalus*	Coppersmith Barbet	LC	NL	No	VP	2	3	1	< 200	N/A
16	*Psilopogon lineatus*	Lineated Barbet	LC	NL	No	VP	1	1	1	< 200	N/A
17	*Micropternus brachyurus*	Rufous Woodpecker	LC	NL	No	Transect	1	2	N/A		N/A
18	*Psittacula finschii*	Grey-headed Parakeet	NT	NL	No	VP	1	1	1	< 200	N/A
19	*Oriolus chinensis*	Black-naped Oriole	LC	NL	No	VP, Transect	4	4	1, 2	25	20
20	*Pericrocotus flammeus*	Scarlet Minivet	LC	NL	No	VP	2	4	1	< 200	N/A
21	*Aegithina tiphia*	Common Iora	LC	NL	No	VP, Transect	13	24	1	< 200	N/A
22	*Dicrurus macrocercus*	Black Drongo	LC	NL	No	VP, Transect	20	33	1	< 200	N/A
23	*Dicrurus leucophaeus*	Ashy Drongo	LC	NL	No	VP, Transect	24	46	1	< 200	N/A
24	*Dicrurus hottentottus*	Hair-crested Drongo	LC	NL	No	Transect	1	1	N/A	< 200	N/A
25	*Lanius tigrinus*	Tiger Shrike	LC	NL	Yes	VP	1	1	1	< 200	N/A
26	*Lanius cristatus*	Brown Shrike	LC	NL	Yes	Transect	1	2	N/A	< 200	N/A
27	*Lanius collurioides*	Burmese Shrike	LC	NL	No	VP, Transect	20	31	1	< 200	N/A
28	*Crypsirina temia*	Racquet-tailed Treepie	LC	NL	No	Transect	1	1	N/A	< 200	N/A
29	*Garrulus glandarius*	Eurasian Jay	LC	NL	No	VP	3	10	1, 2	350	300
30	*Corvus macrorhynchos*	Large-billed Crow	LC	NL	No	VP	5	10	1, 2	250	210
31	*Prinia hodgsonii*	Grey-breasted Prinia	LC	NL	no	VP, Transect	12	48	1	< 200	N/A
32	*Orthotomus sutorius*	Common Tailorbird	LC	NL	No	VP, Transect	14	20	1	< 200	N/A
33	*Orthotomus atrogularis*	Dark-necked Tailorbird	LC	NL	No	VP, Transect	4	7	1	< 200	N/A

34	*Hirundo rustica*	Barn Swallow	LC	NL	Yes	VP, Transect	12	40	1, 2	2500	600
35	*Riparia riparia*	Collared Sand Martin	LC	NL	Yes	VP	3	15	1	< 200	N/A
36	*Hypsipetes leucocephalus*	Black Bulbul	LC	NL	No	VP, Transect	5	45	1	< 200	N/A
37	*Rubigula flaviventris*	Black-crested Bulbul	LC	NL	No	VP	1	5	1	< 200	N/A
38	*Pycnonotus jocosus*	Red-whiskered Bulbul	LC	NL	No	Transect	2	6	N/A	< 200	N/A
39	*Pycnonotus aurigaster*	Sooty-headed Bulbul	LC	NL	No	VP, Transect	41	208	1, 2	150	120
40	*Pycnonotus finlaysoni*	Stripe-throated Bulbul	LC	NL	No	VP, Transect	16	33	1	< 200	N/A
41	*Brachypodius atriceps*	Black-headed Bulbul	LC	NL	No	VP	1	1	1	< 200	N/A
42	*Phylloscopus inornatus*	Yellow-browed Warbler	LC	NL	Yes	VP, Transect	10	12	1	< 200	N/A
43	*Phylloscopus fuscatus*	Dusky Warbler	LC	NL	Yes	Transect	1	1	N/A	< 200	N/A
44	*Phylloscopus schwarzi*	Radde's Warbler	LC	NL	Yes	Transect	1	1	N/A	< 200	N/A
45	*Phylloscopus coronatus*	Eastern Crowned Warbler	LC	NL	Yes	VP	2	2	1	< 200	N/A
46	*Chrysomma sinense*	Yellow-eyed Babbler	LC	NL	No	VP, Transect	4	10	1	< 200	N/A
47	*Zosterops palpebrosus*	Indian White-eye	LC	NL	No	VP	4	10	1	< 200	N/A
48	*Timalia pileata*	Chestnut-capped Babbler	LC	NL	No	VP	1	4	1	< 200	N/A
49	*Mixornis gularis*	Pin-striped Tit-babbler	LC	NL	No	VP, Transect	6	14	1	< 200	N/A
50	*Garrulax leucolophus*	White-crested Laughingthrush	LC	NL	No	VP	1	6	1	< 200	N/A
51	*Gracupica nigricollis*	Black-collared Starling	LC	NL	No	VP, Transect	7	16	1, 2	200	180
52	*Sturnia sinensis*	White-shouldered Starling	LC	NL	Yes	VP	2	14	1, 2	45	30
53	*Sturnia malabarica*	Chestnut-tailed Starling	LC	NL	No	VP	1	2	1	< 200	N/A
54	*Acridotheres tristis*	Common Myna	LC	NL	No	VP, Transect	2	4	1	< 200	N/A
55	*Acridotheres leucocephalus*	Vinous-breasted Myna	LC	NL	No	VP, Transect	7	49	1, 2	60	40
56	*Muscicapa dauurica*	Asian Brown Flycatcher	LC	NL	Yes	VP, Transect	3	4	1	< 200	N/A
57	*Cyornis unicolor*	Pale Blue-flycatcher	LC	NL	No	VP	1	1	1	< 200	N/A
58	*Calliope calliope*	Siberian Rubythroat	LC	NL	Yes	VP, Transect	7	11	1	< 200	N/A
59	*Saxicola caprata*	Pied Bushchat	LC	NL	no	VP, Transect	3	5	1	< 200	N/A
60	*Irena puella*	Asian Fairy-bluebird	LC	NL	No	VP	2	8	1	< 200	N/A
61	*Dicaeum cruentatum*	Scarlet-backed Flowerpecker	LC	NL	No	VP, Transect	12	20	1	< 200	N/A
62	*Cinnyris jugularis*	Olive-backed Sunbird	LC	NL	No	VP, Transect	5	6	1	< 200	N/A
63	*Lonchura punctulata*	Scaly-breasted Munia	LC	NL	No	VP, Transect	6	73	1	< 200	N/A
64	*Passer flaveolus*	Plain-backed Sparrow	LC	NL	No	Transect	2	17	N/A	< 200	N/A
65	*Anthus rufulus*	Paddyfield Pipit	LC	NL	No	Transect	1	2	N/A	< 200	N/A

Notes

In IUCN and VRDB columns : NT = Near Threatened; LC = Least Concern; NL = Not listed

In Method column : VP = Vantage Point

Flight bands : 1 = < 51 m (below Rotor Swept Zone - RSZ) ; 2 = 52 -208m (within RSZ); 3 = > 208 m (above RSZ)

LIST OF HERPETOFAUNA IDENTIFIED FROM FIELD SURVEYS

No	Scientific name	Common name	IUCN	VRDB	Transect	Sum of number
Reptiles						
1	*Calotes bachae*	Vietnamese blue-crested Lizard	LC	NL	1, 2, 3, 4,	> 10
2	*Hemidactylus frenatus*	Common House Gecko	LC	NL	3	2
3	*Gekko gecko*	Tokay Gecko	NL	VU	2	2
4	*Eutropis macularia*	Grass Sun Skink	NL	NL	1, 2	2
5	*Sphenomorphus maculatus*	Spotted Forest Skink	NL	NL	1, 2	2
6	*Sphenomorphus sp.*	Forest Skink	NL	NL	1, 2	2
7	*Boiga multomaculata*	Many-spotted Cat Snake	NL	NL	1,2	2
8	*Coelognathus radiatus*	Radiated Ratsnakes	LC	VU	4, 3, 4	3
9	*Dendrelaphis ngansonensis*	Nganson Bronzeback Tree Snake	LC	NL	1, 2	2
10	*Oligodon sp.*	Kukri Snake	NL	NL	2	1
11	*Ptyas korros*	Indo-Chinese Rat Snake	NL	EN	1, 2	2
12	*Rhabdophis subminiatus*	Red-necked Keelback	LC	NL	2	1
13	*Xenopeltis unicolor*	Asian Sunbeam Snake	LC	NL	2, 3, 4	3
14	*Bungarus candidus*	Malayan Krait	LC	NL	1, 2	2
15	*Ophiophagus hannah*	King Cobra	VU	CR	4	1
Amphibians						
16	*Duttaphrynus melanostictus*	Asian Common Toad	LC	NL	1, 2, 3, 4	4
17	*Microhyla butleri*	Butler's Narrow-mouth Frog	LC	NL	1, 2, 3, 4	> 10
18	*Microhyla daklakensis*	Dak Lak Narrow-mouth Frog	NL	NL	1, 2, 3, 4	> 10
19	*Microhyla mukhlesuri*	Mukhlesur's Narrow-mouthed Frog	NL	NL	1, 2, 3, 4	> 10
20	*Microhyla pulchra*	Beautiful Pygmy Frog	LC	NL	2, 3, 4	> 10
21	*Kaloula pulchra*	Banded Bullfrog	LC	NL	3, 4	2
22	*Fejervarya limnocharis*	Grass Frog	LC	NL	3, 4	2
23	*Occidozyga martensii*	Marten’s Frog	LC	NL	2, 3, 4	> 10
24	*Hylarana taipehensis*	Taipei Frog	LC	NL	1, 2, 3, 4	> 10
25	*Chirixalus nongkhorensis*	Nongkhor Pigmy Tree Frog	LC	NL	1, 2, 3, 4	> 10
26	*Polypedates mutus*	Burmese Whipping Frog	LC	NL	3, 4	2
27	*Ichthyophis nguyenorum*	Nguyen's Caecilia	LC	NL	2	2

Notes

In IUCN and VRDB columns : CR = Critically Endangered; EN = Endangered; VU = Vulnerable; LC = Least Concern; NL = Not listed

LIST OF NON-VOLANT MAMMALS IDENTIFIED FROM INTERVIEW

No.	Scientific Name	Common name	IUCN	VNRB	Assessment of species identity
1	*Tupaia belangeri*	Northern tree shrew	LC	NL	Based on respondent's description and photo identification from A field guide to the mammals of South - East Asia (Francis, 2008).
2	*Melogale personata*	Large-toothed Ferret Badger	LC	NL	Based on respondent's description and Introduction of mammals of Indochina and Thailand (WWF, 2000).
3	*Lutrogale perspicillata*	Smooth-coated Otter	VU	EN	Based on respondent's description and Introduction of mammals of Indochina and Thailand (WWF, 2000).
4	*Paradoxurus hermaphroditus/ Viverricula indica*	Common Palm Civet/ Small Indian Civet	LC	NL	Based on respondent's description and Introduction of mammals of Indochina and Thailand (WWF, 2000).
5	*Paguma larvata*	Masked palm civet	LC	NL	Based on respondent's description and photo identification from A field guide to the mammals of South - East Asia (Francis, 2008).
6	*Herpestes auropunctatus*	Small Indian Mongoose	LC	NL	Based on respondent's description and Introduction of mammals of Indochina and Thailand (WWF, 2000).
7	*Prionailurus bengalensis*	Leopard cat	LC	NL	Based on respondent's description and photo identification from A field guide to the mammals of South - East Asia (Francis, 2008).
8	*Menetes berdmorei*	Berdmore's squirrel	LC	NL	Based on respondent's description, samples and records documented by the volant mammal group in the 1st survey in May 2021 and field survey this time.
9	*Tamiops rodolphii*	Cambodian striped squirrel	LC	NL	Based on respondent's description, samples and records documented by the volant mammal group in the 1st survey in May 2021 and field survey this time.

Notes

In IUCN and VRDB columns : EN = Endangered; VU = Vulnerable; LC = Least Concern; NL = Not listed

LIST OF NON-VOLANT MAMMALS IDENTIFIED FROM FIELD SAMPLING

No.	Scientific name	Common name	Method	Sum of number	IUCN	VRDB
1	*Tupaia belangeri*	Northern Treeshrew	O	5	LC	NL
2	*Tamiops rodolphii*	Cambodian striped squirrel	S	7	LC	NL
3	*Menetes berdmorei*	Berdmore's squirrel	O, Ca	10	LC	NL
4	*Callosciurus erythraeus flavimanus*	Pallas's Squirrel	O, Ph	1	LC	NL
5	*Rattus nitidus*	Rattus nitidus	O, Ph	5	LC	NL
6	*Ratus* sp.	Rats	S, Ca	12		

Notes:

In Method column : O = obsevered on transects; S = sampled from ecountering with a group of local people hunting; Ph = photographed by other survey teams; Ca = camera trap/ cage traps

In IUCN and VRDB columns: LC = Least Concern; NL = Not listed

List of bat species (both surveys)

No.	Scientific name	Common name	Bat group	IUCN	VRDB	Method	Count (1st survey)	Count (2nd survey)	Flight bands
1	*Cynopterus sphinx*	Greater short-nosed fruit bat	Fruit bat	LC	NL	O, MN	3	3	1
2	*Myotis muricola*	Nepalese whiskered myotis	Insect-eating	LC	NL	O, E, MN	14	4	1
3	*Myotis* cf. *ater*	Peters's Myotis	Insect-eating	LC	NL	O, E	3	N/A	1
4	*Pipistrellus* cf. *javanicus*	Java pipistrelle	Insect-eating	LC	NL	O, E	3	13	1
5	*Scotophilus heathii*	Greater Asiatic yellow bat	Insect-eating	LC	NL	O, E	5	3	1
6	*Scotophilus* cf. *kuhlii*	Lesser Asiatic yellow bat	Insect-eating	LC	NL	E	3	N/A	1
7	*Macroglobosus sobrinus*	Hill Long-tongued Fruit Bat	Fruit bat	LC	NL	O/MN	N/A	2	1

Notes:
In IUCN and VRDB columns: LC = Least Concern; NL = Not listed
In Method column**:** O = obsevered on transects; E = echolocation; MN = mist net; HT = harp trap
Flight bands : 1 = < 51 m (below Rotor Swept Zone - RSZ) ; 2 = 52 -208m (within RSZ); 3 = > 208 m (above RSZ)

APPENDIX J CRITICAL HABITAT ASSESSMENT

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
REPTILIA	*Crocodylus siamensis*	Siamese Crocodile	CR	CR	Yes	No	No	160,000	500	1,000	X				Wetlands (inland)	This species is is a medium-sized freshwater crocodile native in Thailand, Indonesia, Vietnam. The global population is considered estimated at 500 - 1,000 mature individuals. The EOO is unknown. In Viet Nam, wild populations are possibly extirpated. Surveys over the past two decades have failed to detect crocodiles in sites they were reported to occur except one site, Ha Lam Lake (Phu Yen Province), where at least two individuals were present in 2005. A single reintroduced population is at Cat Tien National Park, where breeding occurs.	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and at least 5 reproductive units.
REPTILIA	*Indotestudo elongata*	Elongated Tortoise	CR	EN	Yes	No	No	N/A	N/A	N/A	X				Forest, Shrubland	Indotestudo elongata is widely distributed across South and Southeast Asia, scattered occurrences in Viet Nam. Severe population declines has occurred recently due to human activities. Subpopulations in Viet Nam have since been severely depleted and possibly locally extirpated (R. Timmins pers comm. 2018). Some record of this species were found in Binh Dinh province between 2011-2014. Elongated Tortoises inhabit primarily deciduous forest types (Sal, Dry Dipterocarp, Mixed Deciduous forests) with open, broken canopy allowing sufficient light for a moderate to very dense undergrowth of grasses and herbs; during the dry, leafless season animals may retreat to evergreen stream gallery forest.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Manis javanica*	Sunda Pangolin	CR	EN	Yes	No	No	N/A	N/A	N/A	X				Grassland, Wetlands (inland), Forest, Shrubland	The Sunda Pangolin is widely distributed geographically, occurring across mainland and island Southeast Asia. t is suspected that the species has been extirpated from some lowland areas of Lao PDR, Myanmar and Thailand, and is highly vulnerable in other lowland areas in these countries as well as Cambodia and Viet Nam. Recent research suggests the species is present but rare in central and southern Viet Nam; however records from these areas vary in reliability. Recent enforcement activity suggests the species is still present in in protected areas in Dak Nong, Kon Tum, Quang Binh, Ha Tinh, Kien Giang, Ca Mau, Thua Thien Hue, Quang Nam and Gia Lai provinces. Hunters interviewed in Viet Nam reported that the species is found in a variety of habitats, though areas with primary forest support more pangolins, probably because they contain more older, larger trees with hollows suitable for sleeping and for use as den sites and support lower levels of human activity.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
REPTILIA	*Mauremys annamen*	Vietnamese Pond Turt	CR	CR	Yes	Yes	No	12,500	N/A	100	X				Wetlands (inland), Artificial/Aquatic & Marine	*Mauremys annamensis* is endemic to central Viet Nam, where it occurs in a narrow strip of coastal lowlands between the South China Sea to the east and the Annamite Mountains to the west. Eastward extensions of mountains reaching to the sea form the northern (Hai Van Pass) and southern (Ca Pass) boundaries of the species' distribution. Field surveys for M. annamensis in recent years have been mostly unsuccessful, indicating that the species is now extremely rare in the wild. At one site in Quang Ngai Province, fewer than five new turtles were observed each year between 2008 and 2013 in local village households. Published records of M. annamensis exist from Quang Nam, Da Nang, and Gia Lai Provinces. Mauremys annamensis inhabits marshes and slow-moving streams, along with small lakes, ponds and riparian areas of large rivers (such as the Thu Bon River in Quang Nam Province). Local people interviewed by the Asian Turtle Programme (ATP) have reported that the species was also frequently encountered within rice fields around villages in the past. The extent of occurrence (EOO) for M. annamensis is estimated at 12,500 km2. There are no quantifiable data available on the historic or present population sizes of Mauremys annamensis.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
REPTILIA	*Sacalia quadriocellat*	Four-eyed Turtle	CR	NL	Yes	No	No	N/A	N/A	N/A	X				Forest, Wetlands (inland)	Sacalia quadriocellata occurs in southern mainland China (Guangdong and Guangxi), Hainan (China), eastern Lao PDR and Viet Nam. It ranges as far south in Viet Nam as Khanh Hoa. Sacalia quadriocellata is likely to remain in small numbers of scattered individuals in most of the remaining areas of suitable habitat, now nominally protected areas, throughout its range in Viet Nam and Lao PDR. Sacalia quadriocellata inhabits fairly large streams including waterfall plunge pools in hill forest areas at moderate altitudes. Clutch size ranges from one to four eggs; single clutches observed in northern Viet Nam, but multiple clutches have been indicated further south	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAMMALIA	*Pygathrix nigripes*	Black-shanked Douc La	CR	EN	Yes	No	No	60,000	N/A	N/A	X		X		Artificial/Terrestrial, Forest	This specie is found Lam Dong, Binh Phuoc, Dak Lak. These animals are predominantly arboreal but may occasionally come to the ground. They are found in evergreen, semi-evergreen and semi-evergreen-mixed deciduous forest mosaics, as well as in coastal dry forest. It seems that species of this genus can adapt to relatively heavily disturbed forest (Nadler et al. 2003). The largest known population exists in Seima Biodiversity Conservation Area, Cambodia and was estimated at approximately 42,000 individuals. The largest known population in Viet Nam may be in Bu Gia Map NP (Binh Phuoc Province) which is estimated at 1,789 individuals. Other stronghold for the species are recorded in Nui Chua National Park (Ninh Thuan Province), which is estimated at 500-700 individuals, Phuoc Binh NP at least 164 individuals, Chu Prong (Gia Lai Province) at about 200 to 250 individuals, Hon Heo Peninsula (Khanh Hoa Province) at about 155-180 individuals, Cat Tien National Park at about 109 individuals, and Takou Nature Reserve is about 64 individuals. In southern Viet Nam, this species survives in a large number of small, isolated forest fragments, in comparison with the situation with the Red-shanked Doucs in the north, where the species is not able to persist in small forest fragments.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Muntiacus vuquange*	Large-antlered Muntja	CR	VU	Yes	No	No	106,100	N/A	N/A	X				Artificial/Terrestrial, Forest	The Large-antlered Muntjac is known only from the Annamite mountain chain and associated hill ranges of Lao PDR, Viet Nam and, marginally, eastern Cambodia. In Vietnam, the species survives nowhere commonly, and in all well-surveyed areas is now extremely rare or extirpated, although one area which seems to have held large numbers at least into the 1990s has not been re-surveyed. The species has only been recorded in Vu Quang National Park in Ha Tinh Provinice and in Pu Mat National Park in Nghe An Province. The habitat preferences of the Large-antlered Muntjac remain unclear. Its global distribution is somewhat similar to better-understood species such as Crested Argus Rheinardia ocellata and Red-shanked Douc Pygathrix nemaeus, suggesting that it is tied to the evergreen and semi-evergreen forests.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
AVES	*Gyps bengalensis*	White-rumped Vulture	CR	CR	Yes	No	No	7,370,000	N/A	N/A	X		X		Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	This species is native to India, Banladesh, Myanmar, Thailand, Cambodia. This species possibly extict in Vietnam. The global population is considered estimated at 2500 - 9999 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 7,370,000 km2.	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and 5 reproductive units.
AVES	*Sarcogyps calvus*	Red-headed Vulture	CR	NL	Yes	No	No	5,230,000	2,500	9,000	X		X		Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	This species is native to India, Myanmar, Cambodia. This species possibly extict in Vietnam. The global population is considered estimated at 2500 - 9999 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 5,230,000 km2.	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and 5 reproductive units.
AVES	*Emberiza aureola*	Yellow-breasted Buntir	CR	NL	Yes	No	Yes	21,800,000	N/A	N/A	X				Wetlands (inland), Grassland, Shrubland, Artificial/Terrestrial	This species once bred across the northern Palaearctic from Finland, Belarus and Ukraine in the west, through Kazakhstan, China and Mongolia, to far eastern Russia, Korea and northern Japan. However,it is now thought to have potentially completely disappeared from Finland, Belarus, Ukraine and large parts of Russia. The species is migratory, wintering from central and eastern Nepal, Bangladesh, north-east India east to south-east China (Guangdong) and Taiwan (Province of China), south to the north Malay Peninsula and south-east Asia. It winters in large flocks in cultivated areas, rice fields and grasslands, preferring scrubby dry-water rice fields for foraging and reedbeds for roosting. The breeding season is normally from the second half of June to the beginning of July. The decline is likely to be driven by excessive trapping at migration and, in particular, wintering sites.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAMMALIA	*Panthera pardus ssp.*	Indochinese Leopard	CR	NL	Yes	No	No	N/A	77	776	X				Forest, Shrubland, Artificial/Terrestrial	The Indochinese Leopard once ranged widely across Southeast Asia and southeastern China, but now occurs in only a small fraction (about 2%–6%) of its historical distribution (i.e. range prior to 1900).There are no known viable Leopard populations remaining in Viet Nam, and this species is now likely to have been extirpated from the country (Rostro-García et al. 2016). From 1995 to 2013, there were no photographs of Leopard from camera-trapping studies in the country, including those in the largest and best protected areas (Rostro-García et al. 2016). The last published record of Leopard from Viet Nam was probably from the early 2000s in Yok Don National Park, in central Viet Nam (Eames et al. 2004), which might have been transient Leopard originating from the adjacent population in eastern Cambodia. It is doubtful that Leopard still occurs as a resident in Viet Nam given high levels of hunting and snaring there, which have devastated populations of smaller cat species in the country (Willcox et al. 2014). Poaching for the illegal wildlife trade is likely to be the greatest factor contributing to the decline of the Indochinese Leopard.	The species is extinct in Vietnam
LILIOPSIDA	*Curcuma pygmaea*		CR	NL	Yes	Yes	No	N/A	N/A	N/A	X				Forest	This species is known only from the type locality in southern Viet Nam where it was collected in 2010. This species is known only from the type locality at Ea H'Leo village, Ea H'Leo Dist., Dak Lak Province, Viet Nam. The habitat at the type locality has been cleared, so the species may well be extinct. A rhizomatous herb found growing in Dipterocarp forest at about 308 m asl. It flowers from the centre of the leafy shoot around July.	The species is possibly extinct in Vietnam. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
LILIOPSIDA	*Curcuma newmanii*		CR	NL	Yes	Yes	No	N/A	200	200	X				Forest	This is a very restricted range endemic known only from two subpopulations about 1 km from each other and with an area of occupancy (AOO) of 8 km2. Known only from two localities in southern Viet Nam, Đắk Lắk Province, in the vicinity of Bản Đôn village. A very localized species with two subpopulations, each with about 100 mature plants. A rhizomatous herb found growing in lowland, deciduous dipterocarp forests. The inflorescences appear and the first flowers open from April to May, just before the leaves, with leafy shoots appearing shortly after.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Bos javanicus*	Banteng	EN	NL	Yes	No	Yes	105,000	4,000	8,000	X		X		Forest, Grassland	This species is in Thailand, Cambodia, Viet Nam, and Lao PDR, Banteng occurs (or occurred) in open mainly deciduous forest with glades, parklands, and dense forest patches; In Viet Nam, the species probably now occurs in only a few protected areas. Recorded in Ninh Son district in Ninh Thuan and Nui Ba National Park in the 1900s, but a study in 2009 has declared it being extinct in these two locations. The major threats to Banteng throughout its range are hunting and increasing loss of habitat. In Viet Nam and Lao PDR where the rate of lowland forest loss is also accelerating habitat loss is primarily a concern for the future viability of national populations, the species having been hunted out of forests long before they are cleared.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Rucervus eldii*	Eld's Deer	EN	NL	Yes	No	No	N/A	N/A	N/A	X		X		Forest, Savanna, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial	This species was formerly widely distributed across suitable habitats of South and Southeast Asia, from the Manipur region of northeastern India through much of Myanmar, Thailand, Lao PDR, Cambodia, and Viet Nam. Survival in Viet Nam is now very doubtful. Eld's Deer was still reported by local inhabitants in the early 2000's but field surveys of such areas have failed to find the species. Perhaps a few animals remain along the border with Cambodia (Do Tuoc pers. comm. 2006), but repeated recent surveys of one of the more promising areas, Yok Don National Park, has not produced good evidence. Populations in Lao PDR, Viet Nam and Cambodia seems to have occurred in a variety of primarily open, grass dominated habitats. Most evidence of presence comes from Deciduous Dipterocarp Forests which primarily occur in the highly monsoonal areas of the Mekong plains.	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and 5 reproductive units.
REPTILIA	*Cuora amboinensis*	Southeast Asian Box Tu	EN	VU	Yes	No	No	N/A	N/A	N/A	X		X		Forest, Wetlands (inland), Artificial/Aquatic & Marine	Cuora amboinensis occurs throughout Southeast Asia from northeastern India and the hills of eastern Bangladesh through mainland Southeast Asia, but not entering the hill and mountain areas north and east of the Mekong. It occurs throughout the Southeast Asian archipelago, from the Nicobar Islands through Indonesia to the Moluccas and throughout the Philippines. Cuora amboinensis is largely restricted to standing water bodies, but opportunistically inhabits most types of water bodies except large rivers and reservoirs. It prefers lowland swampy areas with dense vegetation, but also occurs in intermittent streams in hill forest areas, mangrove creeks, rice paddies and irrigation canals, from tidal areas up to about 400 m altitude. It was found in Gia Lai, Đắk Lắk, Bình Thuận, Bà Rịa - Vũng Tàu, Tây Ninh, Long An, Kiên Giang, Cà Mau. The species' EOO and global population are unknown.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAMMALIA	*Nycticebus pygmaeu*	Pygmy Slow Loris	EN	EN	Yes	No	No	900,000	N/A	N/A	X		X		Artificial/Terrestrial, Forest	In Viet Nam, researchers have concluded that wild populations are in major decline. In 2002 in Phong Nha-Ke Bang National Park only seven sightings of this species; in Ben En National Park, only eight animals were encountered. 2013-14 surveys in North Vietnam recorded 0.19 individuals/km and 0.4 individuals/km respectively. In South Vietnam in 2013, 0.48 individuals/km were recorded and 0.41-0.44 individuals/km in 2014. Surveys carried out in Central Viet Nam in 2015 found low densities of N. pygmaeus, with no animals observed in 20 km at Bach Ma National Park, and 0.19 ind./km at Son Tra Nature Reserve. The species has also been observed in Cat Tien National Park and Vinh Cuu Biosphere Reserve, which are both part of the Dong Nai Biosphere Reserve. No estimations about its EOO or global population size. This species has been sighted in a wide variety of habitats, including primary evergreen and semi-evergreen forest, forest on limestone, secondary and highly degraded habitats, and bamboo thickets. Nycticebus pygmaeus is nocturnal and forages alone or in groups of up to four individuals.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Panthera tigris*	Tiger	EN	CR	Yes	No	No	1,184,911	2,154	3,159	X		X		Forest, Shrubland, Grassland	In 1998, the global Tiger population was estimated at 5,000 to 7,000 Tigers. A comparison of these population estimates of the 1990s to similar current ones suggests a decline of about 50% (taking the upper bound of 7,000 as the number of mature individuals in 1993, using a precautionary approach, declining to approximately 3,500 in 2014), but differences in methodologies and accuracy make such comparisons uncertain. Over the past 100 years Tigers have disappeared from southwest and central Asia, from two Indonesian islands (Java and Bali) and from large areas of Southeast and Eastern Asia. An extensive review of scientific literature as well as correspondence with Tiger scientists and protected area managers resulted in the identification of just 42 source sites totalling approximately 90,000 km². In Vietnam, in the last decaded, about 27-50 tigers are only recorded in Protected Areas: Muong Nhe, Pu Mat, Vu Quang, Chu Mom Ray, Song thanh, Yok Don. Poaching for illegal trade in high-value Tiger products including skins, bones, meat and tonics is a primary threat to Tigers, which has led to their recent disappearance from broad areas of otherwise suitable habitat, and continues at unsustainable rates.	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and at least 5 reproductive units.
MAGNOLIOPSIDA	*Pterocarpus macroc*	Burma Padauk	EN	EN	Yes	No	No	1,245,247	N/A	N/A	X				Forest	Pterocarpus macrocarpus is a large tree species native to Lao PDR, Thailand, Vietnam, Cambodia and Myanmar. Pterocarpus macrocarpus is native to the Indochina peninsula where it grows within Lao PDR, Thailand, Vietnam, Cambodia and Myanmar. It has an estimated extent of occurrence of 1,245,247 km2. Pterocarpus macrocarpus is a large tree species, growing up to 30 m in height	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Trachypithecus germ*	Elliotâ€™s Silver Langu	EN	NL	Yes	No	No	280,000	N/A	N/A	X				Forest, Rocky areas	This species is found throughout Cambodia, Laos, Myanmar, Thailand and Vietnam. This is primarily a lowland species, with a preference for evergreen and semi-evergreen, mixed deciduous, riverine and gallery forest. Records in hilly areas or at higher elevations are few. The EOO is unknown for this species. The number of mature individuals is unknown, however, considered to be decreasing.There are no population estimates available for this species throughout its entire geographic range. It has been recorded from Phu Quoc National Park (Viet Nam), and probably still occurs in Cat Tien National Park (Viet Nam), Tran et al. (2017) recorded the species different habitats within three provinces in the Mekong delta region, the semi-evergreen forest at the Seven Mountains of An Giang province, the mangrove forest in Ngoc Hien and Nam Can districts, Melaleuca forest in U Minh Ha National Park of Ca Mau province, the limestone forest at Kien Luong Karst Area and semi-evergreen and evergreen forests at Phu Quoc National Park of Kien Giang province.The estimate the total population of the langur in Viet Nam to be 362–406 individuals, with the largest population found in the Kien Luong Karst Area (223 individuals). Another potentially viable population in Viet Nam is confirmed on Phu Quoc Island with estimated 31-44 individuals. Major threats to this species include habitat loss due to land use, hunting, use in traditional medicine, and collection for the pet trade.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAMMALIA	*Viverra megaspila*	Large-spotted Civet	EN	VU	Yes	No	No	N/A	N/A	N/A	X				Forest, Artificial/Terrestrial, Shrubland, Wetlands (inland)	The Large-spotted Civet is found throughout Cambodia, Laos, Malaysia, Myanmar, Thailand, Vietnam and likely extinct in southern Vietnam and China. This speices is found in Ke Go-Khe Net Lowlands and Cat Tien National Park. Large-spotted Civet is now evidently very rare in Viet Nam and is probably very close to national extinction if not gone already. Of the five camera-trapping surveys operating in Viet Nam during 1998–2006, all found Owston's Civet; while the four cameras in 2006–2013 all did not. The lack of Viet Namese records from 2006 onwards suggests a major recent decline in the species in sites across the country. This suspected decline is corroborated by the failure of over 15,000 camera-trap-nights of effort in wet evergreen forest in the Hue and Quang Nam Saola Reserves. Nor has it been found in another lowland area of wet evergreen forest, Khe Nuoc Truong in Quang Binh province, where extensive camera-trapping recorded many other small carnivore species. Dry and moist lowland forests are considered important to Within suitable altitude and terrain, the species has been recorded in a number of different habitats: natural habitats assigned directly by observers include evergreen forest, semi-evergreen forest, mixed deciduous forest, deciduous dipterocarp forest, Melaleuca-dominated swamp-forest, shrubland, wetlands and grassland.	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and at least 5 reproductive units.
REPTILIA	*Cuora mouhotii*	Keeled Box Turtle	EN	NL	Yes	No	No	N/A	N/A	N/A	X				Forest, Wetlands (inland)	Cuora mouhotii occurs in scattered, disjunct occurrences in northeast India, northern Myanmar, southern China, Lao PDR, and central Viet Nam adjoining Lao PDR. Cuora mouhotii inhabits mainly tropical moist evergreen forests with low undergrowth and leaf litter, but it has also been recorded from lowland swamp areas. Its general distribution pattern appears to be correlated with limestone/karst topography. The EOO and population size are unknown.	The species has been found in a lot of countries, although very limited population data are available in Vietnam and globally. The EAAA is unlikely to contain 0.5% of its global population and at least 5 reproductive unit.
AVES	*Pavo muticus*	Green Peafowl	EN	EN	Yes	No	No	4,590,000	10,000	19,999	X	X	X		Forest, Grassland, Shrubland, Savanna, Artificial/Terrestrial	This species is native to Myanmar, Vietnam. The global population is considered estimated at 10,000-19,999 mature individuals. The Green Peafowl is found throughout Southeast Asia. n Vietnam, the species was formerly widespread virtually throughout, being locally numerous even as recently as the late 1970s/early 1980s, but numbers have been much reduced by habitat loss (McGowan et al. 1998). The main population is now thought to lie in the southcentral region, with the Yok Don and Cat Tien National Parks thought to contain the most important populations. The species has an EOO of 4,590,000km2. The species uses a range of forest, savannah, shrub land, grassland and pastureland habitats. The species favours areas with water access and minimal human interference. Widespread hunting for meat and feathers, and collection of eggs and chicks, combined with habitat modification and human disturbance, has caused a catastrophic decline throughout much of the species's range.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
AVES	*Asarcornis scutulata*	White-winged Duck	EN	NL	Yes	No	Yes	4,120,000	250	999	X		X		Forest, Wetlands (inland)	Asarcornis scutulata was historically widely distributed from north-eastern India and Bangladesh, through South-East Asia to Java and Sumatra, Indonesia. It has undergone a dramatic decline and been suggested that the species's population may precautionarily be considered to lie within the band 250-999 mature individuals. The only recent records from Vietnam are from watercourses in dry dipterocarp forest in Yok Don NP, where it is rare but probably under-recorded. It is likely to be extirpated elsewhere due to widespread forest and wetland destruction. Usually found alone or in small groups, the species is most easy to see at dawn and dusk when moving between daytime roosts and the species's feeding sites.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
AVES	*Heliopais personatus*	Masked Finfoot	EN	NL	Yes	No	Yes	1,810,000	600	1,700	X		X		Forest, Wetlands (inland)	EOO is 1810000km2. Heliopais personatus is patchily distributed from north-east India and Bangladesh and Vietnam. The species appears to have declined dramatically and is now known from comparatively few sites, occurring at low densities everywhere. The species appears to have declined dramatically and is now known from comparatively few sites, occurring at low densities everywhere. It occurs principally in rivers in lowland riverine forest including mangroves, but has been recorded in coastal and inland wetlands, such as tidal creeks, flooded forest, swamps and lakes.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Sterna acuticauda*	Black-bellied Tern	EN	NL	Yes	No	No	4,490,000	6,700	17,000	X				Wetlands (inland)	This species is native to India and posibly extinct in Vietnam. The global population is considered estimated at 6700 - 17000 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 4,490,000 km2. It is found on large rivers (usually breeding on sandpits and islands) and marshes, occasionally on smaller pools and ditches, in lowlands (but not on the coast), up to 730 m. There is lack of information relate to distribution range. Threats include the destruction of breeding habitat (islands and sandspits in larger rivers are increasingly cultivated).	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and at least 5 reproductive unit
AVES	*Lonchura oryzivora*	Java Sparrow	EN	NL	Yes	No	No	148,000	N/A	N/A	X				Grassland, Shrubland, Savanna, Artificial/Terrestrial	This species is a native endemic of the islands of Java, Bali and was introduced in coastal area of Southeast Asisa, including is Vietnam. The global population is considered estimated at 1000 - 2499 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 148,000 km2.	This species is introduced to Vietnam. It is not eligible for critical habitat assessment.
MAGNOLIOPSIDA	*Magnolia bidoupensis*		EN	NL	Yes	Yes	No	700	N/A	N/A	X				Forest	Magnolia bidoupensis is endemic to the Bidoup-Nui Ba National Park in south Viet Nam. This species has an estimated extent of occurrence (EOO) of 700 km2, occuring in less than five locations. Continuing decline in the area and quality of habitat has been reported due to encroachment, fire and illegal logging. Magnolia bidoupensis grows as a evergreen tree up to 8 m tall in montane, broad-leaved forests, associated with species such as Calophyllum balansae, Gordonia sp. and some Ericaceae, usually co-dominant in the first forest stratum.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Nomascus gabriellae*	Red-cheeked Gibbon	EN	EN	Yes	No	No	70,000	6	N/A	X				Forest	In Viet Nam, the species occurs in Gia Lai (Sre Pok River), Phu Yen (Ba River), Dak Nong (Quang Truc commune), Ninh Thuan (Ninh Son State Forest Enterprise) and Khanh Hoa province (Son Thai - Giang Ly Communes) to the south. Within protected areas, the species has been recorded in Cat Tien NP (150 groups and around 500 individuals), Bi Doup- Nui Ba Mountain (17 groups), Bu Gia Map NP (124 groups), Phuoc Binh NP (78 groups), Hon Ba NR (54 groups), Chu Yang Sin NP (166 groups). Outside protected areas, the populations were estimated at 86 groups in Quang Truc Commune, Dak Nong province; 56 groups in Ninh Son State Forest Enterprise, Ninh Thuan Province; about 66 groups in forest areas of Thanh Son and Son Trung Commune; and 52 groups in Son Thai - Giang Ly Communes, Khanh Hoa Province. The species displays a monogamous social structure of adult pair and offspring. This species is found in tall evergreen and semi-evergreen forest, and occasionally in other forest types such as mixed bamboo and woodland forest. Though dry deciduous dipterocarp forests are present in their range, these gibbons do not appear to utilize these forests where associated semi-evergreen or evergreen forest is absent.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Bos gaurus*	Gaur	VU	EN	Yes	No	No	1,200,000	6,000	21,000	X		X		Forest, Artificial/Terrestrial	This species is found Ninh Thuan, Dong Nai, Binh Duong, Tay Ninh, Dak Lak, Gia Lai, Kon Tum provinces. The EOO is quite large. The global population is estimated approximately 6,000-21,000 mature individuals. In Viet Nam, the current status of Gaur is poorly known. Several areas in Dak Lak Province (the Easo and Easup areas and Yok Don National Park) were known to contain Gaur in 1997, but very little reliable information was traced for other parts of the country. Several herds of Gaur persist in Cat Tien National Park and in adjacent state forest enterprises, where the population is now probably stable and even perhaps increasing. It is possible even probable that Gaur have largely been extirpated from all areas where no form of protection exists.	This species is common wordwide. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Helarctos malayanus*	Sun Bear	VU	EN	Yes	No	No	N/A	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	Sun Bears are a forest-dependent species, favouring interior mature and/or heterogeneously structured primary forests (Augeri 2005). There are two ecologically distinct categories of tropical forest that comprise their natural range, distinguished by differences in climate, phenology, and floristic composition: seasonal evergreen and deciduous forest in the mainland (north of the Isthmus of Kra) and aseasonal evergreen rainforest in Malaysia, Sumatra and Borneo. The historic range of this species (within 500 years) extended across much of Southeast Asia, from Borneo and Sumatra north to at least Yunnan Province, China.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAMMALIA	*Lutrogale perspicillat*	Smooth-coated Otter	VU	EN	Yes	No	No	N/A	N/A	N/A	X		X	X	Forest, Shrubland, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	Lives in lowland wetlands and rivers, including sluggish flowing canals and flooded fields; occurs in shallow, open water and is capable of lying buried in mud for lengthy periods if water evaporates during dry seasons. Dependent on swamps and swamp forest. Can move out of the water using its extended fins. It feeds on aquatic insects, young shrimps and small fishes.	The populations of Smooth-coated Otter in Vietnam and globally is unknown. The group of 5 individuals found in the Project area through field survey is considered likely to represent a 0.5% of national population (estimating at 1000 individuals). Therefore, this species triggered critical habitat under criterion 1.
MAMMALIA	*Macaca arctoides*	Stump-tailed Macaque	VU	VU	Yes	No	No	1,000,000	N/A	N/A	X				Forest	This specie is found in Vietnam, Cambodia, Myanmar, Vietnam (Phuoc Binh National park). There are no available population estimates for this taxon in Vietnam. The population is probably large as the species is frequently encountered throughout its distribution in these countries, although populations are mostly fragmented and isolated. This species has a wide habitat range from tropical evergreen forest to semi-deciduous, deciduous forest and limestone forest, but it prefers dense evergreen forests. It occurs widely in the hill and mountain areas of Vietnam. There are no available population estimates for this taxon in Lao PDR, Viet Nam, Cambodia and Thailand (R. Boonratana pers. comm.). The population is probably large as the species is frequently encountered throughout its distribution in these countries, although populations are mostly fragmented and isolated. The species is also protected in national wildlife acts of Lao PDR, Viet Nam, Thailand, Cambodia, Malaysia, and Myanmar.	Although no estimations of population were made within this area or globally. The species is also very common in other forest areas in Vietnam and worldwide. It is unlikey that the EAAA contain areas that support globally important concentrations of this species the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds to trigger criterion 1.
MAMMALIA	*Macaca fascicularis*	Nicobar Crab-eating M	VU	LR	Yes	No	No	N/A	N/A	N/A	X				Wetlands (inland)	In Vietnam, Macaca fasicularis is found in the northern region and in Con Son Island, off the coast of southern Viet Nam. The species is extremely tolerant of a range of habitats, including mangrove and swamp forests, and can be found in agricultural areas near forest (secondary growth, secondary forest, and primary forest). Although this species is widely distributed and is known to be tolerant to habitat changes,, excessive hunting and persecution of this species is cause for concern. Population size and EOO have not yet been estimated.	The Project EAAA does not support suitable habitats for this species. It is unlikey that the EAAA contain areas that support globally important concentrations of this species the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds to trigger criterion 1.
MAMMALIA	*Neofelis nebulosa*	Clouded Leopard	VU	NL	Yes	No	Yes	6,172,455	N/A	N/A	X				Forest,shrubland	The Clouded Leopard is found from the Himalayan foothills in Nepal through mainland Southeast Asia into China (Nowell and Jackson 1996). The Clouded Leopard historically had a wide distribution in China, south of the Yangtze, but recent records are few, habitat is fast disappearing, illegal hunting of this species has been prolific and its current distribution in China is poorly known. Clouded Leopards prefer closed forest (Grassman et al. 2005, Austin et al. 2007), and their habitat in Southeast Asia is undergoing the world's fastest deforestation rate (1.2-1.3% a year since 1990: FAO 2007).	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Panthera pardus*	Leopard	VU	CR	Yes	No	No	N/A	N/A	N/A	X				Forest, Desert, Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Savanna, Shrubland	CR in Vietnam Redlist. This species is found in Lai Chau, Bac Kan, Quang Tri, Thua Thien - Hue, Lam Dong. It is considered extinct in Vietnam	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and at least 5 reproductive unit.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAMMALIA	*Ursus thibetanus*	Asiatic Black Bear	VU	EN	Yes	No	No	N/A	N/A	N/A	X				Forest, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial	Asiatic Black Bears occupy a variety of forested habitats, both broad-leaved and coniferous, from near sea level to an elevation of 4,300 m. The distribution of the Asiatic Black Bear roughly coincides with forest distribution in southern and eastern Asia (FAO 2010), Largest populations occur in China (government estimate: ~28,000; Gong and Harris 2006), Japan (government estimate: 12,000-19,000, with much wider confidence intervals; Ministry of the Environment 2011), India (5,000-7,000; Sathyakumar and Choudhury 2007), and Russia (5,000-7,000; Aramilev 2006). Countries with the smallest total numbers of Asiatic Black Bears are Iran (~100-200) and South Korea. All other countries report probable declining numbers (no report from Democratic People's Republic of Korea). The most severe declines, estimated at >60% in the past 30 years, were reported in Viet Nam and Bangladesh.	This species is common wordwide. The EAAA is unlikely to contain critical habitat criterion 1 for this species, which are areas that support 0.5% of its global population and at least 5 reproductive units.
MAMMALIA	*Macaca fascicularis*	Long-tailed Macaque	VU	NL	Yes	No	No	N/A	N/A	N/A	X				Forest	The species is extremely tolerant of a range of habitats, including mangrove and swamp forests, and can be found in agricultural areas near forest. This subspecies occurs in southern Lao PDR, South Viet Nam, Cambodia, east and south Thailand (and offshore islands), south to the Malay peninsula, Borneo, Sumatra, Java, Bali, and most but not all offshore islands. This taxon is semi-terrestrial, diurnal, and omnivorous	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
MAMMALIA	*Macaca leonina*	Northern Pig-tailed Ma	VU	VU	Yes	No	No	N/A	N/A	N/A	X		X		Forest	This species occur in central and southern Viet Nam (historical records in in Nghe An province, but there is uncertainty whether the species was ever found in the northern province). The species is widely distributed and common in large forest blocks remaining in southern and central Lao PDR, but it is much scarcer in northern Lao PDR and Viet Nam. Habitat disturbances affecting the future survival of this species include: selective logging; timber and firewood collection for making charcoal; building roads, dams, power lines; and deliberately setting fires.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
MAMMALIA	*Arctictis binturong*	Binturong	VU	EN	Yes	No	No	N/A	N/A	N/A	X				Forest, Artificial/Terrestrial	EN in Vietnam Redlist. The Binturong is widespread in South and South-east Asia. Historically, the Binturong was often thought to be relatively common within its distribution range, but it is now mostly uncommon or rare, and is likely to be approaching national extinction in some range countries in mainland South-east Asia (including Viet Nam). Binturong is primarily arboreal, but does descend to the ground so it is detectable using camera-traps. However, relatively intensive post-1999 field surveys that have used this method in suitable habitat in protected areas have produced few or no records of this species in Vietnam. Thailand might be expected to hold one of the healthiest populations in mainland South-east Asia, but declines are suspected there as well. The ecology of this species is poorly known and might vary between areas, mostly associated with primary, secondary evergreen lowland forest, but also include logged forest.	This species is extinct in Vietnam
MAMMALIA	*Rusa unicolor*	Sambar	VU	NL	Yes	No	No	N/A	N/A	N/A	X				Forest, Savanna, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial	No large Indian ungulate has adapted itself to a wider variety of forest types and environmental conditions than has Sambar. In the mountains of Viet Nam, Sambar seems often to be associated with degraded valley bottom areas. In Viet Nam, in most of the northern highlands, in particular, and all other areas of Viet Nam to an increasing extent, Sambar is very rare or has been hunted out from many areas of otherwise suitable habitat. Greater than 19,000 camera-trap nights from >100 locations in the Hue and Quang Nam Saola Nature Reserves detected the species from only one location. The Sambar iscommon in Taiwan and protected areas in India. It is among the most sought-after wild meats which led to the major, ongoing, declines. No information about EOO and global population size.	There are no other evidences of presene in the Project area. he EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAMMALIA	*Aonyx cinereus*	Asian Small-clawed Ott	VU	NL	Yes	No	No	N/A	N/A	N/A	X				Wetlands (inland), Marine Neritic	A riverine and lacustrine species, but perhaps passing from estuaries into the sea. Occurs in medium to large-sized rivers of the lower Mekong. Reported to undertake migrations in the Mekong mainstream. From the Khone Falls to the Mekong delta, it migrates upstream during the dry season from October to March and downstream at the onset of the monsoon season from May to July. These migrations are reported to be triggered by the receding or rising of the water levels. Feeds on crustaceans, insects and small fishes.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
REPTILIA	*Naja siamensis*	Black And White Spitti	VU	NL	Yes	No	No	810,306	N/A	N/A	X				Forest, Artificial/Terrestrial, Artificial/Aquatic & Marine	Yunnan in southern China to Viet Nam). This species inhabits lowland and upland forest and cultivated areas, including rice paddies. It is found in deciduous, disturbed and open forest, and is absent from closed-canopy evergreen forest. There is no detailed population information available for this species, but snake hunters in the region of U Minh Thuong National Park, Viet Nam, report that the species has become much rarer	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and
REPTILIA	*Ophiophagus hanna*	King Cobra	VU	CR	Yes	No	No	N/A	N/A	N/A	X		X		Habitat type Wetlands (inland), Forest, Artificial/Terrestrial, Artificial/Aquatic & Marine, Shrubland, Grassland	The King Cobra is widely distributed in South and Southeast Asia. The EOO is unknown (quite large) for this species but is considered stable. This species is found in a variety of habitats, primarily in pristine forests, but it can also be found in degraded forest, mangrove swamps and even agricultural areas with remnants of woodland. The surviving population of this snake in Viet Nam may be very small. No EOO and population size are available. This species is threatened by destruction of habitat due to logging and agricultural expansion, as Southeast Asia is experiencing one of the highest rates of deforestation in the tropics and this species appears to be most abundant in forested habitats.	There was one King Cobra found during the field surveys. The actual numbers in the Project area could be greater (could possible be 2 or 3 individuals). The populations of King Cobra in Vietnam is unknown, however, the sub-population within the Project area is unlikely to represent a 0.5% national population of this species and 5 reproductive units. This species does not trigger criterion 1.
REPTILIA	*Python bivittatus*	Burmese Python	VU	CR	Yes	No	No	N/A	N/A	N/A	X				Wetlands (inland), Forest, Wetlands, Caves and Subterranean Habitats, Dessert	The Burmese Python is mostly found in forested areas, including mangrove forests and rainforests, but is also found in grasslands, marshes, streams and rivers. It is a widely distributed species found throughout Southeast Asia, especially India, but reported to be rare in Cambodia, Lao PDR and Viet Nam. EOO and population sizes are unavailable. This large constrictor is harvested for food, skin for use in the leather industry, medicinal purposes, and the pet trade.	There is a lack of evidences that this species occur within the EAAA. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.
AVES	*Mulleripicus pulverul*	Great Slaty Woodpecke	VU	NL	Yes	No	No	9,650,000	26,000	550,000	X	X			Forest, Savanna	A Mekong basin endemic, known from the lower basin in Viet Nam. The global population has been estimated to number 26,000-550,000 individuals. The Great Slaty Woodpecker occupies primary semi-open moist deciduous and tropical evergreen old growth, lower elevation forests, as well as adjacent secondary forest and clearings with scattered tall trees. It prefers dipterocarp and teak forests in certain areas, as well as swamp-forest and tall mangroves. Confined to pristine forests with an abundance of tall trees. It is threatened by habitat destruction, particularly the felling of old-growth forest, though it may persist in heavily logged forests at lower densities.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
AVES	*Buceros bicornis*	Great Hornbill	VU	VU	Yes	No	No	10,300,000	13,000	27,000	X	X	X		Forest, Artificial/Terrestrial	This species can be found in Asia. In Vietnam, it is rare and declining resident. The most recent records are from Cat Tien National Park and Deo Nui San in the south, but also from Phong Nha-Ke Bang National Park. Global population is 13000 to 27000, EOO is not estimated. This species frequents wet evergreen and mixed deciduous forests, ranging out into open deciduous areas to visit fruit trees. Habitat-use seems to be negatively associated with human population and positively correlated with the density of large tree required for nesting, and it is therefore most common in unlogged forest. Known nest trees include Tetrameles nudiflora, Dipterocarpus gracilis, Dipterocarpus turbinata, Cleistocalyx nervosum, Shorea faguetiana, Hopea odorata, Neobalanocarpys heimii, Palaquiuum ellipticum, Mangifera indica, Bombax ceiba, Mesua ferrea and Syzygium gardneri.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Rhyticeros undulatus*	Wreathed Hornbill	VU	NL	Yes	No	No	7,020,000	N/A	N/A	X				Forest	The species has a large natural distribution extending eastwards from Myanmar via Thailand, Lao PDR, Cambodia as far as Viet Nam. The species occurs in extensive primary rainforest, mainly in the lowlands. During the non-breeding season, it ranges higher uphill, up to 2,560 m. It tolerates selective logging, but generally avoids disturbed habitats and proximity to human population. The global population size has not been quantified, and the EOO is 7020000 km2.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
AVES	*Carpococcyx renauld*	Coral-billed Ground-cu	VU	NL	Yes	No	No	816,000	N/A	N/A	X				Forest, Shrubland	The species restricted to Cambodia, Laos, Vietnam and Thailand. Throughout most of its range (Cambodia, Laos, Vietnam), the population is likely small and extremely patchily distributed as a consequence of population declines caused by increased levels of hunting. The global population size has not been quantified, but the species is reported to be uncommon. The species is heavily threatened by the rapid expansion of industrial drift-fence cable snaring, which is taking place since the early 2000s.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
AVES	*Columba punicea*	Pale-capped Pigeon	VU	EN	Yes	No	No	1,530,000	2,500	9,999	X		X		Forest, Shrubland, Artificial/Terrestrial	Columba punicea is locally distributed across its broad range, which encompasses parts of northern India, Bangladesh, Myanmar, Thailand, Laos, Cambodia and Vietnam. In Vietnam it is very rare and local with small numbers recently reported from Mang Den/Kon Plong, Kontum Province in 2010 and from magrove forest at Ho Tram, approx 100 km south-east of Ho Chi Minh City, in 2011. However, large flocks (over 90 individuals) were reported in the past from near Da Lat Pleateau (C. Robson in litt. 2012, 2020), whilst regarded as uncommon but resident on some islands in Bai Tu Lam Bay (S. Mahood in litt. 2012), and seen across mangroves in the Red River Delta despite no previous breeding observations nearby (C. Robson in litt. 2020). The global population is considered estimated at 2500-9999 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 1,530,000 km2. It frequents a wide variety of habitats from the lowlands up to 1,600 m, chiefly primary or secondary evergreen forest, but also open, deciduous dipterocarp forest, bamboo, and agricultural fields or overgrown cultivation, particularly in close proximity to forest.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.
AVES	*Sterna aurantia*	River Tern	VU	NL	Yes	No	Yes	9,330,000	20,000	70,000	X				Wetlands (inland), Marine Neritic, Marine Intertidal	This species occurs along river systems across a wide range in southern and south-east Asia. In contrast to declines noted in South-East Asia, the species is now more regular in southern India than was once thought, having probably benefited from the development of reservoirs. It inhabits rivers and freshwater lakes, also occurring rarely on estuaries, and breeds on sandy and rocky islands, especially along river banks. The species is known to be breed in high concentrations in large reservoirs and rivers, as well as natural and artificial wetlands. Breeding occurs mainly in February-May, although the season may extent from November to May.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
AVES	*Clanga clanga*	Greater Spotted Eagle	VU	NL	Yes	No	Yes	18,100,000	3,300	8,800	X				Forest, Wetlands (inland), Shrubland, Artificial/Aquatic & Marine, Grassland	This species is found throughout western Asia, central Asia, parts of eastern and southern Asia, a few isolated parts of Europe and Africa.The global population is considered estimated at 3300-8800 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 18,100,000 km2. The preferred habitat types for this species is inland wetlands, marine intertidal, grassland and rocky areas. It is a migratory species, with birds leaving their breeding grounds in October and November to winter in southern Europe, southern Asia and north-east Africa (del Hoyo et al. 1994). They tend to return in February and March.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Leptoptilos javanicus*	Lesser Adjutant	VU	VU	Yes	No	Yes	11,300,000	5,500	10,000	X	X	X		Forest, Savanna, Wetlands (inland), Marine Intertidal, Marine Coastal/Supratidal, Artificial/Terrestrial, Artificial/Aquatic & Marine	Inland, birds inhabit natural and human-modified wetlands, both open and forested. Coastal populations frequent mangroves and intertidal flats. It nests colonially in large trees, and historically on cliffs, often at traditional sites in or adjacent to wetlands. It utilises small wetlands within Asian dry forest, and can breed some distance from these; shrinking of pools during the dry season and limited availability can lead to overlap with human uses and resulting disturbance. Leptoptilos javanicus has an extensive range across South and South-East Asia. the global population probably numbers 5,500-10,000 mature individuals. In Viet Nam, it was found in South Central Coast and South Vietnam, commonly found in Dong Nai in wetlands (Cat Tien National Park), wetlands in Dong Thap Muoi (Tram Chim, Tam Nong, Dong Thap), coastal plain Mekong River and U Minh Melaleuca forest, as well as in Yok Don National Park (Dak Lak). The species' EOO is unknown.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
MAMMALIA	*Arctonyx collaris*	Greater Hog Badger	VU	NL	Yes	No	No	N/A	N/A	N/A	X				Forest, Savanna, Shrubland, Grassland, Artificial/Terrestrial	Greater Hog Badger occurs from Bangladesh and North-east India east through Myanmar, Thailand and Lao PDR to Vietnam and south to Cambodia and peninsula Thailand. The Laos and Vietnam populations are patchy, and no records were found for the Mekong Delta. As of mid 2014, only two camera-trap records were known for the entire country from Pu Mat Nature Reserve and Pu Luong NR. Subsequently, it is considered to be possibly extinct in Vietnam. This species occurs across a wide variety of habitats. In South-east Asia most records come from forests. The extent of actual and potential occupation of non-forest habitats is unknown: concerted survey in them is rare and off-take of mammals of this size is heavy in much of this species's range. Thus, it is possible that they would occur widely in non-forest parts of South-east Asia but are currently excluded by hunting levels.	Wild population is possibly extinct in Vietnam. It is unlikely that the species trigger critical habitat criterion 1, which are areas that support 0.5% of its global population and at least 5 reproductive unit.
MAGNOLIOPSIDA	*Quercus braianensis*		VU	NL	Yes	No	No	66,808	N/A	N/A	X				Forest	Quercus braianensis is an oak species native to Viet Nam (Braian pass, Di Linh District, Lam Dong Province) and Lao PDR. Quercus braianensis is mostly restricted to southern Viet Nam, with isolated pockets in north and south Lao PDR. The habitat of Quercus braianensis is not well known. EOO is 66808km2	There is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
REPTILIA	*Bronchocela vietnamensis*		VU	NL	Yes	Yes	No	19,816	N/A	N/A	X				Forest	This species is endemic to Viet Nam, where it has been found in the provinces of Gia Lai (K Bang), Phu Yen (Son Hoa) and Dong Nai (Cat Tien). Its type locality is near Tram Lap village, 40 km northwest of Kannackin the Annam mountains, Ankhe District, Gia Lai Province, where it has been recorded at 900 m asl. It is a very rare species, with little information on population trends. This diurnal and arboreal species inhabits submontane forests, where it is associated with tall trees.	There is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
REPTILIA	*Physignathus cocinci*	Chinese Water Dragon	VU	VU	Yes	No	No	N/A	N/A	N/A	X				Forest, Wetlands (inland)	This Chinese Water Dragon occurs throughout Lao PDR, Cambodia and Viet Nam in appropriate habitat. It inhabits evergreen forest, where it is always found in association with streams and rivers. It rests on the branches of trees overhanging the waterway, into which it will plunge to escape danger.The first population-level mark-recapture survey of this species, across 14 stream transects in Thua Thien Hue Province in 2016 and 2017, found that the population appeared stable in two of three districts in this province over this short period but that the population size in this area may have been as low as 232-250 individuals in 2017. "Distinct decline" in the number of individuals encountered was observed over the period between April and June 2017 in the third district, and no mature individuals were recorded in the June survey. Harvesting of this easily-captured species - primarily for food, but also for the international pet trade - constitute serious threats. The species is very widely captive-bred juveniles are taken from the wild for export, especially from Viet Nam. The CITES Trade Database reports 44,741 animals exported from Viet Nam into European Union countries between 2010 and 2016; in every year but 2010 and 2015 annual exports exceeded 8,200. The EOO and global population of this species is unknown	There is a lack of evidences that this species occur within the EAAA, according to field survey results. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAMMALIA	*Capricornis sumatrae*	Mainland Serow	VU	EN	Yes	No	No	N/A	N/A	N/A	X				Forest, Shrubland, Grassland, Rocky areas (eg. inland cliffs, mountain peaks), Artificial/Terrestrial	The Mainland Serow occurs across eleven countries, including China, Southeast Asia and Himalayan range. In other countries, they are quite widely distribued, especially in protected forests in Nepal. In Viet Nam the serows were recorded in almost all protected areas from northern to the south-central areas of the country, especially where forested limestone mountains and cliffs occured (Nguyen Xuan Dang and Le Xuan Canh 2009). During mammal surveys from 1999 to 2008, serows were found in the northern and northern central areas of Vietnam including Quang Tri; in the central areas and in the southern central areas of Vietnam, including in Binh Dinh, Binh Thuan and Ninh Thuan provinces. The species has also been recorded from offshore islands in the north, e.g. Cat Ba (Phan et al. 2014). However, there is no further information available on its distribution status and it is believed that this sub-species has significantly declined due to poaching in Viet Nam.	This species is common wordwide. The EAAA is unlikely to contain critical habitat criterion 1 for this species, which are areas that support 0.5% of its global population and at least 5 reproductive units.
LILIOPSIDA	*Paris polyphylla*	Love Apple	VU	NL	Yes	No	No	6,500,000	N/A	N/A	X				Forest	Paris polyphylla is mainly distributed in the temperate forest across the Himalayas to Western China. The population of P. polyphylla in its entire distribution is not known. Paris polyphylla is a perennial rhizomatous herb, 40-70 cm tall bearing four to nine dark green colored, stalked leaves arranged in a whorl at the top of the stem. EOO is 5500000-6500000km2	There is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
MAMMALIA	*Ratufa bicolor*	Black Giant Squirrel	NT OR LR	VU	Yes	No	No	N/A	N/A	N/A	X				Forest	This widespread Asian species ranges from northern South Asia, through southern China into much of mainland and western insular Southeast Asia. In Southeast Asia, it is widely but patchily distributed from Myanmar and Thailand, through Lao PDR, Cambodia, Viet Nam. It occurs in tropical and subtropical montane evergreen and dry deciduous forests. It is found to occupy tree hollows in mid high canopy. It is easily eradicated from fragmented habitat and not tolerant of habitat modification	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
AVES	*Polyplectron germaini*	Germain's Peacock-ph	NT OR LR	VU	Yes	No	No	60,900	6,000	15,000	X		X		Forest	Polyplectron germaini is endemic to southern Indo-China. There are recent records from numerous localities, including Cat Tien National Park and Cat Loc Nature Reserve, where it is fairly common, the lower slopes of the Da Lat and Di Linh Plateaus. In 1998, it was also frequently heard and seen at six sites in Dak Lak province during surveys. It appears to occupy a range of forest types from montane, dipterocarp-dominated evergreen and semi-evergreen forest, including logged secondary forest and thorny bamboo brakes (N. Brickle in litt. 2004). It is found in both damp and dry areas, from sea-level up to at least 1,400 m.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
AVES	*Palaeornis eupatria*	Alexandrine Parakeet	NT OR LR	NL	No	No	Yes	8,920,000	N/A	N/A	X				Forest, Shrubland, Desert, Artificial/Terrestrial	This species inhabits a variety of moist and dry forests and woodlands, as well as cultivated areas, mangroves and plantations. Psittacula eupatria is widespread in South and South-East Asia, ranging from Pakistan, through most of India , Sri Lanka, much of Nepal, Bhutan and Bangladesh, into southern and central Myanmar, central Thailand, southern and western Laos, much of Cambodia and southern Vietnam. This species occurs in the lowlands to c.1,500 m, inhabiting light forest, including savanna, secondary growth, forest edge, clearings and cultivated areas. It breeds in January-May, nesting in tree cavities and laying a clutch of usually 4-5 eggs. This species has suffered much habitat loss, which, in combination with capture for the cage-bird trade and general persecution as pests, have caused the species to become uncommon or rare in Thailand. EOO is 8920000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Himalayapsitta finsc*	Grey-headed Parakeet	NT OR LR	NL	No	No	Yes	2,060,000	No	No	X				Forest, Shrubland, Artificial/Terrestrial	Psittacula finschii is distributed from eastern India, Bhutan and Bangladesh and Vietnam. The global population size has not been quantified. This species frequents oak, teak, cedar and pine forest, open wooded hillsides and cultivated areas with tall trees, at up to 3,800m. EOO is 2060000km2	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Limosa lapponica*	Bar-tailed Godwit	NT OR LR	NL	No	No	Yes	9,050,000	#######	#######	X				Wetlands (inland), Marine Neritic, Marine Intertidal	The species is extinct in Vietnam. Migrate to Asia starting from March to May approximately. The species is threatened by the degradation of stopover and non-breeding sites due to land reclamation, shellfisheries, pollution, human disturbance, reduced river flows, and in some areas the invasion of mudflats and coastal saltmarshes by mangroves (owing to sea-level rise and increased sedimentation and nutrient loads at the coast from uncontrolled development and soil erosion in upstream catchment areas)	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Numenius arquata*	Eurasian Curlew	NT OR LR	NL	No	No	Yes	20,700,000	647,500	876,000	X				Marine Intertidal, Forest, Wetlands (inland), Marine Coastal/Supratidal, Artificial/Terrestrial, Artificial/Aquatic & Marine, Shrubland, Grassland	The species has a very large range and is migratory. The species winters in Vietnam. The estimated extent of occurrence 20,700,000km2. The estimated population is approximately 647,500-876,000 individuals globally.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Calidris ruficollis*	Red-necked Stint	NT OR LR	NL	No	No	Yes	3,360,000	N/A	315,000	X				Grassland, Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal	During the breeding season the species uses low altitude montane tundra in the subalpine belt. In the non-breeding season it mainly uses coastal and intertidal mudflats, sheltered inlets, bays and lagoons but it also uses freshwater, brackish and saltwater wetlands and occasionally sandy beaches and rocky shorelines. The species is restricted to the East Asian-Australasian Flyway and habitat loss at critical stopover sites in the Yellow Sea is suspected to be the most important threat to this species.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Calidris ferruginea*	Curlew Sandpiper	NT OR LR	NL	No	No	Yes	3,050,000	N/A	90,000	X				Marine Intertidal, Grassland, Marine Neritic, Artificial/Aquatic & Marine, Marine Coastal/Supratidal, Wetlands (inland)	The species has a very large range and is migratory. The species winters in Vietnam. The estimated extent of occurrence 3,050,000km2. The estimated population is approximately 90,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Icthyophaga ichthya*	Grey-headed Fish-eagl	NT OR LR	VU	Yes	No	No	16,300,000	10,000	100,000	X		X		Wetlands (inland), Marine Neritic, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	Although widespread, the Grey-headed Fish-eagle species is now only locally common and may have a moderately small population. In Vietnam it is scarce in south and disappearing from north. This species's global population is preliminarily estimated at 10,000-100,000 mature individuals on the basis that it may not exceed a five-figure total. It is found near slow-moving rivers and streams, lakes, reservoirs and tidal lagoons in wooded country, usually in lowlands but ascending locally to 1,525 m. The most pertinent threats are the loss of undisturbed wetlands, over-fishing, siltation, pollution and persecution. There are also reports that this species may be deliberately targeted by poachers for meat.	This species is common wordwide. Any small populations within the Project EAAA might not represent a globally important concentrations of this species, the loss of which would result in the change of the IUCN Red List to EN or CR.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Anhinga melanogast*	Oriental Darter	NT OR LR	VU	Yes	No	Yes	19,400,000	N/A	22,000	X	X	X		Forest, Marine Coastal/Supratidal, Marine Neritic, Wetlands (inland)	The Oriental Darter occurs in Vietnam (previously widespread breeder, once locally common but now almost extinct, however, increasing numbers are now recorded in the non-breeding season). The population is estimated to number at least 22,000 mature individuals and EOO is 19,400,000 km2. It inhabits shallow inland wetlands including lakes, rivers, swamps and reservoirs.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. The EAAA is unlikely to contain areas that support globally important concentrations of the species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds.
AVES	*Ciconia episcopus*	Asian Woollyneck	NT OR LR	VU	Yes	No	No	13,000,000	50,000	249,999	X	X			Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Artificial/Terrestrial, Artificial/Aquatic & Marine	The species occurs in natural wetland habitats such as in savanna and grassland, including rivers, streams, lakes, ponds, water-holes, lagoons, dams, flood plains, marshes, and freshwater and peat swamp forests, whilst also using artificial habitats such as rice paddy-fields, flooded pastures, and cultivated fields. The species is also known to use man-made, urban structures such as mobile-towers for nesting. Steep declines have been noted since the mid 20th century in South-East Asia with the species considered rare or near-extinction across Thailand, Laos, Cambodia, Vietnam. The EOO is 13,000,000 km2. The global population size is 50,000 to 249,000.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. The EAAA is unlikely to contain areas that support globally important concentrations of the species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds.
MAMMALIA	*Hylopetes alboniger*	Particolored Flying Squ	LC OR LR/	VU	Yes	No	No	4,122,319	N/A	N/A	X				Forest, Shrubland	This species is present in northeastern South Asia, southern and central China, and mainland Southeast Asia. There is little information available on the abundance of this species. This is an arboreal and nocturnal species, found in tropical and subtropical montane forests, and in more temperate oak and rhododendron forests with elevation ranging between 100 – 4,000 m. Populations can be found in primary forests as well as secondary, degraded forests and scrubby habitat. In Vietnam, it is listed in the Vietnam Red Data Book due to the loss of forest habitats. It can be found in Lai Chau, Lang Son, Thua Thien - Hue, Kontum, Gia Lai and Lam Dong provinces.	The species has been found in a lot of countries, although very limited population data are available in Vietnam and globally. The EAAA is unlikely to contain areas that support globally important concentrations of the species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds.
MAMMALIA	*Petaurista philippens*	Indian Giant Flying Squ	LC OR LR/	VU	Yes	No	No	N/A	N/A	N/A	X				Forest, Artificial/Terrestrial	This widely distributed Asian species is found in South Asia, southern and central China, and mainland Southeast Asia (only absent from the Malay Peninsula). It is locally abundant in Southeast Asia where suitable habitat protection is in place. This is an arboreal and nocturnal species. In South-east Asia it is widespread in lowland and hill evergreen broad-leaveed forest, up to about 1000 m, and probably also inhabits deciduous dipterocarp forest. There are no major threats to this species overall. In Southeast Asia, the species seems to be very resilient to hunting, habitat degradation and fragmentation, but it cannot tolerate deforestation excpt for when the forest is replaced by tree plantations. Thus, it is likely to be in overall reflecting the rate and distribution of deforestation.	The species has been found in a lot of countries, although very limited population data are available in Vietnam and globally. The EAAA is unlikely to contain areas that support globally important concentrations of the species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds.
AMPHIBIA	*Ingerophrynus galea*	Bony-headed Toad	LC OR LR/	VU	Yes	No	No	609,844	N/A	N/A	X				Forest, Wetlands (inland)	This species is currently known from 400–1,060 m Asl across much of Viet Nam and central Lao PDR and eastern Cambodia. These are unlikely to represent the actual limits of the species' range as similar habitat and elevations to those in the species' known localities extend into adjacent parts of northern and southern Lao PDR as well as southern China. The size of this species' population is not well known, however it has been detected in a considerable number of surveys. The size of this species' population is not well known, however it has been detected in a considerable number of surveys. It is likely that ongoing forest loss associated with expanding agriculture throughout Southeast Asia is causing some population declines, and the species is listed as 'VU' in the Viet Nam Red Data Book. This species is associated with hilly evergreen and evergreen mixed with deciduous or bamboo forest, and has been observed in or adjacent to flowing streams and pools on the bed of ephemeral creeks (Stuart 2005). In Viet Nam, reproduction presumably occurs around the middle of the year as both larvae and a juvenile have been observed in June.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. The EAAA is unlikely to contain areas that support globally important concentrations of the species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AMPHIBIA	*Zhangixalus feae*	Thao Whipping Frog	LC OR LR/	EN	Yes	No	No	2,892,231	N/A	N/A	X				Forest, Wetlands (inland), Artificial/Terrestrial	This relatively widespread species is known from Myanmar, through northern Thailand, northern Lao PDR, southern and central China, and into much of Viet Nam. These may not represent the actual limits of the species' distribution as similar habitat and elevations to those at its known localities occur in adjacent areas of northeastern India, southern Laos and eastern Cambodia. Little is known about the size and trends of this species' population except that it has been detected in a number of surveys (and described as extremely abundant at Sa Pa in the early 1940's and abundant in parts of north and central Viet Nam. Now the population is rare, about 1-2 indivuals may be found at a time in Sa Pa and only 2 locations have been known to occur. This arboreal species occurs mostly in evergreen forest and is associated with water bodies from stagnant pools to flowing streams. It has also been observed in anthropogenically modified environments. Reproduction has been observed in May and June in Viet Nam. Habitat loss and degradation due to rapidly expanding agriculture is an ongoing threat to biodiversity throughout Southeast Asia.	This species is mostly found in SaPa. There is a lack of recods of this species in elsewhere Vietnam. In addition, the species is common worldwide. It is unlikely that the EAAA contains critical habitat for this species that can support 0.5% of global populations and at least 5 reproduction units.
REPTILIA	*Naja kaouthia*	Monocled Cobra	LC OR LR/	EN	Yes	No	No	N/A	N/A	N/A	X				Forest, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial	This species occurs from northeastern India, Bangladesh and Bhutan across southern China, southward to northern Peninsular Malaysia. It is absent from North Viet Nam, where records attributed to this species likely reflect confusion with N. atra or N. siamensis.This species is common in most of its range. It is explicitly included within the concept of Naja naja that the Viet Nam Red Data Book estimates has suffered a 50% population decline over the same period (Dang et al. 2007), but rates of decline specifically attributable to this species in Viet Nam are unknown. It is unclear whether this species is undergoing significant declines elsewhere within its range. This species can adapt to a range of habitats, including both natural and anthropogenically-modified environments. It prefers habitats associated with water, such as paddy fields, swamps, and mangroves, but can also be found in grasslands, shrublands, and forests. It also occurs in agricultural land and human settlements, including cities. This species is harvested in Lao PDR, Viet Nam, Myanmar and China for both domestic use and export to supply demand for Chinese traditional medicine. It is also used in snake wine in Viet Nam and probably throughout its range.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.
REPTILIA	*Varanus salvator*	Common Water Monit	LC OR LR/	EN	Yes	No	No	N/A	N/A	N/A	X				Forest, Shrubland, Wetlands (inland), Artificial/Terrestrial	This species is extremely widespread throughout southern and Southeast Asia. Recent work has shown that the species is absent from northeastern Myanmar, northern and northeastern Thailand, all but coastal Cambodia, and all of Laos except for the ranges on the Vietnam border and northwestern Vietnam. This species group is thought to be abundant in many places (Gaulke and Horn 2004), including some cities like Bangkok, but no specific population data exists. This species is semi-aquatic and opportunistic and inhabits a variety of natural habitats, such as primary forests and mangrove swamps, agricultural areas (e.g., rice, oil palm) and even cities with canal systems (e.g. in Sri Lanka). Although the species may inhabit all the habitats listed above in at least parts of its range, they cannot all be considered equally as important. The habitats considered most important to this species are mangrove vegetation, swamp and wetlands at altitudes of below 1,000 m. The main threat to this species comes from hunting, as the skin of this species is used in the leather trade, its meat is eaten, and its fat is used in traditional medicine.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.
REPTILIA	*Malayopython reticu*	Reticulated Python	LC OR LR/	CR	Yes	No	No	N/A	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	This species is widespread throughout much of Southeast Asia. It has a northern range limit in central Viet Nam. This snake's population status, and the availability of population data, greatly vary across the species' large geographic range. The snake remains abundant in Thailand, where it can often be found in people's houses during the rainy season (T. Chan-ard pers. comm. August 2011). In the Philippines this is a widespread and common species, even in residential areas. The Philippine subpopulation is believed to be stable, or possibly increasing. It is very rarely found in Viet Nam in the wild, but has been found to be common in good forest in southern Viet Nam (D. Natusch pers. comm. 2018). It is thought likely that it remains common in southern parts of this country where suitable habitat remains, including protected areas. The rate of population decline in Vietnam has been estimated at greater than 80% over ten years. The species occurs in rainforest, woodland and adjacent grassland areas. It is also associated with rivers and is often found near or in streams and lakes. Its habitat tolerances appear to vary across its range. This species is an excellent swimmer; it has even been reported far out at sea and has consequently colonized many small islands within its range. Pressures from exploitation are likely to be increasing in lowland areas of central and southern Viet Nam.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Lophura diardi*	Siamese Fireback	LC OR LR/	VU	Yes	No	No	1,040,000	N/A	N/A	X		X		Forest, Shrubland	Lophura diardi is found in Thailand, Laos, Cambodia and Vietnam (locally common and widespread in central and southern regions). It occurs in evergreen, semi-evergreen and bamboo forest, secondary growth and scrub, often near roads and tracks through the forest, chiefly in the plains and foothills to 500 m, but occasionally up to 800 m, and perhaps 1,150m. According to vncreature, the species occurs in Hà Tĩnh, Quảng Bình, Quảng Trị, Thừa Thiên - Huế, Gia Lai, Kontum, Đắk Lắk, Lâm Đồng, Khánh Hoà, Đồng Nai, Tây Ninh.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. The EAAA is unlikely to contain areas that support globally important concentrations of an species, the loss of which would result in the change of the IUCN Red List status to EN or CR.
AVES	*Nettapus coromande*	Cotton Pygmy-goose	LC OR LR/	EN	Yes	No	Yes	33,800,000	N/A	130,000	X	X			Wetlands (inland)	This species is distributed throughout southern Asia, parts of Southeast Asia and northern New Guinea and eastern Australia. It has an EOO of 33,800,000km2. The global population has been estimated at 130,000 – 1,100,000 individuals. In Vietnam, the species are rare and mostly occur in protected areas including Cat Tien National Park, Dam Doi Bird Sanctuary Nature Reserve (Ca Mau), Bac Lieu Bird Sanctuary.	This species is common wordwide. The EAAA is unlikely to contain critical habitat criterion 1 for this species, which are areas that support 0.5% of its global population and at least 5 reproductive units.
AVES	*Spatula clypeata*	Northern Shoveler	LC OR LR/	NL	No	No	Yes	89,900,000	#######	#######	X				Marine Intertidal, Marine Coastal/Supratidal, Artificial/Aquatic & Marine, Grassland, Wetlands (inland), Marine Neritic	This migratory species is found throughout Europe, North America and Asia. The EOO for the species is 89,900,000km2. The global population has been estimated at 4,300,000 – 4,700,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Spatula querquedula*	Garganey	LC OR LR/	NL	No	No	Yes	32,500,000	#######	#######	X				Marine Intertidal, Marine Neritic, Wetlands (inland), Grassland, Artificial/Aquatic & Marine, Marine Coastal/Supratidal	This widespread species is found throughout most of Asia, most of Europe, parts of Africa and parts of Australasia. The species spends its non-breeding season in Vietnam. The global population has been estimated at 2,600,000-2,800,000 individuals. The EOO for the species is 32,500,000km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Anas crecca*	Common Teal	LC OR LR/	NL	No	No	Yes	48,200,000	N/A	#######	X				Wetlands (inland)	This migratory species is widely distributed throughout the northern hemisphere. The EOO is 48,200,0000km2. The global population is estimated at 6,600,000 – 7,700,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Turnix tanki*	Yellow-legged Buttonq	LC OR LR/	NL	No	No	Yes	N/A	N/A	N/A	X				Grassland, Artificial/Terrestrial, Shrubland, Forest	This migratory species occurs in grassland, forest and shrub land habitat types. This species is found in Bangladesh, Bhutan, Cambodia, China, India, Korea, Democratic People's Republic of, Lao People's Democratic Republic, Myanmar, Nepal, Pakistan, Russian Federation (Eastern Asian Russia), Thailand, Vietnam. Vietnam is identified as an area used for breeding. The EOO is estimated to be 19,400,000km2. The global population size has not been quantified, but the species is apparently common through much of its range and is considered to be stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Jynx torquilla*	Eurasian Wryneck	LC OR LR/	NL	No	No	Yes	38,400,000	#######	#######	X				Forest, Grassland, Shrubland, Marine Coastal/Supratidal, Artificial/Terrestrial, Savanna	This species is found throughout Europe, northern Asia, central Africa and southern Asia. Its EOO is 38,400,000km2. The global number of mature individuals is between 3,000,000 and 7,199,999	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Dendrocopos hyperyt*	Rufous-bellied Woodp	LC OR LR/	NL	No	No	Yes	5,130,000	N/A	N/A	X	X			Forest	The global population size has not been quantified, but the species is reported to be rather uncommon to scarce in most of its range. No data available on geographic range and habitat. EOO is 5130000km2. According to birdwatchingvietnam, this species occurs in Northeast, Northwest and Central Highland in Vietnam. They live in Forests, including pine forests. Spawns from about March to May, laying 4-5 eggs.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Upupa epops*	Common Hoopoe	LC OR LR/	NL	No	No	Yes	77,600,000	N/A	#######	X	X			Grassland, Artificial/Terrestrial, Savanna	This migratory species is found throughout Asia, Europe and Africa. The EOO is estimated to be 77,600,000km2. The overall population is estimated at 5,000,000-10,000,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Eurystomus orientali*	Oriental Dollarbird	LC OR LR/	NL	No	No	Yes	32,400,000	N/A	N/A	X	X			Artificial/Terrestrial, Forest, Shrubland	The estimated EOO is 32,400,000 km2. The estimated population is unknown	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Alcedo atthis*	Common Kingfisher	LC OR LR/	NL	No	No	Yes	79,900,000	700,000	#######	X	X			Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Artificial/Terrestrial, Artificial/Aquatic & Marine	The estimated EOO is 94,100,000 km2. The estimated population is approximately 700000-1399999 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Halcyon coromanda*	Ruddy Kingfisher	LC OR LR/	NL	No	No	Yes	22,100,000	N/A	N/A	X				Forest, Artificial/Terrestrial, Wetlands (inland)	This species is found throughout most of Southeast Asia and Korea and Japan. The EOO is 22,100,000km2. The global population size has not been quantified, but the species is reported to be widespread but generally rare and uncommon	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Halcyon pileata*	Black-capped Kingfishe	LC OR LR/	NL	No	No	Yes	5,160,000	200	200,000	X	X			Wetlands (inland), Forest, Marine Coastal/Supratidal, Marine Intertidal, Artificial/Terrestrial, Marine Neritic	This migratory species is found consistently throughout Southeast Asia, parts of India, China and Korea. The EOO for this species is 5,160,000km2. The global population is not yet quantified, although, it is estimated that China holds between 100 and 100,000 breeding pairs.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Merops philippinus*	Blue-tailed Bee-eater	LC OR LR/	NL	No	No	Yes	18,300,000	N/A	N/A	X	X			Artificial/Terrestrial, Forest, Wetlands (inland)	This species is found throughout southern Asia, Southeast Asia and New Guinea. The species breeds in Vietnam. It has an EOO of 22,800,000 km2. The species global population has not yet been quantified	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Merops leschenaulti*	Chestnut-headed Bee-	LC OR LR/	NL	No	No	Yes	12,000,000	N/A	N/A	X	X			Shrubland, Forest, Artificial/Terrestrial, Wetlands (inland)	This species is found and breeds in Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Nepal, Sri Lanka, Thailand and Vietnam. It has an EOO of 12,000,000km2. The species global population has not yet been quantified, but considered increasing and locally common throughout its very large range.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Clamator coromand*	Chestnut-winged Cuck	LC OR LR/	NL	No	No	Yes	13,100,000	N/A	N/A	X	X			Artificial/Terrestrial, Shrubland, Savanna, Forest	This species is found throughout southern Asia and Southeast Asia. Its EOO is 13,100,000km2. The global population has not yet been quantified, however, considered fairly common within its range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Cuculus micropterus*	Indian Cuckoo	LC OR LR/	NL	No	No	Yes	26,200,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This species is found throughout eastern and southern Asia and Southeast Asia. Its EOO is 26,200,000km2. The global population size has not been quantified, but the species is reported to be fairly common and widespread, while national population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Korea and possibly c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Russia.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Cacomantis sonnera*	Banded Bay Cuckoo	LC OR LR/	NL	No	No	Yes	14,800,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial, Shrubland	This species is found throughout Southeast Asia, parts of India and the Himalayas. The species actively breeds in Vietnam. The EOO for this species is 14,800,000km2. The global population has not yet been quantified, however, it is considered fairly common within its range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Cacomantis merulinu*	Plaintive Cuckoo	LC OR LR/	NL	No	No	Yes	12,900,000	N/A	N/A	X	X			Forest, Shrubland, Grassland, Artificial/Terrestrial	This species is found throughout Southeast Asia and parts of India. The species actively breeds in Vietnam. The EOO for this species is 12,900,000km2. The global population has not yet been quantified but considered stable. The population in China has been estimated at c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Chrysococcyx maculc*	Asian Emerald Cuckoo	LC OR LR/	NL	No	No	Yes	4,400,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is probably scarce to rare. No data on geograhic range and habitat. EOO is 4400000km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Chrysococcyx xantho*	Violet Cuckoo	LC OR LR/	NL	No	No	Yes	10,600,000	N/A	N/A	X				Forest, Artificial/Terrestrial	This species is found throughout Southeast Asia and parts of Myanmar. The species actively breeds in Vietnam. The EOO for this species is 10,600,000km2. The global population has not yet been quantified but considered descreasing.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Eudynamys scolopac*	Western Koel	LC OR LR/	NL	No	No	Yes	34,200,000	N/A	N/A	X	X			Shrubland, Forest, Artificial/Terrestrial	This species is found in southern Asia and Southeast Asia. The EOO for this species is 34,200,000km2. The global population has not yet been quantified, although considered common throughout most of its range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Loriculus vernalis*	Vernal Hanging-parrot	LC OR LR/	NL	No	No	Yes	6,460,000	N/A	N/A	X	X			Artificial/Terrestrial, Shrubland, Forest	This species is found throughout parts of India, Bangladesh, Myanmar, Cambodia, Vietnam, Thailand and Laos. The EOO for this species was 6,460,000km2. The global population for this species has not been quantified	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hirundapus caudacu*	White-throated Needle	LC OR LR/	NL	No	No	Yes	17,000,000	N/A	N/A	X				Forest, Shrubland, Grassland	This species is found in Southeast Asia. The EOO for this species is 6,460,000km2. The global population has not yet been quantified but considered stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Hirundapus cochinch*	Silver-backed Needleta	LC OR LR/	NL	No	No	Yes	2,470,000	N/A	N/A	X				Forest	This migratory species prefers forest habitat types and is distributed throughout Asia. This species distribution includes Vietnam. This species is also thought to reside in Cambodia, China, India, Laos, Malaysia, Myanmar, Nepal, Singapore and Thailand (Breeding locations unknown). Its EOO is 2,470,000km2. The global population size has not been quantified, but the species is reported to be locally common to uncommon	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Apus pacificus*	Pacific Swift	LC OR LR/	NL	No	No	Yes	27,400,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	The estimated EOO is 27,400,000 km2. The estimated population is unknow	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Otus spilocephalus*	Mountain Scops-owl	LC OR LR/	NL	No	No	Yes	12,500,000	N/A	N/A	X				Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as common in places (Konig et al. 1999), while national population sizes have been estimated at c.10,000-100,000 breeding pairs in China and c.10,000-100,000 breeding pairs in Taiwan	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Glaucidium brodiei*	Collared Owlet	LC OR LR/	NL	No	No	Yes	14,400,000	N/A	N/A	X	X			Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be common to fairly common throughout most of its range (del Hoyo et al. 1999), while national population sizes have been estimated at c.10,000-100,000 breeding pairs in China and c.10,000-100,000 breeding pairs in Taiwan (Brazil 2009).	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Glaucidium cuculoide*	Asian Barred Owlet	LC OR LR/	NL	No	No	Yes	8,500,000	N/A	N/A	X	X			Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be common over most of its range (del Hoyo et al. 1999), while the population in China has been estimated at c.10,000-100,000 breeding pairs (Brazil 2009).	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Streptopelia tranque*	Red Turtle-dove	LC OR LR/	NL	No	No	Yes	18,300,000	N/A	N/A	X	X			Forest, Savanna, Shrubland	This migratory species occurs in forest, shrub land and savannah habitat types. This species is distributed throughout Asia. The species winters in Vietnam. Its EOO is 18,300,000km2. The global population size has not been quantified, but the species is described as common to abundant.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Macropygia unchall*	Barred Cuckoo-dove	LC OR LR/	NL	No	No	Yes	19,000,000	N/A	N/A	X				Forest, Artificial/Terrestrial	This species is found throughout parts of Bhutan, China, Indonesia, Malaysia, Nepal, India, Bangladesh, Myanmar, Cambodia, Vietnam, Thailand and Laos. The EOO for this species was 19,000,000km2. The global population for this species has not been quantified, but is considered stable with the population in China estimated at c.100-100,000 breeding pairs.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Treron curvirostra*	Thick-billed Green-pige	LC OR LR/	NL	No	No	Yes	9,970,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	The estimated EOO is 9,970,000 km2. The global population size has not been quantified, but the species is described as generally common to abundant (Gibbs et al. 2001).	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Treron apicauda*	Pin-tailed Green-pigeo	LC OR LR/	NL	No	No	Yes	3,220,000	N/A	N/A	X	X			Forest	The EOO is 3,220,000 km2. The global population size has not been quantified, but the species is reported to be locally common to uncommon	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Treron seimundi*	Yellow-vented Green-p	LC OR LR/	NL	No	No	Yes	N/A	N/A	N/A	X				Forest	The global population size has not been quantified, but the species is reported to be uncommon to frequent (del Hoyo et al. 1997).	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Treron sphenurus*	Wedge-tailed Green-pi	LC OR LR/	NL	No	No	Yes	9,880,000	N/A	N/A	X				Forest	The global population size has not been quantified, but the species is reported to be common to uncommon.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Amaurornis phoenicu*	White-breasted Water	LC OR LR/	NL	No	No	Yes	39,300,000	10,000	100,000	X	X			Wetlands (inland), Marine Coastal/Supratidal, Shrubland, Forest, Artificial/Terrestrial, Grassland, Artificial/Aquatic & Marine	This migratory species occurs in a variety of habitat types including inland wetlands, coastal/supratidal, shrub land, grassland and aquatic environments. It occurs in countries such as Thailand, China and Nepal, and United Arab Emirates during the non-breeding season. In the breeding season the species is known to occur in British Indian Ocean Territory. This species winters in Vietnam and distribution includes the Project area. The EOO is 39,300,000km2. The global population is estimated between 10,000-100,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Zapornia pusilla*	Baillon's Crake	LC OR LR/	NL	No	No	Yes	74,800,000	500,000	999,999	X				Marine Intertidal, Wetlands (inland), Artificial/Aquatic & Marine, Grassland	The Baillo's Crake is found in continuously throughout central Asia, parts of Europe, southern Africa, Southeast Asia and parts of Australasia. The species is extant to Vietnam. Its EOO is 74,800,000km2. The population of mature individuals has been estimated at 500000-999999	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Zapornia fusca*	Ruddy-breasted Crake	LC OR LR/	NL	No	No	Yes	31,400,000	N/A	N/A	X				Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland	This migratory species breeds in Korea, Democratic People's Republic of; Korea, Republic of; Philippines; Russian Federation (Eastern Asian Russia); Singapore . The EOO is estimated to be 31,400,000km2. The population is unknown and the population trend is considered to be unknown	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Gallicrex cinerea*	Watercock	LC OR LR/	NL	No	No	Yes	22,600,000	N/A	N/A	X				Artificial/Terrestrial, Wetlands (inland), Artificial/Aquatic & Marine	This species is continuously distributed throughout most of eastern and southern Asia (including Southeast Asia).This species distribution includes Vietnam, and includes the Project area. This species utilises Korea during the breeding season. This species EOO is 22,600,000km2. The global population size has not been quantified, though national population estimates include: c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in China; < c.100,000 breeding pairs and < c.1,000 individuals on migration in Taiwan; c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Korea and < c.50 individuals on migration in Japan	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Porphyrio porphyrio*	Purple Swamphen	LC OR LR/	NL	No	No	Yes	N/A	780,000	#######	X				Wetlands (inland), Marine Coastal/Supratidal, Artificial/ Aquatic & Marine	This species has an extremely large range. Wetlands International (2015) estimate the overall population to be 780,000-2,910,000 individuals. It shows a preference for permanent, fresh or brackish, still or slow-flowing, sheltered, extensive wetlands (del Hoyo et al. 1996) with floating mats of water-lilies (Taylor and van Perlo 1998), tall, dense emergent vegetation, muddy or sandy shorelines and patches of shallow water. Suitable habitats include ponds, lakes, dams, marshes, swamps, rivers, flood-plains, artesian wells, sewage farms, and wet rice-fields.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Fulica atra*	Common Coot	LC OR LR/	NL	No	No	Yes	152,000,000	#######	#######	X				Wetlands (inland), Grassland, Artificial/Aquatic & Marine, Marine Coastal/Supratidal, Marine Neritic	The Common Coot is found throughout Europe, most of Asia, northern Africa and most of Australasia, including Vietnam. The species utilises Australia, Kazakhstan, Korea, Mongolia, New Zealand, Norway, The Russian Federation, Tajikistan, Turkmenistan, Uzbekistan and Western Sahara during the breeding season. Its EOO is 152,000,000km2. The global population is estimated at 5300000-6500000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Gallinago stenura*	Pintail Snipe	LC OR LR/	NL	No	No	Yes	12,900,000	N/A	N/A	X				Wetlands (inland), Grassland, Forest, Shrubland, Artificial/Aquatic & Marine	The Pintail Snipe is found throughout north-eastern Asia and parts of central Asia, parts of southern Asia and Southeast Asia. The species inhabits Vietnam during the non-breeding season. The EOO for this species is 12,900,000km2. The global population of individuals is estimated at 50,000 – 2,000,000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Gallinago gallinago*	Common Snipe	LC OR LR/	NL	No	No	Yes	21,500,000	N/A	N/A	X	X			Marine Neritic, Wetlands (inland), Grassland, Forest, Artificial/Aquatic & Marine	The Common Snipe is found throughout most of Asia (except central parts), Europe and parts of Africa. The species inhabits Vietnam during the non-breeding season. The EOO for this species is 21,500,000 km2. The global population of mature individuals is estimated at 15,000,000 – 29,000,000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Numenius phaeopus*	Whimbrel	LC OR LR/	NL	No	No	Yes	31,100,000	N/A	N/A	X				Marine Intertidal, Forest, Marine Neritic, Marine Coastal/Supratidal, Artificial/Aquatic & Marine, Shrubland, Grassland, Wetlands (inland)	This birds are found in coastal area of Asia, Australia, Africa. The estimated EOO is 31,100,000 km2. The estimated population is unknow	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Tringa erythropus*	Spotted Redshank	LC OR LR/	NL	No	No	Yes	7,360,000	N/A	N/A	X	X			Forest, Shrubland, Grassland, Wetlands (inland), Marine Intertidal, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	This species is found throughout northern Asia, parts of Europe, southern Asia and parts of Africa. The species utilises Vietnam during the non-breeding season. The EOO for this species is 7,360,000km2. The global population is estimated at 110,000-270,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Tringa totanus*	Common Redshank	LC OR LR/	NL	No	No	Yes	40,700,000	#######	#######	X				Wetlands (inland), Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal, Artificial/Terrestrial	EOO is 40700000km2. This species has an extremely large range. The global population is estimated to number c.1,300,000-3,100,000 individuals. Most populations of this species are fully migratory and travel on a broad front over land and along coasts. On passage the species may frequent inland flooded grasslands and the silty shores of rivers and lakes, but during the winter it is largely coastal, occupying rocky, muddy and sandy beaches, saltmarshes, tidal mudflats, saline and freshwater coastal lagoons, tidal estuaries, saltworks and sewage farms. It is found in Northeast (near Red River Delta), South Central Coast, and Southern Viet Nam.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Tringa nebularia*	Common Greenshank	LC OR LR/	NL	No	No	Yes	18,700,000	N/A	N/A	X	X			Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	This species inhabits northern Asia, most of Africa, southern Asia , Southeast Asia and Australaisa. The species utilises Vietnam during the non-breeding season. The EOO for this species is 18,700,000km2. The global population is estimated at 440,000-1,500,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Tringa ochropus*	Green Sandpiper	LC OR LR/	NL	No	No	Yes	24,600,000	N/A	#######	X	X			Wetlands (inland), Forest, Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland	This species inhabits northern Asia, most of Africa, southern Asia, Europe and Southeast Asia. The EOO for this species is 24,600,000km2. The global population is estimated at 1,200,000-3,600,000 individuals. The popuation trend is increasing	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Tringa glareola*	Wood Sandpiper	LC OR LR/	NL	No	No	Yes	23,000,000	N/A	N/A	X	X			Forest, Shrubland, Grassland, Wetlands (inland), Artificial/Aquatic & Marine	This species inhabits northern Asia, most of Africa, southern Asia , Southeast Asia and Australaisa. The species utilises Vietnam during the non-breeding season. The EOO for this species is 23,000,000km2. The global population is estimated at 3,100,000-3,500,000 individuals and tje pupulation trend is stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Actitis hypoleucos*	Common Sandpiper	LC OR LR/	NL	No	No	Yes	47,200,000	N/A	N/A	X	X			Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Artificial/Terrestrial, Artificial/Aquatic & Marine	The Common Sandpiper is broadly distributed, found throughout most of Africa, Europe, most of Asia and Australasia. The species has an EOO of 47,200,000km2.The global population has been estimated at 2,600,000-3,200,000.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Arenaria interpres*	Ruddy Turnstone	LC OR LR/	NL	No	No	Yes	177,000	300,000	500,000	X				Marine Intertidal, Grassland, Wetlands (inland), Marine Neritic	This species is found in coastal area. The species has an EOO of 177,000km2.The global population has been estimated at 300000-500000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Calidris temminckii*	Temminck's Stint	LC OR LR/	NL	No	No	Yes	9,780,000	110,000	850,000	X				Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal	This species is found in coastal area. The species has an EOO of 9,780,000km2.The global population has been estimated at 110000-850000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Calidris subminuta*	Long-toed Stint	LC OR LR/	NL	No	No	Yes	11,000,000	N/A	25,000	X				Shrubland, Artificial/Aquatic & Marine, Marine Coastal/Supratidal, Grassland, Marine Intertidal	This species has a scattered distribution, found throughout most of Southeast Asia, isolated patches throughout Russia, Australia and New Guinea. The species has an EOO of 11,000,000km2. Suitable habitats include the edges of permanent and temporary lakes, ponds, reservoirs, lagoons, swamps and streams, river flood-plains, marshes, rice-fields, sewage ponds, saltpans and saltmarshes The global population has been estimated at >25,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Hydrophasianus chir*	Pheasant-tailed Jacana	LC OR LR/	NL	No	No	Yes	19,700,000	N/A	N/A	X				Wetlands (inland)	This species is found in coastal area. The species has an EOO of 19,700,000km2.The global population is unknow but the population trend is decreasing	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Metopidius indicus*	Bronze-winged Jacana	LC OR LR/	NL	No	No	Yes	N/A	N/A	N/A	X				Wetlands (inland)	The global population is estimated to number > c.100,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pluvialis fulva*	Pacific Golden Plover	LC OR LR/	NL	No	No	Yes	705,000	N/A	N/A	X				Forest, Shrubland, Grassland, Wetlands (inland), Marine Intertidal, Marine Coastal/Supratidal, Artificial/Terrestrial	This species is found in coastal area of Asia. The species has an EOO of 705,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pluvialis squatarola*	Grey Plover	LC OR LR/	NL	No	No	Yes	2,910,000	N/A	N/A	X				Marine Intertidal, Grassland, Marine Coastal/Supratidal	This species is found in coastal area of Asia. The species has an EOO of 2,910,000km2. thr global population is estimated approximately 490000-630000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Charadrius dubius*	Little Ringed Plover	LC OR LR/	NL	No	No	Yes	55,900,000	280,000	530,000	X	X			Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Artificial/Terrestrial, Artificial/Aquatic & Marine	The species has a very large range and is migratory. The species winters in Vietnam. The estimated extent of occurrence 55,900,000km2. The estimated population is approximately 280,000 – 530,000 individuals globally.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Charadrius mongolu*	Lesser Sandplover	LC OR LR/	NL	No	No	Yes	47,100,000	11,000	12,000	X				Artificial/Aquatic & Marine, Wetlands (inland), Marine Neritic, Marine Coastal/Supratidal	The species has a very large range and is migratory. The species winters in Vietnam. The estimated extent of occurrence 47,100,000km2. The global population is about 11,000-12,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Charadrius leschenau*	Greater Sandplover	LC OR LR/	NL	No	No	Yes	9,590,000	154,000	339,000	X				Marine Coastal/Supratidal, Grassland, Wetlands (inland), Rocky areas (eg. inland cliffs, mountain peaks), Desert, Marine Intertidal	The species has a very large range and is migratory. The species winters in Vietnam. The estimated extent of occurrence 9,590,000km2. The estimated population is approximately 154,000 -339,000 individuals globally.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Vanellus indicus*	Red-wattled Lapwing	LC OR LR/	NL	No	No	Yes	14,700,000	50,000	60,000	X	X			Grassland, Wetlands (inland), Artificial/Terrestrial	The global population is estimated at 50,000-60,000 individuals. t uses open areas near fresh or brackish water: rivers, mudbanks, wet grassland, pools, particularly on cultivated land, such as corn fields, grass fields and large gardens. It also uses open forests, waste, fallow and ploughed land and occasionally grass along highways	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Glareola maldivarum*	Oriental Pratincole	LC OR LR/	NL	No	No	Yes	25,400,000	N/A	N/A	X				Grassland, Wetlands (inland), Marine Intertidal, Artificial/Terrestrial	This species has a scattered distribution throughout Australasia and is found consistently through eastern and southern Asia. Its EOO is 25,400,000km2. The global population size is estimated at 2.9-3 million individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Larus brunnicephalus*	Brown-headed Gull	LC OR LR/	NL	No	No	Yes	851,000	N/A	N/A	X				Wetlands (inland), Marine Neritic	This species is found in coastal regions of Southeast Asia, southern Asia and inland western China. The species spends the non-breeding season in Vietnam. The EOO for this species is 851,000km2. The global population has been estimated at 100,000-200,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Larus ridibundus*	Black-headed Gull	LC OR LR/	NL	No	No	Yes	44,500,000	#######	#######	X				Wetlands (inland), Marine Neritic, Grassland, Marine Intertidal, Artificial/Aquatic & Marine, Artificial/Terrestrial, Marine Coastal/Supratidal	This species is found throughout Europe, north and west Africa, eastern North America, northern Asia and coastal southern and eastern Asia. This species EOO is 44,500,000km2. The global population is estimated at 4,800,000-8,900,000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Chlidonias hybrida*	Whiskered Tern	LC OR LR/	NL	No	No	Yes	130,000,000	N/A	N/A	X				Wetlands (inland), Marine Intertidal, Artificial/Aquatic & Marine	This widely distributed Bird is found throughout most of Africa, scattered throughout Europe, scattered throughout central and southern Asia, Southeast Asia and Australasia. This species is found in Vietnam during the non-breeding season. The EOO for this species is 130,000,000km2. The global population has been estimated at 300,000 – 1,500,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Chlidonias leucopter*	White-winged Tern	LC OR LR/	NL	No	No	Yes	27,200,000	#######	#######	X				Marine Intertidal, Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine, Grassland	This widely distributed Bird is found throughout most of Africa, western, central and southern Asia, Southeast Asia and Australasia. The EOO for this species is 27,200,000km2. The global population has been estimated at 3,100,000 – 4,000,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pandion haliaetus*	Osprey	LC OR LR/	NL	No	No	Yes	228,000,000	100,000	499,999	X	X			Forest, Marine Neritic, Artificial/Aquatic & Marine, Wetlands (inland), Marine Coastal/Supratidal	This widespread species is found throughout all continents except Antarctica, central Australia, central Asia, the Sahara and southern South America. It has an EOO of 228,000,000. There is an estimated 100,000 – 499,999 mature individuals globally	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Aviceda leuphotes*	Black Baza	LC OR LR/	NL	No	No	Yes	6,880,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This small Bird of prey species is found throughout parts of India, Bangladesh, Cambodian, Myanmar, Nepal, Thailand, Indonesia, Malaysia, Singapore, Sri Lanka and Vietnam. The species breeds in Vietnam and prefers forest and inland waters as its habitat type. The EOO for this species is 6,880,000km2. The global population has been estimated at >10,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pernis ptilorhynchus*	Oriental Honey-buzzar	LC OR LR/	NL	No	No	Yes	38,200,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial, Grassland	This migratory species is found from southern Asia, Southeast Asia to Eastern Russia Asia. Its EOO is 38,200,000km2. The global population is estimated at 100,000 individual and considered stable.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Circus melanoleucos*	Pied Harrier	LC OR LR/	NL	No	No	Yes	6,080,000	N/A	N/A	X	X			Wetlands (inland), Grassland, Shrubland, Artificial/Terrestrial	This species is found through southern Asia, parts of Southeast Asia and parts of Mongolia, north eastern China and southeastern Russia. The species spends the non-breeding season in Vietnam. The EOO for this species is 6,080,000km2. There has been an estimated 10,000-100,000 breeding pairs in China during migration.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Accipiter badius*	Shikra	LC OR LR/	NL	No	No	Yes	62,500,000	N/A	500,000	X	X			Forest, Grassland, Artificial/Terrestrial, Savanna, Shrubland	This migratory species is native to central and southern Africa, parts of central Asia, southern Asia and Southeast Asia. This species breeds in Vietnam. The global population is considered stable and estimated at 500,000 – 999,999 mature individuals. Its Estimated Extent of Occurrence (EOO) is estimated at 62,500,000km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Accipiter gularis*	Japanese Sparrowhawk	LC OR LR/	NL	No	No	Yes	11,400,000	N/A	N/A	X	X			Artificial/Terrestrial, Forest, Shrubland, Wetlands (inland)	This migratory species central eastern and Southeast Asia during the non-breeding season and China, Japan, Korea and Eastern Asian Russia during the breeding season. The EOO is 11,400,000km2. The global population is estimated to be in the tens of thousands and considered stable.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Accipiter virgatus*	Besra	LC OR LR/	NL	No	No	Yes	21,200,000	100,000	N/A	X	X			Forest, Artificial/Terrestrial	The global population is estimated to number c.100,000 individuals. The EOO is 21,200,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Butastur indicus*	Grey-faced Buzzard	LC OR LR/	NL	No	No	Yes	3,280,000	N/A	N/A	X	X			Wetlands (inland), Artificial/Terrestrial, Forest, Artificial/Aquatic & Marine	This species is found throughout most of eastern Asia and Southeast Asia. The species is a resident of Vietnam. The EOO for this species is 3,280,000km2. The global population for this species is estimated at > 100,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Falco tinnunculus*	Common Kestrel	LC OR LR/	NL	No	No	Yes	106,000,000	N/A	#######	X	X			Artificial/Terrestrial, Shrubland, Forest, Grassland	The Common Kestrel is distributed throughout Europe, most of Africa (except Sahara) and most of Asia. The EOO is 106,000,000km2. The global number of mature individuals is estimated at 4,000,000 – 6,500,000.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Falco severus*	Oriental Hobby	LC OR LR/	NL	No	No	Yes	20,300,000	N/A	670	X				Forest, Artificial/Terrestrial, Rocky areas (eg. inland cliffs, mountain peaks), Grassland	This species is found throughout southern and Southeast Asia (patchy). The species actively breeds in Vietnam. The EOO for this species is 20,300,000km2. The global population of mature individuals is estimated at 670 - 6,700. The species is found in moist lowland and mangrove forests, grasslands, rocky areas and artificial arable land/ plantations. The oriental hobby has a large home range.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Tachybaptus ruficolli*	Little Grebe	LC OR LR/	NL	No	No	Yes	170,000,000	N/A	N/A	X	X			Wetlands (inland), Marine Neritic, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	This migratory species is found in Europe, Central Asia, Africa and North Asia. The EOO is estimated to be 133,000,000km2. The population is unknown and the population trend is considered to be decreasing.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Microcarbo niger*	Little Cormorant	LC OR LR/	NL	No	No	Yes	13,000,000	N/A	N/A	X	X			Forest, Wetlands (inland), Artificial/Aquatic & Marine	The estimated EOO is 13,000,000 km2. The estimated population is unknow	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phalacrocorax carbo*	Great Cormorant	LC OR LR/	NL	No	No	Yes	304,000,000	N/A	N/A	X				Marine Neritic, Marine Coastal/Supratidal, Wetlands (inland), Forest (in Vietnam Redlist)	This widespread species is scattered across eastern North America, western Greenland, Europe, Africa, Asia and Australasia. The global population is 1,400,000-2,100,000[183]. The estimated EOO is 304,000,000 km2. The estimated population is unknow	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ardea cinerea*	Grey Heron	LC OR LR/	NL	No	No	Yes	136,000,000	500,000	#######	X	X			Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Artificial/Aquatic & Marine	Most Palearctic populations of Grey Heron are fully migratory, dispersing widely in September-October after the breeding season and returning to breeding grounds in February. Most migratory movements occur nocturnally, with birds moving in small parties or larger flocks of 200-250. It feeds at any time day or night, but is most active at dawn or dusk, typically roosting communally or solitary during the middle of the day and at night in trees and on cliffs, low rocks, islets or along shores. This species is a generalist in its habitat use. The EOO is estimated to be 136,000,000 km2. The population is 500,000 - 2,500,500.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ardea purpurea*	Purple Heron	LC OR LR/	NL	No	No	Yes	109,000,000	180,000	380,000	X	X			Forest, Shrubland, Wetlands (inland), Marine Intertidal	African and tropical-Asian populations are largely sedentary however, occasionally making local dispersive movements. In migratory populations, the autumn migration occurs from August to October, with the return passage in the spring beginning in March	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ardea alba*	Great White Egret	LC OR LR/	NL	No	No	Yes	366,000,000	590,000	#######	X	X			Grassland, Wetlands (inland), Marine Intertidal, Artificial/Aquatic & Marine	The species typically breeds in colonies of tens, hundreds or even a thousand pairs. he timing of the breeding season varies geographically (del Hoyo et al. 1992) although temperate breeders tend to nest in the spring and summer (e.g. April to July) and tropical breeders nest in the part of the rain cycle when food becomes maximally available (this may be during the rains or in the dry season).	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Bubulcus ibis*	Cattle Egret	LC OR LR/	NL	No	No	Yes	394,000,000	#######	#######	X	X			Forest, Grassland, Wetlands (inland), Artificial/Terrestrial	This wide ranging migratory species is found consistently through the following areas: USA, South America, Africa, southern Asia and Australasia. The species has an EOO of 349,000,000km2. The global population has been estimated at 4,000,000 – 9,850,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ardeola bacchus*	Chinese Pond-heron	LC OR LR/	NL	No	No	Yes	9,030,000	25,000	#######	X	X			Forest, Grassland, Wetlands (inland), Marine Intertidal, Artificial/Aquatic & Marine	This migratory species is found along eastern Asia and Southeast Asia. This species breeds in Korea. Its EOO is 9,030,000km2. The global population has been estimated at 25,000 – 1,000,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Nycticorax nycticorax*	Black-crowned Night-h	LC OR LR/	NL	No	No	Yes	290,000,000	570,000	#######	X	X			Forest, Wetlands (inland), Marine Intertidal	Tropical populations are not migratory but may undergo seasonal post-breeding dispersive movements (del Hoyo et al. 1992). In temperate regions breeding occurs in the local spring, with tropical and subtropical nesting generally coinciding with the rains	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Gorsachius melanolo*	Malay Night-heron	LC OR LR/	NL	No	No	Yes	10,400,000	N/A	1,300	X				Artificial/Terrestrial, Artificial/Aquatic & Marine, Wetlands (inland)	This species is scattered throughout southern Asia and Southeast Asia. The EOO for this species is 10,400,000km2. The global population has been estimated at 1,300-13,000 mature individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ixobrychus sinensis*	Yellow Bittern	LC OR LR/	NL	No	No	Yes	36,000,000	N/A	100,000	X	X			Artificial/Aquatic & Marine, Wetlands (inland), Grassland, Forest	This species is found throughout Southeast Asia, eastern Asia and parts of the Himalayas. Its EOO is 36,000,000km2. The global population has been estimated at 100,000 – 1,000,000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ixobrychus eurhythm*	Schrenck's Bittern	LC OR LR/	NL	No	No	Yes	8,610,000	N/A	N/A	X				Grassland, Artificial/Terrestrial, Wetlands (inland), Marine Coastal/Supratidal	This species distribution includes eastern Asia and Southeast Asia. The EOO is 8,610,000km2. The global population is estimated at 670-17000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Ixobrychus cinnamor*	Cinnamon Bittern	LC OR LR/	NL	No	No	Yes	25,400,000	N/A	130,000	X	X			Grassland, Wetlands (inland), Forest, Artificial/Aquatic & Marine	This species is found parts of India, Pakistan, Bhutan, Myanmar, Bangladesh, Sri Lanka, south-eastern China and Southeast Asia. The EOO for this species 25,400,000km2. The global population has been estimated at 130,000-2,000,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ixobrychus flavicollis*	Black Bittern	LC OR LR/	NL	No	No	Yes	49,200,000	63,000	320,000	X				Marine Intertidal, Wetlands (inland), Marine Neritic, Forest, Artificial/Aquatic & Marine, Marine Coastal/Supratidal	This species is distributed throughout parts of the Himalayas, parts of India, Southeast Asia and Australasia. Its EOO is 49,200,000km2. The global population has been estimated at 63,000-320,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Plegadis falcinellus*	Glossy Ibis	LC OR LR/	NL	No	No	Yes	223,000,000	#######	#######	X				Wetlands (inland), Marine Coastal/Supratidal	This species was found mainly in Africa, native but not breeding in Vietnam. EOO is about 223,000,000 km2. The population trend is decreasing. The global population has been estimated at 1,200,000-3,200,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pitta moluccensis*	Blue-winged Pitta	LC OR LR/	NL	No	No	Yes	1,790,000	N/A	N/A	X	X	X		Shrubland, Artificial/Terrestrial, Forest	This species is found in throughout parts of Southeast Asia. The species is extant to Vietnam. The EOO for this species is 1,790,000km2. The global population is unquantified, however, it is considered fairly common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Lanius collurioides*	Burmese Shrike	LC OR LR/	NL	No	No	Yes	2,700,000	N/A	N/A	X	X			Artificial/Terrestrial, Savanna, Shrubland, Forest	This species is found throughout Bangladesh, southern China, eastern India, Myanmar, Thailand and Vietnam and Cambodia. The EOO for this species is 2,700,000km2. The global population has not yet been quantified, but considered stable.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Lanius schach*	Long-tailed Shrike	LC OR LR/	NL	No	No	Yes	28,800,000	N/A	N/A	X	X			Forest, Shrubland, Grassland, Wetlands (inland), Desert, Artificial/Terrestrial	The global population size has not been quantified. The EOO is 28,800,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Artamus fuscus*	Ashy Woodswallow	LC OR LR/	NL	No	No	Yes	9,310,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial, Savanna	This species is found throughout southern Asia (India, Himalayas, Thailand, Cambodia, Vietnam, and Malaysia). The EOO for this species 9,310,000km2. The global population for this species has not yet been quantified, although it is considered common within its range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Oriolus chinensis*	Black-naped Oriole	LC OR LR/	NL	No	No	Yes	17,400,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This species is found throughout eastern China, parts of southern Asia and parts of Southeast Asia. The EOO is 17,400,000km2. The global population has not yet been quantified, but the species is described as common, while national population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; < c.100 breeding pairs and < c.50 individuals on migration in Taiwan; c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Korea and c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Russia	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Oriolus traillii*	Maroon Oriole	LC OR LR/	NL	No	No	Yes	5,200,000	N/A	N/A	X	X			Forest	This species utilises the Himalayas, Myanmar, Thailand, southern China, Vietnam, Laos and Cambodia. The EOO for this species is 5,200,000km2. The global population has not been estimated, but considered fairly common to uncommon	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Lalage melaschistos*	Black-winged Cuckoosh	LC OR LR/	NL	No	No	Yes	8,190,000	N/A	10,000	X	X			Forest, Artificial/Terrestrial	This species is found throughout parts of India, the Himalayas, southern Asia and eastern China. The EOO for this species is 8,190,000km2. There is an estimated 10,000 – 100,000 individuals in China.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pericrocotus roseus*	Rosy Minivet	LC OR LR/	NL	No	No	Yes	3,630,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This species is found in throughout the Himalayas, eastern India and parts of Southeast Asia. The species is extant to Vietnam. The EOO for this species is 3,630,000km2. The global population is unquantified, however, considered decreasing.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pericrocotus cantone*	Brown-rumped Minive	LC OR LR/	NL	No	No	Yes	2,270,000	N/A	N/A	X	X			Forest, Savanna	The EOO is approximately 2,330,000 km2. This species has an extremely large range. The population trend is descreasing	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Pericrocotus divarica*	Ashy Minivet	LC OR LR/	NL	No	No	Yes	3,110,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial, Shrubland	This species is found throughout eastern Asia, parts of Southeast Asia and southern Asia. Its EOO is 3,110,000km2. There is not global population estimate for this species yet, however, the species has been described as fairly common.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pericrocotus ethologi*	Long-tailed Minivet	LC OR LR/	NL	No	No	Yes	10,100,000	N/A	N/A	X				Forest, Artificial/Terrestrial	This species is found in Thailand, India, Vietnam. EOO is 10,100,000km2. The population trend is decreasing	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Dicrurus macrocercu*	Black Drongo	LC OR LR/	NL	No	No	Yes	17,900,000	N/A	N/A	X	X			Savanna, Artificial/Terrestrial, Shrubland, Grassland	This species is found throughout southern Asia and parts of Southeast Asia. The EOO for this species is 17,900,000km2. The global population has not yet been quantified, however, there is an estimated 10,000-100,000 breeding pairs in China	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Dicrurus leucophaeu*	Ashy Drongo	LC OR LR/	NL	No	No	Yes	21,200,000	N/A	N/A	X	X			Shrubland, Artificial/Terrestrial, Savanna, Forest	This species is found throughout southern Asia and parts of Southeast Asia. The EOO for this species is 21,200,000km2. The global population has not yet been quantified, however, there is an estimated 10,000-100,000 breeding pairs in China.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Dicrurus annectens*	Crow-billed Drongo	LC OR LR/	NL	No	No	Yes	2,760,000	N/A	N/A	X		X		Forest, Artificial/Terrestrial, Savanna, Shrubland	This species is found throughout parts of Southeast Asia and the Himalayas. The EOO for this species is 2,760,000km2. The global population has not yet been quantified, although considered locally frequent throughout the Indian subcontinent	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Monticola gularis*	White-throated Rock-t	LC OR LR/	NL	No	No	Yes	3,270,000	N/A	N/A	X				Rocky areas (eg. inland cliffs, mountain peaks), Forest, Shrubland	This species is found in north eastern Asia, parts of China and parts of Southeast Asia. The species spends the non-breeding season in Vietnam. The EOO is 3,270,000 km2. The global population is not yet quantified, however, considered stable.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Monticola solitarius*	Blue Rock-thrush	LC OR LR/	NL	No	No	Yes	66,600,000	N/A	#######	X	X			Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Shrubland, Artificial/Terrestrial	This species is scattered throughout north Africa, southern Asia, Southeast Asia, southern Europe and parts of eastern Asia. Its EOO is 66,600,000km2. The global population of mature individuals is estimated at 1,000,000 – 3,999,999	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Myophonus caeruleu*	Blue Whistling-thrush	LC OR LR/	NL	No	No	Yes	18,600,000	UC	UC	X				Forest, Wetlands (inland), Artificial/Terrestrial	The estimated EOO is 18600000. The population size is unknown.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Geokichla sibirica*	Siberian Thrush	LC OR LR/	NL	No	No	Yes	4,640,000	N/A	N/A	X				Forest	The global population size has not been quantified, though national population estimates include: c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in China; c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Japan and c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Russia. The EOO is 4,640,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Turdus obscurus*	Eyebrowed Thrush	LC OR LR/	NL	No	No	Yes	6,690,000	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	This migratory species is found in Europe, Central Asia, Africa and South East Asia. The breeding population is found within Mongolia; Russian Federation (Central Asian Russia) The EOO is estimated to be 6,690,000 km2. The population is unknown and the population trend is considered to be unknown	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Muscicapa sibirica*	Dark-sided Flycatcher	LC OR LR/	NL	No	No	Yes	19,600,000	N/A	N/A	X	X			Forest, Shrubland	This species utilises north-eastern Asia, the Himalayas and parts of Southeast Asia. It is considered extant to Vietnam. It has an EOO of 19,600,000km2. The global population has not been estimated but considered stable. The Chinese population is estimated at 10,000-100,000 breeding pairs.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Muscicapa dauurica*	Asian Brown Flycatche	LC OR LR/	NL	No	No	Yes	37,700,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This species utilises north-eastern Asia, southern Asia and Southeast Asia. It is considered a resident of Vietnam. It has an EOO of 37,700,000km2. The global population has not been estimated but considered stable. The Chinese population is estimated at 10,000-100,000 breeding pairs	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Muscicapa ferrugine*	Ferruginous Flycatcher	LC OR LR/	NL	No	No	Yes	30,600,000	N/A	N/A	X				Forest	This species utilises Bhutan, India, Myanmar, Nepal, Chian, Vietnam, Laos, Thailand, Indonesia, Malaysia, Philippines and Singapore. It is considered a resident of Vietnam. It has an EOO of 30,600,000km2. The global population has not been estimated but considered decreasing. The Chinese population is estimated at 54000000-83999999 breeding pairs.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ficedula mugimaki*	Mugimaki Flycatcher	LC OR LR/	NL	No	No	Yes	7,500,000	N/A	N/A	X				Artificial/Terrestrial, Forest, Shrubland	This species is found in north central Asia (e.g. Mongolia) and parts of Southeast Asia. The species spends the non-breeding season in Vietnam. The EOO for this species is 7,500,000km2. The global population has not yet been quantified, although China is estimated to contain 100 – 100,000 breeding pairs.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Anthipes monileger*	White-gorgeted Flycat	LC OR LR/	NL	No	No	Yes	2,280,000	N/A	N/A	X				Forest, Shrubland	The population size is unknown, but the species is described as generally uncommon. The EOO is 2,280,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Eumyias thalassinus*	Verditer Flycatcher	LC OR LR/	NL	No	No	Yes	13,300,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This species is found throughout most of southern Asia and parts of Southeast Asia. The species is a resident of Vietnam. The EOO for this species is 13,300,000km2. The global population is unknown, however, considered common within its range.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Calliope calliope*	Siberian Rubythroat	LC OR LR/	NL	No	No	Yes	10,100,000	N/A	N/A	X				Forest, Wetlands (inland), Shrubland, Artificial/Aquatic & Marine, Artificial/Terrestrial	This migratory species is found throughout eastern, central and southern Asia. Its EOO is 10,100,000km2. The global population has not been estimated. Although there is an estimated 10,000 – 100,000 breeding pairs in China.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Larvivora cyane*	Siberian Blue Robin	LC OR LR/	NL	No	No	Yes	21,500,000	N/A	N/A	X				Shrubland, Forest, Artificial/Terrestrial	This species utilises parts of central, eastern Asia and Southeast Asia. Its EOO is 21,500,000km2. Global population has not yet been quantified, although, there is an estimated 10,000-100,000 breeding pairs in Korea	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Saxicola torquatus*	Common Stonechat	LC OR LR/	NL	No	No	Yes	113,000,000	N/A	#######	X				Forest, Wetlands (inland), Shrubland, Artificial/Terrestrial, Grassland	This migratory species occurs in forest, desert, inland wetlands, grassland habitat types. This widespread species is found throughout most of Asia, most of Europe and parts of Africa. This species winters in Vietnam, and species distribution includes the Project area. This species uses but is not limited to Korea, Germany, Serbia and Ukraine during the breeding season. Its EOO is 113,000,000km2. The global population of mature individuals is estimated at 55,000,000-94,999,999	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Saxicola caprata*	Pied Bushchat	LC OR LR/	NL	No	No	Yes	30,300,000	N/A	N/A	X	X			Shrubland, Savanna, Artificial/Terrestrial, Grassland, Wetlands (inland)	This species is inhabits western and southern Asia, Southeast Asia and New Guinea. The EOO for this species is 30,300,000km2. The global population has not yet been assessed, but considered to be stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Agropsar sturninus*	Purple-backed Starling	LC OR LR/	NL	No	No	Yes	4,430,000	N/A	N/A	X				Forest, Grassland, Artificial/Terrestrial	This migratory species occurs in a variety of habitat types including grassland and forest. It occurs in countries such as Cambodia, China and Vietnam during the non-breeding season. In the breeding season the species is known to occur in Korea and Mongolia. The EOO is 4,430,000km2. The global population is unknown, while national population estimates include: c.100-100,000 breeding pairs	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Sturnia sinensis*	White-shouldered Star	LC OR LR/	NL	No	No	Yes	1,070,000	N/A	N/A	X	X			Shrubland, Artificial/Terrestrial, Savanna	This species is found throughout south-eastern China. Taiwan, Thailand, Vietnam, Cambodia and Laos. The species utilises Vietnam in the non-breeding season. The EOO for this species 1,070,000km2. The global population has not yet been quantified, however, considered stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hirundo smithii*	Wire-tailed Swallow	LC OR LR/	NL	No	No	Yes	49,700,000	N/A	N/A	X				Savanna, Grassland, Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine	The global population size has not been quantified, but the species is reported to be common in Africa, common in Pakistan and locally common in India	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Delichon dasypus*	Asian House Martin	LC OR LR/	NL	No	No	Yes	16,500,000	N/A	N/A	X	X			Wetlands (inland), Rocky areas (eg. inland cliffs, mountain peaks), Artificial/Terrestrial	This species is found in parts of eastern Asia and southern Asia and also Southeast Asia. Its EOO is16,500,000km2. The global population is increasing. National population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Taiwan; c.10,000-100,000 breeding pairs, c.1,000-10,000 individuals on migration and < c.1,000 wintering individuals in Japan and c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Russia	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Prinia hodgsonii*	Grey-breasted Prinia	LC OR LR/	NL	No	No	Yes	9,370,000	N/A	N/A	X	X			Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as locally common over most of its range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Tesia cyaniventer*	Grey-bellied Tesia	LC OR LR/	NL	No	No	Yes	4,430,000	N/A	N/A	X				Forest, Wetlands (inland)	The global population size has not been quantified, but the species is reported to be locally common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Urosphena squameic*	Asian Stubtail	LC OR LR/	NL	No	No	Yes	2,460,000	N/A	N/A	X				Forest, Shrubland, Grassland, Wetlands (inland)	The global population size has not been quantified, but the species is reported to be locally common; while national population estimates include: c.10,000-100,000 breeding pairs, c.1,000-10,000 individuals on migration and c.50-1,000 wintering individuals in China; c.50-1,000 individuals on migration and c.50-1,000 wintering individuals in Taiwan. The EOO is 2,460,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hemitesia pallidipes*	Pale-footed Bush-warb	LC OR LR/	NL	No	No	Yes	4,660,000	N/A	N/A	X				Forest, Shrubland, Grassland	The global population size has not been quantified, but the species is reported to be fairly common and locally abundant	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Locustella tacsanow*	Chinese Grasshopper-v	LC OR LR/	NL	No	No	Yes	7,070,000	N/A	N/A	X				Artificial/Terrestrial, Artificial/Aquatic & Marine, Forest, Grassland	This species is found along southern and eastern Asia. The EOO for this species is 7,070,000km2. The global population has not yet been quantified, however, there is an estimated <100,000 individuals within China	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Locustella lanceolata*	Lanceolated Warbler	LC OR LR/	NL	No	No	Yes	17,600,000	N/A	N/A	X	X			Artificial/Aquatic & Marine, Wetlands (inland), Grassland, Shrubland, Artificial/Terrestrial	This species is chiefly found in eastern and northern Asia but is also found in northern Europe and southern Asia. Its EOO is17,600,000km2. The global population of mature individuals is estimated at 600,000 – 1,200,000.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Arundinax aedon*	Thick-billed Warbler	LC OR LR/	NL	No	No	Yes	7,180,000	N/A	N/A	X				Wetlands (inland), Artificial/Terrestrial, Grassland, Shrubland	This species is found throughout eastern Asia and parts of southern Asia. The species spends the non-breeding season in Vietnam. This species EOO is 7,180,000km2. The global population is not considered stable, however, it is considered common in Southeast Asia (during non-breeding season)	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phylloscopus fuscatu*	Dusky Warbler	LC OR LR/	NL	No	No	Yes	10,400,000	N/A	N/A	X	X			Forest, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be locally common, while national population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; c.50-1,000 individuals on migration and c.50-1,000 wintering individuals in Taiwan. The EOO is 10,400,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phylloscopus schwar*	Radde's Warbler	LC OR LR/	NL	No	No	Yes	6,190,000	N/A	N/A	X				Grassland, Wetlands (inland), Forest, Shrubland	This species is found in throughout eastern Asia and parts of Southeast Asia. The species is extant to Vietnam. The EOO for this species is 6,190,000km2. The global population is unquantified, however, it it stable population	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phylloscopus inornat*	Yellow-browed Warble	LC OR LR/	NL	No	No	Yes	15,600,000	N/A	N/A	X	X			Forest, Shrubland, Artificial/Terrestrial	This species is continuously found throughout northern, central and eastern Asia and parts of southern Asia. This species is extant to Vietnam. The EOO is 15,600,000km2. The global population has not yet been quantified, however, the population is considered stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phylloscopus tenellip*	Pale-legged Leaf-warb	LC OR LR/	NL	No	No	Yes	1,560,000	N/A	N/A	X				Habitat type Forest, Shrubland, Artificial/Terrestrial	This species is foundin Thailand, Myanmar, China, Vietnam. The EOO for this species is 1,560,000km2.The populationtrend is stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phylloscopus corona*	Eastern Crowned Wart	LC OR LR/	NL	No	No	Yes	3,320,000	N/A	N/A	X				Forest, Shrubland	This species is found throughout eastern Asia and parts of South East Asia. The EOO for this species is 7,330,000km2. There is an estimated 10,000 – 100,000 breeding pairs within China.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Phylloscopus ricketti*	Sulphur-breasted Warl	LC OR LR/	NL	No	No	Yes	614,000	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	Phylloscopus ricketti is native to China, Laos, Vietnam and Thailand. It primarily inhabits forests, but it has also been recorded in open, somewhat degraded woodland and scrubland with scattered conifers, and in gardens and tea plantations adjacent to close-canopy secondary forest. The global population size has not been quantified, but the species is reported to be rather local and thinly distributed. The EOO is 614,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phylloscopus poliogei*	Grey-cheeked Warbler	LC OR LR/	NL	No	No	Yes	2,280,000	N/A	N/A	X				Forest	The global population size has not been quantified, but the species is reported to be locally common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phylloscopus castani*	Chestnut-crowned Wa	LC OR LR/	NL	No	No	Yes	8,360,000	N/A	N/A	X				Forest	The global population size has not been quantified, but the species is reported to be locally common (Baker 1997), while the population in China has been estimated at c.100-10,000 breeding pairs, c.50-1,000 individuals on migration and c.50-1,000 wintering individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pnoepyga pusilla*	Pygmy Cupwing	LC OR LR/	NL	No	No	Yes	15,200,000	N/A	N/A	X				Forest	The global population size has not been quantified, but the species is described as frequent in Nepal, fairly widespread at low densities in Bhutan and fairly common in India (del Hoyo et al. 2007), while the population in China has been estimated at c.100-100,000 breeding pairs	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Siva cyanouroptera*	Blue-winged Minla	LC OR LR/	NL	No	No	Yes	6,160,000	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Alauda gulgula*	Oriental Skylark	LC OR LR/	NL	No	No	Yes	23,600,000	N/A	N/A	X				Shrubland, Grassland, Wetlands (inland), Marine Intertidal, Artificial/Terrestrial	The population size has not been quantified, but it is not believed to approach the thresholds for Vulnerable under the population size criterion	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Dendronanthus indic*	Forest Wagtail	LC OR LR/	NL	No	No	Yes	7,080,000	N/A	N/A	X				Forest, Artificial/Terrestrial	This species is found throughout most of eastern and Southeast Asia and southwest India. The EOO is 7,080,0000km2. The global population size has not been quantified, but the species is reported to be locally common, while national population estimates include: c.100-10,000 breeding pairs and < c.1,000 individuals on migration in China; < c.50 individuals on migration and < c.50 wintering individuals in Taiwan; c.100-10,000 breeding pairs and < c.1,000 individuals on migration in Korea and c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Russia	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Motacilla alba*	White Wagtail	LC OR LR/	NL	No	No	Yes	37,800,000	N/A	#######	X	X			Marine Intertidal, Artificial/Terrestrial, Grassland, Wetlands (inland), Desert	This species is found throughout all of Eurasia and in parts of north Africa. Its EOO is 37,800,000km2. The global population of mature individuals has been estimated at 135,000,000-221,000,000	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Motacilla cinerea*	Grey Wagtail	LC OR LR/	NL	No	No	Yes	60,700,000	#######	#######	X	X			Wetlands (inland), Grassland, Artificial/Aquatic & Marine, Artificial/Terrestrial	This widespread species is distributed throughout most of Europe, parts of north and eastern Africa, the Middle East, very large areas of central northern Asia, southern Asia, Southeast Asia and eastern Asia. Its EOO is 60,700,000km2. The number of mature individuals is estimated at 5,000,000 – 19,999,999	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Anthus hodgsoni*	Olive-backed Pipit	LC OR LR/	NL	No	No	Yes	29,200,000	N/A	N/A	X	X			Rocky areas (eg. inland cliffs, mountain peaks), Forest, Grassland, Shrubland, Artificial/Terrestrial	This species is found throughout most of northern Asia, eastern Asia and southern Asia. The species is extant to Vietnam. Its EOO is 29,200,000km2. The global population is not yet quantified, although considered stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Anthus cervinus*	Red-throated Pipit	LC OR LR/	NL	No	No	Yes	540,000	N/A	N/A	X	X			Marine Intertidal, Wetlands (inland), Grassland, Shrubland, Artificial/Aquatic & Marine, Artificial/Terrestrial	This species is foundin Thailand, Myanmar, China, Vietnam. The EOO for this species is 540,000km2.The population is estimated approximately 2,000,000 mature individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Emberiza fucata*	Chestnut-eared Buntin	LC OR LR/	NL	No	No	Yes	15,600,000	N/A	N/A	X				Shrubland, Artificial/Terrestrial, Wetlands (inland), Grassland	This species is found along eastern Asia and within the Himalayas region. Its EOO is 15,600,000km2. The global population size has not been quantified, but the species is reported to be common to locally common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Caprimulgus jotaka*	Grey Nightjar	LC OR LR/	NL	No	No	Yes	17,700,000	N/A	N/A	X	X			Artificial/Terrestrial, Forest, Rocky areas (eg. inland cliffs, mountain peaks), Shrubland	This migratory species occurs in forest, rocky areas (inland cliffs, mountain peaks) and shrub land habitat types. It resides in Bangladesh, Bhutan, China, Hong Kong, India, Malaysia, Myanmar, Nepal and Pakistan. This species breeds in Korea, Japan, Mongolia and Vietnam. The EOO is 17,700,000km2. The global population is unknown and is stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Merops orientalis*	Asian Green Bee-eater	LC OR LR/	NL	No	No	Yes	11,600,000	N/A	N/A	X	X			Forest, Savanna, Shrubland, Wetlands (inland), Desert, Artificial/Terrestrial	This species is found throughout southern Asia. The species is considered a resident of Vietnam. It has an EOO of 11,600,000km2. The species global population has not yet been quantified, but considered increasing and locally common throughout its very large range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Merops viridis*	Blue-throated Bee-eat	LC OR LR/	NL	No	No	Yes	8,760,000	N/A	N/A	X				Artificial/Terrestrial, Forest, Marine Coastal/Supratidal, Wetlands (inland), Shrubland	This species is found throughout Southeast Asia and south-eastern China. The species is a resident of Vietnam. It has an EOO of 8,760,000km2. The species global population has not yet been quantified, but considered widespread and common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Charadrius alexandri*	Kentish Plover	LC OR LR/	NL	No	No	Yes	70,700,000	N/A	N/A	X				Marine Intertidal, Marine Neritic, Wetlands (inland), Grassland, Artificial/Aquatic & Marine, Marine Coastal/Supratidal, Desert	The species has a very large range and is migratory. The species winters in Vietnam. The estimated extent of occurrence 70,700,000km2. The estimated population is approximately 100000-499999 individuals globally	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ardea intermedia*	Intermediate Egret	LC OR LR/	NL	No	No	Yes	30,300,000	N/A	N/A	X	X			Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	The global population has not been quantified owing to recent taxonomic splits. Despite the fact that the population trend appears to be decreasing, the decline is not believed to be sufficiently rapid to approach the thresholds for Vulnerable under the population trend criterion	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Himantopus himanto*	Black-winged Stilt	LC OR LR/	NL	No	No	Yes	335,000,000	N/A	N/A	X	X			Marine Intertidal, Marine Neritic, Wetlands (inland), Grassland, Artificial/Aquatic & Marine, Marine Coastal/Supratidal	This widespread species is found throughout most of Australasia, parts of Southeast Asia, most of central and western Asia, most of Europe, parts of Africa, parts of North America and parts of South America. The EOO for this species is 359,000,000km2. The global population has been estimated at 450,000-780,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hierococcyx sparveri*	Large Hawk-cuckoo	LC OR LR/	NL	No	No	Yes	9,890,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This species is found throughout southern and eastern China, the Himalayas, southern India, Thailand, Myanmar, Cambodia, Vietnam, Laos, Malaysia and Indonesia. The species actively breeds in Vietnam. The EOO is 9,890,000km2. The global population has not yet been quantified, although considered stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Butorides striata*	Green-backed Heron	LC OR LR/	NL	No	No	Yes	303,000,000	N/A	N/A	X	X			Wetlands (inland), Marine Intertidal, Forest	This species is foundin Thailand, Myanmar, China, Vietnam. The EOO for this species is 303,000,000 km2.The populationtrend is decreasing.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Otus sunia*	Oriental Scops-owl	LC OR LR/	NL	No	No	Yes	22,200,000	N/A	N/A	X	X			Artificial/Terrestrial, Shrubland, Forest	This migratory species occurs in shrub land and forest habitat types. This species is continuously found throughout eastern Asia, most of southern Asia and parts of Southeast Asia. The species winters in Vietnam, and species distribution includes Project area. The species uses but is not limited to Korea, China, India and Japan during the breeding season. The EOO is 22,200,000km2. The global population size has not been quantified, but the species is reported to be very abundant regionally, while national population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China; < c.1,000 individuals on migration in Taiwan; c.100-100,000 breeding pairs and c.50-10,000 individuals on migration in Korea; c.100-100,000 breeding pairs and c.50-10,000 individuals on migration in Japan and c.100-10,000 breeding pairs and c.50-1,000 individuals on migration in Russia	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Abroscopus supercili*	Yellow-bellied Warbler	LC OR LR/	NL	No	No	Yes	8,290,000	N/A	N/A	X				Forest	The global population size has not been quantified, but the species is reported to be locally fairly common to uncommon	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Buteo japonicus*	Japanese Buzzard	LC OR LR/	NL	No	No	Yes	10,600,000	N/A	N/A	X	X			Wetlands (inland), Artificial/Terrestrial, Forest, Shrubland, Grassland	This migratory species is known from Southeast Asia, central Asia and Micronesia. The EOO is 10,600,000km2. Due to recent taxonomic splits, the population size of this species is unknown. The population trend is also unknown	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Acrocephalus orientc*	Oriental Reed-warbler	LC OR LR/	NL	No	No	Yes	8,170,000	N/A	N/A	X	X			Wetlands (inland), Artificial/Terrestrial, Savanna, Shrubland, Grassland	This migratory species is found throughout Southeast Asia, Japan, eastern China, eastern Mongolia and Korea. This species EOO is 8,170,000km2. The population is not yet quantified, although considered to be decreasing	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hierococcyx hyperyth*	Northern Hawk-cuckoc	LC OR LR/	NL	No	No	Yes	6,580,000	N/A	N/A	X				Forest, Artifical/Terrestrial	This species is found throughout coastal eastern China and a few parts of Southeast Asia. The EOO for this species is 6,580,000km2. The global population has not yet been assessed, although is considered stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hierococcyx nisicolor*	Whistling Hawk-cuckoc	LC OR LR/	NL	No	No	Yes	3,980,000	N/A	N/A	X				Forest, Artificial/Terrestrial	This species is found continuously throughout Vietnam, Laos, Thailand, Cambodia and parts of China, India, Bhutan, Nepal, Malaysia and Indonesia. The species is a resident of Vietnam. The EOO for this species is 3,980,000km2. The global population size has not been quantified, but the species is reported to be uncommon to rare throughout its range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ficedula albicilla*	Red-throated Flycatche	LC OR LR/	NL	No	No	Yes	14,400,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This species is foundin Thailand, Myanmar, China, Rusia, IndiaVietnam. The EOO for this species is 14,400,000 km2.The population trend is stable	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Locustella mandelli*	Russet Grasshopper-w	LC OR LR/	NL	No	No	Yes	3,910,000	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	This species has a large range, occurring in parts of north-eastern India, Bhutan, China, Myanmar, Thailand, Laos and Vietnam. The global population size has not been quantified, but the species is described as quite numerous in north-eastern India, common in parts of China and locally common in South-East Asia	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Phylloscopus ogilvieg*	Kloss's Leaf-warbler	LC OR LR/	NL	No	No	Yes	989,000	N/A	N/A	X				Forest	This species has a large range extending across south-east China, Vietnam, Laos, Cambodia, Thailand, and possibly north-east Myanmar	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Phylloscopus reguloi*	Blyth's Leaf-warbler	LC OR LR/	NL	No	No	Yes	3,840,000	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	This species has a large range, extending from north-west India to southern Viet Nam. The global population size has not been quantified, but the species is described as common and widespread in most of its range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Surniculus dicruroide*	Fork-tailed Drongo-cuc	LC OR LR/	NL	No	No	Yes	9,710,000	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	This species is found throughout parts of the Indian subcontinent and Southeast Asia. The species is a resident of Vietnam. The EOO for this species is 9,710,000km2. The global population has not yet been quantified, but considered declining.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Burhinus indicus*	Indian Thick-knee	LC OR LR/	NL	No	No	Yes	8,230,000	N/A	N/A	X				Shrubland, Grassland, Artificial/Terrestrial	The global population has not been estimated. The EOO is 8,230,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Falco peregrinus*	Peregrine Falcon	LC OR LR/	NL	No	No	Yes	413,000,000	100,000	499,999	X	X			Marine Coastal/Supratidal, Marine Intertidal, Forest, Wetlands (inland), Grassland, Shrubland, Savanna, Artificial/Terrestrial, Rocky areas (eg. inland cliffs, mountain peaks), Desert	This species is found throughout most of the globe except for the artic and Antarctica. The EOO is 413,000,000km2. The global population of mature individuals is estimated at 100,000 – 499,999	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Spilopelia chinensis*	Eastern Spotted Dove	LC OR LR/	NL	No	No	Yes	16,800,000	N/A	N/A	X				Forest, Wetlands (inland), Artificial/Terrestrial	This species is found in Thailand, Myanmar, Indonesia, China, Vietnam. The EOO for this species is 16,800,000 km2. The global population size has not been quantified, but the species is described as very common throughout almost all of its range.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Cuculus saturatus*	Oriental Cuckoo	LC OR LR/	NL	No	No	Yes	35,300,000	N/A	#######	X				Forest, Shrubland	This species is foundin Thailand, Myanmar, China, Vietnam. The EOO for this species is 35,300,000 km2.The population is estimated approximately 5000000-14999999 mature individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Ceyx erithaca*	Oriental Dwarf-kingfish	LC OR LR/	NL	No	No	Yes	N/A	N/A	N/A	X				Forest, Artificial/Terrestrial, Wetlands (inland)	This species is found throughout Southeast Asia and parts of India and Sri Lanka. The EOO for this species is 14,600,000 km2. The global population has been described as scarce and declining. Habitats of significance include dry and moist lowland tropical/subtropical forests.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Circus spilonotus*	Eastern Marsh-harrier	LC OR LR/	NL	No	No	Yes	7,180,000	400,000	60,000	X				Wetlands (inland), Marine Intertidal	This migratory species is predominately found in eastern Asia. The EOO is 7,180,000km2. The population is considered stable and there is an estimated 40,000 – 60,000 mature individuals globally[68].	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Otus lettia*	Collared Scops-owl	LC OR LR/	NL	No	No	Yes	8,580,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be widespread and locally common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Gallinula chloropus*	Common Moorhen	LC OR LR/	NL	No	No	Yes	143,000,000	N/A	N/A	X	X			Wetlands (inland), Marine Coastal/Supratidal, Artificial/Aquatic & Marine	This widespread species is found throughout most of Europe, parts of western Asia, most of southern Asia, parts of Africa and eastern Asia. Its EOO is 143,000,000km2. The global population is estimated at 2,900,000 – 6,200,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Egretta garzetta*	Little Egret	LC OR LR/	NL	No	No	Yes	151,000,000	660,000	#######	X	X			Forest, Grassland, Wetlands (inland), Marine Neritic, Marine Intertidal, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	The Little egret is found throughout southern Asia, Southeast Asia, Australasia, parts of Europe, parts of Africa and parts of western Asia. Its EOO is 151,000,000km2. The global population is estimated at 660,000-3,150,000.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Pteruthius aeralatus*	White-browed Shrike-b	LC OR LR/	NL	No	No	Yes	13,200,000	N/A	N/A	X				Forest, Shrubland	The global population size has not been quantified, but the species is described as the commonest shrike-babbler (del Hoyo et al. 2007), while the population in China has been estimated at c.10,000-100,000 breeding pairs	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pericrocotus solaris*	Grey-chinned Minivet	LC OR LR/	NL	No	No	Yes	4,940,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as generally common throughout its range but scarce in Nepal (del Hoyo et al. 2005). National population sizes have been estimated at c.10,000-100,000 breeding pairs in China and c.10,000-100,000 breeding pairs in Taiwan	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Tephrodornis virgatu*	Large Woodshrike	LC OR LR/	NL	No	No	Yes	13,100,000	N/A	N/A	X	X			Forest, Shrubland	The global population size has not been quantified, but the species is described as generally uncommon, although locally common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Rhipidura albicollis*	White-throated Fantail	LC OR LR/	NL	No	No	Yes	11,200,000	N/A	N/A	X				Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as common	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Dicrurus hottentottu*	Hair-crested Drongo	LC OR LR/	NL	No	No	Yes	22,300,000	N/A	N/A	X	X			Forest, Artificial/Terrestrial	This species is found throughout southern Asia and parts of Southeast Asia. The EOO for this species is 22,300,000km2. The global population has not yet been quantified	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hypothymis azurea*	Black-naped Monarch	LC OR LR/	NL	No	No	Yes	19,800,000	N/A	10,000	X	X			Wetlands (inland), Forest, Artificial/Terrestrial	This species is found throughout most of India, the Himalayas and Southeast Asia. The EOO for this species is 19,800,000km2. The global population has not yet been quantified, although there is an estimated 10,000-100,000 breeding pairs in Taiwan	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Terpsiphone incei*	Chinese Paradise-flyca	LC OR LR/	NL	No	No	Yes	6,060,000	N/A	N/A	X				Forest, Artificial/Terrestrial, Shrubland	This species is found throughout eastern Asia and parts of Southeast Asia. The species uses Vietnam during the non-breeding season. The EOO for this species is 6,060,000km2. The global population has not yet been quantified, but considered stable.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Terpsiphone affinis*	Oriental Paradise-flyca	LC OR LR/	NL	No	No	Yes	6,060,000	N/A	N/A	X				Forest, Artificial/Terrestrial, Shrubland	This species is found throughout Southeast Asia and the eastern parts of Himalayas. The species is a resident of Vietnam. The EOO for this species is 6,060,000km2. The global population has not yet been quantified, but considered stable.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Cyanoptila cyanomel*	Blue-and-white Flycatc	LC OR LR/	NL	No	No	Yes	3,290,000	N/A	N/A	X	X			Forest, Shrubland, Artificial/Terrestrial	The Blue-and-white flycatcher is found in parts of eastern Asia (eastern China, Korea, and Japan) and parts of Southeast Asia. It has an EOO of 3,290,000 km2. The global population is not yet quantified, China contains 10,000 – 100,000 breeding pairs.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Mirafra javanica*	Horsfield's Bushlark	LC OR LR/	NL	No	No	Yes	73,900,000	N/A	N/A	X				Savanna, Shrubland, Grassland, Artificial/Terrestrial	The global population size of the Horsfield's Bushlark has not been quantified. In Vietnam, it is found from the North to Hue. This species has an extremely large range. The species' EOO is 73,900,000 km2 and global population are unknown.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Prinia superciliaris*	Hill Prinia	LC OR LR/	NL	No	No	Yes	6,500,000	N/A	N/A	X	X			Forest, Shrubland, Grassland, Artificial/Terrestrial	The population size has not been quantified, but it is not believed to approach the thresholds for Vulnerable under the population size criterion	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Delichon lagopodum*	Eastern House Martin	LC OR LR/	NL	No	No	Yes	12,600,000	N/A	N/A	X				Forest, Rocky areas (eg. inland cliffs, mountain peaks), Grassland, Savanna, Artificial/Terrestrial	The EOO for this species is 12,600,000 km2. The global population has not quantified but considered decreasing	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Cecropis daurica*	Red-rumped Swallow	LC OR LR/	NL	No	No	Yes	99,900,000	N/A	#######	X	X			Forest, Rocky areas (eg. inland cliffs, mountain peaks), Wetlands (inland), Artificial/Terrestrial, Shrubland	The EOO for this species is 99,900,000km2. The global population is approximately in 10,000,000-500,000,000 individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Anthus richardi*	Richard's Pipit	LC OR LR/	NL	No	No	Yes	16,000,000	N/A	N/A	X	X			Grassland, Artificial/Terrestrial	This migratory species is distributed throughout central and eastern Asia.. Its EOO is 16,000,000km2. The global population has not yet been quantified, although considered to be between 90,000-120,000 mature individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Motacilla tschutsche*	Eastern Yellow Wagtail	LC OR LR/	NL	No	No	Yes	15,900,000	N/A	#######	X				Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine, Shrubland, Grassland	This species is found in Thailand, Myanmar, Indonesia, China, Vietnam. The EOO for this species is 15,900,000 km2.The populationtrend is estimated approximately 50000000-150000000 mature individuals	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hypsipetes leucocep*	Black Bulbul	LC OR LR/	NL	No	No	Yes	8,830,000	N/A	N/A	X	X			Artificial/Terrestrial, Forest, Grassland	This species is found throughout most of the Himalayas and most of Southeast Asia. The species is a resident of Vietnam. The EOO for this species is 8,830,000km2. The global population has not yet been quantified, although there is an estimated 100,000-1,000,000 breeding pairs in Taiwan	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Pycnonotus flavescer*	Flavescent Bulbul	LC OR LR/	NL	No	No	Yes	2,160,000	N/A	N/A	X				Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as locally abundant throughout much of its range	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Brachypodius atricep*	Black-headed Bulbul	LC OR LR/	NL	No	No	Yes	8,120,000	N/A	N/A	X	X			Forest, Shrubland, Grassland, Artificial/Terrestrial	The global population size has not been quantified, but the species is described as locally common throughout much of its range. The EOO is 8,120,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Phylloscopus plumbe*	Two-barred Warbler	LC OR LR/	NL	No	No	Yes	6,290,000	N/A	N/A	X	X			Forest, Shrubland, Wetlands (inland), Artificial/Terrestrial	The species is found throughout north eastern Asia and parts of southern Asia. The species uses Vietnam during the breeding season. The EOO for this species is 6,290,000km2. The global population has not yet been quantified, although the species has been considered common or locally common in north east China.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Milvus migrans*	Black Kite	LC OR LR/	NL	No	No	Yes	206,000,000	#######	#######	X	X			Marine Coastal/Supratidal, Artificial/Terrestrial, Forest, Shrubland, Desert, Grassland, Marine Intertidal, Wetlands (inland), Savanna	This wide ranging migratory species is found throughout Europe, Africa, Australasia and Asia. The EOO is 206,000,000km2. The estimated global number of mature individuals is 1,000,000 – 2,499,999.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
MAMMALIA	*Belomys pearsonii*	Hairy-footed Flying Squ	DD	CR	Yes	No	No	200,000	N/A	N/A	X				Forest	The population abundance of this species is poorly known, however, it is believed to be significantly declining, or at least very rare, in some areas. In Southeast Asia, there are recorded from Myanmar, Thailand, Lao PDR, Viet Nam and possibly Cambodia although there are no records from this country and South Asia, it is threatened by shifting (jhum) cultivation, forest fires, monoculture plantations and hunting for local consumption.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.
AVES	*Charadrius dealbatus*	White-faced Plover	DD	NL	No	No	Yes	730,000	N/A	N/A	X				Marine Coastal/Supratidal, Desert, Artificial/Aquatic & Marine, Marine Neritic, Wetlands (inland), Marine Intertidal, Grassland	This species is inhabits coastal areas along southern China, Vietnam, Cambodia, Thailand, Malaysia and Indonesia. The species is a resident of Vietnam. Its EOO is 730,000km2. The species breeds in Hong Kong. The global population number and trend of this species is unknown. The species inhabits a broad range of habitats including grasslands, wetlands, deserts, marine intertidal areas, coastal and artificial aquatic areas.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Anas acuta*	Northern Pintail	LC OR LR/	NL	No	No	Yes	41,900,000	#######	#######		X			Wetlands (inland), Marine Neritic, Marine Coastal/Supratidal	This species is strongly migratory throughout its northern range, although some populations in the Southern Hemisphere are sedentary. It feeds nocturnally; flocks are roosting by day on open water. It breeds in solitary pairs or loose groups from April to June, with males leaving the breeding areas first from May to early-June to undertake extensive moult migrations (females following later). The species shows a preference for open lowland grassland, prairie or tundra habitats containing freshwater, brackish and saline wetlands with shallow water (10-30 cm deep). uring the winter, it also frequents large inland lakes, brackish coastal lagoons, brackish and saline marshes, shallow fresh or brackish estuaries, tidal flats and river deltas with adjacent agricultural land (e.g. stubble fields) and scattered impoundments. The EOO is 41,9000,00 km2. The population is estimated to number 7,100,000-7,200,000 individuals.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Streptopelia oriental*	Oriental Turtle-dove	LC OR LR/	NL	No	No	Yes	1,650,000	N/A	N/A		X			Forest, Shrubland, Artificial/Terrestrial, Artificial/Aquatic & Marine	The population has not been quantified, but the species is described as generally common. National population estimates include: c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in China. The EOO is approximately 16,500,000km2. This species has a wide range.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Streptopelia chinens*	Eastern Spotted Dove	LC	NL	No	No	Yes	16,800,000	N/A	N/A		X			Forest, Wetlands (inland), Artificial/Terrestrial	This species is found in Thailand, Myanmar, Indonesia, China, Vietnam. The EOO for this species is 16,800,000 km2. The global population size has not been quantified, but the species is described as very common throughout almost all of its range.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Surniculus lugubris*	Square-tailed Drongo-(	LC OR LR/	NL	No	No	Yes	6,400,000	N/A	N/A		X			Forest, Shrubland, Artificial/Terrestrial	This square-tailed Drongo-cuckoo has an extremely large range (6,400,000 km2). The population size has not been quantified owing to recent taxonomic splits. No information about its migration period.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Cuculus canorus*	Common Cuckoo	LC OR LR/	NL	No	No	Yes	51,500,000	#######	#######		X			Forest, Savanna, Shrubland, Grassland, Artificial/Terrestrial	The species inhabits forests and woodlands, both coniferous and deciduous, second growth, open wooded areas, wooded steppe, scrub, heathland, meadows, reedbeds, lowlands and moorlands. Individuals of the nominate and bakeri races breeding in Asia winter in India, south-east Asia, the Philippines and Africa.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Aerodramus breviros*	Himalayan Swiftlet	LC OR LR/	NL	No	No	Yes	3,630,000	N/A	N/A		X			Forest, Rocky areas (eg. inland cliffs, mountain peaks), Caves and Subterranean Habitats (non-aquatic), Artificial/Terrestrial	This Himalayan Swiftlet has an extremely large range (3,630,000 km2). The population size has not been quantified owing to recent taxonomic splits. No information about its migration period.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Anastomus oscitans*	Asian Openbill	LC OR LR/	VU	Yes	No	Yes	7,080,000	N/A	N/A		X			Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine	This species has an extremely large range. The population trend is not known, but the population is not believed to be decreasing sufficiently rapidly	There is a lack of evidences that this species occur within the EAAA, according to field survey results. Any populations within the Project EAAA is unlikely to represent a globally important concentrations of this species, the loss of which would result in the change of the IUCN Red List to EN or CR.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Accipiter soloensis*	Chinese Sparrowhawk	LC OR LR/	NL	No	No	Yes	4,070,000	100,000	499,999		X			Forest, Shrubland, Wetlands (inland), Artificial/Terrestrial	Sun et al. (2010) used weather radar to detect flocks of migrating Chinese Sparrowhawk in Taiwan. The EOO is 4,070,000 km2, They estimated that at least 225,935 individuals passed over Taiwan over a period of five days in April 2004. The population is therefore placed in the band 100,000-499,999 mature individuals. Land-use change within the species's wintering range could result in a loss of roosting habitat	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Haliaeetus ichthyaet*	Grey-headed Fish-eagl	NT OR LR	VU	Yes	No	No	16,300,000	10,000	100,000		X			Wetlands (inland), Marine Neritic, Marine Coastal/Supratidal, Artificial/Aquatic & Marine	Although widespread, the Grey-headed Fish-eagle species is now only locally common and may have a moderately small population. In Vietnam it is scarce in south and disappearing from north. This species's global population is preliminarily estimated at 10,000-100,000 mature individuals on the basis that it may not exceed a five-figure total. It is found near slow-moving rivers and streams, lakes, reservoirs and tidal lagoons in wooded country, usually in lowlands but ascending locally to 1,525 m. The most pertinent threats are the loss of undisturbed wetlands, over-fishing, siltation, pollution and persecution. There are also reports that this species may be deliberately targeted by poachers for meat.	There is a lack of evidences that this species occur within the EAAA, according to field survey results. Any populations within the Project EAAA is unlikely to represent a globally important concentrations of this species, the loss of which would result in the change of the IUCN Red List to EN or CR.
AVES	*Psittacula eupatria*	Alexandrine Parakeet	NT OR LR	NL	No	No	Yes	8,920,000	UC	UC		X			UC	UC	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Psittacula finschii*	Grey-headed Parakeet	NT OR LR	NL	No	No	Yes	2,060,000	N/A	N/A		X			Forest, Shrubland, Artificial/Terrestrial	The global population size has not been quantified, the EOO is 2,060,000 km2. The largest population is likely to be in Myanmar. Elsewhere the species is generally uncommon to decidedly rare, being restricted to largely intact forest habitats in southeast Asia, and this is likely a determinant of successful recruitment throughout the range. There have been very few contemporary reports from Vietnam. The Grey-headed Parakeet frequents oak, teak, cedar and pine forest, open wooded hillsides and cultivated areas with tall trees, at up to 3,800 m and also noted to use habitats in human-modified open landscapes in some areas. The species is widely captured for the cage-bird trade and is locally kept as a pet.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Lanius cristatus*	Brown Shrike	LC	NL	No	No	Yes	23,500,000	N/A	N/A		X			Forest, Shrubland, Grassland, Desert, Artificial/Terrestrial	This species has an extremely large range. The EOO is 23,500,000 km2 The global population has not been quantified.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Urocissa erythrorync*	Red-billed Blue Magpie	LC OR LR/	NL	No	No	Yes	8,860,000	N/A	N/A		X			Forest, Artificial/Terrestrial	The global population size has not been quantified, but the species is reported to be locally common throughout most of its range (Madge and Burn 1993), while national population sizes have been estimated at c.10,000-100,000 breeding pairs in China and < c.100 introduced breeding pairs in Taiwan . The EOO is 8,860,000 km2.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Prinia polychroa*	Brown Prinia	LC OR LR/	NL	No	No	Yes	3,820,000	N/A	N/A		X	X		Forest, Shrubland, Grassland, Artificial/Terrestrial	The population size has not been quantified, but it is not believed to approach the thresholds for Vulnerable under the population size criterion	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Riparia riparia*	Collared Sand Martin	LC OR LR/	NL	No	No	Yes	74,400,000	#######	#######		X			Grassland, Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine	The Collared Sand Martin has an extremely large range (EOO is 74,400,000 km2). The global population is about 10,000,000 to 500,000,000 mature individuals. The species nests colonially in newly eroded banks of rivers, streams, lakes, reservoirs and coastal cliffs. Breeding occurs between late April and August. Adult birds migrate soon after breeding. This species is migratory with Eurasian birds typically wintering in the Sahel zone and East Africa south to Mozambique.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Hirundo rustica*	Barn Swallow	LC	NL	No	No	Yes	251,000,000	#######	#######		X			Savanna, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial, Artificial/Aquatic & Marine	This widespread species is found on all continents except Antarctica. The species is continuously distributed along eastern Asia. Its EOO is 251,000,000km2. The global population of mature individuals is estimated at 290,000,000 – 499,999,999.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.
AVES	*Psittiparus margarito*	Black-headed Parrotbil	VU	NL	Yes	Yes	No	12,500	N/A	N/A		X			Forest, Artificial/Terrestrial	This species is confined to the Da Lat Plateau in South Annam, Viet Nam, and adjacent Mondulkiri, Cambodia. It is considered locally common to uncommon within its very small range. The global population size has not been quantified, but the species is described as uncommon to locally fairly common. It occurs in primary and secondary forest and at the forest edge, and occasionally feeds in nearby plantations and agricultural areas. It is most often observed in large flocks moving through the forest canopy. Although it has a broad tolerance of habitat degradation, forest within its very small range is being rapidly converted to coffee plantations.	There is a lack of evidences that this species occur within the EAAA, according to field survey results. Any populations within the Project EAAA is unlikely to represent a globally important concentrations of this species, the loss of which would result in the change of the IUCN Red List to EN or CR.
AVES	*Trochalopteron yersi*	Collared Laughingthrus	EN	NL	Yes	Yes	No	2,700	2,500	9,999		X			Forest, Shrubland	Trochalopteron yersini is endemic to the Da Lat plateau, Vietnam. It is known from a handful of localities the most important of which appear to be Mount Lang Bian, Mount Bi Doup and Chu Yang Sin National Park, with it recently discovered for the first time in Da Nhim Watershed Protection Forest (Mahood and Eames 2012). It is localised and generally uncommon. The population is estimated to number 2,500-9,999 mature individuals based on an assessment of known records, descriptions of abundance and range size. A government resettlement programme has greatly increased human pressure on the Da Lat plateau, increasing problems of forest degradation and fragmentation through logging, shifting agriculture, fuelwood-collection and charcoal production. On Mount Lang Bian, all land below 1,500 m is now logged or under cultivation.	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
AVES	*Tarsiger cyanurus*	Orange-flanked Bush-r	LC OR LR/	NL	No	No	Yes	5,970,000	N/A	N/A		X			Forest	The global population size has not been quantified. No data on geographic range. EOO is 5970000km2. This species breeds in Siberian taiga forest, with a preference for old-growth mossy moist spruce (Picea) tracts with fallen trees and sparse undergrowth, often on hilly slopes, but also pine (Pinus) and mixed forests with birch (Betula) and rhododendron.	This species has a large distribution range and is a common species. The EAAA is unlikely to support areas known to sustain, on a cyclical or otherwise regular basis, ≥ 1 percent of the global population or support areas that predictably support ≥10 percent of the global population of a species during periods of environmental stress for this species.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
AVES	*Chloropsis cochinchin*	Javan Leafbird	EN	NL	Yes	No	No	142,000	N/A	N/A		X			Forest, Artificial/Terrestrial	Chloropsis cochinchinensis and C. moluccensis (del Hoyo and Collar 2016) were previously lumped as C. cochinchinensis following Wells et al. (2003). This species is endemic to the island of Java, Indonesia. It occurs in a number of protected areas, and is considered uncommon, but may still be locally common. The population size is unknown, but the species has been considered rare for some time. This species favours humid forest edge and secondary growth, and is also found in evergreen and semi-evergreen lowland forest, peatswamp-forest, well-grown secondary forest and nearby mixed orchards, from the lowland plains to 1,800 m. Leafbirds have been a moderately popular cage bird for many years, but since 2012 Greater Green Leafbird in particular has become exceptionally sought-after. This has greatly increased the popularity of all leafbird species and with the present species's entire range accessible to trappers, large numbers are now trapped.	This species is endemic to Indonesia and not yet has been recorded in Vietnam. This is record from ebird, which the observer might have mistaken it as the Chloropsis moluccensis Blue-winged Leafbird (IUCN LC). The Blue-winged Leafbird is not a candidate species for critical habitat assessment.
MAMMALIA	*Cuon alpinus*	Dhole	EN	EN	Yes	No	No	N/A	949	2,215			X		Forest, Shrubland, Grassland	The Dhole is a habitat generalist, and can occur in a wide variety of habitats. There are very few recent confirmed records on Dholes in Viet Nam. The last confirmed records of Dholes were in Pu Mat National Park in 1998-99 and in Yok Don National Park in 2003, despite extensive camera trapping in >25 protected areas throughout the country. Along with other large carnivores, Dholes are likely extirpated from Viet Nam, although individuals may occasionally enter the country from neighboring Cambodia or Lao PDR.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.
MAMMALIA	*Elephas maximus*	Asian Elephant	EN	CR	Yes	No	No	11,317,030	48,323	51,680			X		Forest, Shrubland, Grassland, Artificial/Terrestrial	About 100–130 elephants thought to be left in the wild in Vietnam, with the likely numbers even lower. Elephants are currently distributed in three main regions, namely the Nghe An and adjoining areas (Son La and Ha Tinh) in northern Vietnam, Quang Nam area in central Vietnam and Dak Lak Province and adjoining areas (Dak Nong, Dong Nai and Binh Phuroc) in southern Vietnam. Asian Elephants inhabit grassland, tropical evergreen forest, semi-evergreen forest, moist deciduous forest, dry deciduous forested and dry thorn forest, in addition to cultivated and secondary forests or scrublands. owever, it is unclear which, if any, of these habitat types represent optimal suitable habitat for elephant as many landscapes have been subject to human modification. The EOO is 11,317,030 km2 and global population is 48,323 - 51,680.	The Project EAAA does not support suitable habitats for this species. This species was not found in field surveys or had historical records within the Project area. It is unlikely that the EAAA holds 0.5% of its national population and 5 reproductive units, which trigger criterion 1.
AVES	*Thaumatibis gigante*	Giant Ibis	CR	NL	Yes	No	Yes	120,000	194	N/A			X		Forest, Grassland, Wetlands (inland), Artificial/Terrestrial	The species is mostly confined to northern and eastern Cambodia, where it is probably still fairly widespread but extremely rare; with a few birds from the same population observed in extreme southern Lao PDR (BirdLife International 2001). It has also been recorded from Yok Don National Park, Viet Nam, with the most recent sighting of a single bird in 2011. Its historical range spanned southern Viet Nam and south-eastern and peninsular Thailand, where it is now extinct. Available data suggest that it has a patchy distribution across Cambodia, where it is most abundant. Some areas of high density exist in the Northern Plains, including Preah Vihear Protected Forest and Kulen Promtep Wildlife Sanctuary (with 30-40 nests monitored annually, and 24 pairs monitored in 2014). Other areas appear to have relatively low density populations, which may be clustered in some cases (e.g. Lomphat Wildlife Sanctuary [approximately 10-15 pairs]), Seima Protection Forest (estimated at five pairs). The population was estimated at a minimum of 194 mature individuals. Singles, pairs or small parties occur in marshes, pools, wide rivers and seasonal water-meadows in open, predominantly deciduous, dipterocarp lowland forest, although it seems to be dependent on soft mud around seasonal pools. Pools and seasonally flooded grassland with earthworm mounds are important in the breeding season, from June to September (Keo 2008). It appears to be largely resident, but apparently wanders widely in response to local disturbance and seasonal water-levels.	he Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
REPTILIA	*Limnonectes toumar*	Annam Wart Frog	VU	NL	Yes	No	No	154,967	N/A	N/A			X		Forest, Wetlands (inland), Artificial/Aquatic & Marine	This species is currently known from 200–1,085 m Asl in eastern Cambodia and central to southern Viet Nam. Similar habitat and elevations to those in its known localities extend into adjacent parts of south-eastern Lao PDR; and further surveys may uncover its presence there, so its range has been projected beyond known sites to include these areas of suitable habitat. It has mostly been observed in or adjacent to streams, muddy seeps (Jodi Rowley unpubl. data), pools, puddles, and drainage ditches. The species' EOO is 154,967 km2, which represents four threat-defined locations. Not much is known about the size of this species' population. This species is associated with various forest types including evergreen and evergreen mixed with both bamboo and deciduous. In Viet Nam, the species reproduces around May, when males have been observed calling from presumed mating territories. Habitat loss and degradation due to rapidly expanding agriculture is an ongoing threat to biodiversity throughout Viet Nam.). In the Central Highlands of Viet Nam large areas of forest are converted to agricultural land to grow cash crop plantations (e.g. rubber, coffee and tea).	The Project area may provide habitats that support this species. However, there is a lack of evidences that this species occur within the EAAA, according to field survey results. The EAAA is unlikely to contain areas that support globally important concentrations of the species, the loss of which would result in the change of the IUCN Red List status to EN or CR and meet the thresholds.
PINOPSIDA	*Glyptostrobus pensil*	Chinese Swamp Cypres	CR	CR	Yes	No	No	N/A	100	249			X		Forest	This species is found in SE China (it is suggested that most if not all of these supposed occurrences are cultivated plants - there are more than 200,000 mature individuals known in cultivation). This species is known from nine small localities in Dac Lac province in in Viet Nam. Recently several small stands were discovered in Khammouan Province, Lao PDR. No wild plants are known to remain in China, although hope remains that a few individuals may still survive. In Viet Nam fewer than 300 trees occur in five localities. Three of these localities have less than 10 trees each. The main stands are located within Earal and Trap Kso nature reserves. In Lao PDR six stands were recently located during surveys of the Nakai plateau. The largest of these was inundated at the completion of the Nam Theun II hydroscheme. The total number of trees remaining is estimated to be less than 100. A heliophilous species, intolerant of competition and usually growing in pure stands or solitary along streams. In Viet Nam and Lao PDR it occurs along streams and in seasonally inundated areas at altitudes between 500 and 700 m asl. In China and Viet Nam habitat loss due to intensive agriculture has been the main cause of decline. The subpopulations in Viet Nam are within coffee plantations, the water table has been altered and the trees are no longer producing fertile seed. The largest of the recently discovered stands in Lao PDR were located within the inundation zone of the newly completed Nam Theun II hydroscheme and have been flooded. Several small stands are located outside of this zone on land that has been allocated to villages for forestry or agriculture, and each stand has been	There is a lack of evidences that this species occur within the EAAA, according to field survey results and desktop review. It is unlikely that the EAAA holds 0.5% of its global population and 5 reproductive units, which trigger criterion 1.
EUDICOTS	*Camellia Yokdonensi*	N/A	N/A	NL	No	Yes	No	N/A	N/A	N/A			X		N/A	A species that has was discovered in Yok Don National Park in 2018 and its distribution elsewhere besides this area is unknown. The species is still undergoing further researches to determine its conservation status	A newly discovered species. The distribution of this species outside Yok Don National Park is unknown. Further reseraches are needed to understand this species. At this stage, it is considered to be unlikely that the EAAA contains a 10% global population and at least 10 reproduction units of this species.
MAGNOLIOPSIDA	*Dalbergia oliveri*	Cẩm lai / Tamalan	EN	EN	Yes	No	No	N/A	N/A	N/A				X	Forest	The species was found in Myanmar, Thailand, Laos, Cambodia and Vietnam. In Vietnam, they can be gound in Kontum (Sa Thay), Gia Lai, Dak Lak (EaSup, Lak), Dak Nong (Dak Mil), Phu Yen, Khanh Hoa, Ninh Thuan, Binh Thuan, Binh Phuoc, Tay Ninh, Dong Nai, Ba Ria - Vung Tau provinces, accroding to the Vietnam Red Data Book. It is scattered in the dense vergreen and semi-deciduos forest on wet soil or with small slopes, at an altitude of 800 - 900 m. Its beautiful red wood is overexploited.. A protected subpopulation occurs in Nam Cát Tiên National Park. The EOO and global population is unknown.	Two mature individuals were found in field surveys. The global and national populations of this species are unknown. However, it is unlikely that the two mature individuals represent a 0.5% global population of the specíe (which would equal to 400 individuals). Therefore, this species does not trigger critical habitat under criterion 1.
MAGNOLIOPSIDA	*Dipterocarpus intrica*	Dầu lông	EN	NL	Yes	No	No	656,752	N/A	N/A				X	Forest	This species is native to Indochina where it is found in Thailand, Lao PDR, Cambodia and south Viet Nam. It is found at elevations from 100 to 800 m. This is a relatively widespread and common species. It is mostly restricted to dry deciduous forest, lowland to sandstone slope. However there has been between a 30 and 50% population reduction in the last three generations (300 years) due to the expansion of agricultural areas and exploitation for timber. The species is continuing to decline but at a lower rate, threatened by habitat loss. It is found at elevation <700m.	Two mature individuals were found in field surveys. The global and national populations of this species are unknown. However, it is unlikely that the two mature individuals represent a 0.5% global population of the specíe (which would equal to 400 individuals). Therefore, this species does not trigger critical habitat under criterion 1.

Class	Scientific Name	Common Name	IUCN	VRDB	Crit 1	Crit 2	Crit 3	EOO (km2)	Glob-pop (min)	Glob-pop (max)	IBAT	ebird	PAs and KBAs	Field surveys	Habitat	Species information	Justification
MAGNOLIOPSIDA	*Rauvolfia cambodiar*	Ba gạc cam bốt	NL	VU	Yes	No	No	N/A	N/A	N/A				X	Forest, Artificial/Terrestrial	This species can be found in Vietnam, Laos and Cambodia. In Vietnam, the Rauvolfia cambodiana can be found in Quang Tri, Thua Thien Hue (A Luoi), Quang Nam (Tra My, Phuoc Son, Dai Loc, Nam Giang), Quang Ngai (Son Ha, Tra Bong, Minh Long), Binh Dinh (Vinh Thanh), Kontum (Sa Thay, Dak To, Konplong), Gia Lai (Ka Nac), Dak Lak (Buon Ma Thuot, Ea Sup, M'Drac, Dak Nong, Krong Pac), Lam Dong (Bao Loc, Di Linh, Duc Trong) provinces. It can be found in scattered in secondary forests, old upland fields, sometimes even in interstitial forests of bamboo; at an altitude of 400-800 m. Although distributed in many locations, the habitat is often invaded by deforestation for swidden cultivation; leading to a narrower distribution.	The species population in Vietnam is unknown. However, it is consider common in Vietnam, Laos and Camodia. it is unlikely that the EAAA contains a globally important concentrations of this species, the loss of which woud result in the change of the IUCN Red List status to EN or CR.
REPTILES	*Gekko Gecko*	Tokay Gecko	NL	VU	Yes	No	No	N/A	N/A	N/A				X	Forest, Artificial/ Terrestrial	This species can be found in Vietnam, Laos and Cambodia. In Vietnam, the Rauvolfia cambodiana can be found in Quang Tri, Thua Thien Hue (A Luoi), Quang Nam (Tra My, Phuoc Son, Dai Loc, Nam Giang), Quang Ngai (Son Ha, Tra Bong, Minh Long), Binh Dinh (Vinh Thanh), Kontum (Sa Thay, Dak To, Konplong), Gia Lai (Ka Nac), Dak Lak (Buon Ma Thuot, Ea Sup, M'Drac, Dak Nong, Krong Pac), Lam Dong (Bao Loc, Di Linh, Duc Trong) provinces. In natural habitatis, it lives in tree hollows and in rock crevices. It can also live in crevices or in partitions under house roofs. Eat insects, insects forage at night, until midnight. The mating season is in April, corresponding to the time when male geckos start to call. The Tokay Gecko is considered a remedy for coughs and neurasthenia, low back pain, and has a tonic effect. Although distributed in many locations, the habitat is often invaded by deforestation for swidden cultivation; leading to a narrower distribution.	The species population in Vietnam is unknown. However, it is consider common in Vietnam, Laos and Camodia. it is unlikely that the EAAA contains a globally important concentrations of this species, the loss of which woud result in the change of the IUCN Red List status to EN or CR.
REPTILES	***Coelognathus radiatus***	**Radiated Ratsnakes**	**LC**	**VU**	Yes	No	No	N/A	N/A	N/A				X	Forest, Savanna, Grassland, Artificial/Terrestrial	This species occurs from India across southern China to Hong Kong, then southward through Sumatra and Java to Borneo. It is widespread within this range. Although it thrives in human-modified environments, it was formerly more abundant in Indochina than it appears to be now (Q.T. Nguyen and T. Neang pers. comm. August 2011), likely as a result of exploitation. This species occurs in wet and dry forests, particularly in clearings and edges, and in grasslands, plantations, agricultural fields, and suburban and urban areas. It is often found in rural villages, where it consumes human commensalist rodents. It is terrestrial, but climbs well. It is less common in forest than around human habitation and rice fields, as rats and other prey species are found in smaller numbers in natural habitats. There are no apparent threats to this species.	The species population in Vietnam is unknown. However, it is consider common in Vietnam, Laos and Camodia. it is unlikely that the EAAA contains a globally important concentrations of this species, the loss of which woud result in the change of the IUCN Red List status to EN or CR.
REPTILES	*Ptyas korros*	Indo-Chinese Rat Snake	NL	EN	Yes	No	No	N/A	N/A	N/A				X	Forest, Shrubland, Grassland, Wetlands (inland), Artificial/Terrestrial	According to Vietnam Red Data Book, the species is common in Southeast Asia and South Asia. It can be found throughout Vietnam and can inhabit various types of habitats, including human-associated rural areas and sometimes can go into people's houses. The national population has undergone at least 50% reduction due to loss of habitats and over-exploitation in Vietnam; thus the EN status.	Two individuals were found in field surveys. The national populations of this species are unknown. However, it is unlikely that the two mature individuals represent a 0.5% national population of the specíe (which would equal to 400 individuals). Therefore, this species does not trigger critical habitat under criterion 1.

APPENDIX K LIST OF INTERVIEWS AND QUESTIONAIRE FOR NON-VOLANT MAMMALS

No.	Name	Gender	Age	Address	GPS Coordinate (WGS84)		Remarks
1	Y Vốc (A Ma Vai)	Male	63	Cư H'Riết village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.037888	108.183373	Interview at his house
2	Trần Dũng	Male	51	Pơng Drang village, Krong Buk district, Dak Lak province	13.033805	108.184941	Live in Pơng Drang but move to Cư H'Riết village for agriculture cultivation
3	Lê Quang Mai	Male	55	Village 6, Cư Né commune, Krong Buk district, Dak Lak province	13.033422	108.185918	Live in Ha Tinh province but move to Krong Buk for agriculture cultivation
4	Ho Viet Phuc	Male	24	Cư K'Bô commune, Krong Buk district, Dak Lak province	13.017585	108.196057	Live in Ha Tinh province but move to Krong Buk for agriculture cultivation
5	Dang Minh Hai	Male	37	Cư K'Bô commune, Krong Buk district, Dak Lak province	13.012093	108.195476	He is from Quang Ngai province coming to this place for agriculture cultivation (mainly coffee)
6	Y Dih (Ma Sa Na)	Male	38	Đrao village, Cư Né commune, Krong Buk district, Dak Lak province	13.111220	108.260990	Interview at his coffee field
7	Hơ Mỹ Vài	Female	48	EaBrơ village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.037740	108.182650	Interview at her small shop
8	Y Tăng Nia	Male	35	EaBrơ village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.036570	108.181740	Interview at his house
9	Y Chơ Nê	Male	45	Cư H'Riết village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.035590	108.181270	Interview at his house
10	Y Đơk	Male	32	Cư H'Riết village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.034750	108.180830	Interview at his house
11	Y A Miên	Male	51	Cư H'Riết village, Cư Pơng commune, Krong Buk district, Dak Lak province	13.035140	108.179380	Interview at his house

QUESTIONAIRES FOR MAMMAL INTERVIEWS

Bảng câu hỏi dành cho phỏng vấn thú có vú

Phiếu số/No.: | | |

PHIẾU PHỎNG VẤN THÚ
ANIMAL INTERVIEW SHEET

Khu vực nghiên cứu/Research Area:

Người phỏng vấn/Interviewer:

Ngày tháng năm/Date:

1. THÔNG TIN NGƯỜI ĐƯỢC PHỎNG VẤN/ INTERVIEWEE INFORMATION

Họ và tên:
Full name:
Địa chỉ:
Address:

Giới tính:
Gender:

Năm sinh/tuổi:
Birth year/Age:

2. THÔNG TIN VỀ ĐỘNG VẬT (THÚ) TRONG KHU VỰC/INFORMATION ABOUT ANIMALS (MAMMALS) IN THE AREA

2.1. Từ trước tới nay, khu vực của mình có những loài động vật (thú) hoang dã nào? Ông/bà vui lòng kể tên các loài? / What wild animals (mammals) have you seen in your area? Would you mind listing them out?

STT No.	Loài Species	Khu vực Area	Số lượng No	Thời gian gặp gần đây nhất (tháng/năm) Lastest encounter (mm/yy)	Ghi chú (Nghe người khác nói lại) Note (Hearsay)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

2.2. Hỏi về một số loài cụ thể có thể có trong vùng nếu chưa được kể ở trên/ Ask about specific species that could posibly be in the are if they have not been mentioned above

STT. No.	Câu hỏi Question	Trả lời Answer	Ghi chú Note
1	Ở đây có mèo hoang dã không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài? Are there any wild cats? If yes, how many species are there? Please describe in detail about each species		
2	Ở đây có Sóc không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài? Are there any squirrels? If yes, how many species are there? Please describe in detail about each species		
3	Ở đây có cầy/ chồn không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài? Are there any civets/weasels? If yes, how many species are there? Please describe in detail about each species		
4	Ở đây có Culi (Khỉ gió/Cù lần) không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài? Are there any Pygmy Slow Loris? If yes, how many species are there? Please describe in detail about each species		
5	Ở đây có khỉ không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài? Are there any monkeys? If yes, how many species are there? Please describe in detail about each species		
6	Ở đây có chuột không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài? Are there any rats? If yes, how many species are there? Please describe in detail about each species		
7	Ở đây có Rái cá không? Nếu có, gồm mấy loài? Vui lòng mô tả chi tiết từng loài? Are there any otters? If yes, how many species are there? Please describe in detail about each species		
8			
9			
10			

Người thực hiện phỏng vấn đưa ra một số hình ảnh về các loài động vật (thú) để hỏi người được phỏng vấn để tìm thông tin về phân bố? The interviewer will bring up pictures of animals (mammals) to ask the interviewee about distribustion information?

Phiếu số/No.: | | |

PHIẾU PHỎNG VẤN DƠI
BATS INTERVIEW SHEET

Khu vực nghiên cứu/Research Area:

Người phỏng vấn/Interviewer:

Ngày tháng năm/Date:

1. THÔNG TIN NGƯỜI ĐƯỢC PHỎNG VẤN/ INTERVIEWEE INFORMATION

Họ và tên:
Full name:

Giới tính:
Gender:

Năm sinh/tuổi:
Birth year/Age:

Địa chỉ:
Address:

Câu 1: Ông/bà có nhìn thấy Dơi quanh nhà không? Do you see bats around your house?

a. Có/Yes
b. Không/No

Câu 2: Ông/bà có gặp Dơi có về ăn trái cây không? Do you see bats eating fruits?

a. Có/Yes Mùa nào/Which season:…….
b. Không/No

Câu 3: Theo ông/bà, có mấy loài Dơi khác nhau? According to you, how my species of bat are there?

a. 1
b. 2
c. 3
d. Khác: …..

Câu 4: Ông/bà vui lòng mô tả từng loài Dơi để xem chúng khác nhau những điểm gì? Would you mind describing each species of bats to differentiate them?

a. Loài 1/Species 1: ……

b. Loài 2/Species 2: ……
c. Loài 3/Species 3: ……
d. Loài n/Species n: ……

Câu 5: Ông/bà có bẫy Dơi không? Do you trap the bats?

a. Có/Yes Mục đích bẫy Dơi để làm gì/Purpose:…….
b. Không/No

Câu 6: Theo ông/bà, Dơi có lợi hay hại? Do you think bats are helpful or not?

a. Lợi/Helpful
b. Hại/Harmful

ERM has over 160 offices across the following countries and territories worldwide

Argentina
Australia
Belgium
Brazil
Canada
China
Colombia
France
Germany
Hong Kong
India
Indonesia
Ireland
Italy
Japan
Kazakhstan
Kenya
Malaysia
Mexico
Mozambique
Myanmar
New Zealand
Norway
Panama
Peru
Poland
Portugal
Puerto Rico
Romania
Russia
Singapore
South Africa
South Korea
Spain
Sweden
Switzerland
Taiwan
Thailand
The Netherlands
UAE
UK
US
Vietnam

ERM Vietnam
3rd Floor, Saigon Finance Centre
09 Dinh Tien Hoang, Dakao Ward
District 1, Ho Chi Minh City
Vietnam

T: +84 28 3914 7800
F: +84 28 3914 7801

www.erm.com

The business of sustainability

ERM