

National Grid Company of Pakistan Limited (NGC)
Ministry of Energy (Power Division)
Government of Pakistan



**Environmental and Social
Management Plan
(ESMP)**

**Boosting Energy Security Through Transmission in Pakistan (BEST-
PAK)-Multi-Phase Programmatic Approach (MPA) Program Phase 1
(P504536)**

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List of Acronym

Acronym	Full form	Acronym	Full form
AC	Alternating Current	ADB	Asian Development Bank
AIS	Air-Insulated GS	ANSI	American National Standards Institute
AIIB	Asian Infrastructure Investment Bank	IsDB	Islamic Development Bank
AP	Affected Person	AQI	Air Quality Index
BEST	Boosting Energy Security Through Transmission	BHU	Basic Health Unit
CBD	Convention on Biological Diversity	CBO	Community-Based Organization
CBs	Circuit Breakers	CESMP	Contractor's Environmental and Social Management Plan
CHS	Community Health and Safety	CITES	Convention on International Trade in Endangered Species
CO	Carbon Monoxide	CO ₂	Carbon Dioxide
CSC	Construction Supervision Consultant	CSO	Civil Society Organization
DC	Direct Current	DHQ	District Headquarters Hospital
DISCO	Distribution Company	EMF	Electromagnetic Field
EOBI	Employees Old-Age Benefits Institution	EPA	Environmental Protection Agency
EPC	Engineering, Procurement, and Construction	ESCP	Environmental and Social Commitment Plan
ESF	Environmental and Social Framework	ESHS	Environmental, Social, Health, and Safety
ESIC	Environment and Social Impact Cell	ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards	ESMMP	Environmental & Social Management and Monitoring Plan
FGD	Focus Group Discussion	FOGC	Fiber Optic Guard Cables
GBV	Gender-Based Violence	GHG	Greenhouse Gas
GIIP	Good International Industry Practice	GIS	Geographic Information System
GRC	Grievance Redress Committee	GRC-HQ	Grievance Redress Committee - Headquarter *
GRC-P	Grievance Redress Committee - Project *	GRM	Grievance Redress Mechanism
GS	GS	GSO	Grid System Operation
HDI	Human Development Index	HESCO	Hyderabad Electric Supply Company
HRAC	Hazard Risk Assessment Code	HVDC	High Voltage Direct Current
ICNIRP	International Commission on Non-Ionizing Radiation Protection	IDP	Internally Displaced Person
ILO	International Labour Organization	IP	Indigenous People
ISO	International Organization for Standardization	JSA	Job Safety Analysis
KP	Khyber Pakhtunkhwa	kV	Kilovolt
LESCO	Lahore Electric Supply Company	LOTO	Lock Out Tag Out
MEPCO	Multan Electric Power Company	MOU	Memorandum of Understanding
MPA	Multi-Phase Programmatic Approach	MSDS	Material Safety Data Sheet
MV	Medium Voltage	MVAR	Megavolt-Ampere Reactive



MV-BT	Medium Voltage – Bushing Transformer	NEPRA	National Electric Power Regulatory Authority
NEQS	National Environmental Quality Standards	NGC	National Grid Company
NGO	Non-Governmental Organization	NHA	National Highway Authority
NIOSH	National Institute for Occupational Safety and Health	NKLP	New Kot Lakhpat
NO ₂	Nitrogen Dioxide	O ₃	Ozone
OHS	Occupational Health and Safety	OHSMP	Occupational Health and Safety Management Plan
OPGW	Optical Ground Wire	OSHA	Occupational Safety and Health Administration
PC-1	Planning Commission Form 1	PPC	Pakistan Penal Code
PCRWR	Pakistan Council of Research in Water Resources	PH	Potential of Hydrogen
PIU	Project Implementation Unit	PLC	Programmable Logic Controller
PM	Particulate Matter	PPE	Personal Protective Equipment
PPP	Policy Procedure and Protocols	PSZ	Project Site Zone
PT	Potential Transformer	RCA	Root Cause Analysis
RFP	Request for Proposal	SCADA	Supervisory Control and Data Acquisition
SEA	Sexual Exploitation and Abuse	SEP	Stakeholder Engagement Plan
SEPCO	Sukkur Electric Power Company	SF ₆	Sulphur Hexafluoride
SH	Sexual Harassment	SO ₂	Sulfur Dioxide
SOP	Standard Operating Procedure	STATCOM	Static Synchronous Compensator
STD	Sexually Transmitted Disease	TA	Technical Assistance
TBT	Toolbox Talk	TDS	Total Dissolved Solids
THQ	Tehsil Headquarters	TMP	Traffic Management Plan
TPS	Thermal Power Station	UN	United Nations
UPS	Uninterruptible Power Supply	VAR	Volt-Ampere Reactive
VPSHR	Voluntary Principles on Security and Human Rights	VSC	Voltage Source Converter
VT	Voltage Transformer	WB	World Bank
WHO	World Health Organization		

Executive Summary

The National Grid Company of Pakistan (NGC), under the Ministry of Energy (Power Division), is implementing the Phase 1- Component 1 Boosting Energy Security Through Transmission in Pakistan (BEST-PAK) program which is supported by multiple MDBs including the World Bank, Asian Infrastructure Investment Bank and Islamic Development Bank, to strengthen the country's transmission infrastructure and ensure long-term grid stability. In this initiative, NGC will install reactive power compensation devices in 29 grid station sites across Pakistan which include STATCOM installation at three NGC grid stations while switched capacitors and bus-connected reactors at other 26 sites. These installations aim to address voltage fluctuation issues, improve reactive power management, and enhance the grid's capacity to accommodate growing renewable energy inputs.

To support this infrastructure investment in an environmentally and socially responsible manner, a consolidated Environmental and Social Management Plan (ESMP) has been developed. It identifies potential risks and impacts related to environmental quality, social well-being, and occupational health and safety (OHS), and lays out a structured plan for mitigation, monitoring, reporting, and institutional coordination. The scope of the ESMP is confined to activities within the boundary of the existing substations—there is no need for land acquisition or physical displacement. Civil works, including equipment foundations, trenching, and erection, will be carried out in already secured and demarcated areas.

Baseline assessments for all locations including 16 districts of Punjab (22 GS sites), 4 districts of Sindh (4 GS sites) and 3 districts of Baluchistan (3 GS sites) highlighted recurring issues such as high levels of air pollution due to industrial emissions, unpaved roads, and biomass burning, and widespread groundwater contamination, particularly with arsenic and fluoride. Across all locations, no protected flora, fauna, or ecologically sensitive zones were identified within the substation premises. Social assessments of the nearby communities which are mainly the employee colonies within the grid station with separate boundaries revealed mixed rural-urban characteristics, limited infrastructure in some districts, and gender disparities in education and health service access. These findings informed the development of the mitigation and monitoring framework. E&S baseline data for 22 GS sites has been collected through primary sources/field survey and for the remaining 7 GS sites credible secondary sources have been used.

During construction, potential environmental impacts include dust emissions, noise, localized soil or water contamination, and disruption due to increased vehicle movement. These will be mitigated through dust control measures, proper machinery maintenance, noise control during working hours, and strict waste management protocols for solid, liquid, and hazardous waste. Construction-related traffic will be managed through planned routing, signage, and engagement with local traffic authorities. Labor influx, though limited, poses social risks and will be managed by establishing separate labor camps away from communities, along with enforcement of Codes of Conduct and grievance redress mechanisms.

Worker health and safety risks, such as falls from height, electrical hazards, and exposure to moving machinery, have been assessed using a probability-severity-based Hazard Risk Assessment Code (HRAC). Mitigation measures include mandatory PPE, trained

safety supervisors, safe scaffolding and access systems, lockout-tagout procedures for electrical works, and restricted access zones. Residual risks are expected to remain low to medium after implementation. Most of the impacts and risks are site specific, temporary, and manageable through measures provided in the ESMP.

Stakeholder consultations played a central role in shaping ESMP. A total of 332 individuals from the nearby communities are consulted and 37 institutional consultations including government officials, and NGO representatives. Separate focus group discussions were conducted with women participants to ensure their voices and concerns were explicitly heard and integrated. Women raised concerns about noise from machinery, the presence of unfamiliar male workers near residential areas, and the need for proper security arrangements during construction. The project team has addressed these issues by recommending enhanced perimeter security, labor separation from family quarters, and the establishment of a dedicated point of contact for women to lodge grievances or report safety concerns.

Community expectations for employment during construction, particularly for local unskilled labor, were also emphasized in both male and female discussions. Contractors will be required to prioritize local hiring where possible, and all workers especially those in contact with communities, will be trained on respectful behavior, gender sensitivity, and cultural norms.

The institutional framework for ESMP implementation involves several coordinated layers. NGC will serve as the lead agency, managing compliance and coordination through its Environment and Social team including one Assistant Manager Environment, one Assistant Manager Occupational Health and Safety (OHS) and one Assistant Manager Social. This team will be supported by supervision consultants who will monitor the contractors' performance and ensure field-level implementation of the ESMP. Contractors will be responsible for developing and executing site-specific Contractor's ESMPs (CESMPs) and fulfilling all environmental and social obligations. Independent third-party monitoring firms will be hired to conduct periodic audits and verify compliance with ESMP provisions. Government departments, such as the provincial Environmental Protection Agencies (EPAs) and labor authorities, will have an oversight role. At each site, a Grievance Redress Committee (GRC) will be established to handle complaints transparently and efficiently.

Capacity building is an essential component of the ESMP. A series of environmental, social, and health and safety training sessions are planned for NGC staff, contractors, and workers. These include induction training on environmental and social safeguards, OHS-specific training, gender and GBV awareness, emergency response drills, and community health and safety protocols. Refresher training will be conducted periodically to maintain high compliance standards.

To support landscape restoration and contribute to climate co-benefits, the project includes a tree plantation initiative. Native species suited to local conditions will be planted in designated open areas within or around the substations. This will not only help restore the ecological footprint of the project but also improve visual aesthetics and provide minor dust and noise attenuation benefits. Plantation will be carried out with survival monitoring,

and maintenance responsibilities will be assigned to contractors during construction and to NGC after project completion.

The total estimated cost for the implementation of the ESMP, including mitigation measures, monitoring, third-party audits, training, plantation, and grievance redress mechanisms, has been calculated (PKR 429.72 million) and included in the project's overall budget. This ensures that all environmental and social commitments are fully resourced and not left unfunded or delayed.

This ESMP provides a comprehensive and practical roadmap to ensure that the installations of reactive power compensation devices are implemented in full compliance with national laws, World Bank Environmental and Social Standards (ESS), and IsDB Environment and Social Safeguard Policy (ESSP) and good international practices. With clearly defined roles, detailed mitigation strategies, community-inclusive consultation, and adequate budget allocations, the project is positioned to achieve its technical objectives while safeguarding environmental quality and social well-being.

1 Introduction

1.1 Project Background

The National Grid Company of Pakistan (NGC)¹ Pakistan, implementing agency, is responsible for Evacuation/Transfer of Power from all the Public & Private Sector Power Plants in the country to the respective load centers of Distribution Companies (DISCOs) through transmission network consisting of +660 kV HVDC transmission lines and 500 kV & 220 kV HVAC transmission lines along with associated GSs. The company continuously monitors the increasing demand for new transmission lines, GSs, and devices.

Keeping in view the present loading position and expected power demand in near future, the company is undertaking a project (Boosting Energy Security Through Transmission in Pakistan (BEST-PAK), Multiphase Programmatic Approach (MPA) Program Phase 1 - Grid Stability Enhancement Project) to install reactive power compensation devices (Static Synchronous Compensators (STATCOMs), switched capacitor banks and bus-connected reactors) in grid station sites across Pakistan with support from the multiple MDBs including World Bank (WB), Asian Infrastructure Investment Bank (AIIB) and Islamic Development Bank (IsDB). The addition of this technology will help regulate voltage, support grid stability, and enhance the reliability of the national transmission system, particularly under fluctuating load conditions and increasing integration of renewable energy sources. An Environmental and Social Assessment for Component 1 of Phase of the project has been completed, and the corresponding Environmental and Social Management Plan (ESMP) has been developed.

The primary objective of this ESMP is to identify potential environmental, social, health, and safety (ESHS) risks and impacts associated with the installation and operation of the reactive power compensation devices and to define measures to mitigate, manage, and monitor these impacts throughout the project lifecycle. The ESMP sets out practical actions, institutional responsibilities, monitoring requirements, and reporting procedures to ensure compliance with national regulations and World Bank's Environmental and Social Standards (ESSs).& IsDB's Environmental and Social Safeguards Policy (ESSP) (ESSs).

1.2 Unified ESMP for all Grid station Sites

The project involves the installation of reactive power compensation devices in 29 grid station sites across Pakistan which include STATCOM installation at three NGC grid stations while switched capacitor banks and bus-connected reactors at other 26 sites.

Details of grid stations where reactive compensation devices will be installed are provided in the Table 1-1.

¹ Formerly NTDC

Table 1-1 List of Grid Stations for Reactive Power Compensation Devices

S#	GS	District	Province	Statcom/Compensation (MVAR)
1	500kV Rahim Yar Khan GS	Rahim Yar Khan	Punjab	800
2	500kV Guddu GS	Kashmore	Sindh	400
3	500kV Dadu GS	Dadu	Sindh	800
4	220kV Ravi GS	Lahore	Punjab	96
5	220kV Ghazi Road GS	Lahore	Punjab	96
6	220kV Wapda Town GS	Lahore	Punjab	96
7	500kV Lahore North GS	Sheikhupura	Punjab	96
8	500kV Lahore South GS	Kasur	Punjab	96
9	220kV Kala Sha Kaku GS	Sheikhupura	Punjab	96
10	220kV Lalian GS	Chiniot	Punjab	96
11	220kV Nishatabad GS	Faisalabad	Punjab	96
12	500kV Nokhar GS	Gujranwala	Punjab	96
13	220kV Jaranwala Rd GS	Faisalabad	Punjab	96
14	220kV Vehari GS	Vehari	Punjab	96
15	220kV KAPCO	Kot Addu	Punjab	96
16	220kV Piranghaib	Multan	Punjab	96
17	220kV Bahawalpur	Bahawalpur	Punjab	96
18	220kV Sahuwala GS	Sialkot	Punjab	96
19	500kV Yousafwala GS	Sahiwal	Punjab	96
20	220kV Sarfaraz Naggara GS	Kasur	Punjab	96
21	500kV DG Khan GS	DG Khan	Punjab	111
22	500kV Shikarpur GS	Shikarpur	Sindh	2×111
23	500kV Faisalabad West GS	Faisalabad	Punjab	111
24	500kV Rawat GS	Rawalpindi	Punjab	111
25	220kV DM Jamali GS	Nasirabad	Balochistan	60
26	220kV Zhob GS	Zhob	Balochistan	60
27	220kV Loralai GS	Loralai	Balochistan	60
28	220kV Mirpur Khas GS	Mirpur Khas	Sindh	60

29	765/500kV Islamabad West Grid Station	Attock	Punjab	111 160
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Out of 29 GS, 28 grid stations are operational, with defined boundaries, and share similar environmental and social settings, while 1 GS is under construction. The scope of work, equipment to be installed, construction techniques, workforce requirements, and anticipated impacts are largely uniform across the sites. Therefore, a consolidated ESMP has been developed to cover all these locations. This approach ensures consistency in environmental and social compliance while allowing for localized implementation adjustments where necessary.

1.3 Approach and Methodology

1.3.1 Approach

The study is based on both primary and secondary data and information. The primary data includes data collected from field using the Environmental and Social Screening Checklist (sample attached as **Annex 1**). The secondary data includes a review of relevant information from literature and published reports. Discussions were held with stakeholders and community representatives. The main purpose of this approach was to obtain an impartial impression of the people's perceptions about the proposed Project and its environmental and social impacts.

1.3.2 Methodology

The ESMP has been prepared by employing the accepted standard methodology and accomplishing different but well integrated tasks. The key tasks undertaken include:

- **Review of Project details**, to understand subproject activities, likely to cause environmental and social risks and impacts.
- **Review of relevant legislation, policies, standards, and guidelines** to determine the policy, legal and institutional environment for the subproject based on World bank ESF, national and provisional level.
- **Primary data collection** for this purpose, environmental and social checklists were used. The field survey and stakeholder consultations were conducted from 30 April 2025 to 08 May 2025, 25 June 2025 to 27 June 2025 and from 12 November 2025 to 13 November 2025 and 1st December 2025 to 17.12.2025 by the Environmental and Social (E&S) team of NGC dedicated to this project. E&S baseline data for 22 GS sites has been collected through primary sources/field surveys and for the remaining 7 GS sites credible secondary sources have been used.
- **Review of secondary literature** to understand subproject area, sample E&S documents to guide this assessment; and different published development reports for taking stock of environmental and socioeconomic baseline conditions.
- **Conduct consultation with key stakeholders** and potential beneficiary communities. During the field survey the team conducted 34 consultation sessions

with community and around 37 institutional consultations including NGOS, both physically and virtually, in all project districts. **Scoping, screening and impact assessment** while developing interaction between subproject activities and key environmental aspects to screen out the significance of adverse environmental and social impact and proposing generic mitigation measures.

- **Procedures** for environmental and social management, to manage and monitor the environmental and social aspects of the project.
- **Estimation of budget** to ensure the effective implementation of all the mitigation measures/ actions proposed in the ESMP.

2 Project Description

The Boosting Energy Security Through Transmission in Pakistan (BEST-PAK), Multiphase Programmatic Approach (MPA) Program Phase 1 - Grid Stability Enhancement Project aims to strengthen transmission system stability and enhance operational performance.

The BEST-PAK Project comprises the following components:

Component 1: Grid Stability Enhancement

This component, to be implemented by the NGC, will support the installation of reactive power compensation devices to address key grid operational instability, including system reliability issues and the full deployment of VRE, alongside TA for the Project's implementation and preparation of subsequent phases under the MPA program. The component consists of:

Subcomponent 1.1: Power Electronics-based Reactive Power Compensation Devices (STATCOMs) Supporting the installation of: (a) two 400 MVar STATCOMs, modular, for 500 kV, at Dadu substation; (b) two 400 MVar STATCOMs, modular, at for 500 kV at Rahim Yar Khan (RYK) substation; and (c) one 400 MVar STATCOM, modular, for 500 kV at Guddu substation. This component will be financed by the World Bank and AIIB through joint cofinancing arrangements.

Subcomponent 1.2: Fixed Reactive Power Compensation Devices Supporting the installation of fixed reactive power compensation devices including: (a) switched capacitor banks, comprising a bank of 2x48 MVar capacitors at each of 17 substations;² (b) bus-connected reactors totaling 1,132 MVar at 9 substations rated 765, 500, and 220 kV³ with associated spares; and (c) 259 MVar line-connected reactors at the Islamabad West terminals of the double-circuit 500 kV line to Maira Substation. This sub component 1.2 will be financed through the IsDB through parallel cofinancing.

Component 2: Project Implementation Support TA This subcomponent provides hands-on TA to the PMU to deliver Phase 1 and accelerate readiness for subsequent BEST-PAK phases. It finances: (i) an experienced owner's engineer/project management firm to support bidding documents and oversee design, procurement, factory acceptance testing, installation, and commissioning; (ii) PMU institutional strengthening to upgrade planning and analytical tools, and to support targeted upskilling and twinning partnerships with international utilities on advanced transmission planning and operations; (iii) fiduciary capacity building; (iv) E&S capacity building to operationalize the Environmental and Social Framework (ESF) in practice, including grievance redress and other compliance requirements; and (v) ensure support and stakeholder coordination for timely effectiveness of Phase 1 and readiness of future phases in line with the World Bank requirements (including ESF).

² Switched capacitor banks for substations include Lahore South, Kala Shah Kaku, Sarfraz Nagar, Ravi, Ghazi Road, WAPDA Town, Lahore North, Lalian, Nishatabad, Jaranwala Road, Nokhar, Sahuwala (Sialkot), Yousafwala, Vehari, Bahawalpur, KAPCO, and Piranghaib (NGPS).

³ Bus reactors for 765 kV Islamabad West substation (3x60 MVars), the following 500 kV substations (each with 3x37 MVar): DG Khan, Shikarpur, Faisalabad West and Rawat; and the following 220 kV substations (each with 3x20 MVars) DM Jamali, Zhob, Loralai, and Mirpur Khas.

2.1 Project Proponent

The Ministry of Energy (Power Division), Government of Pakistan is the sponsoring agency for the project, providing overall strategic oversight and policy direction. Component 1 of Phase 1 of the project is being executed by the NGC, which is responsible for the planning, implementation, and coordination of all related activities. Upon completion, the operation and maintenance will also be carried out by NGC, ensuring long-term sustainability and efficient functioning of the infrastructure.

2.2 Details of Reactive Power Compensation Devices

The project involves the installation of reactive power compensation equipment at a total of 29 GSs to enhance voltage stability and improve overall system performance. At 3 of these GSs, STATCOM units will be installed. The remaining 26 GSs will be equipped with conventional reactive power compensation devices, including fixed switched capacitor banks, bus-connected reactors, with individual capacities ranging from 60 to 111 MVAR based on the specific requirements of each station.

The key steps of this activity include:

- Design, supply, and installation of reactive compensation devices.
- Civil works, including foundations and modifications within existing GSs.
- Integration with NGC's SCADA and protection systems
- Testing, commissioning, and operational training
- Environmental and social management during construction and commissioning

The typical components of reactive power compensation devices are given below in **Error! Reference source not found..**

Table 2-1 Typical Components

Component	Description
Voltage Source Converter (VSC)	Converts DC to AC and vice versa; core of the STATCOM that controls reactive power.
DC Capacitor Bank	Stores energy and stabilizes the DC voltage for the converter operation.
Harmonic Filters	Filters out high-frequency harmonics generated by the converter.
Interface Transformer	Steps up or down voltage between STATCOM and the grid (e.g., 500kV/33kV).
GIS/AIS Equipment	High-voltage switchgear for safe connection to grid.
Circuit Breakers (CBs)	Protect against short circuits or system faults; used at various locations.
Current Transformers (CTs)	Measure grid current and feed data to protection and control systems.
Voltage Transformers (VTs/PTs)	Measure voltage levels for monitoring, protection, and synchronization.

Isolators / Earth Switches	Provide safe mechanical disconnection for maintenance.
Cooling System	Regulates temperature of VSC and other power electronics (air or liquid based).
Control & Protection System	SCADA or PLC-based system for automatic operation, fault detection, and safety.
Auxiliary Power Supply System	Includes AC/DC panels, battery banks, and UPS for backup power.

To provide a clear understanding of STATCOM technology (one type of Reactive compensation devices) and its physical footprint, a schematic diagram **Error! Reference source not found.** of the STATCOM system has been included, sourced from publicly available technical resources. This diagram illustrates the key components and functional layout of the STATCOM, facilitating better comprehension of its operation and structure. Additionally, a satellite image of an existing SVC (Static VAR Compensator) installation at the New Kot Lakhpat GS (NKLP) in Lahore has been incorporated. This image offers a real-world view of the typical area occupied by such equipment within a GS, allowing for a more accurate assessment of the spatial and environmental impacts related to the STATCOM installation proposed under this project.

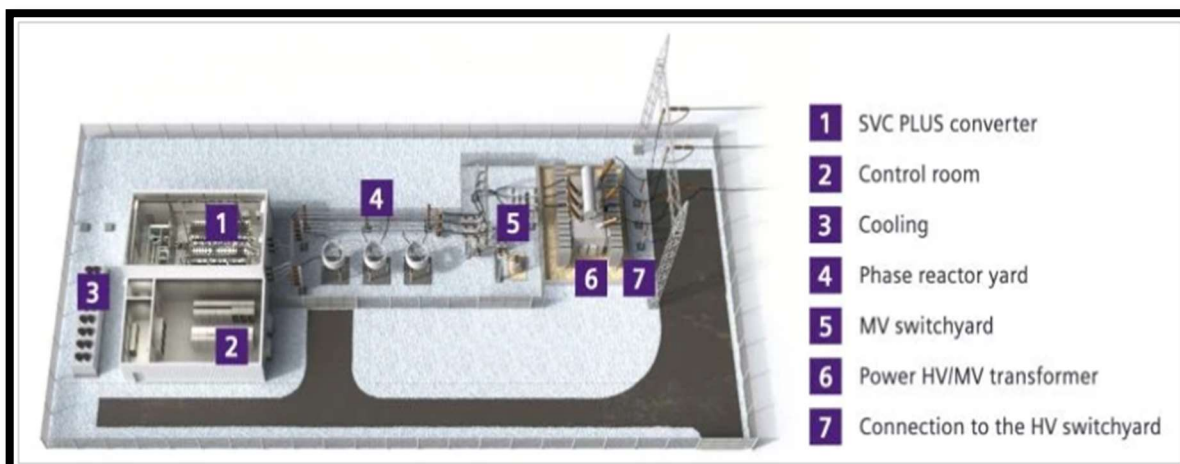


Figure 2-1 General Layout of Statcom



Figure 2-2 Satellite Imagery of SVC in NKLP

2.3 Civil Works and Infrastructure

Civil work will be minimal and limited to:

- Site clearance, Filling, levelling and compaction of site.
- Excavation and Foundation works for reactive compensation equipment (Statcom pads, Transformers, reactors, control panels).
- Switchyard paths, access roads, cable trenches, ducts and earthing system.
- control room construction/extension, where required
- Construction of switchyard fence or security wall.
- Construction/relocation of residence for 500kV Dadu GS.

All construction activities will take place within the boundaries of existing GSs.

2.4 Land Requirements

The installation of the reactive power compensation devices requires an allocated space measuring approximately 60x120 meters⁴ for the STATCOMs while the other devices like switched capacitor banks, bus-connected reactors require less area than this. The required land area is available within the existing boundaries of the GSs. No additional land acquisition is necessary, as the required footprint fits entirely within the secured GS premises.

⁴ These figures are based on assumptions as provided by the NGC Substation Design Department.

2.5 Distance from the residential settlements

Every GS where reactive power compensation devices are to be installed, the residential colonies are adjacent to the boundary enclosed switchyards with distances ranging from 15 meters to 500 meters. Some colonies shared the same entrances while some have totally different entrances.

In Dadu GS, the residential colony is adjacent to 500kV Switchyard. As there is no free space available in 500kV switchyard, for installation of STATCOM, 500kV switchyard needs to be extended towards residential colony for which residential quarter will be demolished and relocated at free space within GS premises.

In 500kV Rahim Yar Khan GS, the residential colony is at a distance of approximately 150 meters from existing 500kV Switchyard area.

In 500kV Guddu GS, the residential colony is about 40 meters from the proposed installation area and existing 500kV switchyard. The residential colony has separate boundary wall and there is a road between 500kV switchyard and colony.

2.6 Labor and construction camps

For the duration of the project, separate labor camps will be established at each of the GS sites. These labor camps will be either constructed or rented at locations situated away from the local communities. Each camp will be equipped with necessary facilities to support the workforce, including accommodation, sanitation, and basic amenities, complying with applicable health, safety, and environmental standards.

2.7 Workforce Estimate

The estimated workforce for the installation project will vary depending on the construction phase. During the peak construction period, each GS site is expected to employ approximately 50 to 60 workers, including skilled technicians, engineers, and support staff, to ensure timely completion of critical activities. During normal or routine construction phases, the workforce size is anticipated to be reduced to around 10 to 20 workers per site, focusing mainly on finishing work, testing, and commissioning activities.

2.8 Implementation Timeline

The implementation period spans from 2025 to 2029⁵ covering approximately 4.5 years. Project activities are set to begin in the second quarter of 2025 and will conclude by the end of 2029. The construction phase is expected to take around 3 years, while the remaining time will be dedicated to procurement, contractor hiring, and other preparatory arrangements. A summary of key project phases and milestones is presented in Table 2-2.

⁵ This timeline has been taken from the PC-1 of STATCOM project which was developed initially for 5 GS sites. The timelines will be updated once the PC-1 was revised.

Table 2-2 Key Project Phases and Milestones

Timeline	Key Activities and Milestones
1 st year 2024-2025	- Completion of detailed engineering designs and E&S instruments (ESMP, ESCP, SEP) - disclosure of E&S documents - Approval of PC-I - Approval of Environmental and social studies by WB - Initiation of procuring the consultancy services for design and supervision of project - Preparation of bidding document
2 nd Year 2025-2026	- Preparation and evaluation of bidding documents - Appointment of Consultant for design review, construction supervision, testing and commissioning - Signing of loan agreement - Award of contract
3 rd Year 2026-2027	- Commencement of civil works - Commencement of manufacturing and shipment of equipment - Implementation of ESMP, OHSMP etc.
4 th Year 2027-2028	- Continuation of civil works - Completion of manufacturing and shipment of equipment - Commencement of installation and erection - Implementation of ESMP, OHSMP etc.
5 th Year 2027-2028	- Completion of civil work - Completion of installation and erection - Testing and Commissioning - Clearing of pending liabilities - E&S Site closing reports

This timeline is indicative and may be adjusted based on procurement outcomes, on-site conditions, and coordination with stakeholders.

3 Legal, Regulatory and Administrative Framework

The Government of Pakistan has established various laws, regulations, policies, and procedures aimed at managing, mitigating, and monitoring the environmental and social impacts generated by different projects. This chapter examines the applicable and relevant national laws and regulations, as well as the policies, ESSs and guidelines set forth by the MDBs (WB and IsDB). AIIB applies a reliance framework under which the WB Environmental and Social Framework (ESF) serves as the applicable E&S framework for the project.

3.1 National Laws, Policies, and Procedures and Their Relevance

The applicable national laws, ordinances and acts along with their relevance to the project are given in **Table 3-1**.

Table 3-1 National laws, ordinance and acts along with their relevance

S#	Law / Ordinance / Act	Brief Description	Relevance to the Project
1	Punjab Environmental Protection Act, 1997 (Amended 2017) / Sindh Environmental Protection Act, 2014/ Balochistan Environment Protection Act 2012	These Acts provide a legal framework for environmental protection, conservation, improvement, and sustainable development. They empower the provincial EPAs to enforce environmental regulations, conduct EIA/IEEs, and take action against polluters.	These Acts form the legal basis for project environmental compliance and approvals from respective provincial EPAs.
2	Sindh / Punjab Environmental Quality Standards (SEQS / PEQS), 2016/ Balochistan Environmental Quality Standards (Self-Monitoring & Reporting by Industry) Rules, 2020	These standards prescribe permissible limits for discharge of pollutants into air, water, and soil, including noise and vehicle emissions.	The project must ensure that emissions and discharges during construction and operation conform to these standards.
3	Pakistan Penal Code, 1860	The PPC contains provisions to hold individuals or entities criminally liable for causing harm, nuisance, or environmental damage through negligence or misconduct.	Provides legal recourse in case of environmental accidents or public nuisances caused by the project.

4	Highway Safety Ordinance, 2000	Regulates safety protocols for transportation of oversized and heavy equipment, ensuring road safety and minimizing accident risks.	Relevant for safe logistics and delivery of large components to the project sites.
5	Motor Vehicle Ordinance, 1965 and Rules, 1969	Govern registration, roadworthiness, emission control, and safety requirements for all vehicles operating on public roads.	Ensure that vehicles used for construction and transport comply with legal and environmental safety norms.
6	Punjab Restriction on Employment of Children Ordinance 2016 The Sindh Prohibition of employment Children Act , 2017 Balochistan Child Protection Act, 2016	Prohibits employment of children under 15 years and regulates working hours and types of work for adolescents aged 15–18. Prohibits the employment of children under 14 years of age and regulates working hours and types of work for adolescents aged 14-18.	Enforces minimum age limits and protects minors from being employed during project activities.
7	Punjab Bonded Labor System (Abolition) Act, 2012 / Sindh Bonded Labor (Abolition) Act, 2015/ Balochistan Forced and Bonded Labour System (Abolition) Act, 2021	Abolishes bonded and forced labor and provides rehabilitation and legal aid to affected individuals.	Applicable to all contractors to prevent any form of forced labor at project sites.
8	Minimum Wages (Amendment) Act, 2012 / Sindh Minimum Wages Act, 2015/ Balochistan Minimum wage act 2021	Establishes legal minimum wage rates across sectors and ensures fair compensation for laborers.	Ensure that all labor employed under the project are paid at least the minimum wage, as per provincial laws.
9	Land Acquisition Act, 1894 (with Sindh Amendment 2009)	Provides legal procedures for acquiring private land for public use and compensating affected persons.	While land acquisition is not anticipated, this Act is a reference for land access or temporary occupation needs.
10	Protection Against Harassment of Women at the Workplace Act, 2010 / Amendment 2022	Mandates the establishment of anti-harassment policies, awareness programs, and complaint committees in all workplaces.	Contractors and project entities must comply to create a respectful and safe workplace, especially for female workers.
11	Factories (Amendment) Act, 2022 / Sindh Factories (Amendment)	These Acts regulate factory working conditions including hygiene, sanitation, clean	Relevant for fabrication yards or supply facilities that may be used during installation of

	Act, 2021/ The Balochistan Factories (Amendment) Act, 2022	water, waste disposal, and worker safety.	reactive power compensation devices.
12	Sindh Occupational Safety and Health Act, 2017/ Punjab Occupational Safety and Health Act 2019/ Balochistan Occupational Safety and Health Act, 2022	Ensures workplace safety by regulating hazard controls, PPE, inspections, and worker training. Establishes a provincial OHS council.	Mandatory compliance for all construction works, operational & maintenance works to prevent occupational injuries and hazards.
14	Punjab / Sindh / Balochistan Land Revenue Acts, 1967	Legal framework for land title verification, mutation, and record maintenance at provincial level.	Useful for confirming rightful land ownership, especially where access routes or temporary facilities are involved.
15	Punjab Industrial Relations Act, 2010 Sindh Industrial Relations Act 2013 Balochistan Industrial Relations Act 2022	Governs employer-employee relations, freedom of association, unionization, unfair labour practices and labor dispute resolution.	Contractors & NGC must respect worker rights, grievance mechanisms, and freedom of association during the project.
16	Boilers and Pressure Vessels Ordinance, 2002	Ensures the safe design, manufacture, operation, and inspection of boilers and pressurized systems.	Applicable if installations of reactive power compensation devices involves pressurized cooling or auxiliary systems.
17	Anti-Sexual Harassment Act, 2010	Requires institutional mechanisms to prevent and address sexual harassment in workplaces.	Applicable for maintaining a gender-sensitive environment at all project stages.
18	Power Safety Code, 2024 (NEPRA)	A binding technical safety code issued by NEPRA governing power transmission, generation, and distribution safety procedures.	Ensures safe design, installation, and operation of reactive power compensation devices units under NGC.
19	Pakistan Climate Change Act 2017	Establishes a comprehensive framework to address climate change through adaptation & mitigation measures.	The project supports the act by improving grid stability, reducing line losses and reduction in emissions.
20	Punjab Antiquities Amendment Act 2012/ Sindh Antiquities Act, 1994/ Balochistan Antiquities Act, 1994	This act ensures government ownership of all antiquities, mandates reporting of accidental discoveries, and prohibits	The project is unlikely to have any impact on the physical cultural resources, since the proposed activities will be carried out within the existing

		construction within 200 feet of protected sites. Any alteration to protected monuments requires official approval, with uniform application across all heritage sites.	boundaries, where no notified cultural heritage sites are present. However, the procedures for handling chance finds has been prepared and made part of the ESMP, to handle any such situation during project implementation.
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The relevant policies along with their relevance to the project are listed in **Table 3-2**.

Table 3-2 National Policies and their relevance

S#	Policy / Strategy	Short Description	Relevance to the Project
1	National Environmental Policy (2005)	A national framework to integrate environmental considerations into planning and development across all sectors.	Encourages environmentally sustainable design and implementation of the project.
2	National Conservation Strategy (1992)	Focuses on resource conservation, biodiversity protection, and community involvement in environmental decision-making.	Supports environmentally responsible planning, including replantation and resource efficiency.
3	Punjab Climate Change Policy 2024	A comprehensive plan to combat climate change issues through improved water resources, biodiversity, disaster management, and climate justice in Punjab.	Promotes renewable energy integration, emission reduction, and energy efficiency, which directly aligns with installations in existing GSs.
4	Sindh Climate Change Policy 2022	Aims to mainstream climate action in all developmental sectors to improve the well being of vulnerable people.	Emphasizes renewable energy integration, energy efficiency, emission reduction, and resilient infrastructure. The installation of reactive power compensation devices at existing GSs directly supports these objectives by stabilizing the grid, reducing transmission losses, and enabling higher renewable energy uptake without additional land disturbance.
5	National Water Policy (2002)	Promotes sustainable water use, pollution prevention, and integrated resource management.	Relevant where project activities involve water use for cleaning, cooling, or dust suppression.
6	National Occupational Safety and	Provides consistent guidelines for occupational safety, risk reduction, and labor welfare across sectors.	Supports implementation of robust OHS measures in line with World Bank ESS2.

	Health Policy, 2021		
7	Labor Protection Policy Punjab 2018 2021	Suggests improvements in worker safety, rights protection, and monitoring mechanisms across Punjab.	Serves as a good-practice reference for construction contractors in Punjab.
8	Labor protection Policy Sindh 2018	Focusses on improvements in worker safety, rights protection, and monitoring mechanisms across Sindh.	Serves as a good-practice reference for construction contractors in Sindh.
9	Sindh Sanitation Policy, 2017	Aims to improve hygiene, sanitation coverage, solid waste management, and public health in Sindh.	Guides development of sanitation and waste management measures at construction camps and worksites.

3.2 World Bank

3.2.1 World Bank Environment and Social Framework

The **Table 3-3** summarizes the key Environmental and Social Standards (ESS) under the World Bank's Environmental and Social Framework (ESF) relevant to this project. These standards guide the identification, management, and monitoring of potential environmental and social risks associated with the project to ensure compliance with international best practices.

Table 3-3 WB ESF and relevance

ESS	Title	Relevance	Description
ESS1	Assessment and Management of Environmental and Social Risks and Impacts	Yes	The environmental risks and impacts are typical to energy distribution system projects and are expected to include emissions from construction equipment, dust and noise from excavations and running of project vehicles, soil contamination, and OHS risks associated with working in energized GSs. Operational phase environmental risks and impacts comprise among others risk of fire due to electrical faults, overheating, or equipment failure, oil and chemical leaks, end of life disposal of equipment, routine maintenance waste. On the social side, the proposed civil works for installing the reactive compensation devices will be undertaken in the existing land of the GSs selected, these are unlikely to have significant adverse social impacts. Other social impacts and risks will be related to the limited labor influx, gender, SEA/SH, CHS and distress of public/community due to disruption of utility services.

ESS2	Labor and Working Conditions	Yes	The project is expected to involve direct workers, contract workers and primary supply workers. It includes provisions on working conditions, code of conduct, employment terms and agreements, compensation, grievance mechanism for project workers and other labor-related risks. Project workers will sign a code of conduct before commencement of civil work. The LMP will be embedded in ESCP to manage labor related issues.
ESS3	Resource Efficiency and Pollution Prevention and Management	Yes	This standard is relevant as project activities are expected to generate noise and air pollution. Fine dust particles may get airborne due to excavations and running of project vehicles. However, such emissions are not expected to have any significant impact on ambient air quality. Use of hazardous material under the project activities can also result in soil contamination. Wastewater and solid waste from facilities can also cause soil contamination.
ESS4	Community Health and Safety	Yes	The community health and safety risks within the vicinity of works may arise especially during the installation of reactive power compensation devices. The potential risks related to community health and safety may include exposure to hazardous material, air pollution from dust, noise, traffic and road safety during transportation of construction materials/equipment. The presence of non-local workers can increase the risk of social conflicts, burden public services, and lead to illicit behavior and crime. The project may also result in the transmission of infectious diseases, and gender-based violence (GBV).
ESS5	Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	No	Not directly applicable as the fact devices will be installed within the boundaries of existing NGC GSs. No new land acquisition or involuntary resettlement is anticipated.
ESS6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	No	The project activities are unlikely to have any impact on biodiversity and living natural resources as most of the proposed activities will be carried out inside the existing GSs.
ESS7	Indigenous Peoples/Sub-Saharan African Historically Underserved	No	No social impacts related to indigenous people are anticipated under any of the components of the proposed project as no Indigenous Peoples (IP) are known to exist in the districts where the project activities will be implemented. The Kalash community

	Traditional Local Communities		in Lower Chitral district of the KP province is the only community considered as IP in accordance with the definition given in ESS7.
ESS8	Cultural Heritage	No	The project activities are unlikely to have any impact on any of the cultural resources as most of the proposed activities will be carried out inside the existing GSs where no known cultural heritage sites are present. However, chance find procedures are included in the ESMP to address any accidental discoveries of physical cultural resources during excavation.
ESS9	Financial Intermediaries	No	This standard is not currently relevant as no financial intermediaries are part of the project implementation modality and are not envisaged to be engaged.
ESS10	Stakeholder Engagement and Information Disclosure	Yes	A standalone separate Stakeholder Engagement Plan (SEP) will be prepared by the NGC. Stakeholder consultations have been conducted with local communities and relevant officials. Further, the SEP will include a Grievance Redress Mechanism (GRM) to resolve stakeholder grievances.

3.2.2 World Bank Environmental, Health, and Safety (EHS) Guidelines

These guidelines provide technical reference standards and good international industry practices (GIIP) for managing environmental, occupational health and safety, and community health impacts during the project lifecycle. The ESHS guidelines along with relevance are written in below **Table 3-4**.

Table 3-4 WB EHS Guidelines and Relevance

Guideline Type	Guideline Title	Relevance to the Project
General EHS Guidelines	Environmental, Health, and Safety Guidelines (2007)	Applies to construction activities and O&M. Covers air emissions, noise, waste management, community health and safety, and occupational health and safety. Forms the basis for the ESMP and OHSMP.
Sector-Specific Guidelines	EHS Guidelines for Electric Power Transmission and Distribution (2007)	Directly relevant. Includes guidance on EMF exposure, electrical safety, working at heights, vegetation management, and waste handling from electrical equipment. Supports implementation of ESS1, ESS2, ESS3, and ESS4.

3.3 Islamic Development Bank (IsDB)

The Project is proposed for financing by the Islamic Development Bank (IsDB) and will therefore be subject to the requirements of the IsDB Environmental and Social Safeguards Policy (ESSP), approved in February 2020. The ESSP establishes the Bank's

overarching framework for managing environmental and social risks and impacts associated with IsDB-financed projects and aims to promote environmentally sound, socially inclusive, and sustainable development outcomes.

The ESSP is supported by ten Environmental and Social Norms (ESNs), which set out the requirements for borrowers to identify, assess, mitigate, monitor, and manage environmental and social risks throughout the project lifecycle. The ESNs cover key areas including assessment and management of environmental and social risks and impacts, labor and working conditions, resource efficiency and pollution prevention, community health and safety, land acquisition and involuntary resettlement, biodiversity conservation, vulnerable groups, cultural heritage, financial intermediaries, and stakeholder engagement and disclosure of information.

The applicability of the relevant ISDB Environmental and Social Norms to the proposed Project is summarized in table below.

Table 3-5 IsDB ESNs and their relevance

ESN	Title	Relevance	Applicability to Project
ESN 1	Assessment and Management of Environmental and Social Risks and Impacts	Yes	Relevant for identification and management of environmental and social risks associated with installation of reactive power compensation devices.
ESN 2	Labor and Working Conditions	Yes	Applicable to direct, contracted, and primary supply workers involved in project activities.
ESN 3	Resource Efficiency and Pollution Prevention and Management	Yes	Relevant for management of waste, emissions, hazardous materials, and efficient use of resources.
ESN 4	Community Health, Safety and Security	Yes	Applicable to construction traffic, community safety, and emergency preparedness.
ESN 5	Land Acquisition, Involuntary Resettlement and Economic Displacement	No	Activities will be undertaken within existing GS boundaries, and no land acquisition is anticipated.
ESN 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources	No	Project activities are confined to existing developed sites.
ESN 7	Cultural Heritage	No	No impacts anticipated; chance find procedures will be implemented.
ESN 8	Stakeholder Engagement and Information Disclosure	Yes	Relevant for consultation, disclosure, and grievance management throughout project implementation.

3.4 International Conventions Ratified by Pakistan

The **Table 3-6** summarizes key international environmental, climate change, and labor-related treaties and conventions to which Pakistan is a signatory. These international commitments reflect Pakistan's dedication to sustainable development, environmental conservation, climate action, and social protection.

Table 3-6 International Treaties/Conventions Ratified by Pakistan

Treaty / Convention	Year Signed / Ratified	Focus Area	Relevance to Project
United Nations Framework Convention on Climate Change (UNFCCC)	1994	Climate Change	Guides climate-resilient infrastructure and promotes reduction of GHG emissions.
Kyoto Protocol	2005	Climate Change	Reinforces commitments under UNFCCC for emission reduction.
Paris Agreement	2016	Climate Change	Encourages sustainable and low-carbon development.
Convention on Biological Diversity (CBD)	1994	Biodiversity	Supports protection of ecosystems potentially impacted by project activities.
Convention on International Trade in Endangered Species (CITES)	1976	Biodiversity / Wildlife Trade	Ensures that project activities do not harm endangered species.
ILO Convention No. 87 – Freedom of Association	1951	Labor Rights	Promotes fair labor practices and protection of workers' rights.
ILO Convention No. 98 – Right to Organize and Collective Bargaining	1952	Labor Rights	Relevant to construction labor management and contractor obligations.
ILO Convention No. 138 – Minimum Age	2006	Child Labor	Ensures no child labor is employed in project activities.
ILO Convention No. 182 – Worst Forms of Child Labor	2001	Child Labor	Prevents exploitation and supports ethical workforce practices.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes	1994	Hazardous Waste Management	Guides safe handling and disposal of hazardous materials potentially used on-site.

3.5 International guidelines

3.5.1 International Commission on Non-Ionizing Radiation Protection (ICNIRP)

The International Commission on Non-Ionizing Radiation Protection (ICNIRP) provides scientifically backed limits for exposure to electromagnetic fields (EMF), widely endorsed by the World Health Organization (WHO). For power frequency EMF (50/60 Hz), the ICNIRP 2010 guidelines recommend following exposure limits:

Occupational: Electric field strength: 10 kV/m, Magnetic flux density: 1 mT

General public: Electric field strength: 5 kV/m, Magnetic flux density: 200 μ T

Although Pakistan has not formally adopted ICNIRP guidelines in its national legislation, this project will adhere to ICNIRP standards as a best international practice to ensure the safety of both workers and nearby communities from any potential EMF-related health risks.

4 Environmental and Social Baseline

The project spreads in 16 districts of Punjab (22 GS sites), 4 districts of Sindh (4 GS sites) and 3 districts of Baluchistan (3 GS sites).

The broader district wise environmental and social baseline conditions are described below while the GS location and nearby premises are attached as **Annex 2**.

4.1 District Rahim Yar Khan (500kV Rahim Yar Khan GS)

Rahim Yar Khan District lies in the arid southern Punjab plains, characterized by an extremely dry desert climate with annual rainfall of about 174 mm and an average temperature of 26.9 °C, summers peak in June at around 36 °C, while January remains the coldest month near 15 °C⁶. Geologically, the district forms part of the Central Indus Basin, comprising Cretaceous–Eocene sedimentary formations with alluvial deposits across irrigated plains and sandy soils extending into the Cholistan Desert. It falls in Seismic Zone 2B (moderate hazard). Hydrology is shaped by the Indus River and the Punjnad canal system, which support agriculture in the northern and central belt, whereas groundwater in the southern desert is increasingly saline due to limited recharge. Air quality is degraded by dust, vehicular emissions on N-5, crop-residue burning, and industrial activities, with PM_{2.5} often surpassing NEQS standards^{7,8}. The district's ecology ranges from irrigated agricultural zones producing wheat, cotton, sugarcane, and mangoes to the arid Cholistan ecosystem supporting species such as chinkara, desert fox, and migratory Houbara bustard; the project site lies outside protected areas or sensitive habitats.

RYK has a population of 5.56 million (2023), with about 1.34 million urban residents, a literacy rate of 47.94% (55.14% male; 40.15% female)⁹, and over 3,900 public schools¹⁰. Its economy is predominantly agrarian but supported by sugar mills, fertilizer plants, and textile units¹¹. The district hosts 191 health facilities, though services remain limited in rural areas the nearest hospital to the project site is approximately 12 km away in Zahir Pir¹². Despite having a 940 km road network, Sheikh Zayed International Airport, and major industrial units, gaps persist in drinking water, sanitation, electricity, and gas access, particularly in rural settlements. Culturally, the district reflects a blend of Punjabi, Saraiki, Sindhi, and Cholistani traditions, with Saraiki being the most widely spoken language.

⁶ Pakistan Meteorological Department (2023).

⁷ *Ambient particulate matter (PM_{2.5}) levels in urban and peri-urban regions of Punjab, Pakistan. Environmental Monitoring and Assessment*, 194(4), 251.

⁸ Khan, S., et al. (2023). *Assessment of PM_{2.5} and PM₁₀ pollution in southern Punjab: implications for health and policy. Atmospheric Pollution Research*, 14(1), 76–85.

⁹ Pakistan Bureau of Statistics (PBS) 2023.

¹⁰ Punjab School Education Department (2023).

¹¹ Government of Punjab, *Punjab Industrial Directory 2023*.

¹² Punjab Health Department, *Health Infrastructure Database (2023)*.

4.2 District Guddu (500kV Guddu GS)

Guddu, located in Kashmore District in northern Sindh, lies within Pakistan's hot desert climatic zone, receiving only around 100 mm of annual rainfall, with temperatures ranging from 8°C in winter nights to over 45°C in summer⁶, and falls in Seismic Zone 1 (minor–moderate hazard). The area is situated on the Indus River floodplain, underlain by over 150 m of alluvial sands with silty–clayey loam soils. In the Sindh floodplain, groundwater—commonly available at shallow depths between 3.7 and 6.1 meters—is a primary source of drinking water¹³. Although around 80% of Sindh's groundwater is saline, aquifers near the Indus River are regularly recharged, resulting in TDS levels between 186 and 276 mg/L, which meet national and WHO drinking water. Air quality generally complies with SEQS, with rural PM_{2.5} between 20–25 µg/m³¹⁴. Native flora includes *Acacia nilotica*, *Neem*, *Tamarix*, and *Karir*, supporting fauna such as the Indus River Dolphin, Hog Deer, Smooth-coated Otter, freshwater turtles, and various bird species.

Kashmore has a population of 1.23 million (2023), with 22% urbanization and a literacy rate of 35.6% (male 45%, female 25.7%). Economic activity is dominated by agriculture (wheat, rice, cotton), livestock, fishing, and major industrial assets including the Guddu Thermal Power Station, rice mills, flour mills, and ginning units⁹. The district has limited social infrastructure, with about five hospitals (122 beds), 25 BHUs, 4 RHCs¹², and scattered educational facilities¹⁵, prompting many residents to seek services in Sadiqabad. Culturally, Guddu reflects a blend of Sindhi and Baloch traditions, with Sindhi spoken by 94% of residents, alongside Balochi, Seraiki, and Brahui, and is characterized by strong tribal networks, traditional music, crafts, and local festivals¹⁶.

District's diverse fauna reflects its riverine forests, wetlands, and desert edges, hosting multilingual character. Cultural identity is expressed through traditional attire, handicrafts, music, and communal celebrations such as religious festivals and local fairs.¹⁷

4.3 District Dadu (500kV Dadu GS)

Dadu District, located in central Sindh, is a predominantly rural region situated between the Kirthar Mountain Range in the west and the Indus River in the east. The district experiences a hot desert to semi-arid climate, with annual rainfall around 150–200 mm and temperatures ranging from 6°C in winter to above 45°C in summer⁶, and lies in Seismic Zone 2A due to the nearby Kirthar Fault. Its geology includes alluvial plains along the Indus River and limestone, shale, and sandstone formations of the Kirthar Range, forming mineral-rich terrain with gypsum, limestone, and fossiliferous deposits. Groundwater in Dadu District is a critical resource but suffers from arsenic contamination,

¹³ Soomro, Z. A., Baloch, M. U., & Tunio, M. A. (2022). *Microbial contamination of drinking water in Sindh and its health implications*. Journal of Environmental Health Science and Engineering, 20(1), 117–125.

¹⁴ Shah, Z., Qureshi, B. A., & Jamali, M. A. (2023). *Ambient air quality monitoring in rural Sindh: A spatial and seasonal analysis*. Atmospheric Pollution Research, 14(2), 101423.

¹⁵ Education and Literacy Department, Government of Sindh (2022). *Education Statistics Report: Kashmore District*.

¹⁶ Government of Sindh (2021). *Cultural Heritage and Traditions of Sindh*. Department of Culture and Tourism.

¹⁷ Government of Sindh (2021). *Cultural Heritage and Traditions of Sindh*. Department of Culture and Tourism.

with recorded levels of 0–500 µg/L—far exceeding the WHO permissible limit of 10 µg/L¹⁸. Dadu’s air quality ranges from moderate to unhealthy, with PM_{2.5} and PM₁₀ levels consistently surpassing WHO annual guidelines (PM_{2.5}: 5 µg/m³; PM₁₀: 15 µg/m³)¹⁹. Indigenous vegetation includes *Acacia nilotica*, *Prosopis cineraria*, *Tamarix*, and xerophytic shrubs, supporting wildlife such as Chinkara, Sindh Ibex, Desert Hare, Indian Fox, migratory waterbirds, and reptiles; the Kirthar National Park.

As per the 2023 census, Dadu has a population of 1.55 million, with 18% urbanization. Literacy remains low at around 43%, with a wide gender gap, only about 28% of females are literate compared to 57% of males and a literacy rate of around 44%⁹, reflecting significant rural educational gaps. The economy is driven by agriculture (wheat, rice, sugarcane), livestock, fisheries, and major energy assets including the Guddu–Jamshoro transmission corridor, hydropower at Khirthar canals, and oil and gas fields in Johi and Sehwan areas. Social infrastructure remains limited, with a network of district hospitals, RHCs, BHUs²⁰, and improving but uneven education services. The nearest hospital Civil hospital dadu is around 4-5 km away from the project site. Culturally, Sindhi as the dominant language, alongside Seraiki, Balochi, and Urdu spoken across settlements¹⁶.

4.4 District Lahore (Wapda Town, Ghazi Road, Ravi road GS)

Lahore, the capital of Punjab and Pakistan’s second-largest city, is a highly urbanized district serving as the province’s administrative, commercial, and cultural hub. It has a semi-arid subtropical climate with annual rainfall of about 630 mm and temperatures ranging from 5°C to 42°C⁶ and lies in Seismic Zone 2B (moderate hazard). The city’s geology comprises fertile alluvial soils deposited by the River Ravi²¹ while groundwater—fresh up to 180–200 m depth—is the main water source²². The River Ravi, along Lahore’s northwestern boundary, receives reduced flow and wastewater discharges during dry months²³. Air quality often deteriorates in winter, with PM_{2.5} levels exceeding 200 µg/m³, largely due to vehicular and industrial emissions²⁴. Native flora such as *Acacia nilotica* and *Dalbergia sissoo* persist in urban green belts, though faunal diversity is limited due to extensive urbanization²⁵.

Lahore has an estimated population of 13.1 million, with 91% urbanization and a literacy rate of 76%⁹. Lahore District has a well-developed education network, including over 270 primary schools, 240 middle schools, 170 high schools, around 32 degree colleges, 34 universities, and multiple vocational training institutes, providing comprehensive education across all levels¹⁰. Its economy is dominated by services, manufacturing, and construction and transport²⁶. The district hosts over 30 universities, 21 hospitals, 25 RHCs, and 85 BHUs, serving both Lahore and adjoining districts¹⁶. Culturally, it is home

¹⁸ WHO. (2017). *Guidelines for Drinking-water Quality*, 4th ed.

¹⁹ Khan, M.F., et al. (2020). *Atmospheric Pollution Research*, 11(3), 465-480

²⁰ PPHI Sindh (2024). *Health Facility Data – Dadu District*.

²¹ Geological Survey of Pakistan (2021). *Alluvial Geology of Lahore Region*.

²² WASA Lahore (2023). *Groundwater Monitoring Report*.

²³ WWF Pakistan (2022). *River Ravi Ecological Assessment*.

²⁴ EPA Punjab (2023). *Annual Air Quality Report*.

²⁵ Urban Unit, *Environmental and Urban Profile of Lahore District*, 2023.

²⁶ *Pakistan Social and Living Standards Measurement (PSLM) Survey 2022–23*.

to three UNESCO World Heritage Sites—the Lahore Fort, Badshahi Mosque, and Shalimar Gardens—while Punjabi (80%) remains the dominant language, followed by Urdu and Pashto ²⁷.

4.5 District Sheikhupura (Kala Shah Kaku GS and Lahore North GS)

Sheikhupura District, located northeast of Punjab adjacent to Lahore. The district lies in Seismic Zone 2A, indicating moderate seismic risk²¹. It experiences a seasonal climate with summer temperatures up to 45°C, winter lows of 5°C, and annual rainfall around 500 mm⁶. Geologically, Sheikhupura comprises alluvial deposits of the Chenab River. Groundwater meets 90% of drinking, 60% of irrigation, and 100% of industrial needs²², though arsenic contamination levels of up to 357 µg/L pose a public health concern**Error! Bookmark not defined..** Air quality remains poor, with an AQI of 199 and PM_{2.5} at 124 µg/m³²⁴, mainly due to emissions from nearby industries and biomass burning. The area's flora mainly includes Kikar, Pipal, Bohar, Eucalyptus, Poplar, and Sharin, with vegetation typical of agricultural plains²⁸. while fauna is limited to wild boars, jackals, hares, and common birds like partridges, doves, sparrows, and egrets²⁹.

The district's literacy rate is 68.9%, with male literacy at 72.1% and female literacy at 65.5%⁹. Health services include the DHQ Hospital Sheikhupura, THQ Ferozewala, and numerous BHUs and RHCs, such as BHU Ghaziabad, Machike, and Mananwala, providing basic to secondary healthcare¹². Infrastructure is well-developed—over 80% of households have electricity, and sanitation coverage reaches 70–90% of households³⁰. The economy is driven by industry, trade, and agriculture (wheat, rice, sugarcane)³¹. Cultural landmarks such as Hiran Minar and Sheikhupura Fort reflect its Mughal heritage³².

4.6 District Kasur (Lahore South and Sarfaraz Nagar GS)

Kasur District, located in eastern Punjab adjacent to Lahore and bordering India, covers fertile alluvial plains between the Ravi and Sutlej rivers within the Bari Doab region. The climate is semi-arid, with temperatures ranging from 5°C in winter to 45°C in summer and annual rainfall around 500–600 mm⁶. The district lies in Seismic Zone 2A with loamy-clay soils highly suitable for agriculture. Groundwater meets about 90% of drinking and 70% of irrigation needs, while air quality is degraded due to industrial and vehicular emissions. Vegetation includes Kikar, Shisham, Eucalyptus, and Neem, with the 5,000-hectare Changa Manga Forest as a key ecological zone. Common fauna comprise jackals, wild boars, mongooses, and partridges³³.

²⁷ Department of Archaeology and Museums, *List of UNESCO World Heritage Sites in Punjab*, 2023.

²⁸ Punjab Forest Department. (2023). *District-wise Flora of Punjab Province*. Government of Punjab.

²⁹ WWF Pakistan. (2022). *Biodiversity Assessment of Central Punjab Districts*. Lahore Office.

³⁰ Punjab Development Statistics. (2023). *Planning and Development Board, Government of Punjab*.

³¹ Punjab Small Industries Corporation. (2023). *Industrial Profile of Sheikhupura District*. Lahore: Government of Punjab.

³² Department of Archaeology and Museums. (2023). *Protected Heritage Sites of Punjab*. Government of Pakistan.

³³ Punjab Forest and Wildlife Department (2023).

Kasur has a population of about 3.54 million and a literacy rate of 59% (male 68%, female 49%)⁹. The district has a well-established education network comprising over 1,200 primary and middle schools, 310 secondary and higher secondary schools, and around 25 degree colleges and 10 vocational training institutes across all tehsils¹⁰. The district has one DHQ, four THQ hospitals, and over 90 BHUs and RHCs providing healthcare¹². Infrastructure is moderately developed, with 75–80% electricity and 65–80% sanitation coverage, and strong connectivity via the N-5 and M-3 Motorway. The economy relies on agriculture, livestock, and industry, producing wheat, rice, sugarcane, maize, and ornamental plants in Pattoki³⁴. Culturally, Kasur is renowned as the birthplace of Sufi poet Bulleh Shah, whose shrine remains a key heritage site.

4.7 District Chiniot (Lalian GS and Faisalabad West GS)

District Chiniot serves as a regional agricultural, industrial, and artisanal hub, renowned for its fine wood-carving and furniture craftsmanship³⁵. The district experiences a hot semi-arid climate, with annual rainfall averaging about 290 mm and temperatures ranging from 6°C in winter to 40°C in summer⁶. It lies within Seismic Zone 2A, indicating moderate seismic hazard. Geologically, the area consists of Quaternary alluvial deposits of sand, silt, and clay, with fertile loamy soils supporting agriculture³⁶. Groundwater occurs within these alluvial formations, though salinity and bacteriological contamination have been reported in some localities³⁷. The River Chenab forms the district's western boundary, supporting irrigation and riverine habitats. Air quality fluctuates seasonally and is often degraded in winter due to emissions from brick kilns, vehicles, and crop-residue burning, with PM_{2.5} levels exceeding 180 µg/m³ during smog episodes³⁸. Vegetation includes native species such as *Acacia nilotica*, *Prosopis juliflora*, and *Dalbergia sissoo* in riverine and agricultural belts, while faunal diversity is relatively low outside these green zones³³.

Chiniot has an estimated population of 1.56 million and a literacy rate of about 55% (male 65%, female 45%)³⁹. Chiniot's economy is mainly agriculture-based, producing wheat, sugarcane, and rice, with a notable wood furniture and handicraft industry employing much of the urban population³⁹. The district has 3 government hospitals, 3 RHCs, and 36 BHUs, along with private clinics and a new 125-bed DHQ Hospital under construction¹². Educational facilities include several schools and colleges, though higher education options remain limited. Punjabi is the dominant language⁴⁰, and the district's cultural identity is marked by its architectural heritage, notably the Umer Hayat Palace.

³⁴ PIEDMC Industrial Estate Report (2024).

³⁵ Government of Punjab. (2021). *Punjab Almanac – Chiniot District Profile*. Lahore: Urban Unit.

³⁶ Geological Survey of Pakistan (GSP). (2018). *Hydrogeological and Soil Mapping of Central Punjab*.

³⁷ International Journal of Environmental Science and Development (2020). *Groundwater Contamination Issues in Chiniot Area, Punjab, Pakistan*.

³⁸ Weather.com (2024). *Air Quality Index for Chiniot, Punjab – PM_{2.5} and PM₁₀ Data*.

³⁹ Graana.com (2023). *Everything You Need to Know about Chiniot Furniture Industry*.

⁴⁰ Citypopulation.de (2023). *Chiniot District – Population by Tehsil and Language*.

4.8 District Faisalabad (Nishatabad and Jaranwala GS)

Faisalabad District located in central Punjab, has a population of 9.1 million with nearly half residing in urban areas. The district has a semi-arid climate, annual rainfall around 600 mm, and temperatures ranging from 6°C to 39°C⁶. According to seismic zoning, Faisalabad falls into Seismic Zone 2A (low to moderate hazard) in Pakistan's classification. Geologically, it lies on alluvial plains of the Chenab River, supporting fertile agricultural soils. Groundwater is a major source of water for agriculture and industry, supplemented by irrigation from the lower Chenab canal which serves over 80 % of cultivated land⁴¹. Average PM_{2.5} concentrations often exceed 150–200 µg/m³, significantly above the WHO safe limit of 15 µg/m³**Error! Bookmark not defined..** Major pollution sources include vehicular emissions, textile and chemical industries, brick kilns, and crop residue burning in surrounding agricultural areas. Common tree species include *Acacia nilotica* (kikar), *Dalbergia sissoo* (sheesham), *Azadirachta indica* (neem), and *Eucalyptus* spp. along roads and canals⁴². Faunal diversity has declined due to habitat loss and urbanization, but species such as Indian mongoose (*Herpestes edwardsii*), jackal (*Canis aureus*), wild hare (*Lepus nigricollis*), and various reptiles and avian species (e.g., partridges, mynas, and kites) are still observed in peri-urban and agricultural areas⁴³. The literacy rate stands at approximately 64%, with male literacy around 71% and female literacy near 57%**Error! Bookmark not defined..** The district has over 300 health facilities (including 5 tertiary hospitals)¹² and thousands of schools, though higher education access is concentrated in urban centers like the University of Agriculture Faisalabad.¹⁰ The economy is driven by textiles, manufacturing, trade, and agriculture, producing wheat, sugarcane, rice, and citrus fruits. Culturally, Faisalabad is known for its Clock Tower (Ghanta Ghar) and eight bazaars symbolizing its colonial heritage and industrial identity. Punjabi (94%) is the main language, followed by Urdu⁹¹.

4.9 District Gujranwala (Nokhar GS)

Gujranwala District, in north-east Punjab, is a predominantly industrial and agricultural zone. It features a semi-arid subtropical climate, with annual rainfall in the range of 550–750 mm and summer temperatures reaching 36–42 °C, while winter lows drop to around 7 °C⁶. The geology comprises fertile alluvial soils of the Rachna Doab plain, gently sloping from northeast to southwest, underlain by silty sand and lean clay⁴⁴. Groundwater is a key water source, supported by canal networks (e.g., the Upper Chenab Canal) in the region. Gujranwala is among the most polluted districts in Punjab. Real-time monitoring shows PM_{2.5} levels exceeding 460 µg/m³ and AQI values reaching 760+ (Hazardous) during smog episodes²⁴. The district's natural vegetation—once dry tropical thorn forest—has been largely replaced by cultivated land. Common trees include *Acacia nilotica* (kikar), *Dalbergia sissoo* (sheesham), *Azadirachta indica* (neem), and *Eucalyptus* spp.,

⁴¹ Faisalabad Development Authority (FDA), *District Profile* (2022).

⁴² Pakistan Forest Institute (PFI), *Flora of Central Punjab* (2022).

⁴³ WWF-Pakistan, *Biodiversity and Habitat Assessment in Punjab Plains* (2021).

⁴⁴ Urban Unit – Gujranwala Regional Plan (Water Supply & Env Sector).

planted along roads and canals. Wildlife species such as Indian hare, mongoose, jackal, and partridge survive mainly in peri-urban and rural fringes⁴⁵.

It has a population of 5.96 million with 65% urbanization concentrated around Gujranwala City. The literacy rate stands at 76.6%⁹ higher than the Punjab average—with 77.9% male and 75.3% female literacy⁹. District has around 2,212 primary schools, 1,631 middle schools, 1,399 high schools, and 2,212 higher secondary schools¹⁰. Gujranwala has six major hospitals, 13 RHCs, and about 70 BHUs, supplemented by numerous private clinics¹². About 85% of the urban population has access to piped or motorized groundwater sources, while rural communities depend on hand pumps and community wells. Economically, Gujranwala lies on Punjab's "industrial golden triangle" and supports crop production of wheat, sugarcane and basmati rice; it also features a large manufacturing base⁴⁶. Punjabi (92%) is the predominant language, followed by Urdu.

4.10 District Vehari (Vehari GS)

Vehari District, located in southern Punjab along the River Sutlej spans about 4,364 km²⁴⁷. The climate is semi-arid, with summer highs up to 42°C, winter lows near 8°C, and annual rainfall of about 175 mm⁴⁸. Air quality declines in winter due to dust, vehicular, and biomass emissions (PM_{2.5} > 120 µg/m³)²⁴. The area lies in Seismic Zone 2A, featuring flat alluvial plains and fertile soils of the Nili Bar region. Groundwater (10–30 m deep) and canal irrigation are the main water sources. Vegetation includes *Acacia nilotica*, *Dalbergia sissoo*, and *Eucalyptus*, while wildlife consists of jackals, wild boars, and migratory birds near the Sutlej wetlands⁴⁹.

Vehari has an estimated population of 3.43 million of which 23% reside in urban areas. The literacy rate is 59% (male 66%, female 52%)⁹. The district hosts approximately 110 healthcare facilities, including 1 District Headquarters Hospital (DHQ), 3 Tehsil Headquarters Hospitals (THQs), 25 Rural Health Centers (RHCs), and over 80 Basic Health Units (BHUs)¹². Water supply is mainly from tube wells; rural sanitation coverage is around 70%⁵⁰. The economy is primarily agricultural, producing cotton, wheat, sugarcane, and rice, supported by small agro-industries⁵¹. Punjabi and Saraiki dominate, and the district retains a strong agrarian-cultural heritage.

4.11 District Multan (Piranghaib GS)

Multan District, located in southern Punjab, covers approximately 3,721 km² and lies between the Chenab and Ravi Rivers. Multan has a semi-arid continental climate, with extremely hot summers (up to 48°C) and cool winters (as low as 4°C)⁶. The average annual rainfall is around 180 mm, concentrated during the monsoon (June–September)**Error! Bookmark not defined.** The terrain is flat and alluvial, with fertile soils

⁴⁵ WWF-Pakistan, *Biodiversity and Habitat Assessment in Punjab Plains* (2022).

⁴⁶ https://www.dawn.com/news/1613809?utm_source=chatgpt.com

⁴⁷ District Overview – Chief Police Office Vehari.

⁴⁸ World Bank Environmental Assessment – Vehari District

⁴⁹ WWF-Pakistan, *Southern Punjab Wetlands Review*

⁵⁰ PCRWR, *Water Quality Monitoring Report* (2022)

⁵¹ Vehari Chamber of Commerce & Industry (VCCI, 2023)

derived from riverine deposits. The groundwater is generally fresh up to 150–200 m⁵². The district lies in Seismic Zone 2A. Air quality often deteriorates in winter due to dust, vehicle emissions, and biomass burning, with PM_{2.5} levels exceeding 150 µg/m³²⁴. Native vegetation includes *Acacia nilotica*, *Prosopis juliflora*, *Dalbergia sissoo*, and *Eucalyptus*. Wildlife such as jackals, hares, partridges, and migratory birds are found in riverine belts near the Chenab⁵³.

The district has an estimated population of 5.02 million, with 54% urbanization. The literacy rate is around 65% (male 72%, female 58%)**Error! Bookmark not defined..** Educational facilities include 2 public universities, several colleges, and over 1,500 public schools**Error! Bookmark not defined..** The district hosts around 150 healthcare facilities**Error! Bookmark not defined..** Sanitation coverage is around 80% urban and 65% rural⁵⁰. driven by agriculture, manufacturing, trade, and services, with major crops like wheat, cotton, sugarcane, and mangoes, and over 400 industrial units in textiles, fertilizers, and food processing⁵⁴. Multan is home to numerous Sufi shrines, including those of Bahauddin Zakariya and Shah Rukn-e-Alam, reflecting its strong cultural and religious significance.⁵⁵ Major languages are Saraiki, Punjabi and Urdu.

4.12 District Bahawalpur (Bahawalpur GS)

Bahawalpur District, located in southern Punjab bordered by the Sutlej River and the Cholistan Desert**Error! Bookmark not defined..** The climate is arid to semi-arid, with scorching summers reaching 49 °C, mild winters (~5 °C), and annual rainfall around 120 mm. Dust storms and winter smog occasionally reduce air quality, with PM_{2.5} levels exceeding 100 µg/m³²⁴. The district lies in Seismic Zone 2A. Groundwater is the primary source for domestic and agricultural use—fresh in northern parts and saline in southern and Cholistan areas. The Sutlej River is the main surface water body⁵⁰. Dominant vegetation includes *Acacia nilotica*, *Capparis decidua*, and *Prosopis cineraria*. Wildlife includes chinkara gazelle, desert fox, wild boar, and migratory birds at the Lal Sohanra National Park, a UNESCO biosphere reserve⁵⁶.

The district population is 3.34 million, with 35% urbanization**Error! Bookmark not defined.** and a literacy rate of 55% (male 62%, female 47%)⁹. Education infrastructure includes over 1,500 schools, Islamia University of Bahawalpur, and multiple colleges**Error! Bookmark not defined..** The district hosts about 130 healthcare facilities**Error! Bookmark not defined..** Urban areas rely on piped and groundwater supplies, while rural communities use tube wells and hand pumps. Sanitation coverage is about 75% urban and 60% rural. Bahawalpur's economy is agriculture-based, producing cotton, wheat, sugarcane, and sunflower, supported by cotton ginning, textile, and sugar industries⁵⁷. Bahawalpur is known for its royal palaces, Derawar Fort, and Lal

⁵² Irrigation Dept, Punjab, (2023).

⁵³ WWF Pakistan, *Southern Punjab Ecology Review* (2023)

⁵⁴ (Multan Chamber of Commerce and Industry [MCCI], 2023).

⁵⁵ UNESCO Pakistan, *Cultural Heritage Sites of Punjab* (2023).

⁵⁶ WWF-Pakistan, *Cholistan Ecosystem Review* (2023).

⁵⁷ Bahawalpur Chamber of Commerce & Industry (BCCI, 2023).

Sohanra National Park, reflecting rich Saraiki-Islamic heritage. Major languages are Saraiki, Punjabi, and Urdu⁵⁸.

4.13 District Sialkot (Sahuwala GS)

Sialkot, located in northeast Punjab, is a highly urbanized and industrial district. The district lies in Seismic Zone 2A (moderate hazard) and experiences a humid subtropical climate with annual rainfall of ~1,000 mm and temperatures ranging from 5°C to 42°C⁶. Soils are alluvial and fertile. Water resources include groundwater—fresh up to 200 m depth—and surface flows from seasonal nullahs like Aik and Palku. Air quality is often degraded due to industrial emissions, traffic congestion, and brick kilns, with PM_{2.5} levels exceeding 150 µg/m³ in winter²⁴. Flora includes *Acacia nilotica*, *Dalbergia sissoo*, and *Eucalyptus* spp., while fauna such as parakeets, mynas, and small mammals survive mainly in peri-urban green spaces⁵⁹.

The district has a population of 4.1 million with 65% urbanization and a literacy rate of 78%⁹. It hosts 1 DHQ Hospital, 3 THQs, 24 RHCs, and 85 BHUs, alongside numerous private healthcare facilities¹². Education infrastructure includes 1,500+ schools, colleges, and universities¹⁰. Sialkot's economy is export-driven, Small and medium enterprises dominate the landscape, while agriculture—primarily rice and wheat—supports rural livelihoods⁶⁰. Urban areas rely on piped and groundwater supplies, while rural communities use tube wells and hand pumps. Sanitation coverage stands at approximately 80% in urban and 65% in rural areas. Sialkot is famous for its craftsmanship and global trade connections. Punjabi is the dominant language, followed by Urdu and Pashto⁶¹.

4.14 District Sahiwal (Yousafwala GS)

Sahiwal District is located in central Punjab, covering approximately 3,276 km². The district experiences a semi-arid subtropical climate, with summer temperatures up to 45°C and winter lows around 5°C, and an annual rainfall of ~400 mm⁶. It lies in the fertile Rechna Doab between the Ravi and Chenab Rivers, with flat alluvial plains and soils suitable for agriculture. Groundwater is generally fresh up to 150 m, supporting domestic and irrigation needs. The district is in Seismic Zone 2A (moderate hazard). Air quality can deteriorate in winter due to vehicular and biomass emissions, with PM_{2.5} levels occasionally exceeding 120 µg/m³²⁴. Native vegetation includes *Acacia nilotica*, *Dalbergia sissoo*, and *Eucalyptus* spp. Fauna includes small mammals, migratory birds, and reptiles in peri-urban and riverine habitats³³.

Population is approximately 2.5 million with 45% urbanization. The literacy rate is around 62% (male 69%, female 55%)**Error! Bookmark not defined.** Education facilities include over 1,000 schools, colleges, and campuses of University of Sahiwal. Healthcare comprises 1 DHQ, 3 THQs, 20 RHCs, and ~70 BHUs¹². Sahiwal receives water from Ravi

⁵⁸ UNESCO Pakistan, *Cultural Heritage of Bahawalpur* (2023).

⁵⁹ Biodiversity and Wildlife Profile of Punjab Districts – Sialkot Region

⁶⁰ Sialkot Chamber of Commerce and Industry (SCCI). (2023). *Annual Economic and Export Report – Sialkot District*.

⁶¹ Punjab Cultural Heritage and Linguistic Profile – Sialkot District.

and Chenab canals, while groundwater is widely used for domestic and agricultural purposes. Urban areas have piped water systems; rural communities rely on tube wells and hand pumps. Sanitation coverage is about 75% urban and 65% rural. The economy is agriculture-based, producing wheat, cotton, sugarcane, and rice. Dairy farming and small-scale agro-industries, including flour mills and sugar processing, are significant contributors⁶². Sahiwal is known for Harappa archaeological site, reflecting the ancient Indus Valley civilization⁶³. Punjabi is the dominant language, followed by Urdu.

4.15 District Kot Addu (KAPCO GS)

Kot Addu District, newly notified in late 2024, covers about 3,471 km², situated in southern Punjab just east of the Indus River near the Taunsa Barrage. Kot Addu has a hot semi-arid climate with temperatures from 5°C to 47°C and annual rainfall of about 200 mm⁶, concentrated in the monsoon season. Kot Addu lies on alluvial plains of the Indus Basin, composed of recent river deposits and fertile loamy soils suitable for agriculture⁶⁴. Groundwater supports domestic & irrigation use. Air quality is generally moderate to poor, with PM_{2.5} levels exceeding 120 µg/m³ in winter²⁴. Native trees include *Acacia nilotica*, *Dalbergia sissoo*; fauna limited in heavily cultivated zone, but adjacent riverine/Indus habitats support bird and small-mammal species.

Kot Addu has a population of about 1.49 million, with 80.8% rural residents and a literacy rate of 57% (male 66%, female 48%)**Error! Bookmark not defined.** Education infrastructure growing, multiple schools and colleges; health facilities under-documented but increasing thanks to district upgrade. Urban water via piped/tube-well, rural tube wells & hand pumps; sanitation remains partial. Economy is predominantly based on agricultural (wheat, cotton, sugarcane, rice, oil-seeds) and strong industrial presence including Kot Addu Power Company (KAPCO), sugar mills, oil and textile mills and cottage industries. Linguistically dominated by Saraiki/Punjabi; culturally marked by Sufi shrines, riverine heritage and growing industrial-town identity⁶⁵.

4.16 District Dera Ghazi (DG) Khan (DG Khan GS)

Dera Ghazi Khan lies in western Punjab, covering approximately 13,018 km²⁶⁶. The district experiences a semi-arid to arid continental climate, with summer temperatures often exceeding 45 °C, winter lows near 5 °C, and annual rainfall around 200-300 mm⁶. It is situated in Seismic Zone 2A–2B (moderate hazard) and comprises flat alluvial plains transitioning into piedmont zones of the Sulaimans. Ground-water is tapped for domestic and agricultural use. Air quality tends to deteriorate in dry/hot periods due to dust and emissions. Local flora includes species such as *Acacia nilotica* and *Dalbergia sissoo*;

⁶² Sahiwal Chamber of Commerce & Industry (SCCI), *District Economic Profile* (2023).

⁶³ UNESCO, *Harappa and Indus Valley Heritage Sites* (2023).

⁶⁴ Geological Map and Soil Characteristics of Southern Punjab.

⁶⁵ KotAddu.com. (2024). *Historical Background of Kot Addu*

⁶⁶ District Profile – Dera Ghazi Khan. Government of Punjab. (2024).

faunal richness is limited though desert and piedmont zones host species like chinkara, foxes and migratory birds³³.

Population stands at around 2.87 million (2017 census) with ~76% rural and ~24% urban. Literacy rate is about 48%**Error! Bookmark not defined.** The district hosts 1 DHQ/teaching hospital, 2 THQs, 9 RHCs and 51 BHUs (total ~95 health facilities)¹², and a network of schools/colleges including a medical college and several higher education institutions. Urban water is provided by piped/tube-well systems; rural settlements rely on hand-pumps/tube-wells and sanitation coverage is limited. The economy is mainly agriculture-based, producing wheat, cotton, sugarcane, rice and dates, with livestock significant; industrial activity includes cement, cotton ginning, flour mills and oil mills⁶⁷. The district is culturally rich, with key sites such as Fort Munro (hill resort), Sufi shrines like that of Sultan Sakhi Sarwar. The dominant language is Saraiki.

4.17 District Rawalpindi (Rawat GS)

Rawalpindi District lies on the Pothohar Plateau in northern Punjab, covering about 4,547 km². It is situated adjacent to the Islamabad Capital Territory and includes both urban and rural zones⁶⁸. The district experiences a humid-subtropical to semi-arid climate, with summer highs often exceeding 40 °C, winter lows near 5 °C, and annual rainfall typically around 600-800 mm⁶. Subsoil comprises alluvial and loamy deposits with limestone and sandstone in foothills. Rawalpindi lies in Seismic Zone 2B – moderate hazard zone. Water supply relies on surface reservoirs (Rawal Dam, Khanpur Dam), major tube well networks and piped supply systems⁶⁹. PM_{2.5} often exceeds 150 µg/m³ in winter; major sources include vehicles, brick kilns, and industry²⁴. Common species include *Acacia nilotica*, *Dalbergia sissoo*, and *Eucalyptus spp.*; fauna limited to small mammals and birds (parakeets, mynas, foxes)⁷⁰.

Rawalpindi district has population of 5.75 million with urbanization over 60%. Literacy ~83%**Error! Bookmark not defined.** The district hosts multiple tertiary hospitals (including the district headquarters hospital), numerous RHCs/BHUs¹², over 1,500 schools and multiple colleges/universities serving its urban and rural population¹⁰. The Water and Sanitation Agency Rawalpindi indicates water-supply coverage around 85% in WASA-serviced zones. The economy is diverse—export manufacturing, services, defence, and trade dominate. Industries include textiles, leather goods, steel, and logistics. District is rich Gandhara heritage; includes Taxila⁷¹. Punjabi remains the dominant language followed by Pashto and Urdu.

⁶⁷ Dera Ghazi Khan District – Irrigation & Agriculture.” Pakistan Almanac. (2024).

⁶⁸ Wikipedia (2023)

⁶⁹ Water and Sanitation Agency Rawalpindi (WASA). “About Us.”

⁷⁰ WWF-Pakistan. (2023). *Pothohar Plateau Biodiversity Profile*.

⁷¹ **Tourism Development Corporation of Punjab (TDCP). (2023). *Heritage and Tourism Profile of Rawalpindi & Taxila Districts*.**

4.18 District Attock (Islamabad West GS)

Attock District is located in northern Punjab, bordering Khyber Pakhtunkhwa to the west and north, with the Indus River forming its western boundary. The climate is semi-arid to sub-humid, with hot summers (up to 42–45°C), cool winters (down to 3–5°C), and average annual rainfall of about 600–700 mm, mainly during the monsoon season⁶. Attock falls within Seismic Zone 2B, indicating moderate seismic risk. Soils range from loamy and sandy loam in riverine areas to shallow and gravelly soils on the plateau, supporting both rain-fed (barani) and irrigated agriculture⁷². Groundwater is a key source for drinking and agriculture, though quality and depth vary across tehsils⁵⁰. Air quality concerns exist near urban centers and along major highways due to vehicular emissions and industrial activity²⁴. Natural vegetation includes Phulai, Kikar, Beri, and wild olive, while fauna commonly includes jackals, foxes, wild boars, hares, and various bird species²⁸.

Attock District has an estimated population of about 2.0 million, with an overall literacy rate of approximately 60–62%⁹. The education sector includes over 1,000 primary and middle schools, more than 250 secondary and higher secondary schools, several degree colleges, and multiple technical and vocational training institutes across its tehsils¹⁰. Healthcare infrastructure consists of one District Headquarters (DHQ) Hospital, several Tehsil Headquarters (THQ) Hospitals, and a widespread network of Basic Health Units (BHUs) and Rural Health Centers (RHCs)¹². Infrastructure development is moderate, with electricity coverage exceeding 80% and gradual improvements in sanitation and safe drinking water access. The district benefits from strong connectivity through the M-1 Motorway, N-5 National Highway, and railway links. The local economy is primarily based on agriculture (wheat, groundnut, maize, and fodder crops), livestock rearing, oil and gas exploration, and small-scale industries¹¹. Culturally and historically, Attock holds strategic significance due to the historic Attock Fort and its location as the traditional gateway between Central Asia and the Indian Subcontinent³².

4.19 District Shikarpur (Shikarpur GS)

Shikarpur District, in upper Sindh province, lies west of the Indus River⁷³. The district has a semi-arid climate with scorching summers frequently exceeding 40 °C, mild winters around 5 °C, and annual rainfall of around 200–300 mm⁶. It sits on flat alluvial plains comprised of river-deposited silts and sands, with underlying groundwater forming the main water source. Groundwater is the principal source for agriculture and domestic use. Air quality in Shikarpur District regularly reaches “Unhealthy for sensitive groups” levels, with PM_{2.5} concentrations around 48–83 µg/m³. Native vegetation includes *Acacia nilotica* and *Dalbergia sissoo*. Fauna is limited in highly cultivated plains though riverine fringes and irrigation channels support birds and reptiles.

As of the 2023 census, Shikarpur houses approximately 1.39 million people, with about 23% urban and 77% rural population. The literacy rate stands at about 45% (male ~60%, female ~29%). Shikarpur District has 131 functional schools (RSU, 2023-24), with several lacking adequate facilities, while SRSO community

⁷² Punjab Soil Survey & Land Use Reports

⁷³ Encyclopaedia Britannica. (n.d.). “Shikārpur.

schools enroll about 5,923 students, including 1,529 girls⁷⁴. According to the National Health Services Programme (NHSP) Sindh, the district has 33 Basic Health Units (BHUs) and 7 Rural Health Centres (RHCs)**Error! Bookmark not defined..** Urban supplies rely on tube-wells and shallow wells; rural access is less reliable and sanitation infrastructure remains limited. The economy is predominantly agriculture-based, cultivating rice, wheat, sugar-cane and cotton. Sindhi is the dominant language, with small minorities speaking Brahui and others**Error! Bookmark not defined..**

4.20 District Mirpur (Mirpur Khas GS)

Mirpur Khas District lies east-central Sindh, covering an area of about 2,925 km². The district experiences a hot semi-arid climate, with summer highs often exceeding 40 °C and winter lows around 5 °C, annual rainfall is modest⁶. The terrain is predominantly flat alluvial plain, irrigated by canal systems including the Jamrao and Let Wāh canals. groundwater is widely used for domestic and agricultural purposes. Water-logging and salinity are noted challenges in some areas⁷⁵. Flora includes species such as *Acacia nilotica* and *Dalbergia sissoo*. The district also includes the Nara Desert Wildlife Sanctuary, which supports desert and wetland fauna including migratory birds and threatened species.

According to the 2023 census, the population is approximately 1.68 million, with about 1.19 million rural and 0.49 million urban residents⁹. The district has a reported literacy rate of about 45% (male ~55%, female ~35%)⁹ According to the Annual School Census 2023-24 by the Reform Support Unit (RSU) Sindh, the district has 2,016 schools in total, of which 1,762 are functional⁷⁴. Mirpur Khas has 12 hospitals (616 beds), 5 RHCs, 38 BHUs, 134 dispensaries, 34 TB clinics, and 14 MCH centres, but lacks a fully equipped public hospital for emergencies**Error! Bookmark not defined..** Agriculture is a key economic sector: Mirpur Khas is known for mango cultivation. The district also supports sugar mills and agro-based industries. Culturally, Mirpur Khas is noted for its annual mango festival and historic mercantile heritage⁷⁶. Sindhi is the dominant language with significant Urdu and Punjabi-speaking minorities.

4.21 District Nasirabad (Dera Murad Jamali GS)

Nasirabad District lies in centre-west Balochistan, Pakistan, with its headquarters at Dera Murad Jamali⁷⁷. Nasirabad has a semi-arid to arid climate, with extremely hot summers often exceeding 40 °C, mild winters near 5 °C, and relatively low annual rainfall (~200-300 mm)**Error! Bookmark not defined..** Nasirabad is situated on fertile plains at the edge of the Indus basin and Kachhi Plains.⁷⁸ Irrigation comes via canals (e.g., the Pat Feeder) and groundwater; however, many southern plains face water-shortage and salinity issues. Nasirabad District's semi-arid plains support *Acacia nilotica*, *Prosopis*

⁷⁴ Sindh Education Management Information System, School Education & Literacy Department (RSU), Government of Sindh. (2024). *Annual School Census 2023-24 – Shikarpur District Profile*.

⁷⁵ Wikipedia contributors. (2024). "Mirpur Khas District." Available at: en.wikipedia.org

⁷⁶ Exploring Mirpur Khas: The City of Mangoes." Graana Blog. (2024).

⁷⁷ Pakistan Almanac. (2023). *Nasirabad District – Balochistan*.

⁷⁸ Digital Hub Balochistan. (2024). *Naseerabad District: The Agricultural Heart of Balochistan*.

juliflora, and *Tamarix* spp., with fauna including jackals, foxes, hares, desert cats, partridges, kites, and migratory waterfowl⁷⁹.

The district has an estimated population of 563,315 (2023 census), with around 19% urban dwellers and the remainder rural. Literacy is about 28.96% (male ~36.4%, female ~21.2%)⁹. Education and health infrastructure remain under-developed—schooling coverage and health-facility access lag behind provincial averages. District hosts 34 Healthcare units with limited facilities⁸⁰. The economy is strongly agriculture-based, producing crops such as wheat, rice, cotton and sugarcane, supported by canal irrigation. Nasirabad has a mixed tribal and linguistic heritage with major Baloch tribes. Languages spoken include Balochi, Brahui, Sindhi, and Saraiki.

4.22 District Zhob (Zhob GS)

Zhob District lies in north-eastern Balochistan, Pakistan, bordering Afghanistan. The district has a semi-arid to arid continental climate, with summer highs often exceeding 45 °C, winter lows near 5 °C, and annual rainfall around 200–300 mm⁶. Soils are alluvial in valleys but large parts remain uncultivable due to slope and lack of water. Groundwater and limited springs feed cultivation in irrigated pockets; large stretches are barani (rain-fed) or dry mountain terrain⁸¹. Vegetation includes olive (*Olea ferruginea*), wild almond (*Prunus eburnean*), and shrubs *Haloxylon*, *Pistacia* spp. Wildlife includes wolves, jackals, porcupines, markhor, wild goats, and a variety of game birds such as chukar, partridge, sand grouse and migratory ducks.

As of the 2023 census the population is approximately 355,692, with about 86% rural and 14% urban⁹. Literacy is low (~36.6% overall, ~45% male, ~27% female)⁹. Education and health infrastructure are under-developed: early reports show literacy rates among the lowest in Balochistan and a large % of children out of school⁸². The economy is mainly based on agriculture and livestock, with limited area under irrigation due to mountainous terrain⁸³. Historically called Fort Sandeman (name changed to Zhob in 1976), the district has strategic importance linking Pakistan to Afghanistan; local tribal traditions remain strong. The dominant language is Pashto, followed by Saraiki and smaller linguistic groups.

4.23 District Loralai (Loralai GS)

Loralai lies in northeast Balochistan on the Sulaiman Range foothills; the district covers approximately 9,830 km². The climate is semi-arid, with hot summers, cold winters in higher elevations, and annual rainfall modest/variable⁸⁴. Vegetation includes olive (*Olea ferruginea*), wild almond (*Prunus eburnean*), and shrubs *Haloxylon*, *Pistacia* spp. Wildlife includes wolves, jackals, porcupines, markhor, wild goats, and a variety of game birds

⁷⁹ Khan, A. & Baloch, S. (2022). *Biodiversity of Balochistan: Flora and Fauna Overview*. Quetta Balochistan University Press, Pakistan Environmental Protection Agency (Pak-EPA). (2021). *Environmental Assessment of Arid Districts in Balochistan*. Islamabad.

⁸⁰ <https://pildat.org/wp-content/uploads/2025/01/NasirabadDistrictProfile.pdf>.

⁸¹ <https://zhob.balochistan.gov.pk/about-district-zhob>.

⁸² Dawn Newspaper, “Education in Zhob” (2017). News article profiling literacy issues.

⁸³ <https://pakistanalmanac.com/balochistan-zhob>.

⁸⁴ Government of Balochistan, *District Loralai* (2024), World Bank/Environment Assessment, *Loralai District* (2017).

such as chukar, partridge, sand grouse and migratory ducks. Irrigation and water supply rely on valley alluvium and springs; remote terrain limits widespread infrastructure.

According to the 2023 census, Loralai has a population of 272,432, Literacy stands at 43.16% (male 54.27%, female 30.81%)⁶. Public sector schools number about 254 (mostly rural) in the district. Health infrastructure is limited; facilities and services remain under-developed relative to population needs. The economy is largely agriculture and livestock-based, with significant horticulture (almonds, apricots) and emerging mining/marble industries. The predominant first language is Pashto (~96.25%), with smaller proportions of Balochi, Saraiki and others.

5 Stakeholder Consultations and Information Disclosure

5.1 Introduction

Stakeholder consultation is a critical component of ESMP. A detailed Stakeholder Engagement Plan (SEP) has been prepared separately, outlining the comprehensive strategy for ongoing engagement throughout the project lifecycle. The SEP, being a live document, is to be updated throughout the life of the project to ensure effective, robust and transparent stakeholder engagement. This section highlights key consultation activities, findings, and how feedback has been incorporated into project planning.

5.2 Objectives of Stakeholder Consultation

The primary objectives of stakeholder consultations were:

- To identify and engage with affected stakeholders and other interested parties.
- To gather feedback on potential environmental and social impacts.
- To address concerns related to construction, operation, and safety.
- To ensure transparency and build trust among stakeholders.
- To comply with national regulations and international best practices (including World Bank ESF)

5.3 Identification and Classification of Stakeholders

The three categories of Project Stakeholders are: Affected Parties, Other Interested Parties and Disadvantaged/vulnerable individuals or groups. A detailed list of identified stakeholders for this project is provided in SEP.

5.4 Consultation Methods

Stakeholder consultations were conducted through:

- **Meetings:** Structured discussions with NGC Construction and operation staff, and relevant stakeholders.
- **Community Engagement Sessions:** Focus group discussions with nearby residents.
- **Virtual Consultations**

5.5 Summary of Stakeholder consultation

The number of consultations held are provided in the Table 5-1.

Table 5-1 Summary of stakeholder consultation

District	Number of locations	Number of FGDs		Total number of female participants	Total number of male participants	Total number of participants
		M	F			

Lahore	02	01	01	10	14	24
Sheikhupura	04	02	02	18	19	37
Rahim Yar Khan	02	01	01	05	07	12
Kashmor	01	01	00	0	11	11
Dadu	01	01	00	0	11	11
Kasur	03	02	01	9	25	34
Gujranwala	02	01	01	8	12	20
Sialkot	02	01	01	7	10	17
Sahiwal	02	01	01	12	11	23
Multan	02	01	01	10	09	19
Bahawalpur	02	01	01	12	09	21
Vehari	02	01	01	06	10	16
DG Khan	01	01	00	0	12	12
Chiniot	02	02	00	0	09	09
Faisalabad	04	02	02	19	28	47
Kot Addu	02	01	01	04	15	19
Total	34	20	14	120	212	332

5.6 Consultation feedback

A series of consultations have been carried out with the communities living near the GSs and with the stakeholders concerned. The photo log of the consultation is attached as **Annex 3**.

5.6.1 Consultations with the communities

The feedback received as an outcome of these consultations is presented below in Table 5-2.

Table 5-2 Feedback of Consultation with communities

S#	Summary of Stakeholder Consultations with Communities	
	Community Concerns	E&S Team Response
1	Will the project involve any land acquisition or result in resettlement related impacts?	The project equipment will be installed within the GS boundaries therefore no land acquisition and involuntary resettlement will be involved.
2	Will the installation of the new equipment pose any health issues for the community?	The equipment will be designed and installed, keeping in view the community's health and safety. Additionally, the measures provided in the ESMP shall be implemented.

3	What measures will be taken for noise disruption in the nearby community during the construction phase of the project?	An assessment will be performed, and mitigation measures will be proposed in the project ESMP. Moreover, CESMP implementation will be ensured by all contractors.
4	Will the labor be accommodated within the community?	A labor management plan will be developed and implemented to mitigate the impacts of labor influx including SEA/SH. Measures will be taken to segregate the construction labor from the community.
5	The security protocol of foreign workers disrupts daily lives of the community members living within the GS colonies.	Measures will be taken to isolate all construction phase workers from the community members living in the GS colonies.
6	Are there any project benefits anticipated for the community?	WB funded projects ensure positive benefits for the community therefore, local jobs will be prioritized during the construction phase of the project.
7	Will the extension of switch yard into colony area of Dadu GS result in demolition of residential quarters. What measures will be taken to ensure that colony members are not disrupted?	The required space is available for the project without disturbing the residential quarters. If in any case the quarters are to be demolished, alternate residential quarters will be provided to accommodate the GS colony members. Additionally, all the work will be done in accordance with the environmental and social guidelines outlined in the ESMP.
8	What measures will be in place for lodging any complaints?	A GRM will be put in place to raise any sort of complaints regarding the project.
9	Due to the closure of the Thermal Power Station at Guddu, the provided facilities by the TPS are going to be closed soon like Dispensaries, schools, markets and parks etc. What is NGC planning to cater these issues as the nearby NGC colony will be suffering a lot due to this being dependent on the TPS facilities.	These are the government strategic decisions to close any thermal power station and decide about the future of facilities to be provided in the residential colonies. However, the facilities for the NGC employees need to be provided by the company and hence will be provided by the department concerned.
10	Late-time work will disturb our lives.	Construction activities will be limited to daytime hours wherever possible. Night work will be minimized and subject to prior notice and approvals.
11	Will there be long shutdowns for this activity? Please avoid them in the summer season.	The project team will coordinate with grid operation authorities to schedule minimal and short-duration shutdowns,

		preferably avoiding peak summer months.
12	Will the project help in stabilizing the voltage problem?	Yes. The project installation is specifically aimed at enhancing voltage regulation and reactive power support, thus improving power quality and system reliability.
13	There is air pollution issue related with rice industry near Nokhar GS. Will this be addressed?	While this issue is outside the project scope, it will be reported to the local municipal authorities. NGC will raise this concern with relevant departments.
14	Security concerns while traveling to/from Kashmore District—especially at night. Will the project provide its own security?	Project-related security will be managed at the construction site. Broader area security is under local law enforcement, but concerns will be shared with authorities. The security management plan will be prepared where required.
15	Residents of the Rahim Yar Khan Colony requested better roads and basic services (e.g., dispensary, gas, transport).	Infrastructure upgrades and service provision fall under NGC's internal departments. The community's request will be shared with the department concerned for consideration.
16	Residents of the Dadu GS colony requested basic services (e.g., water filtration plant, operational school/dispensary buildings).	These requests are outside the project scope but have been conveyed to the respective NGC departments. Coordination for operationalizing idle facilities will be recommended.
17	Does the project hire local labor from nearby communities?	Yes. Priority will be given to hiring semi-skilled and unskilled labor from local communities, in coordination with contractors and in line with labor laws.
18	Residents of almost all GS colonies raised concerns over the unavailability of Ambulance and clean drinking water.	Yes, these issues have been duly noted and will be communicated to the departments concerned. The funded projects typically include a provision for community development. Subject to the availability of funds under this component, these issues will be accorded priority for consideration

5.6.2 Consultations with Women, Vulnerable Communities and Minorities

The women of the nearby communities are consulted, and their concerns are presented below in **Table 5-3**.

Table 5-3 Summary of Consultations with Women

S#	Women's Concerns	E&S Team Response
1	Will there be any health risks to women and children due to electromagnetic fields (EMFs) or construction activities?	The equipment will be installed in compliance with international safety standards. No harmful EMF exposure is expected outside the GS boundary. Dust and noise will be controlled through mitigation measures.
2	Will there be restrictions on movement or access for women living near the construction area?	Construction activities will be limited to the defined project boundaries. Community pathways and access routes will remain unaffected.
3	Is there a risk of harassment or discomfort due to the presence of male laborers near colony residences?	A strict Code of Conduct (CoC) will be enforced for all project workers. The Labor Management Plan includes provisions to prevent sexual exploitation and abuse (SEA) and sexual harassment (SH).
4	Will there be any job opportunities for local women in this project?	Where possible, non-technical roles (e.g., administrative work, canteen support, cleaning services) may be offered to women. Equal employment opportunity policies will be encouraged by the contractor.
5	Will construction noise affect young children and elderly women in households nearby?	Noise mitigation measures (e.g., scheduling work during the day, equipment mufflers) will be adopted. Monitoring will be done as per the Environmental Management Plan.
6	Can women raise complaints anonymously if they feel uncomfortable interacting directly with male staff?	Yes. A gender-sensitive Grievance Redress Mechanism (GRM) will be available, allowing confidential and anonymous complaints. A female focal person will be appointed where necessary.
7	Will the project support any health or sanitation improvements in the colonies for women?	While not part of the project scope, such concerns will be shared with NGC's internal departments for potential future action. The project encourages safe sanitation practices at all labor camps.
8	What measures are in place to ensure that construction workers do	Water for construction and labor use will be sourced separately. Contractors will be

	not use local water sources used by women for domestic chores?	instructed to avoid any interference with community resources.
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Various stakeholders' institutions were consulted. A total of 37 consultation sessions were conducted with various departments in dates ranging from 30th of April 2025 to 26th of June 2025 and 12th of November 2025 to 13th of November 2025 and from 1st December 2025 to 17th December 2025, and the discussions are presented in the table below.

Table 5-4 Summary of Institutional Stakeholder Consultations

Sr. No.	Stakeholders	Concerns	E&S Team Response
1	NGC GS Operations/Maintenance	What is the purpose of the system to be installed?	To improve the reliability and increase the efficiency of the Grid.
		What type of system will be installed?	The design of the equipment to be installed has not been finalized.
		Who will operate this equipment?	The equipment will be handed over to the GS operations.
		There are already operation staff shortages; installation of new equipment will further overburden the staff.	This issue will be discussed with management.
		Will the GS operations staff be trained in the new equipment?	Specific operational staff will be trained during the project phase to ensure a smooth transition.
2	Environmental Protection Agency (EPA)	How much additional land will be required for the project?	No additional land acquisition or involuntary resettlement is involved as equipment will be installed within existing GS boundaries.
		Concerns about waste management during construction phase.	Waste management measures will be included in the ESMP and implemented by the contractor.
		Is the project focused solely on improving the	The reactive power compensation devices installation is specifically aimed at enhancing voltage

		electricity or there is any other scope.	regulation and reactive power support, thus improving power quality and system reliability.
		Noise exposure levels during operation phase of new equipment.	Equipment procurement will ensure compliance with noise limits per national and international standards.
3	MEPCO and HESCO	Operational downtime during installation will disrupt supply to consumers.	Installation will be scheduled in phases with close coordination to minimize service interruptions.
4	Labor Department	Minimum wages must be ensured for all contractor labor.	This is a requirement of ESS2 and labor laws; written contracts and audits will ensure compliance.
		What measures will be taken for the grievances of local workers?	A dedicated GRM will be provided for all labor complaints, and the labor management plan will ensure workers' rights.
		Workers' health and safety must be ensured.	Contractors will follow health and safety protocols per national labor laws and ESMP requirements.
5	Archaeology Department	Ground excavation may impact subsurface cultural heritage.	A Chance Finds Procedure will be included in the ESMP and strictly followed during excavation.
6	National Highway Authority (NHA)	Heavy vehicle movement may impact highway infrastructure.	While the project does not involve highway construction or upgradation, transport of equipment via highways will follow NHA regulations with prior coordination.
7	Ministry of Energy (Environment & Sustainability)	Ensure the project aligns with national sustainability goals.	The project supports grid efficiency and stability, aligning with energy sector modernization and climate resilience strategies.
8	NEPRA	Will the installation affect tariffs or	The project will not directly affect consumer tariffs. However, NEPRA

		energy regulation? What regulatory standards apply?	Power Safety Code 2024 and associated technical codes related to system performance, safety, and voltage support will be adhered to.
9	Agriculture Department	Will construction affect nearby agricultural land or irrigation?	No impact on agricultural land is anticipated as the work is confined to existing GS areas. If any agricultural land is affected during temporary access or transport, proper permission and compensation rates will be coordinated with the Agriculture Department.
10	Forest Department	Are any trees or green belts being cleared for the installation?	No tree cutting is involved; activities are confined to the station boundary. However, a written request will be submitted through the proper channel to the Forest Department to obtain a recommended list of plant species (ornamental and indigenous) for the project's tree plantation and landscaping program.
11	Social Welfare Department	Will there be any CSR or social development initiatives under the project?	While the project scope is technical, NGC will forward such suggestions to relevant departments for possible inclusion under other corporate programs.
12	Wildlife Department	Any risk to nearby natural habitats or species from the project?	The project has no interface with sensitive ecosystems. Activities are within existing built-up infrastructure.
13	SYCOP (Local NGO)	What type of project benefits will be there for the community?	Priority will be given to local labor hiring during construction. No displacement or major social impacts are expected.
		How will the project ensure women's privacy and community safety during construction?	A gender-sensitive approach will be adopted, including a strict Code of Conduct for workers, separation of labor camps, and confidential access to the GRM for women.

		Will local NGOs be engaged during project implementation for awareness or monitoring?	Yes. NGC welcomes engagement with civil society organizations for community outreach, feedback, and awareness-raising on environmental and social safeguards.
		Will there be support for vulnerable groups (e.g., women, children, persons with disabilities)?	The ESMP include specific provisions to protect vulnerable groups. Contractor training will include social inclusion and sensitivity protocols.
		Has NGC established an anonymous grievance mechanism for labor and community concerns?	Yes. A gender-sensitive and anonymous GRM will be established and communicated to all stakeholders. NGO inputs were considered in its design.

5.7 Information Disclosure

As disclosure requirement, the ESMP will be uploaded on the NGC website after the approval of World Bank. In addition to this, ESMP documents will be made available at all the project sites. The executive summary of the ESMP will be translated into local language i.e. Urdu.

5.8 Benefit sharing

During stakeholder consultations, communities in the project area raised concerns regarding limited access to clean drinking water and the long distance to medical facilities. In response, the project proponent proposes to utilize grant funding to support selected benefit-sharing initiatives. The detailed budgeting, technical specifications, and exact locations for these measures will be assessed and finalized at a later stage in consultation with relevant stakeholders.

The proposed benefit-sharing measures include:

1. Water Filtration Plant

The project proponent proposes to install a water filtration plant to improve access to safe drinking water for GS community. The specific location, capacity, and operational arrangements of the filtration plant will be determined following further technical assessment and consultation with community representatives and local authorities.

2. Ambulance for Emergency Medical Services

The project proponent proposes to provide an ambulance to support emergency medical services for grid station communities. The selection of grid station, operating mechanism, and service coverage area will be defined at a later stage.

These benefit-sharing measures will be supported through grant funding and implemented in a transparent manner. Progress and outcomes will be monitored and reported as part of the ESMP implementation framework.

5.9 Grievance Redress Mechanism

NGC has already established a Grievance Redress Mechanism (GRM) to promptly address complaints related to social, resettlement, and environmental aspects of projects. The GRM aims to resolve issues quickly at the lowest level possible to prevent escalation. It outlines procedures for documenting, addressing, responding, and resolving grievances from project-affected persons (APs) and communities regarding major project activities including environmental and social performance, stakeholder engagement, land acquisition, resettlement, and unforeseen social impacts. This mechanism applies to all projects funded by the World Bank, ADB, and other foreign donors.

5.9.1 Grievance Redress Committee (GRC)

The GRC is a dedicated institutional mechanism to manage grievances from workers, local communities, and other stakeholders in a timely, fair, and transparent manner.

Responsibilities:

- Receive, register, and assess grievances.
- Conduct investigations and hearings as needed.
- Recommend and implement resolution measures.
- Maintain grievance records and prepare quarterly summaries.
- Ensure feedback is shared with complainants.
- Escalate unresolved grievances to higher-level mechanisms or the World Bank if required.

The two-tier system consists of a Grievances Redress Committee (GRC) at the PMU level (GRC-P) and another at NGC headquarters (GRC-HQ). These committees are composed of NGC/PMU and CO *staff*, representatives from ESIC, project consultants, project-affected individuals, and the patwari (revenue clerk) of the project area. The grievance redress mechanism is designed to be gender-responsive, ensuring the inclusion of female members in both GRCs, culturally appropriate, and readily accessible to the project-affected persons at no cost and without retribution.

The GRC-P will endeavor to resolve any complaints within 21 days; unresolved cases will be referred to the GRC-HQ. GRC Complaint Boxes will be available in the field and at the PMU office, along with a dedicated telephone number for registering any complaints.

At the field level Construction Camp Office (CO), a designated person, not below the rank of an Office Assistant, will register the complaints as per attached format **(Annex 4)** and promptly report them to the field CO Head/Executive Engineer and concerned officials.

The decisions made by the GRC are mandatory and shall be implemented by the project. If any disputant is dissatisfied with the outcomes, they may pursue grievance through the court as their legal right in accordance with the law of the country.

The outcomes of the GRC deliberations and decisions will be communicated in written form by the Chair of the GRC within a week from the date of the meeting. The decisions taken are binding on the NGC concerning any additional awards or compensation to be paid to the disputants.

All records of GRC cases must be available for review and verification by NGC, WB, independent monitoring consultants, and other interested stakeholders.

Grievances can be submitted via the following channels:

Complaint telephone number:

051-9334942

Managed by Deputy Manager (Social & Environment)

Email to esic.dtlp@ntdc.com.pk

Grievance or suggestion boxes located at all GS sites.

Letter to House No 706, Street No 33 Block-B, Sector B-17, Multi-Gardens, Islamabad

Complaints can be submitted in person to the Grievance Focal Persons or via dedicated phone lines, email addresses and suggestion boxes provided at GS sites.

As the project makes use of varying types of labor across all components, a separate GRM specifically designed for project labor has been prepared as part of the Labor Management Procedures, in line with the requirements set out in ESS2 Labor and Working Conditions.

To address any complaints related to GBV/SEA/SH, the project will ensure that GBV-related grievances received by the GRM are referred to relevant GBV service providers. Dedicated trained female staff will be appointed to receive and process GBV related complaints. Special considerations will be taken to ensure that the complainant's identity is treated as privileged information, and the option to lodge the complaint anonymously will also be provided. Additionally, all GRM response teams will be trained in GBV, SEA and SH.

The World Bank and the NGC do not tolerate reprisals and retaliation against project stakeholders who share their views about Bank-financed projects.

6 Potential Environmental and Social Impacts

This Chapter assesses the project for key environmental and social aspects, identifies significant potential impacts and hazard risks that may be caused by the project activities and proposes appropriate mitigation and preventive measures to address these impacts and hazards.

6.1 Impact Assessment Methodology

The significance of potential impacts was assessed using the risk assessment methodology that considers impact magnitude and sensitivity of receptors, described below.

6.1.1 Impact Magnitude

The potential implications of the project have been categorized as major, moderate, minor or nominal based on consideration of the parameters such as i) duration of the effect; ii) spatial extent of the impact; iii) reversibility; iv) likelihood; and v) legal standards and established professional criteria.

The magnitude of each potential impact of the Project has been identified according to the categories outlined in **Table 6-1**.

Table 6-1 Parameters for Determining Magnitude

Parameter	Major	Moderate	Minor	Minimal
Duration of potential impact	Long term (beyond the project life)	Medium Term Lifespan of the project (within the project life span)	Limited to construction period	Temporary with no detectable potential impact
Spatial extent of the potential impact	Widespread far beyond project boundaries	Beyond next project components, site boundaries or local area	Within project boundary	Specific location within project component or site boundaries with no detectable potential impact
Reversibility of potential impacts	Potential impact is effectively permanent, requiring considerable intervention to return to baseline	Environmental or social parameter needs a year or so with some responses to come back to baseline	Baseline returns naturally or with limited response within a few months	Baseline remains constant
Legal standards and established	Breaches national standards and	Complies with limits given in national standards	Meets minimum national	Not applicable

Parameter	Major	Moderate	Minor	Minimal
professional criteria	or international guidelines/obligations	but violates international lender guidelines in one or more parameters	standard limits or international guidelines	
Likelihood of potential impacts occurring	Occurs under typical operating or construction conditions (Certain)	Happens under worst case (negative consequences) or best case (positive impact) working conditions (Likely)	Occurs under abnormal, exceptional or emergency conditions (occasional)	Unlikely to happen

6.1.2 Sensitivity of Receptor

The sensitivity of a receptor has been determined based on a review of the population (including proximity/numbers/vulnerability) and the presence of features on the site or the surrounding area. For each potential impact of the project, the sensitivity of the related receptor was determined using the criteria outlined in **Table 6-2**.

Table 6-2 Criteria for Determining Sensitivity

Sensitivity Determination	Definition
Very Severe	Vulnerable receptor with little or no ability to absorb proposed changes or minimal opportunities for mitigation.
Severe	Vulnerable receptor with little or no ability to absorb proposed changes or limited opportunities for mitigation.
Mild	Vulnerable receptor with some ability to absorb proposed changes or moderate opportunities for mitigation
Low	Vulnerable receptor with good ability to absorb proposed changes or/and excellent opportunities for mitigation

6.1.3 Assigning Significance

Following the assessment of impact magnitude and determining the quality and sensitivity of the receiving environment or potential receptor, the significance of each potential impact was established using the impact significance matrix shown in Table 6-3.

Table 6-3 Criteria for Determining Impact Significance

Magnitude of Impact	Sensitivity of Receptors			
	Very Severe	Severe	Mild	Low
Major	Critical	High	Medium	Negligible
Moderate	High	High	Medium	Negligible

Magnitude of Impact	Sensitivity of Receptors			
	Very Severe	Severe	Mild	Low
Minor	Medium	Medium	Minor	Negligible
Minimal	Negligible	Negligible	Negligible	Negligible

6.2 Hazard Risks Assessment

Hazard risk assessment is a critical examination of health and safety hazards at a construction site and operation and maintenance (O/M) work. Performing regular hazard risks assessments can help construction and O/M stakeholders comply with occupational health and safety (OHS) regulations. Hazard risks assessments can help OHS teams implement corrective measures to protect workers from health and safety threats during construction and operation stages.

6.2.1 Hazard Risks Assessment Codes

The principle behind the Hazard Risks Assessment System and the assignment of Hazard Risks Assessment Codes (HRACs) to identify and mitigate workplace hazards. HRACs are based on the hazard severity, probability of occurrence, and number of people exposed or potentially adversely affected in the event of an accident. While all hazards should be resolved as soon as possible, the Hazard Risks Assessment System is a safety risk ranking method to assist in making informed decisions concerning hazard control while providing decision makers with a consistent and defensible approach for prioritizing safety hazard abatement efforts based on available resources and with consideration towards competing demands and priorities.

6.2.2 Likelihood and Consequence of Hazards

HRACs require assigning a value for both the likelihood and probability of an outcome occurring, and the consequence or severity of a potential outcome. Based on these assigned values, a matrix format is used to place the specific hazard within a specific location of the matrix. This location can then be used to determine an HRAC number for that hazard activity.

The Likelihood or probability Code is considered numerical (1 through 4). These are presented below in Table 6-4.

Table 6-4 Likelihood Code

S#	Likelihood	Definition
1	Frequent	Immediate danger to the health and safety of the public, staff, resources, or property; occurs frequently or continuously.
2	Likely	Probably will occur in time if not corrected or probably will occur one or more times during the life of the system.
3	Occasional	Possible to occur in time if not corrected.
4	Rarely	Unlikely to occur, may assume exposure will not occur.

Next is the Consequence or severity Code (A to D) is presented in Table 6-5.

Table 6-5 Consequences Code

S#	Consequence	Definition
A	Catastrophic/Fatal	Imminent and immediate danger of death.
B	Critical/Major	Significant injury or illness diagnosed by a physician or other license professional, which involves days away from work.
C	Minor	Medical treatment beyond first aid
D	First aid	Minimal threat to human safety and health, property, or resources, but is still in violation of a standard.

6.2.3 Hazard Risks Assessment Matrix

The hazard risks assessment matrix is presented in Error! Reference source not found.. This matrix helps OHS team to prioritize workplace hazards by identifying them as high, serious, medium, and low. Those hazards identified as high will require the most stringent controls available as well as immediate attention. They may even demand that such activities be cancelled from the Project. Specific workplace controls can be applied so that the associated hazards are more effectively controlled and therefore result in a revised assessment category to a more acceptable level. Note that the box at the bottom indicates that if we can remove the hazard (such as incorporating an engineering design into a process), the hazard no longer exists and therefore can be removed from a project's control process – this is the ultimate hazard control.

Table 6-6 Worksite Hazards

Severity Probability	Catastrophic (A)	Critical/Major (B)	Marginal/Minor (C)	Negligible (D)
Frequent (1)	High	High	Serious	Medium
Probable/Likely (2)	High	Serious	Medium	Low
Occasional (3)	Serious	Medium	Medium	Low
Remote/Rare (4)	Medium	Medium	Low	Low
Eliminated (5)	Eliminated			

6.3 Assessed Environmental and Social Impacts

The project's potential impacts and their significance for the project activities listed in the project description chapter have been assessed using the methodology described above. A list of these impacts and their significance along with the mitigation measures are presented in **Table 6-7**.

Table 6-7 Accessed Impacts

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
Preconstruction/Design Phase – Environmental						
Land clearing and grubbing during site clearance	Vegetation loss, dust generation, soil erosion	Mode rate	Mild	Medium	The Contractor will prepare and implement the soil erosion plan. Clearing will be restricted to designated areas. Contractor will ensure regular Dust suppression (e.g., water sprinkling). Cleared zones will be re-vegetated, biomass properly disposed, and temporary erosion control measures applied.	Negligible
Material procurement	Pollution from hazardous materials; unsustainable sourcing	Mode rate	Severe	High	Priority will be given to materials which are free from hazardous substances. Preference will be given to certified suppliers who demonstrate compliance with safety and environmental standards.	Negligible
Utility mapping and relocation	Damage to existing underground utilities	Minor	Mild	Medium	The Contractor will conduct utility surveys prior to excavation and clearly mark identified lines. Relocation, if necessary, will be done in coordination with service providers under PIU supervision.	Negligible
Inclusion of environment	Poor environmental and social performance	Mode rate	Severe	High	The PMU will include environmental and social obligations in all contracts.	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
al clauses in contracts					The Contractor will prepare and implement a site-specific C-ESMP, covering waste, noise, dust, and HSE. Supervision consultants will monitor compliance.	
Preconstruction/Design Phase – Social						
Early planning and surveys	Temporary disruption to local communities	Minor	Mild	Medium	PMU to conduct community consultations within the GS before work begins Work plans will consider local sensitivities and scheduling conflicts. A stakeholder log will be maintained.	Negligible
Construction Phase – Environmental						
Excavation of land and site preparation	Dust emissions, soil disturbance	Mode rate	Mild	Medium	The Contractor will implement site-level dust suppression and soil protection measures as described in his CESMP. Excavation will be minimized, and disturbed areas will be re-vegetated after work completion. Speed limits will be imposed on all vehicles at the worksite. Unnecessary movement of vehicles will be avoided. Raw materials such as cement, gravel and sand will be kept under sheet covers. The height of material stockpiles will be minimized.	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
Use of machinery for construction	Noise and air emissions	Mode rate	Mild	Medium	The Contractor will use well-maintained, low-noise equipment and restrict noisy work to daytime. The contractor will carry out Environmental monitoring (Air quality and Noise) regularly. Nearby dwellers and communities will be notified prior to any typical noise events. Adequate PPEs will be provided to workers such as hearing protection. Awareness sessions will be conducted with workers and the nearby community to raise awareness about the noise pollution, its health impacts and mitigation measures.	Negligible
Chemical/fuel use (concrete mixing, cable trenching)	Soil or groundwater contamination	Mode rate	Mild	Medium	The Contractor will provide secondary containment and spill kits. Refuelling/mixing will be done at designated areas, with trained personnel.	Negligible
Generation of waste during construction	Solid and hazardous waste generation	Mode rate	Mild	Medium	The Contractor will prepare a Waste Management Plan as part of its CESMP. Waste will be segregated, stored in covered containers, and disposed	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					of through licensed vendors with documented records. Burning of waste material will not be allowed. If hazardous waste is generated onsite the waste will be carefully collected and removed from site and disposed of in an approved manner.	
Site clearance and equipment movement	Loss of flora, disturbance to vegetation	Minor	Mild	Medium	The Contractor will minimize vegetation clearance and avoid damage to trees. Post-construction site restoration will be mandatory.	Negligible
Installation and testing of reactive power compensation devices systems	Chemical spills (e.g., coolant leakage)	Mode rate	Mild	Medium	The Contractor will use non-toxic coolants and ensure bunded, labelled chemical storage. MSDS will be made available on-site. Storage containers will be labeled as to their content and capacity. Warning signs will be installed in storage areas, such as 'Flammable' and 'No Smoking'. Workers will be made aware of the proper handling practices to avoid spills. Spill clean-up kits to be provided.	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					Regular maintenance of machinery will be conducted to avoid unnecessary leaks.	
Excavation or trenching	Damage to archaeological/cultural resources	Minor	Mild	Low	The Contractor will implement a Chance Find Procedure. (Annex 5) Work will be halted, and the authorities will be informed if any finds occur.	Negligible
Transportation of equipment and materials	Traffic congestion, road safety risks, and disruption to local commuters	Medium	Moderate	Moderate	- Contractor will prepare the Traffic Management Plan (TMP) as a part of Contractor ESMP. - Schedule transport during non-peak hours - Use clear signage and warning boards. - Coordinate with local traffic police. - Assign trained flagmen for busy crossings. - Inform communities in advance of large transport movements. - If community access is hindered, the option of alternate routes will be used.	Negligible
All Construction activities like	Occupational Health and Safety	Moderate	Severe	High	- The contractor will submit a comprehensive OHSM Plan. - Ensure the compliance with	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
excavation, stringing, testing and commissioni ng etc.					World Bank Group EHS guidelines, requirements of ESS2 and Punjab/Sindh occupational Safety and Health Act, 2019/2017 - An appropriate level of training will be provided to workers. Workers with inadequate training will not be allowed to operate vehicle / machinery. - SOPs will be prepared for high-risk activities such as working on heights, erecting and using scaffolds and using ladders. - Safety signs will be installed at the entrance to and around the site. - All safety related incidents will be documented including all illness/injury, exposures, and near misses. - All incidents /accidents will be investigated, recorded, reported and Root Cause Analysis (RCA) for fatal incidents will be done. - Emergency response measures will be provided onsite including posting of Emergency Contacts, provision of first aid kits, provision of emergency transport vehicle (ambulance), designating of a	

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					muster point, provision of fire extinguishers/sand buckets, provision of spill clean- kits, etc. work provided with be provided first aid training. - The contractor will establish a MOU with the nearest ambulance service provider. - Proper site sanitation and housekeeping will be maintained on construction sites. - Toolbox Talk (TBT) with workers shall be held regularly before the start of work. - In case of an incident involving injury, the injured will be taken to the nearest medical facility after providing necessary first aid. - Provision of clean drinking water will be ensured for the project workers. - Appropriate and high-quality PPE and safety gear for workers such as gloves, vests, safety shoes, masks etc., will be provided and their use will be strictly enforced. Training will be provided in the use of PPE. - The contractor will designate an OHS focal person at each site to	

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					ensure the plan's effective implementation.	
Construction Phase – Social						
Hiring local labor	Temporary employment, skill enhancement	Positive	Mild	Medium (Positive)	The Contractor will prioritize hiring from the local community, ensure fair wages, and offer safety training and skill-building.	Positive
Establishment of labor camps	Risk of social tension, poor sanitation, increased service demand	Severe	Moderate	High	The Contractor will prepare and implement a Labor Camp Management Plan. Camps will be located >500 m from communities, including proper sanitation, healthcare access, and waste disposal. Ensure effective implementation of SEP and GRM.	Negligible
Labor recruitment	Use of forced or child labor	Severe	Severe	High	The Contractor will strictly prohibit forced or child labor in any form. Age verification will be mandatory during recruitment. Contractual clauses will enforce compliance with both local and WB requirements and with ILO conventions. Independent audits will be conducted to ensure adherence. Awareness will be created among the local communities and project staff	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					about the adverse impacts of child labor. Primary suppliers will be made aware of the provincial labor laws and World Bank requirements regarding child/forced labor.	
Workforce management and community interaction	Discrimination against vulnerable groups, social exclusion	Mode rate	Moderate	High	The Contractor will ensure non-discriminatory hiring practices and equal opportunity regardless of gender, ethnicity, religion, or disability. Where possible the employment of vulnerable groups will be encouraged. Employment opportunities will be provided to individuals residing near the project site, aiming to enhance social benefits through the recruitment of local residents. Ensure the implementation of the SEP including GRM and requirements of ESS2. .	Negligible
Labor-community interaction and presence of	Risk of GBV/SEA/SH	Severe	Severe	High	- Ensure compliance with the labor management procedure embedded in the ESCP. - Project staff will sign the code of conduct before commencement of civil works.	Medium

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
male workforce					- Establishment of temporary housing for workers near the the GS colonies will be discouraged. The contractor will rent out a room/place for outside workers away from the construction site. - The use of language or behavior, towards women or children, which is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate will be prohibited. - Recruitment of local human resources, as much as is available and practicable, will be in the Contractors' Clauses to minimize the chances of GBV/SEA and harassment. Provision related to SEA/SH or GBV will be incorporated in the bidding document. - The exchange of money, employment, goods, or services for favors or other forms of humiliating, degrading or exploitative behavior will be prohibited. - Ensure effective implementation of GRM to timely address the issues. - Training/orientation sessions will be conducted for PMU and	

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					Contractor's staff on GBV/SEA/SH risks at the project level. - The communities will be consulted as well as informed about the construction timings in advance. - If the privacy of the nearby households is affected, the Contractor will make some fence/screen arrangements for those households. - Contractor will warn the staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions particularly with reference to women.	
Construction activities near local communities and access roads	Risk to community health and safety due to construction traffic, noise, dust, improper waste disposal, or labor influx	Mode rate	Severe	High	Mitigation measures will ensure compliance with the World Bank Group Environment, Health, and Safety (WBG EHS) Guidelines, including but not limited to the following: - The construction site will be appropriately fenced or cordoned off to prevent stray animals and people, including communities, residents, from straying on to the site. - Excavated areas and pits will be marked with appropriate	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					signage. - Awareness sessions will be organized to sensitize construction workers and local communities. - The free flow of traffic around the work site will be maintained. Trucks or other construction equipment will not be left standing on the roadway or shoulders. - A Traffic Management Plan will be prepared and implemented by the contractor. - As much as possible, delivery of construction materials and equipment will be timed to coincide with off-peak traffic hours. - If community access is hindered, alternate routes will be provided. The contractor will inform the public of the date and time of activity before the start of work. - A safety procedure and protocol will be developed for vacating children away from activity when materials arrive. - Ensure effective implementation of GRM to timely address community	

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					issues. - Potentials of communicable disease during construction phase, like Sexually Transmitted Disease (STDs) such as HIV/AIDS, will be prevented by health awareness; education initiatives; training; immunization program and providing health service. - The contractor will take due care of the local community and observe the sanctity of local customs and traditions by his staff.	
Deployment of security personnel (private or public) for protection of camp and project assets	Risk of misconduct by security personnel, including harassment, intimidation, excessive use of force, or GBV toward workers or community members	Mode rate	Severe	High	• All security staff will follow a Code of Conduct, consistent with the UN Voluntary Principles on Security and Human Rights (VPSHR) • Security personnel will be screened and background-checked before deployment. • All security staff will undergo training in human rights, conflict sensitivity, and GBV prevention. • Inform the local elders and concerned authorities about the security personnel	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					- The contractor will ensure a Grievance Redress Mechanism (GRM) is in place, accessible to workers and communities to report misconduct. - Project management will conduct regular monitoring and unannounced site visits to ensure compliance. - Security incidents or complaints will be documented and addressed promptly in coordination with local authorities. - Contractors will be held accountable under contract terms for misconduct or violations. - A sample Security Management Plan in consistent with a WB ESS attached as Annex 6. The contractor is required to use this as guideline for site specific SMP.	
Operation & Maintenance Phase – Environmental						
Cooling system operation	Noise generation	Minor	Mild	Medium	The Contractor will inspect cooling systems periodically and retrofit acoustic shielding if needed. Work will be limited to daytime.	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
Handling of coolants	Minor chemical leakage	Minor	Mild	Medium	The O&M team will conduct regular inspections of coolant tanks and joints. Spill kits and bunding will be maintained on-site.	Negligible
Power consumption	Indirect emissions from grid energy use	Mode rate	Low	Negligibl e	Energy- efficient reactive power compensation devices components will be used. Periodic energy audits will be performed to track efficiency.	Negligible
EMF generation	Electromagnetic field exposure	Minor	Mild	Medium	EMF levels will be monitored. Public access to operational areas will be restricted. Compliance with WHO/ICNIRP standards will be ensured.	Negligible
Transformer/ cooling units	Oil leaks / spillage	Mode rate	Mild	Medium	Secondary containment (bunds, oil trays), regular inspection of seals/pipes, spill kits available onsite. Contaminated materials disposed of as per hazardous waste rules.	Negligible
Equipment replacement / maintenance	E-waste and maintenance waste	Mode rate	Severe	Medium	Contractor will Prepare and implement an e-waste management plan as part of CESMP. The disposal of e Waste will be conducted through licensed recyclers.	Negligible

Activity	Impact	Magnitu- de	Severi- ty	Signifi- cance	Mitigation and Enhancement Measure	Residual Impact
					The record of replaced components will be kept. The working staff will be trained on safe handling of waste.	
Operation & Maintenance Phase – Social						
Reactive power compensation devices operation	Perceived EMF health risks	Minor	Mild	Medium	Awareness campaigns will be conducted. Monitoring results will be shared publicly to address concerns.	Negligible
Maintenance works and equipment use	Community nuisance (noise, traffic)	Minor	Mild	Medium	Advance notice will be given before maintenance. Noisy tasks will be restricted to daytime hours.	Negligible

6.4 Assessment of Impacts related to OHS

The project's potential OHS impacts and their significance have been assessed using the methodology described above. A list of these impacts and their significance along with the mitigation measures are presented in Table 6-8.

Table 6-8 Assessed OHS Impacts

Activity	Hazard	Probability	Severity	HRAC Level	Control Measures	Residual Risk Level
Construction Phase						
Steel structure erection and bay stringing/	Fall from height	Frequent	Catastrophic	High	The contractor will ensure the use of full-body harnesses, installation of scaffolds with guardrails, establish exclusion zones below work areas, Deployment of trained	Medium

Activity	Hazard	Probability	Severity	HRAC Level	Control Measures	Residual Risk Level
Work at height					supervisors for monitoring and Training of staff and workers	
Equipment installation and cable connections	Electrical shock	Likely	Catastrophic	High	The contractor will implement a lock-out/tag-out system, provide insulated tools and PPE, and assign only trained and certified electricians for such tasks.	Medium
Cable trenching and excavation	Struck by machinery / collapse	Likely	Critical	Serious	The contractor will erect safety barricades, use trench shields, coordinate excavation activities with machinery operators, and designate safety spotters.	Medium
Manual material handling	Musculoskeletal injuries	Occasional	Minor	Medium	Workers will be trained on manual handling techniques, and mechanical aids such as trolleys and hoists will be provided to minimize strain.	Low
Concrete works	Chemical exposure, dust	Likely	Minor	Medium	Workers will be provided with dust masks, rubber gloves, and eye protection; hygiene stations will be installed for washing after exposure.	Low
Movement of cranes and delivery trucks	Struck-by incidents	Likely	Critical	Serious	A detailed Traffic Management Plan will be implemented, with designated routes, trained flagmen, and safety signage. Workers and drivers will wear high-visibility clothing.	Medium
Confined space entry	Asphyxiation or toxic gas	Occasional	Catastrophic	Serious	A confined space entry permit system will be enforced, including pre-entry gas monitoring, ventilation equipment, trained rescue teams, and emergency PPE.	Medium
Use of fuels and oils	Fire and explosion	Occasional	Critical	Medium	All flammable materials will be stored in bunded, well-ventilated enclosures with "No	Low

Activity	Hazard	Probability	Severity	HRAC Level	Control Measures	Residual Risk Level
					Smoking" signs, and fire extinguishers will be positioned nearby.	
Scattered tools, uneven surfaces	Trips, slips, falls	Likely	First Aid	Low	The contractor will maintain a clean worksite through daily housekeeping, secure tool storage, and place visible warning signs on uneven areas.	Low
Welding / grinding	Eye injury, fire sparks	Likely	Minor	Medium	Welders will wear appropriate PPE including face shields and gloves, welding areas will be isolated using curtains, and fire watches will be maintained.	Low
Use of power tools	Lacerations, vibration exposure	Occasional	Minor	Medium	Power tools will undergo regular maintenance, workers will use anti-vibration gloves, and training will be provided on safe tool use.	Low
Operation and Maintenance Phase						
Reactive power compensation devices equipment inspection	Electrical hazard	Occasional	Catastrophic	Serious	All inspections will follow de-energization protocols, with use of insulated gloves and tools by qualified personnel as per electrical safety standards.	Low
Maintenance in confined areas	Gas buildup / asphyxiation	Occasional	Catastrophic	Serious	Confined space work will require entry permits, pre-entry atmospheric testing, ventilation, emergency rescue equipment, and trained personnel.	Medium
Cooling fan noise	Hearing damage	Rare	Minor	Low	Periodic noise level assessments will be carried out, and workers will be provided with appropriate hearing protection when noise exceeds threshold limits.	Low



Activity	Hazard	Probability	Severity	HRAC Level	Control Measures	Residual Risk Level
Coolant handling	Chemical exposure	Occasional	Minor	Medium	Coolants will be stored in bunded containers with appropriate labelling; safety data sheets will be accessible, and workers will use gloves, goggles, and spill kits.	Low
Maintenance traffic	Vehicle accidents	Rare	Critical	Medium	Maintenance vehicles will follow designated routes, adhere to speed limits, and use reverse alarms and flashing lights within operational boundaries.	Low
Working on ladders	Fall from height	Rare	Minor	Low	Ladder inspections will be conducted before use, three-point contact rule will be enforced, and spotters will assist where necessary.	Low

7 Environmental and Social Management & Monitoring Plan

This section outlines the Environmental and Social Management and Monitoring Plan (ESMMP) for this project. The plan identifies key environmental, social, and occupational health and safety (OHS) impacts, proposes mitigation measures, and defines roles and responsibilities for implementation and monitoring throughout the project lifecycle.

7.1 Objective of ESMMP

The basic objective of the ESMP is to manage adverse impacts and hazards of proposed project interventions in a way that minimizes the adverse impact and risk on the environment, workers, and community during construction and operation stages of project. The specific objectives of the ESMP are to:

- Implement the mitigation measures previously discussed in the document.
- Optimize project benefits while managing adverse impacts.
- Address occupational health and safety (OHS) risks and apply preventive measures during both construction and operation phases.
- Assign responsibilities to NGC, contractors, consultants, and other project team members for environmental, health, safety, and social management of the Project.
- Establish a monitoring and supervision system and specify parameters for inspection to ensure thorough implementation of all mitigation measures and preventive actions.
- Ensure the efficacy of the mitigation measures and preventive actions.

7.2 ESMP Compliance

This ESMP constitutes a mandatory component of the Request for Proposals (RFP) package and Bid Documents, requiring full compliance by all bidders and contractors. The contractor shall be responsible for preparing a site-specific Contractor's Environmental and Social Management Plan (CESMP) and Occupational Health Safety Management Plan (OHSMP) for each subproject, which must incorporate all relevant mitigation and monitoring measures outlined in this master ESMP document. These subproject-specific CESMPs and OHSMPs, once approved, will be formally incorporated into the civil works contracts and shall become legally binding obligations for the contractor.

The contractor is required to submit the draft CESMP and OHSMP to the Supervision consultant/Client for review and formal clearance within 30 days of contract signing or prior to commencement of site mobilization activities, whichever occurs first. It is expressly stipulated that no construction works may be initiated without the written approval of the site-specific CESMP and OHSMP by the designated authorities.

7.3 Tools for Environmental and Social Risk Mitigation

7.3.1 Contractor's Environmental and Social Management Plan (CESMP)

The contractor shall be required to develop a Contractor's CESMP prior to the commencement of any site activities. CESMP will operationalize the commitments and measures outlined in the ESMP by translating them into detailed, site-specific procedures and actions.

The CESMP must be submitted to the Project Implementation Unit (PIU) and supervising engineers for review and approval before mobilization. Include relevant sub-plans such as:

- Waste Management Plan
- Air and Noise Control Plan
- Soil Erosion and Sediment Control Plan
- Traffic Management Plan
- Stakeholder Engagement Plan (during construction)
- Emergency Response Plan

Clearly define roles and responsibilities for environmental and social management on site. Include monitoring and reporting protocols, grievance redress procedures, and non-compliance consequences. The CESMP must comply with the project's ESMP, national environmental laws, and the World Bank's Environmental and Social Standards (ESSs), particularly ESS1 and ESS10.

7.3.2 Occupational Health and Safety Management Plan (OHSMP)

The contractor shall also prepare and implement an OHSMP covering all health and safety risks during the pre-construction, construction, and commissioning phases of the project.

The OHSMP shall:

- Identify work-related risks such as working at heights, electrical hazards, heavy equipment operation, manual handling, noise, and confined space entry.
- Specify risk control measures, including PPE requirements, job safety analysis (JSA), toolbox talks, and safe work procedures.
- Include emergency preparedness and response plans (fire, electrical shock, injury, chemical spill, etc.).
- Outline health and safety training, awareness, and capacity-building activities for workers.
- Establish accident/incident reporting mechanisms and worker grievance procedures.

The OHSMP must conform to World Bank Environmental, Health, and Safety (EHS) Guidelines, national labor, and safety regulations, and ESS2 (Labor and Working Conditions).

7.3.3 Method Statement with Risk Assessment

The Contractor shall develop and implement detailed method statements for all high-risk activities, incorporating task-specific risk assessments. Each method statement shall outline: (1) the work sequence with step-by-step procedures; (2) identified hazards (e.g., electrical shock, falls, EMF exposure); (3) control measures aligned with the hierarchy of controls (elimination, engineering controls, administrative controls, and PPE); (4) emergency procedures; and (5) competent personnel responsible for supervision. For reactive power compensation devices installation in live GSs, this shall specifically address energized work permits, arc flash boundaries, and lockout-tagout (LOTO) procedures. Risk assessments must include a risk rating matrix (probability × severity) and residual risk evaluation after controls. All method statements require prior approval from the PIU and Site OHS Officer before activity commencement, with toolbox talks conducted to communicate risks and controls to workers.

7.3.4 Emergency Response Plan (ERP)

Site specific ERP will be prepared by the contractor however a template for the ERP detailing procedures, reporting lines, and incident investigation protocols are attached as **Annex 7**.

7.3.5 Code of conduct

To support effective implementation of the ESMP, a comprehensive Code of Conduct has to be developed and enforced by the contractor. The Code of Conduct shall outline acceptable behavior and responsibilities for all project workers and aims to promote a safe, respectful, and compliant working environment. It must include key provisions on general workplace ethics, adherence to occupational health and safety protocols, environmental responsibility, and respectful interaction with local communities. It will also address the prevention of gender-based violence (GBV), sexual exploitation and abuse (SEA), harassment, discrimination, and child labor. All workers will receive training in the Code of Conduct and will be required to sign and acknowledge it as a condition of employment. A sample Code of Conduct is provided in **Annex 8**, which the contractor shall adapt and implement for all site personnel, including subcontractors. The code of conduct translated into local language will be ideal.

7.3.6 PPE Obligation and Compliance

The Contractor shall provide all necessary PPE to workers and visitors at no cost, ensuring compliance with [National OSHA Standards/ WBG EHS Guidelines. The PPE Specifications & Minimum Quantities to be needed during this project are provided in the **Table 7-1**.

Table 7-1 PPE Types and Specifications

PPE Type	Standard Required	Quantity (Per Worker)	Replacement Frequency
Safety Helmets	ANSI/IS 2925 or equivalent	1	After impact/damage

High-Visibility Vests	EN ISO 20471 Class 2 or equivalent	2	Every 6 months
Safety Gloves	Cut-resistant (Level 4+)	4 pairs/year	As needed
Safety Footwear	Steel-toe, slip-resistant	1 pair	Every 12 months
Dust Masks (N95)	NIOSH-certified	10/month	Single use
Hearing Protection	SNR $\geq$ 25dB	1 set	Every 6 months
Safety Harnesses	EN 361 (Full-body) + EN 362 (Lanyard)	1	After fall or 5 years

The contractor must maintain a 10% surplus stock for all PPE types. Workers shall receive PPE usage training during induction, which will be recorded in attendance sheets. No worker is allowed on-site without proper PPE. Daily PPE checks will be conducted by OHS Officers. The contractor is required to submit quarterly PPE inventory reports to the Supervising Engineer. Failure to provide adequate PPE will result in work stoppage until rectification.

7.4 Institutional Arrangements

Effective implementation of the ESMP requires a clearly defined institutional framework. The institutional arrangement is depicted in the following **Figure 7-1** and key responsibilities are also provided below.

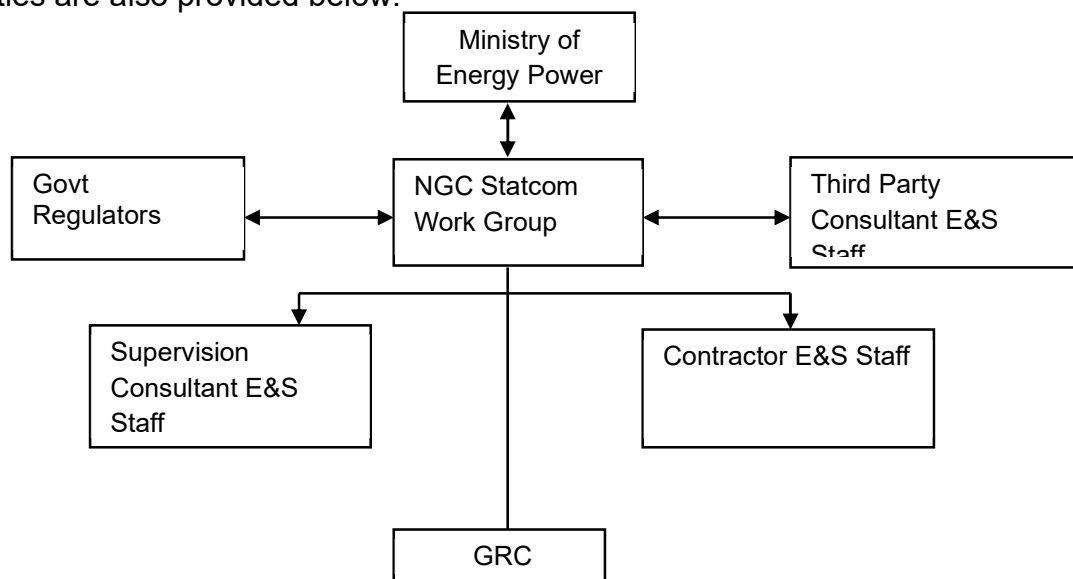


Figure 7-1 Project Organogram

7.4.1 Project Proponent

NGC is the primary project proponent and holds ultimate accountability for the successful implementation of the project. Within NGC, Workgroup led by the Chief Engineer (GS Design) acts as the de facto Project Management Unit (PMU) for this project. This Workgroup includes multidisciplinary members from planning, design, environment, and social teams. Particularly for E&S, one Assistant Manager Environment, one Assistant

Manager OHS and one Assistant Manager Social will be part of PMU to look after the environmental and social tasks. The PMU is responsible for:

- Overseeing project design and construction activities.
- Ensure comprehensive implementation of the ESMP throughout project phases.
- Coordinate and maintain communication with the World Bank, government agencies, and other relevant stakeholders.
- Review and endorse key documents, including the Contractor's Environmental and Social Management Plan (CESMP) and other sub-plans.
- Monitor environmental and social performance through periodic reports submitted by the supervision consultant.
- Address grievances related to environmental and social issues, ensuring a timely and transparent grievance redress process.
- Facilitate capacity-building initiatives as needed for project staff and stakeholders.

NGC, in collaboration with (AFD), is in the process of drafting Environmental and Social (E&S) operational policies. In parallel, NGC is strengthening its Health, Safety, and Environment (HSE) Directorate to enhance institutional capacity for effective E&S risk management and compliance.

7.4.2 Construction Supervision Consultant (CSC)

The project will engage Supervision Consultant responsible for the oversight of construction activities, with a strong focus on environmental and social safeguards compliance. Key Environmental and Social Responsibilities for consultants are;

- Review, evaluate, and approve the contractor's CESMP, including sub-plans such as Labor Management Plan (LMP), OHSMP, Waste Management Plan, and other relevant documents.
- Conduct regular site inspections, compliance audits, and performance monitoring focused on environmental protection and social safeguards.
- Prepare and submit detailed Environmental and Social (E&S) monitoring reports to NGC on monthly basis.
- Assist NGC in managing grievances raised by workers, local communities, or other stakeholders, ensuring timely resolution and follow-up.
- Coordinate closely with NGC's E&S team and the contractor to address non-compliance and implement corrective actions promptly.

Environmental and Social Staffing Requirements:

The Supervision Consultant is required to mobilize dedicated E&S personnel prior to commencement of construction and maintain them throughout the construction phase:

Environmental Specialist

Responsible for supervising the implementation of the CESMP, monitoring environmental mitigation measures, managing waste control, air and noise quality monitoring, and ensuring compliance with environmental laws and ESMP provisions.

OHS Specialist

Responsible for enforcing site-specific safety protocols, conducting daily hazard assessments and safety audits, ensuring true implementation of contractors OHSMP.

Social or Community Liaison Specialist

Responsible for managing social compliance, community engagement activities, grievance handling, and labor-related social issues.

These specialists must possess relevant qualifications and field experience in environmental and social management within infrastructure projects.

7.4.3 Contractor

The selected Contractor bears direct responsibility for the on-ground implementation of all mitigation and management measures defined in the ESMP and then CESMP and OHSMP.

Core Contractor Responsibilities:

- Prepare and submit the CESMP, OHSMP, and related sub-plans for approval by the supervision consultant and NGC before mobilization.
- Ensure compliance with all applicable national laws, the approved ESMP, and World Bank safeguard policies throughout construction.
- Conduct induction, training, and awareness programs related to environmental protection, (OHS), and social responsibilities for all project personnel.
- Maintain detailed records of environmental and social performance and submit regular reports to the supervision consultant and NGC.
- Act promptly to rectify any instances of non-compliance identified during monitoring or grievance investigations.

Environmental and Social Staffing Requirements:

The Contractor shall deploy a qualified, full-time Environmental, Health, and Safety (EHS) team throughout the project duration, comprising at minimum:

Environmental & Social (E&S) Specialist – Responsible for CESMP compliance, including environmental monitoring, social safeguards implementation, grievance redress coordination, and reporting. Ensures adherence to mitigation measures, safety protocols, and incident management across all work sites.

Occupational Health & Safety (OHS) Officer (on every site) – Conducts daily site inspections, enforces PPE compliance, oversees hazard identification and risk assessments, delivers safety inductions, and ensures emergency preparedness. Reports directly to the E&S Specialist.

These staff members should have appropriate professional credentials and relevant experience, ensuring proactive and effective management of environmental and social risks.

7.4.4 Third-Party Environmental and Social Monitoring

To strengthen transparency and accountability, the ESMP provides for the possible engagement of an independent third-party environmental and social monitor during construction. While not confirmed at this stage, if appointed, this role will add an additional oversight layer.

Third-Party Monitor Responsibilities:

- Conduct independent audits of the contractor's and supervision consultant's compliance with ESMP, CESMP, and all relevant World Bank environmental and social standards.
- Verify the adequacy and effectiveness of mitigation measures and management actions.
- Review grievance redress records, stakeholder engagement efforts, and community feedback.
- Prepare impartial monitoring reports annually and submit findings to NGC and the World Bank.
- Provide recommendations to improve environmental and social performance where necessary.

7.4.5 Government Regulatory Authorities

Government regulatory bodies like EPA, Labor Department etc. ensure adherence to national laws, standards, and regulations.

Key Responsibilities:

- Review and issue necessary environmental and construction permits.
- Monitor compliance with environmental, occupational health and safety, and labor regulations.
- Conduct inspections and enforce corrective actions as necessary.
- Coordinate with NGC and other project stakeholders on environmental and social issues.

7.5 Environmental and Social Management and Monitoring Plan

The impacts, mitigations measures, monitoring indicators, frequency and responsibilities have been discussed in this ESMMP in **Table 7-2**.

Table 7-2 Environmental and Social Management and Monitoring Plan

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
Design Phase/Preconstruction Phase					
Land clearing and grubbing during site clearance	Vegetation loss, dust generation, soil erosion	Contractor will prepare and implement a Soil Erosion Plan. Dust suppression via water sprinkling. Only designated areas will be cleared. Biomass will be disposed of properly and temporary erosion control will be enforced.	Contractor / PIU	Area cleared, dust levels, erosion indicators	Daily during activity
Material procurement	Pollution from hazardous materials; unsustainable sourcing	Environmentally friendly, SF ₆ -free materials will be prioritized. Suppliers must provide compliance certification. Procurement audits will be reviewed by PIU and CSC.	Contractor / PIU	Supplier documents, audit reports	Before procurement and quarterly
Utility mapping and relocation	Damage to existing underground utilities	Contractor will conduct a utility survey, mark identified lines, and coordinate relocation with utility providers before excavation.	Contractor	Utility map, coordination records	Once before construction
Environmental clauses in contracts	Poor environmental and social performance	PMU will include E&S clauses in contracts. Contractor will prepare and implement C-ESMP.	PMU / Contractor / CSC	Contract clauses, monthly inspection reports	Prior to award and monthly

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
		CSC will monitor compliance.			
Early planning and surveys	Temporary disruption to local communities	PMU will consult communities and consider their feedback. Schedule adjustments will be made as necessary. Stakeholder log will be maintained.	PMU Contractor /	Consultation records, schedule adjustments	Monthly
Construction Phase					
Excavation and site preparation	Dust emissions, soil disturbance	Site-level dust suppression (e.g., sprinkling), re-vegetation after works, minimal excavation.	Contractor	Dust log, area revegetated	Daily during activity
Use of machinery	Noise and air emissions	Only low-noise, well-maintained equipment will be used. Noisy activities will be limited to daytime. Air quality monitoring during peak works.	Contractor	Equipment logs, noise readings	Weekly
Chemical/fuel use	Soil or groundwater contamination	Contractor will ensure designated fueling/mixing areas, spill kits, trained staff, and containment structures.	Contractor	Spill records, inspection logs	Weekly
Waste generation during construction works	Solid and hazardous waste generation	Contractor will prepare and implement a Waste Management Plan. Waste will be	Contractor	Waste logs, disposal records	Weekly

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
		segregated, stored, and disposed through licensed vendors.			
Site clearance and equipment movement	Loss of flora, vegetation disturbance	Avoid unnecessary clearance, protect trees, and restore site post-construction.	Contractor	Vegetation records, restoration photos	Post-activity and end of construction
Reactive power compensation devices system installation/testing	Chemical spills (e.g., coolant)	Use non-toxic coolants, label all chemicals, and ensure bunded storage with MSDS available.	Contractor	Chemical inventory, MSDS, inspection logs	Weekly
Excavation/trenching	Damage to cultural/archaeological sites	Implement Chance Find Procedure. Notify authorities and stop work if finds occur.	Contractor	Chance find reports	As needed
Equipment delivery/movement	Local traffic disruption	Contractor will prepare and implement a Traffic Management Plan. Community will be informed of movement schedules.	Contractor	Delivery logs, complaints	Weekly
Workforce mobilization	Social tension, conflict with locals	Enforce Code of Conduct, cultural awareness training, and prioritize local hiring. GRM will be functional.	Contractor	Training logs, grievance records	Monthly
Local labor hiring	Temporary employment, skill development	Prefer local workers, ensure fair wages, provide safety training and job skills.	Contractor	Labor register, training attendance	Monthly

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
Labor camps establishment	Social tension, sanitation pressure, waste	Contractor will implement a Labor Camp Management Plan including sanitation, health access, and waste control. GRM will be active.	Contractor	Camp conditions, grievance log	Monthly
Labor recruitment	Use of forced or child labor	Contractor will prohibit child/forced labor, conduct age verification, and enforce labor standards with third-party audits.	Contractor	Recruitment records, audit reports	Monthly
Workforce management	Discrimination, social exclusion	Ensure inclusive hiring and equal opportunity. Establish GRM accessible to vulnerable groups.	Contractor	Diversity stats, GRM log	Monthly
Male workforce presence	Risk of GBV/SEA/SH	GBV Action Plan to be implemented with mandatory Code of Conduct, training, and survivor-centered reporting system.	Contractor	Training attendance, complaint records	Monthly
Construction near communities	Community health & safety risks (traffic, dust, noise)	CHSMP will be implemented covering fencing, signage, access control, traffic safety, emergency response, and worker behavior.	Contractor	Incident logs, awareness session records	Weekly

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
Deployment of security personnel (private or public) for protection of camp and project assets	Risk of misconduct by security personnel, including harassment, intimidation, excessive use of force, or GBV toward workers or community members	Security staff will follow a Code of Conduct aligned with the UN Voluntary Principles; undergo screening and training on human rights, GBV prevention, and conflict sensitivity; GRM will be in place; regular monitoring and unannounced visits will be conducted; incidents will be documented and addressed; contractors held accountable	Contractor/ PIU/ CSC	Signed Code of Conducts, Training and screening records Functioning GRM Incident logs	Monthly
Steel structure erection and bay stringing/ Work at Height	Fall from height	Contractor will ensure 100% use of full-body harnesses, install scaffolds with guardrails, establish exclusion zones, and assign trained supervisors for work-at-height tasks.	Contractor / Safety Supervisor	PPE compliance, scaffold inspection log	Daily
Equipment installation and cable connections	Electrical shock	Lock-out/Tag-out (LOTO) system will be enforced. Insulated tools and PPE will be used, and only trained electricians will perform these tasks.	Contractor	LOTO checklist, training records	Weekly

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
Cable trenching and excavation	Struck-by injury or trench collapse	Trench shields and barricades will be used, activities coordinated with machinery operators, and safety spotters will be assigned.	Contractor	Trench inspection, incident reports	Daily
Manual material handling	Musculoskeletal injuries	Workers will receive training in safe lifting techniques, and mechanical aids (e.g., trolleys, hoists) will be provided.	Contractor	Training records, observation reports	Monthly
Concrete works	Chemical exposure, dust inhalation	Workers will be provided with dust masks, gloves, eye protection, and hygiene facilities for hand and face washing post-exposure.	Contractor	PPE issuance logs, hygiene station records	Weekly
Movement of cranes and delivery trucks	Struck-by incidents	A Traffic Management Plan will be implemented. Designated routes, trained flagmen, high-visibility vests, and proper signage will be ensured.	Contractor	Traffic logs, incident reports	Weekly
Confined space entry	Asphyxiation or toxic gas buildup	A confined space entry permit will be required. Gas monitoring, ventilation, PPE, trained rescue team, and communication	Contractor	Entry permits, gas monitoring logs	Before and during activity

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
		equipment will be ensured.			
Use of fuels and oils	Fire or explosion	Flammable materials will be stored in bunded, ventilated areas with fire extinguishers nearby and "No Smoking" signs posted.	Contractor	Storage inspection, extinguisher logs	Weekly
Scattered tools, uneven surfaces	Slips, trips, and falls	Daily housekeeping protocols, designated tool storage areas, and hazard signage will be implemented.	Contractor	Housekeeping checklist, hazard sign records	Daily
Welding / grinding	Eye injuries, fire sparks	Workers will wear welding shields and gloves. Welding zones will be curtained off and monitored by fire watchers.	Contractor	PPE records, work zone inspections	Daily
Use of power tools	Cuts, vibration exposure	Tools will be regularly inspected and maintained. Workers will use anti-vibration gloves and receive safe tool use training.	Contractor	Tool maintenance logs, training records	Monthly
Operation & Maintenance Phase					
Cooling system operation	Noise generation	Periodic inspections and retrofitting of noise shielding if required. Work to be scheduled during daytime.	NGC	Inspection records, noise measurements	Quarterly

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
Handling of coolants, Chemicals/oils	Minor chemical leakage, Oil leakages/spills	O&M team will maintain bunding, conduct inspections, and ensure spill response kits are present.	NGC	Inspection reports, spill response logs	Monthly
Power use	Indirect emissions	Use of energy-efficient reactive power compensation devices systems and periodic energy audits.	NGC	Energy audit reports	Annually
EMF exposure	EMF radiation risk	Restrict public access, install signage, and monitor EMF levels in compliance with WHO standards.	NGC	EMF readings, signage records	Biannually
Reactive power compensation devices operation	Perceived EMF health risk	Conduct public awareness and share monitoring results with local communities.	NGC	Awareness logs, feedback records	Biannually
Maintenance work	Noise and traffic nuisance	Communities will be notified before maintenance. Noisy tasks scheduled only during the day.	NGC	Notice records, complaint logs	Before each maintenance
Reactive power compensation devices equipment inspection	Electrical hazard	All inspections will follow de-energization procedures. Insulated tools and gloves will be used by trained technicians.	O&M Team	Inspection records, tool checklist	Monthly

Activity	Impact	Mitigation Measure	Responsibility	Monitoring Indicator	Frequency
Maintenance in confined areas	Gas buildup, asphyxiation	Entry permits, atmospheric testing, mechanical ventilation, emergency PPE, and trained rescue teams will be required.	O&M Team	Permit logs, gas detection reports	Before and during entry
Cooling fan noise	Hearing damage	Noise assessments will be done periodically. Hearing protection (earplugs/muffs) will be provided where noise exceeds thresholds.	O&M Team	Noise level logs, PPE distribution	Biannually
Coolant handling	Chemical exposure	Coolants will be stored in bunded, labelled containers. MSDS will be posted, and workers will wear goggles, gloves, and use spill kits.	O&M Team	Storage condition logs, MSDS checklist	Monthly
Maintenance traffic	Vehicle accidents	Vehicles will follow marked paths, obey speed limits, and use alarms and flashing lights during movement in the facility.	O&M Team	Traffic monitoring records, incident logs	Monthly
Working on ladders	Fall from ladder	Ladders will be inspected before use, and workers will follow the three-point contact rule. Spotters will assist as needed.	O&M Team	Ladder inspection checklist	Prior to each use

7.6 Integration of ESMP Requirements in Contractor Bidding Documents

To ensure that environmental and social safeguards are effectively implemented during project execution, the provisions of this ESMP shall be incorporated into the contractor's bidding and contract documents. This includes all relevant mitigation measures, monitoring and reporting obligations, occupational health, and safety (OHS) requirements, and grievance redress mechanisms. By integrating these elements into the bidding documents, prospective contractors will be fully informed of their responsibilities and can accordingly reflect the associated costs and arrangements in their proposals. This approach not only promotes compliance from the outset but also ensures that environmental and social considerations are embedded into project planning, execution, and monitoring. The inclusion of ESMP clauses in contractual obligations will also form the basis for supervision, audits, and performance evaluations during the implementation phase.

7.7 Environmental Effects Monitoring

The Contractor shall be responsible for conducting environmental monitoring throughout the project duration. All monitoring must be performed through EPA-certified laboratories, and the results shall be submitted to the relevant authorities for compliance verification. The details of parameters to be included in the monitoring are listed below in Table 7-3.

Table 7-3 Environmental Effects Monitoring

Environmental Parameter	Key Performance Indicators (KPIs)	Monitoring Method	Frequency	Responsible Party
Air Quality	PM10 & PM2.5 within national permissible limits; gaseous pollutants within regulatory standards	Ambient air sampling by EPA-certified lab	Quarterly	Contractor through EPA-certified Lab
Water Quality	Parameters (pH, turbidity, BOD, COD, DO, oil & grease, metals) within national water quality standards	Surface/groundwater sampling and lab analysis	Quarterly	Contractor through EPA-certified Lab
Noise Levels	Compliance with national noise limits (day & night)	Noise meter measurement at designated points	Quarterly	Contractor through EPA-certified Lab
EMF Levels	EMF levels below acceptable exposure thresholds	EMF field strength measurement	Quarterly	Contractor

7.8 Tree Plantation/ Landscape Restoration

The Contractor shall be responsible for planting trees within the GS along boundary wall, near office space and on access tracks where feasible and maintaining the landscape using indigenous plant species to enhance ecological sustainability. The plantation efforts must align with local biodiversity conservation goals and include:

- Selection of native species suitable for the region.
- Regular maintenance (watering, protection, and replacement if necessary) to ensure survival.
- Periodic monitoring to assess growth and ecological impact.

7.9 Capacity Building and Training

Capacity building for effective implementation of environmental and social safeguard requirements is an essential component of the ESMP. This process must be undertaken at all levels of the project, including NGC (E&S Staff), CSC, and contractors. At the construction site, the CSC will lead the capacity-building initiatives, with contractors also responsible for training their own staff and workers. The capacity-building program will encompass various elements, including general environmental and social awareness, key environmental and social sensitivities of the area, significant environmental and social impacts of the project, ESMP requirements, occupational health and safety aspects, and waste management practices.

Table 7-4: Environmental, Social and Health & Safety Trainings

S. No.	Training Topic	Participants (Trainees)	Responsible Party (Trainer)	Timing / Frequency
1	ESMP Implementation (roles, mitigation, monitoring)	Contractor, Consultant, Client PMU staff	Consultant / Client E&S Officer	Pre-mobilization & Quarterly Refreshers
2	Contractual Obligations Related to ESMP	Client PMU, Procurement Staff, Contractor Management	Client Legal/Procurement Lead & E&S Officer	Pre-contract finalization & Annual Review
3	Stakeholder Mapping and Engagement	Client PMU, Contractor E&S	Consultant / Client E&S Officer	Pre-mobilization & Quarterly Refreshers
4	Specific aspects of E&S Assessment	Client PMU, Contractor E&S	Consultant / Client E&S Officer	During Mobilization & Quarterly Refreshers
5	Occupational Health and Safety (OHS) Basics	Workers, Site Supervisors	Contractor Safety Officer	Induction & Monthly Toolbox Talks

6	Fire Safety Awareness and Incident Response	All site staff, Client Operators	Contractor E&S staff/ Certified Fire Safety Trainer	Biannually & During High-Risk Activities
7	Emergency Preparedness and Response	Client Staff (nominated), Contractor Staff	Contractor / Consultant E&S Staff	Biannually
8	Personal Protective Equipment (PPE) Usage	All Workers and Technicians	Contractor Safety Officer	Weekly Briefings & Toolbox Talks
9	Community Health, Safety & Grievance Mechanism (GRM)	Site Staff, Client and Contractor Focal Points	Environmental & Social Consultant	Pre-mobilization & Mid-Project
10	Work at Height Safety Procedures	Workers at elevated work areas, Supervisors	Contractor Safety Officer	Before such activities & Monthly Refreshers
11	Confined Space Entry Safety (Permit-to-Work, Rescue)	Technicians, EHS Staff, Supervisors	Certified Confined Space Safety Trainer	Before relevant work & Every 6 Months
12	Code of Conduct, Labor Rights, GBV/SEA Prevention/LMP	All contractor and subcontractor personnel	Social/HR Specialist / Client E&S Officer	Induction & Every 6 Months
13	Pollution Prevention/ Waste Management	All contractor and subcontractor personnel	Contractor/ Consultant E&S Staff	Quarterly
14	Monitoring and Reporting	Client, Consultant and Contractor	Consultant/Client	Biannual

To ensure that all training courses provided under the Project achieve their intended outcomes, a Training Effectiveness Evaluation mechanism will be implemented. The effectiveness of each training session will be assessed through a combination of: (i) pre- and post-training assessments to measure knowledge improvement; (ii) practical demonstrations or field-based evaluations where applicable; (iii) feedback forms completed by participants to assess clarity, relevance, and usefulness of the training; and (iv) follow-up monitoring by the PMU E&S Specialists to verify whether trained staff correctly apply the procedures on-site. Evaluation results will be documented and used to improve future training content, delivery methods, and frequency.

7.10 Reporting

To ensure effective implementation of the ESMP, including Occupational Health and Safety (OHS) measures, a reporting mechanism have been given in the Table 7-5.

Table 7-5 Reporting Mechanism

Type of Reporting	Who Will Prepare the Reports	To Whom the Reports Will Be Submitted
Monthly ESHS Reports (construction phase)	Contractor and CSC	PMU and WB
Quarterly ESHS Progress Reports (construction phase)	CSC, in consultation with PMU	PMU and WB
Project Completion Environmental, Social, Health and Safety Monitoring Report	CSC in consultation with PMU	WB

Monthly report will comprehensively cover the implementation status of all mitigation and preventive measures outlined in the ESMP, including site-specific issues related to environmental compliance, community engagement, social safeguards, and occupational (including incidents and accidents) health and safety, stakeholder engagement updates, in line with the SEP, progress on the implementation and completion of project works

The Monthly ESHS Report will include updates on the implementation of the Contractor's approved CESMP and OHSMP. It will detail the results of inspections and audits conducted by the Contractor and verified by the CSC, monitoring data collected on key environmental parameters (such as dust, noise, and waste management), records of incidents and corrective actions, summary of safety inspections and toolbox talks, and any grievances raised and resolved, actions taken, and complaints closed out during the reporting period. The CSC will validate the accuracy and completeness of all information provided by the Contractor in the monthly reports.

If PMU becomes aware of a serious incident in connection with the project, which may have significant adverse effects on the environment, the affected communities, the public, or workers, it should notify the World Bank within 48 hours of becoming aware of such an incident.

7.11 ESMP Implementation Cost

To ensure effective implementation of the ESMP, a dedicated budget has been prepared and given in **Table 7-6**. The cost estimates cover staffing, capacity building, training, monitoring, implementation of mitigation measures, documentation, and compliance with World Bank ESF requirements. The estimates are indicative and may be adjusted during the project lifecycle based on actual needs and site conditions.

Table 7-6 ESMP Implementation Cost

S #	Items	Unit	Quantity	Unit Rate (Million PKR)	Amount (Million PKR)	Remarks
1	CESMP & OHSMP (for contractors)					
	Preparation of CESMP (considering 07 contractors)*	No	1	01	07	Multiple contract package

S #	Items	Unit	Quantity	Unit Rate (Million PKR)	Amount (Million PKR)	Remarks
	Preparation of OHSMP (considering 07 contractors)	No	1	01	07	having different lots will be prepared for the project. This cost corresponds to most probably 7 contractors. Contractors number may vary.
				Sub-Total	14	
2	Environmental Monitoring Plan (For contractors)					
	Air, Noise, Water, EMF (3 years quarterly)		12*29=348	0.2	69.6	For all 29 GS sites.
				Sub-Total	69.6	
3	ESMP Mitigation Measures (For contractors)					
	Waste Disposal, Water sprinkling, HSE signages etc	Lumpsum	-		10	For all 29 sites.
	Personal Protective Equipment (For Approx. 50 workers for 36 Months)	Person/Month	1800	0.010	18	Tentative List of PPEs are mentioned in Section 7.3.5.
	Tree Plantation/ Landscape	Lumpsum	-	-	10	For all 29 GS sites.
				Sub- Total	38	
4	Institutional Arrangements					
	Construction Supervision Consultant (ESHS Staff) 3 persons for 10 months each.	Man months	30	0.4	12	Detail of ESHS staff is mentioned in 7.4.3
	Contractor (ESHS Staff) 2 persons for each contractor (14 persons for 36 months for seven contractors)	Man months	504	0.4	201.6	Detail of ESHS staff is mentioned in 7.4.4.
	PMU Staff 1 AM Environment 1 AM OHS					These positions are regular positions of

S #	Items	Unit	Quantity	Unit Rate (Million PKR)	Amount (Million PKR)	Remarks
	1 AM Social					NGC and are attached with this PMU on temporary basis.
	Monitoring and Evaluation Consultant	Lumpsum			10	
				Sub- Total	223.6	
5.	Capacity Building & training (For NGC)					
	Trainings Sessions, workshops etc.	Lumpsum			5	
				Sub- Total	5	
6.	GRM (for NGC)					
	Dissemination of information, display of signages, meetings etc.	Lumpsum			2.9	
				Sub- Total	2.9	
7.	ESHS Implementation (for NGC)					
	ESHS Implementation (Annual). ESHS signages, PPEs ESHS Meetings	Lumpsum/ year			5	Will be born by the NGC from routine operational costs.
	Total (1 to 7)				358.1	
	Contingency (20%)				71.62	
	Grand Total				429.72	

8 Performance Indicators

The following performance indicators will be monitored and reported by the contractor.

Indicator Category	Example Indicator	Unit/Target
Energy Efficiency	Reduction in grid losses	% reduction
Pollution Prevention	Compliance with emission/discharge standards	% compliance
Pollution Prevention	Number of pollution incidents reported and addressed	#
Pollution Prevention	Levels of key pollutants (e.g., BOD, COD, heavy metals) in effluent	mg/L
Pollution Prevention	Concentration of particulate matter (PM2.5, PM10) at project sites	µg/m ³
Pollution Prevention	Reduction in greenhouse gas (GHG) emissions	tons CO ₂ equivalent/year
OHS	Lost time injury frequency rate	#/million man-hours
OHS	% of workers trained in OHS	%
OHS	Number of workplace accidents/incidents reported	#
Waste Management	Amount of solid and hazardous waste generated, treated, or recycled	tons/year
Waste Management	Percentage of project waste disposed of in compliance with regulations	#
Community Health and Safety	Number of community health and safety incidents (e.g., traffic accidents, exposure to hazardous materials)	#
Community Health and Safety	Number of community members reached through health and safety awareness campaigns	#
Community Engagement	Number of consultations held	#
Community Engagement	Percentage of project-affected people who feel adequately consulted	%
Grievance Redress	Number of project workers trained on the Code of Conduct, including sexual exploitation and abuse (SEA)/sexual harassment (SH) prevention measures	#
Grievance Redress	Number of project beneficiaries from vulnerable or disadvantaged groups	#

Grievance Redress	Number of grievances received and resolved through the Grievance Redress Mechanism (GRM)	#
Grievance Redress	% of grievances resolved within timeframe	%
Labor and Working Conditions	% of workers with signed contracts and access to grievance mechanisms	%
Labor and Working Conditions	% of unskilled labor sourced locally	%
Labor and Working Conditions	% of project activities accessible to women, indigenous peoples, or persons with disabilities	
Land Use	Number of people affected by land use	# (ideally zero)
Biodiversity	Area of natural habitat restored or protected (hectares)	Hectares
Biodiversity	Number of species (flora/fauna) monitored or protected	#

Annex 1- Environmental & Social Screening Checklist

The below is the checklist for 500kV Rahim Yar Khan Grid Station and the further checklists can be accessed through the link "[Checklist All Grid.pdf](#)."

ENVIRONMENT AND SOCIAL SCREENING CHECKLIST

500KV RAHIMYAR KHAN GS

A General Information		
1	Subproject Location	City: Zahir Pir District: Rahim Yar Khan Tehsil: Khanpur
2	Subproject Activities	Installation of Reactive power compensation devices within the existing boundaries of GSs
3	Proposed Date of Commencement of Work	Subject to the finalization of relevant documents and procedures.
4	Important geographic / topographic feature (if any)	30.100644116351667, 71.16562113768673
5	Important biological features (if any)	Not as the site is in the GS and is left empty (in no use for future expansion of GS)

B: ENVIRONMENTAL ISSUES

S r. N o	Issues	No/ Yes	Risk Level				Mitigation and Enhancement Measures
			Ne gli gi ble	M e di u m	High	C rit ic al	
1	Will the subproject involve significant land disturbance or site clearance?	Yes	✓				The subproject activities will encompass little site clearance. All tasks will be carried out within the current boundaries of the GS facility.
2	Will the subproject require the setting up of ancillary facilities?	Yes		✓			The establishment of ancillary facilities will be necessary, including waste management facilities, a labor camp (20-25 workers) with temporary washrooms, and a kitchen for the labor camp. Additionally, water, electrical, and sewerage systems will be connected to the existing utilities network. A CESMP will

S r. N o	Issues	No/ Yes	Risk Level				Mitigation and Enhancement Measures
			Ne gli gi ble	M e di um	High	C rit ical	
							be developed, and pertinent mitigation measures will be defined in it. An Environmental and Social Screening Report (ESSR) / Contractor's ESMP will be developed by the contractors, including mitigation plan outlining the relevant mitigation measures.
3	Will the subproject require a large amount of raw or construction materials, energy and/or water?	Yes	✓				Locally available construction materials (such as cement, gravel, sand, soil, steel, etc.), water, electricity, and fuel for generators will be required and stored in a designated area. Staff and contractors will be provided with the necessary instructions.
4	Will the subproject generate large amounts of residual waste, construction material waste?	Yes	✓				The subproject will produce packing material waste which will be managed and stored separately, and contractor will include this waste material handling plan in his CESMP.
5	Is the sub-project expected to result in soil erosion?	Yes	✓				The subproject will include excavation, land clearing, and leveling. These activities may not disturb the surrounding soil outside the site location. This impact will be short-term, occurring only during the construction phase.
6	Is the sub project expected to create borrow pits for construction material?	No					The contractor will be instructed not to create any borrow pits. Instead, the required filling material will be sourced as needed by local vendors.
7	Will the subproject result in potential soil or water contamination (e.g., from oil, grease and fuel from equipment yards)?	Yes		✓			The subproject may potentially contaminate soil and water due improper handling and storage of fuel. Transformer oil, Grease oil and improper disposal of waste generated at the construction site. However, these impacts will be managed by implementing the measures outlined in the overall ESMP as well as detailed in CESMP.
8	Will the subproject involve the storage, handling, or transport of hazardous substances?	Yes		✓			Hazardous substances such as fuel, paints, and similar materials will need to be stored temporarily. Efforts will be made to ensure proper storage away from the construction building, managed by the contractor.

S r. N o	Issues	No/ Yes	Risk Level				Mitigation and Enhancement Measures
			Ne gli gi ble	M e di um	High	C rit ic al	
9	Will the sub project disturb the ambient air quality and/or increase the level of harmful air emissions (due to generation of dust from construction activity, vehicular/ machinery exhaust emissions, etc.)	Yes		✓			The ambient air quality will be temporarily affected during construction activity and will be managed by sprinkling water.
10	Will the subproject increase ambient noise levels?	Yes	✓				During the construction phase, the subproject may involve the use of machinery that will increase ambient noise levels. Construction crew will use Personal Protection Equipment (PPEs) to reduce the impact. However, these impacts will be temporary and are not expected to pose a significant long-term risk.
11	Are there any protected areas on or around the locations which could be affected by the project?	No					There is no protected area located near the subproject site. The activities will be carried out within the allocated area (boundary wall).
12	Will there be any adverse impact on the flora due to project activities?	No					No flora will be disturbed.
13	Will there be any adverse impact on the fauna due to project activities?	No					No fauna will be disturbed.

C: Social Issues

S r. N o	Issues	No/ Yes	Risk Level				Remarks/Mitigation Measures
			Ne gli gi ble	Me diu m	High	C rit ic al	
1	Will there be any social conflicts arising from the interaction of laborers with locals, particularly by the induction of outside labor and establishment of construction camps (if any)?	Yes		✓			There is potential for social conflicts arising from interactions with labor. However, the contractor will be encouraged to hire local labor whenever feasible, and activities at the labor camp will be confined within the facility's boundary wall.
2	Will there be a risk of using Child and forced labor in subproject activities?	Yes		✓			There is a concern regarding the potential use of forced labor and child labor by the Contractor. However, strict measures will be implemented through contractual agreements and the overall ESMP to ensure that no child or forced labor is employed during project execution.
3	Will the subproject result in an increase in noise levels, vibrations, and a decline in ambient air quality due to the operation of construction machinery/vehicles? On the nearby community or sensitive receptors (mosque, temple, church, graveyard, hospital, school/college/university), if any?	Yes		✓			The ambient noise level and air quality may experience temporary disturbances due to airborne dust particles containing hazardous chemicals from healthcare waste in the soil. Additionally, machinery used during the construction phase may temporarily increase ambient noise levels. However, these impacts will be moderate and short-term and will be effectively managed by implementing the measures provided in the overall ESMP.
4	Risks related to Occupational Health and Safety (OHS) caused due to construction and rehabilitation activities, generation of waste (hazardous and non-hazardous), and spread of diseases such as	Yes		✓			There is a potential for occupational health and safety (OHS) risks such as electrical hazards, risk due to work at height, struck by accidents, slips, trips, falls, exposure to the extreme weather, handling of construction and hazardous waste etc. which will be short-term and addressed through the implementation of the overall ESMP, during construction and operation phases. However, the duration of these risks will be limited.

S r. N o	Issues	No/ Yes	Risk Level				Remarks/Mitigation Measures
			Ne gli gi bl e	Me diu m	High	C rit ic al	
	waterborne, vector-borne, communicable infections (HIV/STDs), COVID-19 pandemic during subproject implementation and operation.						
5	Risks related to community health and safety due to the transport, storage, and/or disposal of hazardous, nonhazardous, or dangerous materials (such as fuels and other chemicals, construction waste, and health care waste) and spread of diseases during construction, rehabilitation, and operation?	Yes		✓			Health and safety risks and potential hazards associated with construction materials may occur, but these will be mitigated through the implementation of the overall ESMP and strict supervision of the contractor's activities during the construction phase.
6	Risks of Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH), and Violence Against the Children (VAC) during subproject implementation & operation?	Yes		✓			There is a risk of Sexual Exploitation and Abuse (SEA), Sexual Harassment (SH), and Violence Against Children (VAC). Local labor will primarily be hired to mitigate these risks. The impacts will be managed by implementing specific measures outlined in the overall ESMP and Worker Code of Conduct.
7	Risk of increase in traffic and pedestrian safety due to the construction vehicle movement, particularly near sensitive receptors.	Yes		✓			There is a risk of traffic and pedestrian issues, but effective measures outlined in the overall ESMP will be implemented to minimize these as much as possible.

S r. N o	Issues	No/ Yes	Risk Level				Remarks/Mitigation Measures
			Ne gli gi bl e	Me diu m	High	C rit ic al	
8	Will there be land acquisition? If yes, is the site for land acquisition and ownership status and current usage of land to be acquired known?	No					
9	Will there be a loss of shelter and residential land due to the land acquisition or clearance of the existing site?	No					No displacement of residents or loss of shelter will occur since no land acquisition is required.
10	Are any informal settlers or flood-affected persons present on the subproject site where construction and rehabilitation activities will be carried out?	No					There are no informal settlers or individuals affected by flooding present at the subproject site.
11	Has there been any Anti-Encroachment Drive to forcefully evict/move people at the site where the works are planned to be carried out?	No					There are no plans for an anti-encroachment drive to forcibly evict or relocate people at the site.
12	Will there be a loss of agricultural land, crops, trees, and fixed assets due to land acquisition?	No					
13	Will people lose access to natural resources, communal facilities and services due to involuntary land use restrictions or access to legally	No					

S r. N o	Issues	No/ Yes	Risk Level				Remarks/Mitigation Measures
			Ne gli gi bl e	Me diu m	High	C rit ic al	
	designated parks / protected areas?						
14	Any estimate of the likely number of persons affected by the subproject? If yes, approximately how many? Are any of them falling into disadvantaged/vulnerable groups such as Female/child headed households, Internally Displaced Persons (IDPs), Refugees, Ethnic and religious minorities, Persons with disabilities, Transgender communities, Senior citizens, or economically marginalized groups)?	No					
15	Have there been any past security-related issues at the subproject site?	No					It is anticipated that there will be no security-related issues at the site. However, local authorities will be notified for assistance as needed.
16	Has stakeholder engagement taken place with relevant stakeholders (Provincial / District level Government Departments / Communities/NGOs/ CSOs) for the proposed subproject?	Yes		✓			Consultations with relevant stakeholders are ongoing and will continue throughout the execution phase. All stakeholders will be engaged to ensure their involvement in relevant overall ESMP measures.
17	Is the proposed subproject being implemented in an area with natural hazard risk? (e.g.,	No					

S r. N o	Issues	No/ Yes	Risk Level				Remarks/Mitigation Measures
			Ne gli gi ble	Me diu m	High	C rit ic al	
	floods, earthquakes, cyclones etc.).						
18	Will there be any impact on women that may hinder their mobility during construction activities?	Yes		✓			There will be minimal disruption to the mobility of women, as the subproject activities will be conducted within the existing boundaries of the facility. However, the relevant measures to manage this aspect shall be included in the overall ESMP and Worker Code of Conduct.
19	Will the proposed subproject potentially involve shifting of public utilities?	No					The utilities will be connected to the existing network, and no relocation of public utilities will be necessary.
20	Are any indigenous peoples (as per World Bank ESS7) present in the subproject area?	No					There are no native or indigenous people present in the subproject area.
21	Will the construction activities cause socio-cultural issues and damage any cultural heritage site?	No					During construction work there will be no damage to any heritage sites involved. However, "Chance Find Procedure" to be followed during project implementation in case of any chance find physical culture resource during excavation, and shall be made a part of overall ESMP.

Survey Performed By:

Name: Umair Bangash & Fawad Ahmed
Date: 03-05-2025

Designation: AM Social & Environment

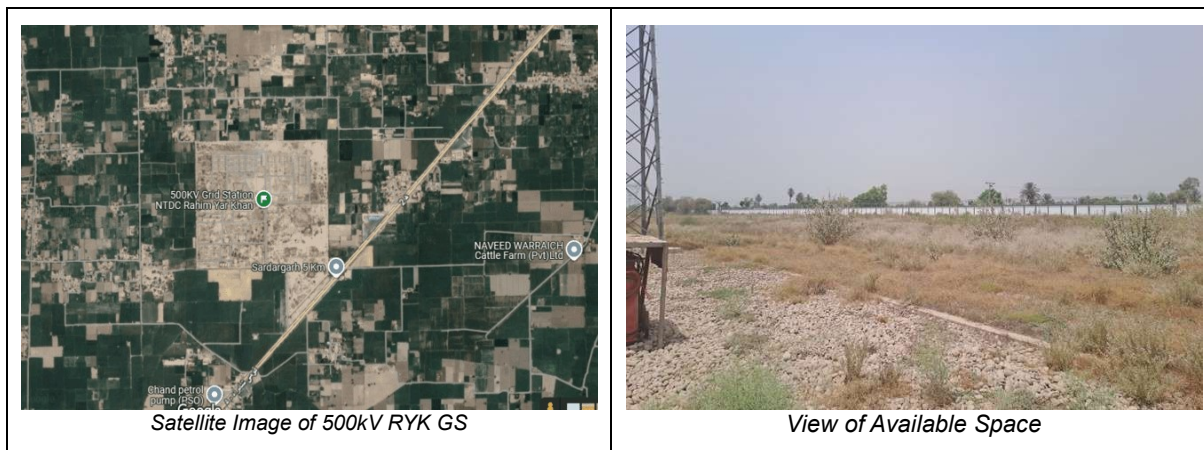
Fawad
Signature:



Annex-2: GS Surroundings & Premises

1. 500kV Rahim Yar Khan Grid station (District Rahim Yar Khan)

The grid station is strategically positioned along National Highway N-5, approximately 12 kilometers from Zahir Pir and 34 kilometers from Rahim Yar Khan city. It is accessible via the M-5 Motorway through the Zahir Pir Interchange, located to east of the grid station, followed by a 10-kilometer route westward along the National Highway N-5. The surrounding area is agricultural, with scattered rural population engaged in farming activities. The region lies within the Indus Basin alluvial plains, known for fertile soils and semi-arid climatic conditions. Key crops grown in the vicinity include wheat, cotton, sugarcane, and vegetables. Within the grid station boundary, there are residential quarters housing approximately 13 families, primarily belonging to staff working at the facility. The satellite image of GS is given in below figure while an overview picture of space available for STATCOM devices is presented.

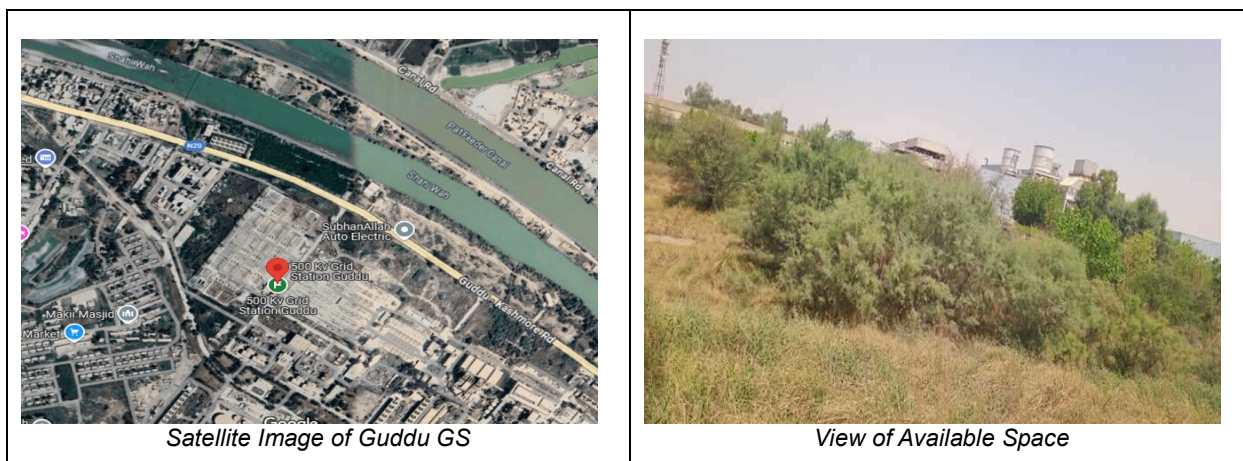


Satellite Image of 500kV RYK GS

View of Available Space

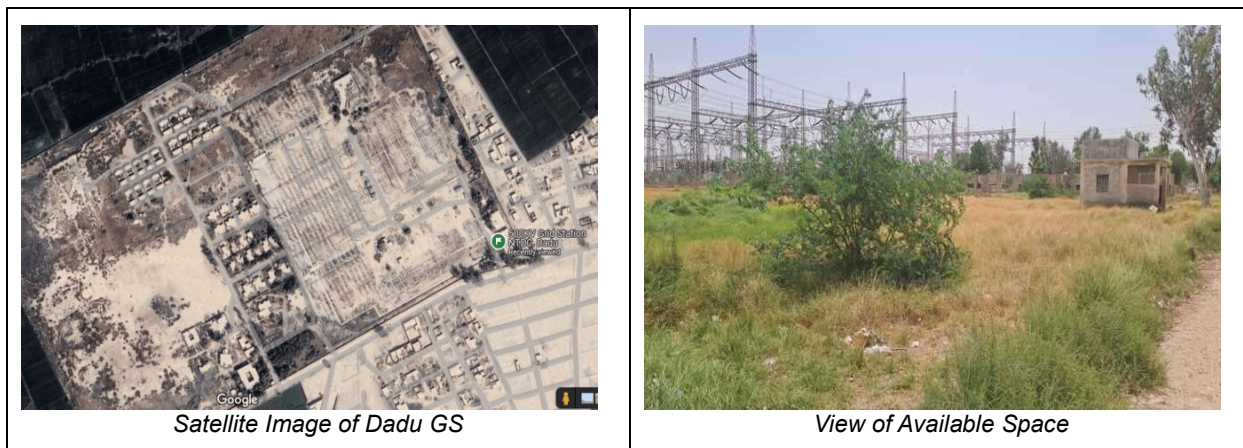
2. 500kV Guddu GS (District Kashmor)

The Guddu 500 kV Grid Station is located near the Thermal Power Station (TPS) Guddu, in District Kashmore of Sindh Province, near the border with Punjab. It is famous for this Power station and for the Guddu Barrage. Just adjacent to the grid station lies a designated residential colony, commonly referred to as the Grid Station Colony, which provides accommodation for operational and maintenance staff. This colony includes family quarters and basic amenities, ensuring 24/7 staffing and rapid response to operational needs. The surrounding landscape is semi-rural, characterized by agricultural lands, sparse rural settlements, and critical irrigation infrastructure. Two major irrigation canals pass near the grid station, and the Indus River flows nearby, adding to the area's hydrological importance. The satellite image of GS is given in above Figure while an overview picture of space available for STATCOM devices is presented.



3. 500kV Dadu GS (District Dadu)

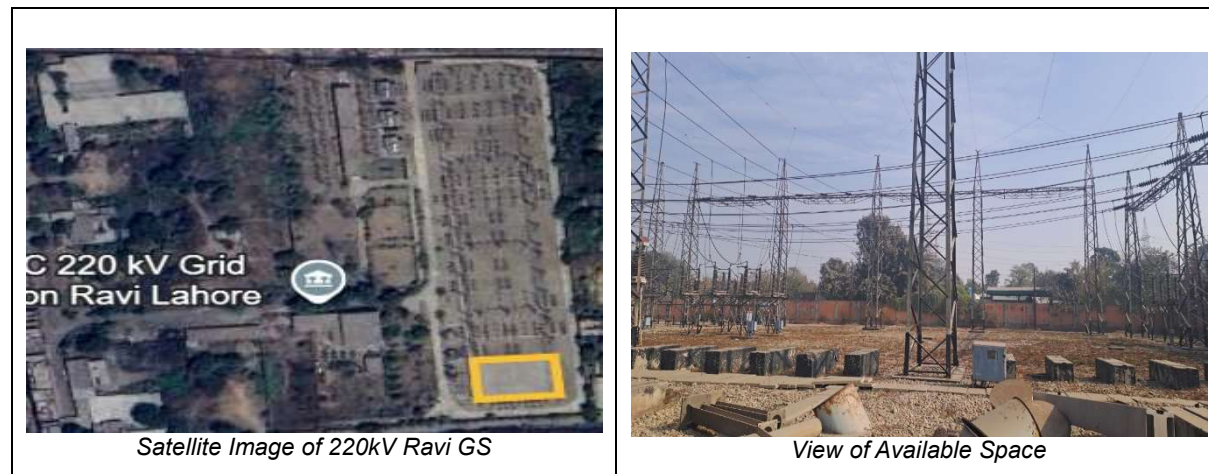
The Dadu Grid Station is located approximately 5 km northeast of Dadu city, Tehsil and District Dadu. It is in the Union Council Pipri and accessible via the Dadu Bypass Road National Highway (N-55) and local link roads. The facility includes an adjacent residential colony comprising 98 staff quarters and communal spaces, situated within a flat, arid landscape near agricultural zones and rural settlements. Surrounding areas include sparse residential colonies, small villages (Panwhar, Pipri etc.), which are more than 500m away from the GS and key infrastructure like the Indus Highway and power transmission lines. The satellite image of GS is given in figure while an overview picture of space available for STATCOM devices is presented.



4. 220 kV Ravi GS (District Lahore)

The grid station is located near the River Ravi, and accessible through Lahore Ring Road, approximately 8 km northwest of central Lahore. Administratively, it falls within Tehsil Shalimar, District Lahore. Total area of the GS is 6 Acre. The surrounding area represents an urban-peri-urban mix, characterized by agricultural fields, small industries. The nearest colony is NGC owned colony having 52 residential units. Access to the site is through a paved link road connected to Ravi Road and Lahore Ring Road, providing convenient connectivity to the city's main transport network. Considering the site's developed nature, controlled operational environment, and compatible surrounding land uses, the environmental and social sensitivity of the GS is assessed as low. A satellite image is

provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



5. 220 kV Ghazi Road GS (District Lahore)

The 220 kV Ghazi Road Grid Station is situated along Ghazi Road in Lahore, Punjab Province. The facility lies within a developed urban zone characterized by mixed land use, including residential colonies, commercial buildings, and institutional areas. The grid station premises are secured with a boundary wall, enclosing the switchyard and associated infrastructure to ensure operational safety and restricted access. The nearest residential buildings are located approximately 50 meters from the switchyard boundary, within adjacent housing colonies. The terrain around the site is flat, with paved internal and approach roads providing convenient access from the main city routes. Vegetation in the area is limited to roadside and ornamental plantings, with no significant natural or agricultural features present. A satellite image of the grid station and its surrounding area is provided below to illustrate the site setting and adjacent land uses.



Satellite Image of 220kV GS Ghazi Road

6. 220 kV Wapda Town GS (District Lahore)

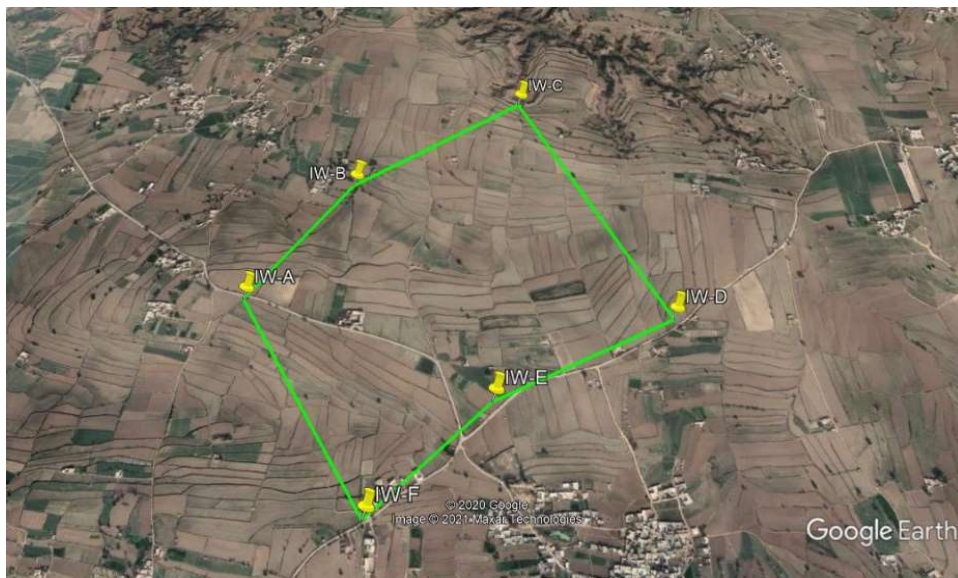
The 220 kV Wapda Town Grid Station is located within the urban-peri-urban area of Wapda Town, Lahore. The site is situated in a developed setting dominated by residential housing societies, small commercial establishments, and former agricultural land converted for urban use. A sewerage drain runs along the northern side of the substation premises. Nearby educational institutes and medical facilities are located at approx 0.2-2 km. The GS is connected via paved access roads to the city road network. No sensitive receptors and potential risks are known to exist nearby. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses. No site is available for the new proposed installation. A satellite image of the grid station and its surrounding area is provided below.



Satellite Image of 220kV GS Wapda Town

7. 765kV/500kV/220kV Islamabad West GS (District Attock)

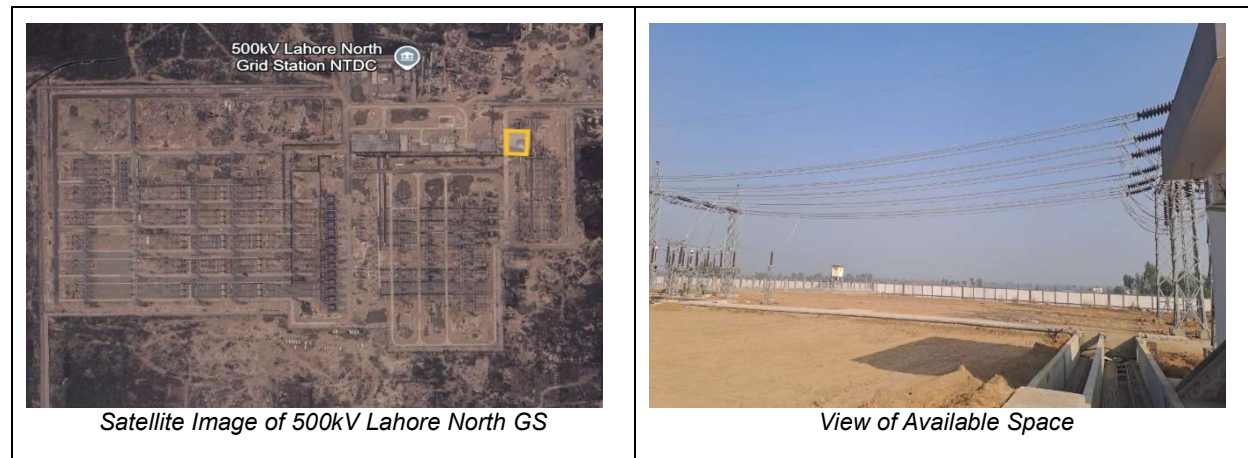
The proposed Islamabad West Grid Station, currently under construction under the World Bank-funded National Transmission Modernization Project (NTMP), is being developed within a designated utility area in the western zone of Islamabad. The site is characterized by generally flat terrain with limited natural vegetation and no proximity to environmentally sensitive or protected areas. Access to the premises is provided through existing road infrastructure, facilitating the movement of construction materials and equipment. Environmental and social impacts associated with construction activities—such as dust emissions, noise generation, soil disturbance, waste generation, and temporary traffic disruption—are being systematically monitored and managed through approved project-specific Environmental and Social Management Plans. Social impacts remain limited due to the site's distance from dense residential areas, with no involuntary resettlement involved. Ongoing monitoring, inspections, and reporting ensure compliance with national regulations and World Bank requirements, while the project is expected to deliver long-term positive benefits through enhanced grid reliability, improved power transmission capacity, and strengthened socio-economic development in Islamabad and surrounding regions. A satellite image of the grid station and its surrounding area is provided below.



Satellite View of IWGS

8. 500 kV Lahore North GS (District Sheikhupura)

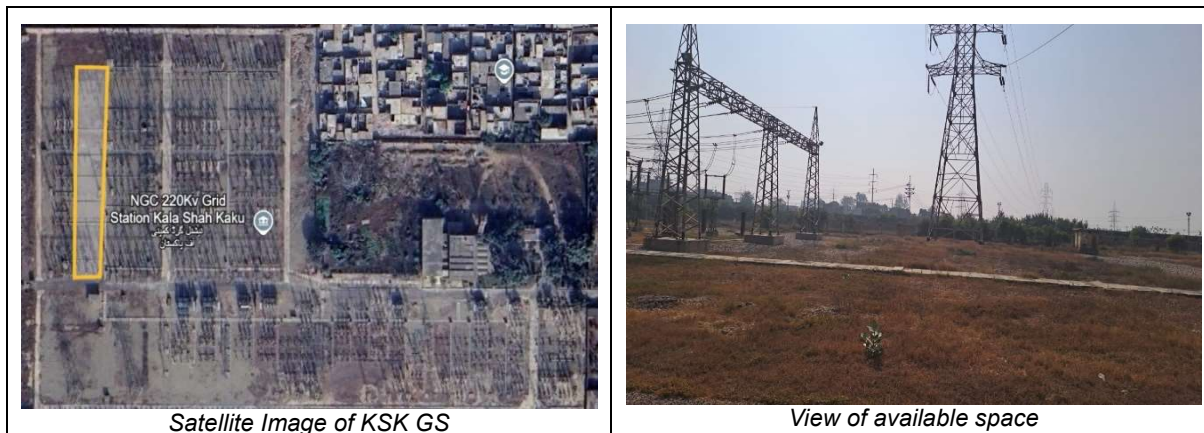
The 500 kV Lahore North Grid Station, recently energized under the Asian Development Bank (ADB)–funded project, is located in the northern zone of Lahore in Seekham on Sheikhupura-Muridke Road, Sheikhupura District. Surrounding land use includes a mix of open land, industrial activities, and low- to medium-density residential developments at an appropriate setback, minimizing direct interaction with nearby communities. Nearby villages include Sekham and Khairpur Malian. The grid is surrounded by agricultural land. Nearby school is around 1.7 km and health facility Sehat Medical Complex UOL 600 m away from site. Sapphire electric plant and asphalt plant at 5 km. No sensitive receptors are found near the site. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



9. 220 kV Kala Shah Kaku GS (District Sheikhupura)

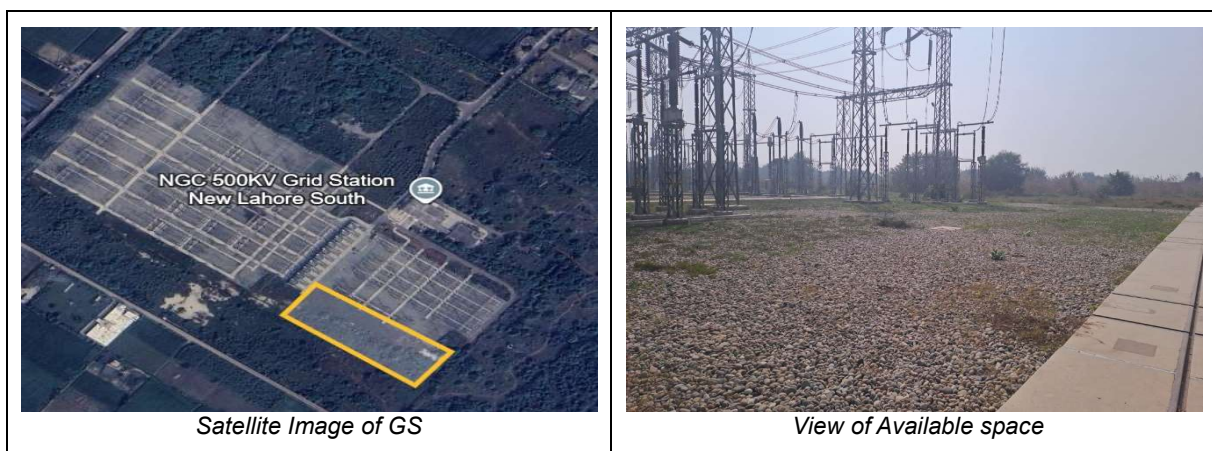
The 220 kV Kala Shah Kaku (KSK) GS is located in Kala Shah Kaku, Tehsil Ferozewala, Sheikhupura District, Punjab, and is accessible via the GT Road / KSK interchange. The

GS has an area of 32 Acre. The GS includes a residential colony 40 units. The surrounding land is mainly agricultural with semi-urban/industrial areas. The front faces GT Road and Manno Textile, the right side has Manno Colony,” and the left side borders Nazarabad and Ravi Rayan. Nearby villages and settlements lie within 30 m of the GS. The nearest school and dispensary are 6–7 km away. No sensitive receptors found at the site. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



10. 500 kV Lahore South GS (District Kasur)

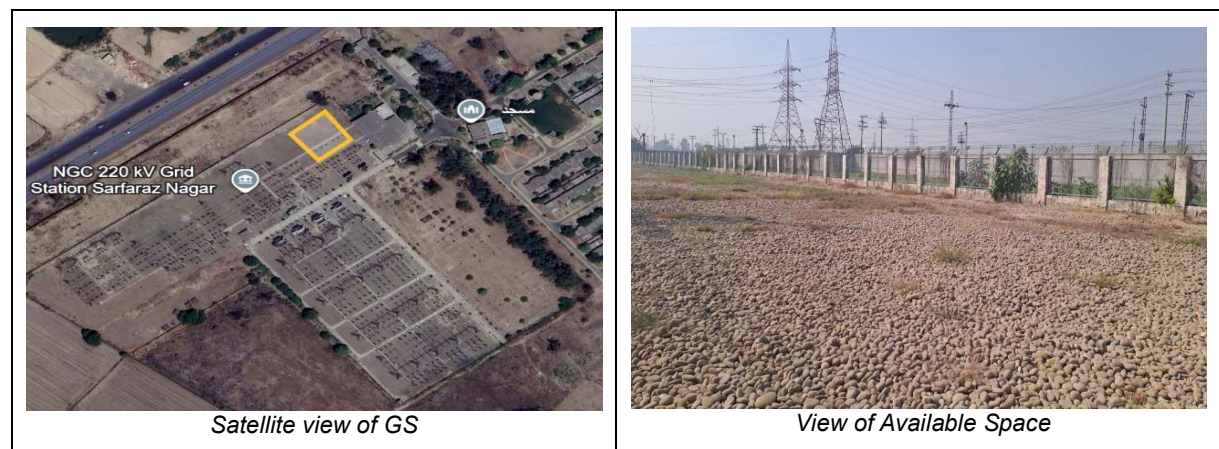
The 500 kV Lahore South Grid Station is located 2 km along Gagga Road near Phool Nagar, Tehsil Pattoki, District Kasur, Punjab. The semi-urban area features industrial and agricultural land, Gagga village and major industries nearby including Nishat Chunian and Millat Batteries approximately 2 km away. The grid is accessible via Multan Road and includes an adjacent, currently non-operational, residential colony of 38 quarters. A school lies 2-3 km while a dispensary and the DHQ Hospital are 5–7 km away from the site. No potential E&S risks are present at the site. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



11. 220kV Sarfaraz Nagar GS (District Kasur)

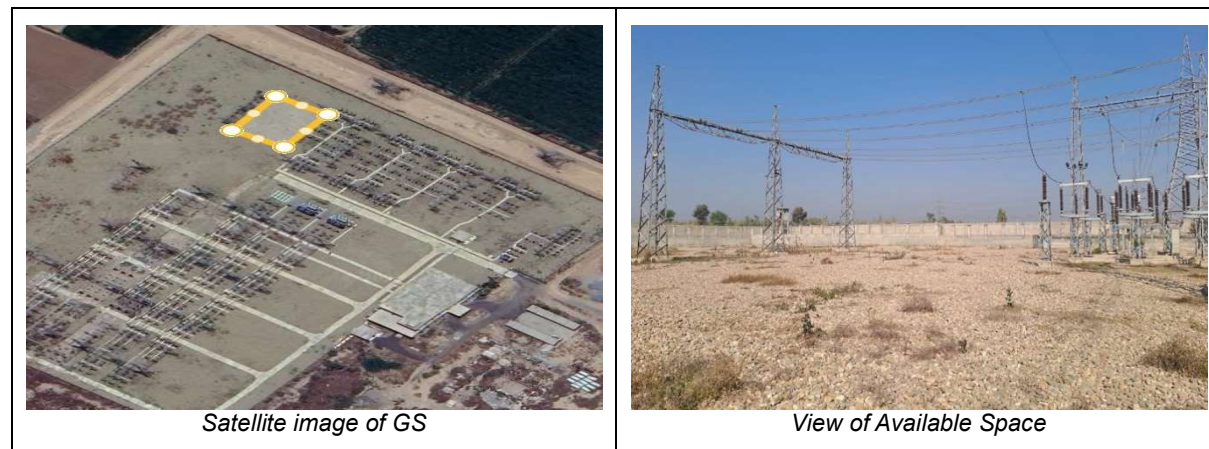
220 kV Sarfaraz Nagar GS is located on Multan Road. The GS lies within Tehsil Pattoki of Kasur District. The semi-urban area features industrial and agricultural land, with major

industries nearby including Nishat Chunian and Millat Batteries approximately 2 km away. The grid is accessible via Multan Road and includes an adjacent, currently non-operational, residential colony of 62 residential units. A school lies 2-3 km while a dispensary and the DHQ Hospital are 7–8 km away from the site. Sarfraz grid is located in same area where Lahore south GS is located. No potential E&S risks are present. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses. The total area of the grid station is 54 acre.



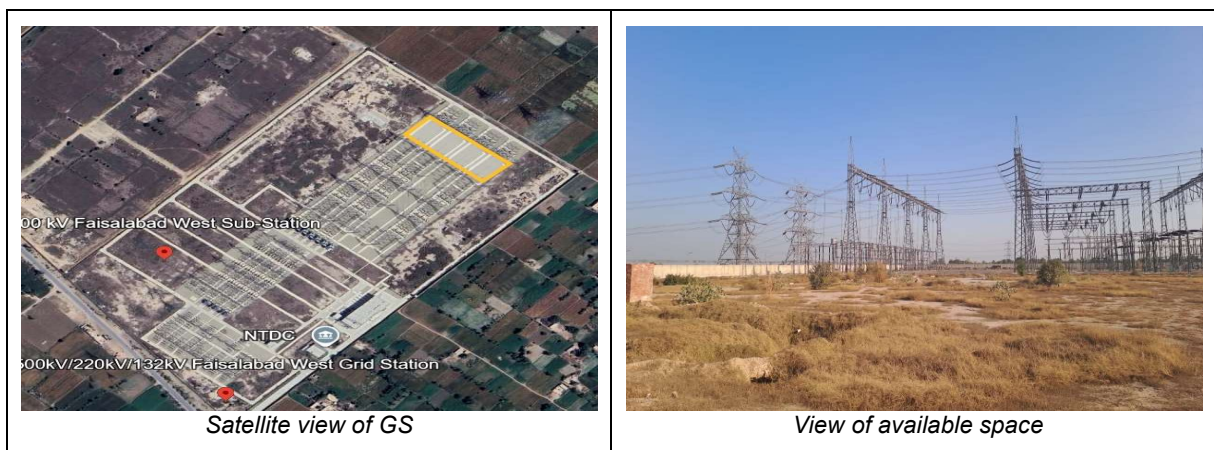
12. 220 kV Lalian GS (District Chiniot)

The Lalian GS is located on the Faisalabad-Sargodha Road in Tehsil Lalian, District Chiniot, Punjab. The site is about 16 km northwest of Chiniot City and approximately 5 km east of Lalian town. Surrounding land use is predominantly rural, characterized by **extensive agricultural land** with small settlements and cultivated areas. The nearest school is located in Lalian town approx. 5km and medical facility is THQ hospital Lalian. However, no Environmental & Social risks are present at the site. The area of the GS is about 46 acre. The grid was energized in 2022 and the residential colony and security watch towers are still under construction. Approximately 40-50 workers are working within the grid station and are camped there. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



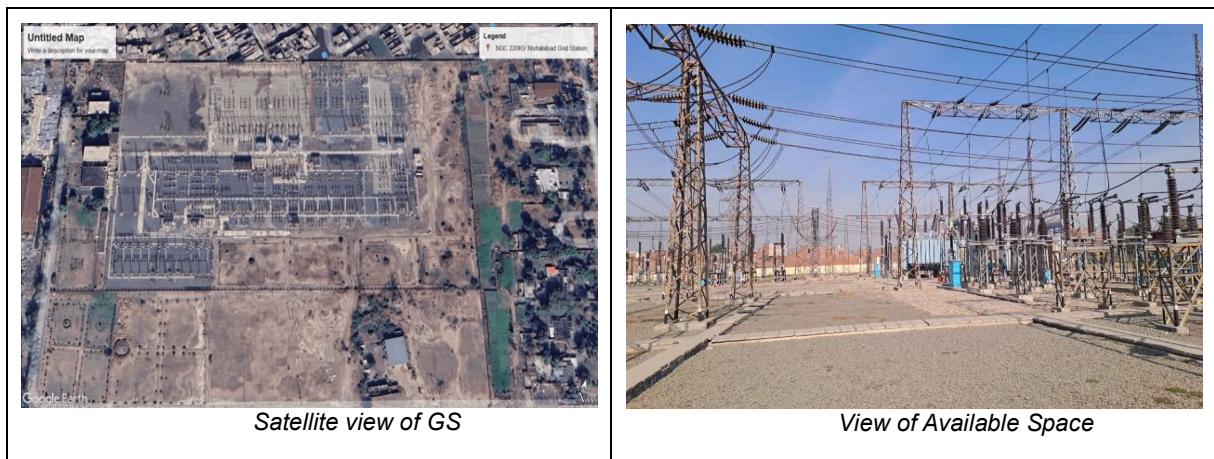
13. 500 kV Faisalabad West Grid Station (District Chiniot)

It is located in the district of Chiniot, Punjab Province, Pakistan, occupying approximately 90 acres of land as part of the infrastructure expansion. It is sited in a largely flat terrain with a surrounding land-use mix predominantly comprising industrial transmission infrastructure and agricultural fields, thereby serving as a major node in the regional high-voltage network. Access to the facility is provided via paved roads linking to major industrial corridors and Faisalabad's urban-industrial zone, supporting ease of logistics and maintenance. The immediate environs are characterized by minimal residential development within the station's immediate fenced area, and no significant natural habitats or forestry cover are noted in the immediate perimeter. The grid was energized in 2022 and the residential colony is still under construction. Approximately 10-20 workers are working within the grid station and are camped there. A satellite image of the grid station and its surroundings is provided below to illustrate the site setting and adjacent land-use pattern.



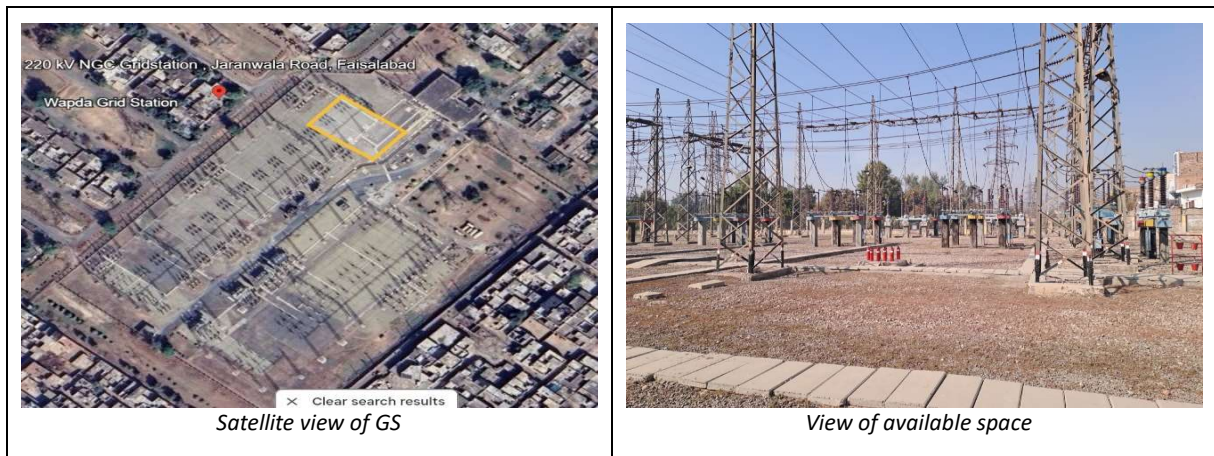
14. 220 kV Nishatabad GS (District Faisalabad)

The Nishatabad Grid Station, located on Lahore – Sheikhpura-Faisalabad Road in the industrial urban area of Faisalabad, approximately 5km from Faisalabad city centre. Administratively, it falls within Tehsil Faisalabad City. The surrounding area is characterised by heavy industrial use, manufacturing units, historic textile mills, and dense residential zones. Access to the site is provided via major connecting roads within Faisalabad city. The residential colony of the GS has 60 residential units accommodating over 300 people. Essential services (schools, dispensaries, and hospitals) are available in the broader Nishatabad–Faisalabad urban area within a few kilometres. No environmental & social receptors found near the project site. The total area of the GS is 76 Acre. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



15. 220 kV Jaranwala GS (District Faisalabad)

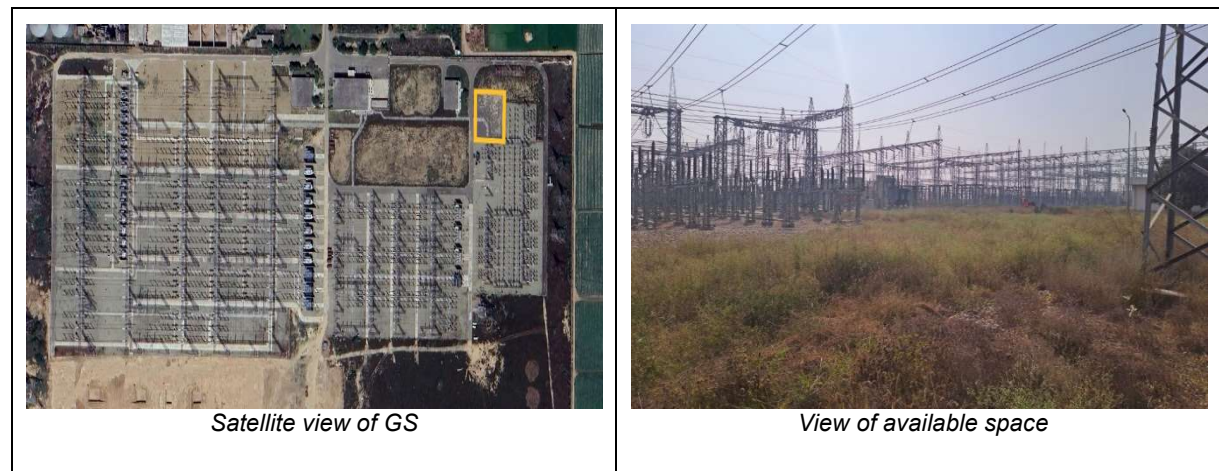
The 220 kV Jaranwala Grid Station is located on the outskirts of Jaranwala City, approximately 35–40 kilometers southeast of Faisalabad, in Faisalabad District, Punjab Province. The site lies within a semi-urban setting characterized by a mix of agricultural lands, institutional facilities, and scattered residential areas. A residential colony for grid station employees consisting of 63 units, including a mosque and basic community facilities, is located adjacent to the switchyard, at a distance of less than 50 meters from the boundary wall. Beyond the colony, the surrounding landscape consists mainly of flat, cultivated land typical of the central Punjab plains, with seasonal cropping patterns and limited tree cover. The grid station is accessible through paved approach roads connected to the Jaranwala–Faisalabad route, ensuring good vehicular access. The area of the grid station is 27 Acre. A satellite image of the grid station and its surroundings is provided below to illustrate the site location and adjacent land-use pattern.



16. 500 kV Nokhar GS (District Gujranwala)

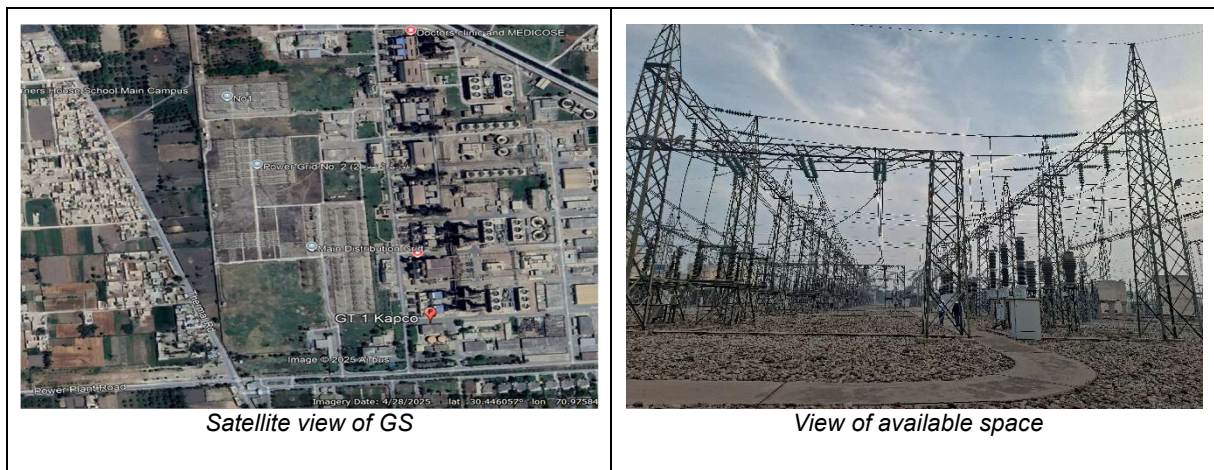
The Nokhar Grid Station is located on the Gujranwala-Hafizabad Road, approximately 28 km south-west of Gujranwala city. Administratively, it falls within Tehsil Nowshera Virkan. The surrounding area is rural-agricultural in nature, comprising fertile plains intersected by small villages, farming lands, and small to medium sized industrial units. Nearby settlements include the town of Nokhar (Union Council Nokhar),

Kot Ladha. GS is facing Hafizabad road on North side while other two sides have Elahi and Noor rice mills. The colony of GS is approximately 200 meters away from switchyard and consists of 50 houses. Educational institutes, Rescue 1122 center, Rural health center lies within approx 3-4 km of GS. No sensitive receptors or potential risks nearby. However, nearby rice mills contribute to air pollution, generating dust and particulate matter that can pose health risks to the surrounding community. While the station itself does not currently pose direct environmental or social risks. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



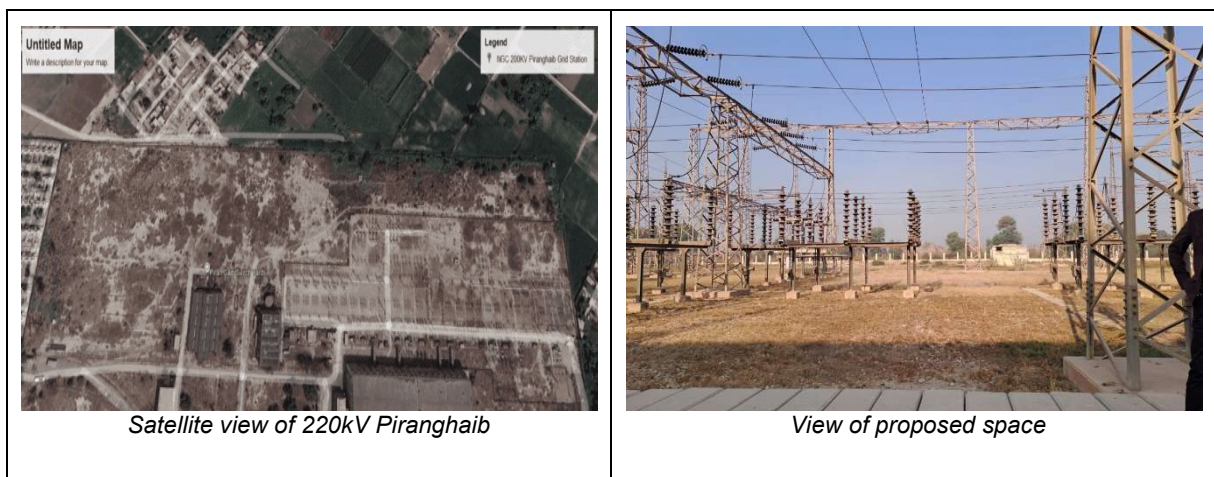
17. KAPCO GS (District Kot Addu)

It is located adjacent to the Kot Addu Power Company (KAPCO) thermal power plant in Kot Addu, Punjab Province. The site is situated within a large industrial complex dedicated to electricity generation, with extensive infrastructure, including power generation units, auxiliary facilities, and heavy machinery. The grid station premises are secured by a boundary wall to ensure operational safety and restricted access. A large residential colony for power plant and grid station employees, including community amenities such as a mosque, schools, and recreational areas, is situated more than 100 meters from the switchyard boundary. The surrounding landscape is predominantly flat, comprising industrial facilities, open land, and irrigation canals characteristic of central Punjab. The area is well-connected via paved roads to Kot Addu city and the nearby Indus Highway, facilitating operational logistics and accessibility. Overall, the surroundings reflect a highly managed industrial environment with significant employee settlement and minimal natural vegetation. A satellite image of the grid station and its surroundings is provided below to illustrate the site location, the power plant, and adjacent land uses.



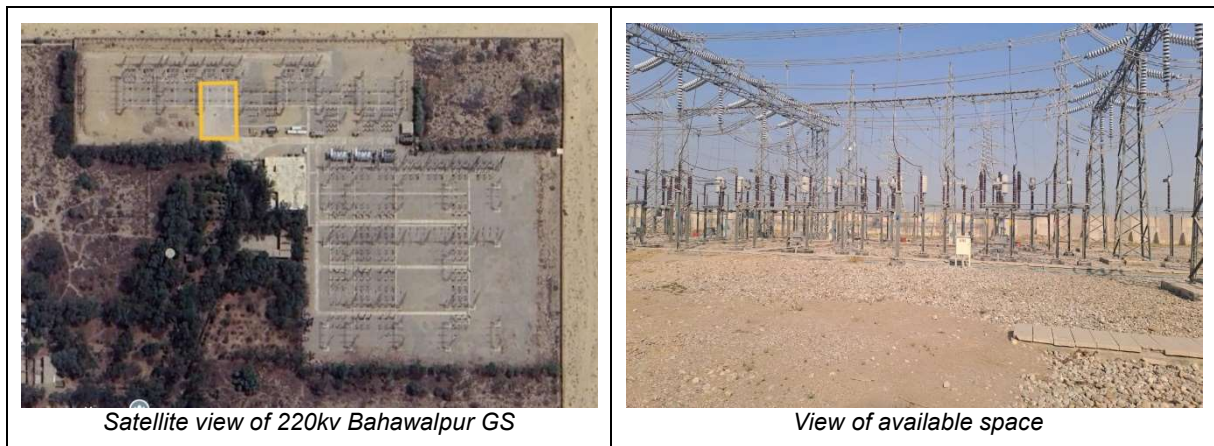
18. 220 kV Piranghaib GS (District Multan)

The proposed grid station is located along Multan–Vehari Road within Tehsil and District Multan, in a semi-urban area characterized by a mix of agricultural land and small-scale industrial activities. The site is co-located with the existing NGPS, which is currently in the dismantling phase, within an established power utility corridor. The grid premises are easily accessible from the main Multan–Vehari Road through existing approach roads and include fenced switchyard areas, internal access routes, and an adjacent operational residential colony comprising approximately 35–40 housing units for NTDC staff. Educational facilities and a Basic Health Unit are available within 2–3 km of the site, while major hospitals, colleges, and other urban services are located in Multan city at a distance of about 10–12 km. As part of the project, a new control building is proposed for the NGC grid within the existing premises, without any additional land acquisition or resettlement. At present, adequate space is not available within the site for the current enhancement works beyond the proposed facilities; however, provision for future expansion has been considered and additional space is planned to be incorporated at a later stage. A satellite image is provided below.



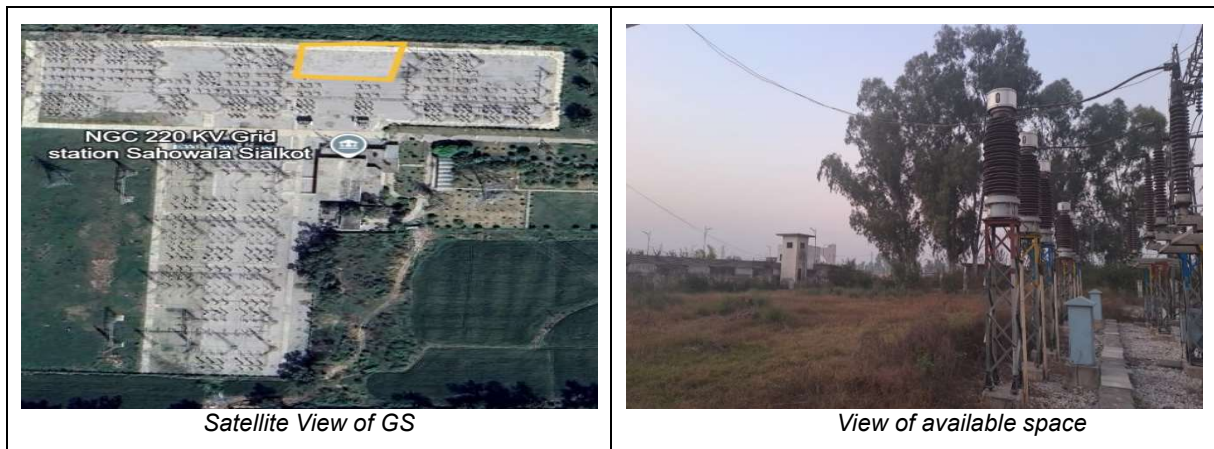
19. 220 kV Bahawalpur GS (District Bahawalpur)

The 220kV Bahawalpur GS is located on the eastern periphery of Bahawalpur city. Administratively, it falls within **Bahawalpur Saddar Tehsil**, District Bahawalpur, Punjab. The grid station is surrounded predominantly by **open agricultural land**, scattered houses, and patches of barren terrain typical of the outskirts of Bahawalpur. There are **no dense settlements immediately adjoining the boundary**. The site is accessible via the Bahawalpur–Lal Sohanra corridor, connected through local paved roads that link to the main Bahawalpur road network. Nearby boys school is at approx. 300m. One RHC is located in Bahawalpur saddar tehsil. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



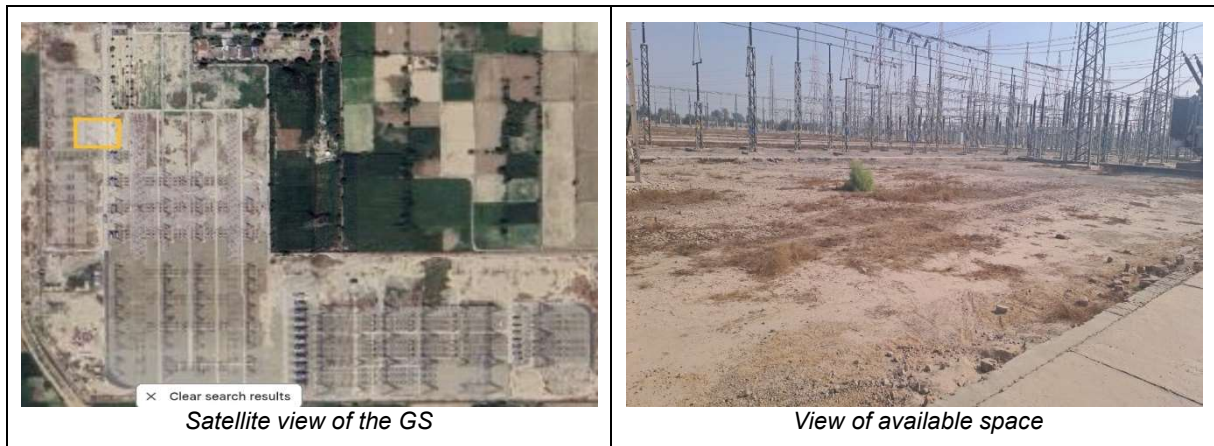
20. 220 kV Sahowala GS (District Sialkot)

The 220 kV Sahowala GS is located near Sahowala village along the Sialkot–Sambrial Road, within Tehsil Sambrial of District Sialkot. The GS lies in a semi-urban industrial zone, with surrounding land characterized by a mix of agricultural fields and industrial units such as Forward sports. The residential colony has 13 housing units. The nearest school is approx. 2-3km, while larger healthcare and educational facilities are available in Sambrial and Sialkot cities, about 10–20 km away. However, no sensitive E&S receptors are present at project site. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



21. 500 kV Yousafwala GS (District Sahiwal)

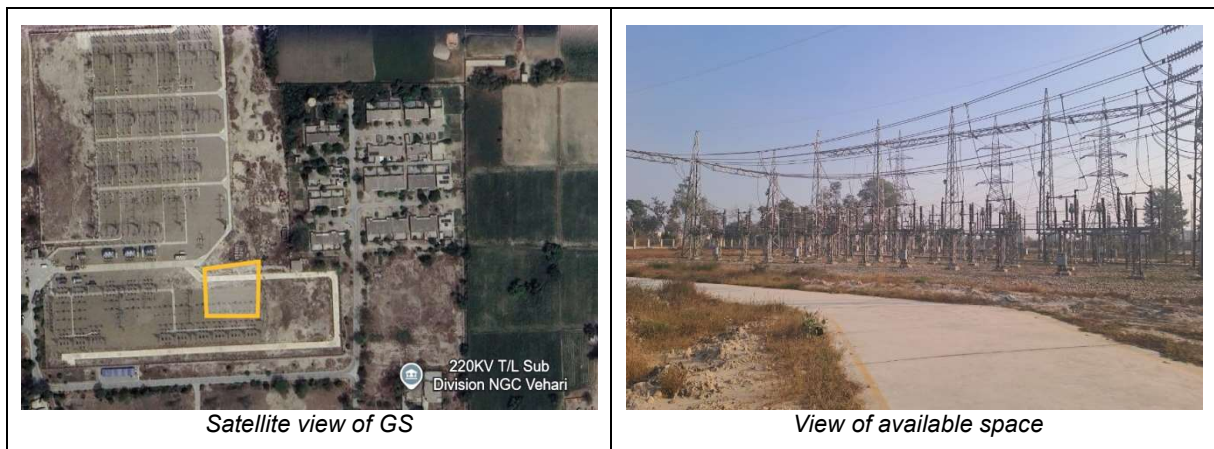
It is situated in the Sahiwal District of Punjab, Pakistan. The site is located in a mixed land-use context characterized by flat agricultural terrain, with transmission line corridors and power infrastructure dominating the immediate surroundings. Notably, the facility is also closely linked to the nearby Sahiwal Coal-Fired Power Plant, which is connected to this grid station via a 500 kV circuit. Within the grid station's boundary, the switchyard and high-voltage equipment are secured, and close to the site there is an employee colony accommodating around 250 people in 90 units. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



22. 220 kV Vehari GS (District Vehari)

This grid station is located in the district Vehari and is around 5km from the main city. The grid is predominantly on agricultural land and is surrounded by agricultural land from all sides. The name of the village is Chak 13 WB on the Khanewal Road. There is canal named Pak Pattan canal running 30 m away from the North boundary of the GS. Grid has occupied a space of approximately 48 acres. The residential colony of the grid has 40 quarters. The nearest medical and education facilities are present in the main city which is 5km away.

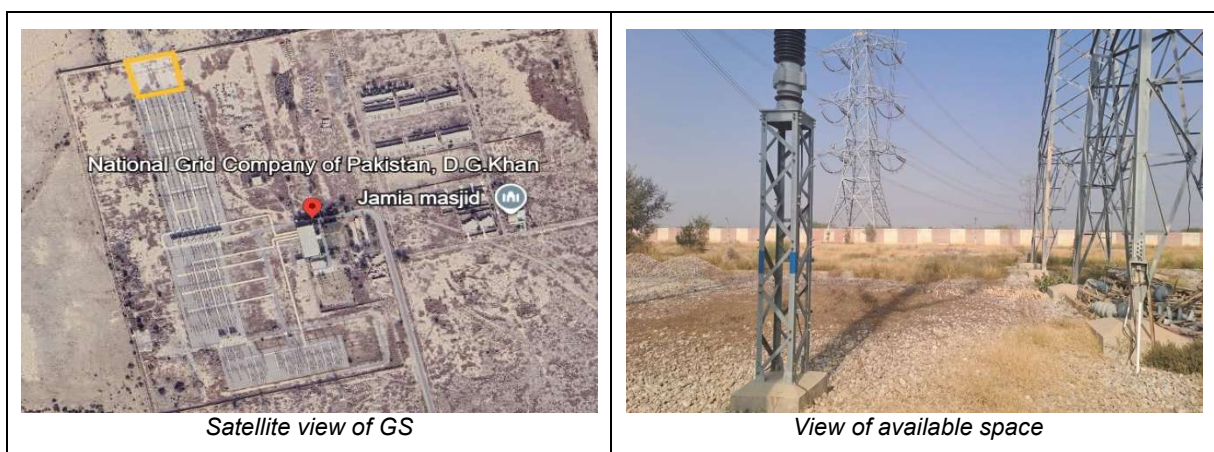
A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



23. 500 kV Dera Ghazi Khan GS (District DG Khan)

It is in the vicinity of Dera Ghazi Khan in southern Punjab, forming a major node in the national high-voltage transmission network. The grid is about 22 km away from the main city. The station sits within a predominantly flat terrain, composed of open land and agricultural fields characteristic of the region, and is accessed via paved road infrastructure connecting to regional arterial routes. The switchyard and associated high-voltage equipment are enclosed within a secured boundary wall to restrict access and ensure operational safety. The nearest settlement is the residential colony for the grid staff which has around 40 residential units accommodating 40 -50 people. The basic facilities like medical and education are available in the main city. The area of the grid station is 143 acres. No social and environmental sensitive receptors are present near the grid station.

A satellite image of the grid station and its surroundings is provided below to illustrate the site location and adjacent land-use pattern.



24. 500 KV Shikarpur New GS (District Shikarpur)

The grid is located in the rural area about 1km away from the Town Lodra. On west side, there is a small residential area named Jatoli Colony adjacent to the boundary wall of grid. On the eastern side, there is a small settlement named Jaffri village approximately 30 m away. There are agriculture fields on the other sides. No sensitive receptors or potential risks nearby. A satellite image is provided below to aid visualization of the facility location, the employee colony, the switchyard fencing, and adjacent land uses.



Satellite Image of 220kV Shikarpur GS

25. 220 kV Mirpur Khas GS (District Mirpur Khas)

It is located in the Sindh Province of Pakistan, serving the load-centres of Mirpur Khas, Sultanabad, Kandhari, Sanghar and surrounding areas under the jurisdiction of Hyderabad Electric Supply Company (HESCO). The surrounding landscape is predominantly flat agricultural plains, with nearby irrigated fields and low-density rural settlements. Access roads link the site to the regional transmission corridors and local road network, facilitating logistics and operations. Immediately adjacent land uses do not show dense residential clusters, although rural habitations are present in the wider vicinity. A satellite image of the grid station and its surroundings is provided below to illustrate the site layout and adjacent land-use pattern.



Satellite Image of 220kV GS Mirpur Khas

26. 500 kV Rawat GS (District Rawalpindi)

The 500 kV Rawat Grid Station is located near Rawat in the Islamabad/Rawalpindi region of Punjab Province, Pakistan. The site is situated in a generally flat to gently undulating terrain, with a mix of semi-urban development, transmission infrastructure corridors, and open land in its immediate surroundings. The grid station premises are enclosed within a secured boundary wall, with access provided via paved roads connecting to the Grand Trunk (GT) Road, one of Pakistan's major arterial highways, which facilitates efficient logistics, material transport, and operational connectivity. Several residential societies and housing developments are present in the broader Rawat / Rawalpindi area, including nearby planned communities along the GT Road corridor, although the immediate vicinity of the switchyard is primarily occupied by transmission equipment and ancillary infrastructure. A satellite image of the grid station and its surroundings is provided below to illustrate the facility location, layout, and adjacent land-use pattern.



Satellite Image of 500kV GS Rawat

27. 220 kV Dera Murad Jamali GS (District Nasirabad)

The 220 kV Dera Murad Jamali Grid Station is located in the Nasirabad Division of Balochistan Province, Pakistan. The facility is enclosed by a secured boundary wall and houses high-voltage switchgear and transformer bays. The surrounding terrain is predominantly flat, comprising agricultural fields and scattered low-density rural settlements. The station is accessible via the Quetta–Jacobabad Highway, a major regional transportation corridor that facilitates the movement of personnel, materials, and equipment to and from the site. Residential and commercial structures are limited in the immediate vicinity of the switchyard, with the nearest settlements located beyond the agricultural lands. The area reflects a largely rural and infrastructure-oriented setting, with minimal urban development nearby. A satellite image of the grid station and its surroundings is provided below to illustrate the site location, layout, and adjacent land-use pattern.



Satellite Image of 220kV GS Dera Murad Jamali

28. 220 kV Zhob GS (District Zhob)

The 220 kV Zhob Grid Station is located in the southern part of Balochistan Province, Pakistan. The station is coupled with the newly constructed 220 kV transmission line from Dera Ismail Khan (DI Khan) to Zhob, spanning approximately 220 km. The substation scope includes two 220 kV transformer bays (220/132 kV) with 2×160 MVA transformers, two 220 kV line bays and six 132 kV line bays along with associated equipment. The surrounding terrain is predominantly flat to gently undulating, typical of the western Balochistan plains, with extensive open land and sparse low-density rural settlements. Land use around the station is largely agriculture or grazing land, and transmission line corridors dominate the immediate environment. Access to the station is provided via regional road networks linking to the DI Khan–Zhob corridor. Residential development is minimal in the immediate vicinity of the switchyard; the nearest local settlements lie at a moderate distance beyond the fenced station boundary. Overall, the setting is infrastructure-oriented in a rural-semi-remote context, with limited natural habitat complexity or major urban development. A satellite image of the grid station and its surroundings is provided below to illustrate the site location, layout and adjacent land-use pattern.



Satellite Image of 220kV GS Zhob

29. 220 kV Loralai GS (District Loralai)

It is in the district of Loralai, Balochistan Province, Pakistan. The facility is enclosed by a boundary wall and houses two 220/132 kV autotransformers with associated line bays and switchgear. The site is situated on or adjacent to the alluvial riverbed of the Loralai River, in predominantly flat and arid terrain with sparse vegetation. The surrounding area is largely infrastructure-oriented, comprising transmission corridors and open land, while residential development is limited and dispersed. Access to the station is provided via local roads connecting to regional highways, facilitating operational logistics. The riverbed setting necessitates attention to storm-water management, erosion control, and seasonal flood considerations. A satellite image of the grid station and its surroundings is provided below to illustrate the facility location, layout, and adjacent land-use pattern.



Satellite Image of 220kV GS Loralai

Annex 3: Photolog of Consultations



Consultation at 500kV Guddu GS



Consultation at 500kV Guddu GS



Consultation at 500kV Dadu GS



Consultation at 500kV Dadu GS



Consultation at 500kV Rahim Yar Khan GS



220kV Sahowala GS



Consultation at 220kV Sarfaraz Nagar GS



Consultation at 500kV Lahore South GS



Consultation at 220kV Kala Shah Kaku GS



Consultation at 500kV Nokhar GS



Consultation at 500kV Nokhar GS



Consultation at 500 kV Yousafwala GS



Consultation at 500 kV Yousafwala GS



Consultation at 220 kV Piranghaib GS



Consultation at 220kV Piranghaib GS



Consultation at 220kV Bahawalpur GS



Consultation at 220kV Bahawalpur GS



Consultation at 220kV Vehari GS



Consultation at 500 kV DG Khan GS



Consultation at 220 kV Lalian GS



Consultation at 500 kV FSD west GS



Consultation at 220 kV Nishtabad GS



Consultation at 220 kV Nishatabad GS



Consultation at 220kV Jaranwala Road GS



Consultation at 220kV Ravi Road GS



Consultation at 220kV KAPCO GS

Annex 4: Grievance Registration Form

Complainant Information (Person Reporting)

Name: _____

Address: _____

National ID: _____

Gender: ☐ Male ☐ Female

Telephone: _____

Email: _____

Type of complainant:

☐ Affected person/s ☐ Civil organization

☐ Service organization ☐ Others (specify) _____

Registration Number (assigned): _____

Complaint Details

Mode of receiving the grievance:

☐ Letter, Fax, Email ☐ Phone call ☐ Verbal complaint (walk-in)

☐ Suggestion box ☐ Others (specify) _____

Location of the problem/issue specified in the complaint:

District: _____; Village: _____

Address: _____

Type of problem/grievance:

☐ Land acquisition ☐ Compensation

☐ Construction ☐ Others (Specify) _____

Short description of the problem:

Short description of the factors causing the problem

Past action/s taken by the complainant (if any):

Details of the focal point that received the complaint:

Name: _____

Position: _____

Name of the receiving office: _____

Date: _____

Actions taken by the Receiving Office

Action 1	Action 2	Action 3	Action 4
Short Description	Short Description	Short Description	Short Description
Name of Action Officer	Name of Action Officer	Name of Action Officer	Name of Action Officer
Office	Office	Office	Office
Date	Date	Date	Date

Final Resolution

Name of the person completing the form: _____

Signature: _____ Date: _____

1. Name Of The Complainant/S:
2. National identification number:
3. Address:
4. Date of the inquiry:
5. Time:
6. Whether complainant participated or not:
7. Grievance or issue (in summary):
8. Statement made by the complainant/s:
9. GRC recommendation:
10. Participants in the GRC:
11. Copies to:

Annex 5: Chance Find Procedure

Definitions

Physical cultural resources are the sites, areas, objects, or artefacts that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural, religious or spiritual significance to a commune, religious group, ethnic group and / or the wider public or nation. They include movable or immovable objects, sites, structures, groups of structures, and natural features and landscapes, for example Sacred landmarks, Sacred burial sites or human remains, Pilgrimage sites or routes, Fossils, Rock drawings, ancient structures, Places of worship etc.

Chance Find Procedures

If any person working on the project discovers a physical cultural resource (site or item) the following procedures should be followed:

- Stop the activities in the area of the chance find;
- Delineate the discovered site or area (e.g. fencing);
- Secure the site to prevent any further disturbance, damage or loss. In cases of removable antiquities or sensitive remains, arrange for guards or wardens to watch the site until the responsible local authorities take over;
- Prohibit the collection of objective by the workforce or outsiders;
- Notify the closest local cultural management agency and the local authority within 24 hours;
- Alert all project personnel of the find and the temporary protection measures;
- Any objects that are found must be handed over to the local cultural management agency or Archaeological Department
- Keep records of all chance finds and actions taken.

The local cultural management authority has the responsibility for studying and evaluating cultural heritage sites / areas and documenting the requirements for protection and preservation. This will require an evaluation of the findings to be performed by archaeologists.

Management measures could include changes to the project layout (such as when finding an irremovable remain of cultural or archaeological importance), or conservation, preservation, restoration and / or salvage of the site or item.

The decision concerning the management of the findings will be communicated in writing by the local cultural management agency.

Project work can resume only after written instruction is provided from the responsible local cultural management agency. Everyone must comply with the conditions of the written instruction.

The project developer / owner is responsible for cooperating with the local cultural management agency and local authorities to monitor all works to ensure that the protection measures are adequate and the cultural heritage sites are protected.

Annex 6: Security Management Plan

Introduction

This security management plan is being developed for the Project Entitled “Boosting Energy Security Through Transmission in Pakistan (BEST-PAK), Multiphase Programmatic Approach (MPA) Program Phase 1 - Grid Stability Enhancement” which is being implemented in 5 GSs of National Grid Company. It includes Standard Operating Procedures to provides guidelines, regulations, standards, options, and hierarchical structure, as well as Policies, Procedures and Protocols (PPP's) for maintaining security of the assets, data, human resources, and boundaries of the currently implemented project. It has been developed after detailed consultation with all the specialists of this project including PMU team, NGC field teams and local communities. It is important to mention that this document only provides as a guidance resource and field-based security plans will be devised for the field team in accordance with the local context. This Security Management Plan covers phase 1 of the project activities.

SMP encompasses the systematic implementation of policies, procedures, and technologies to safeguard an organization's assets, information, and operations from potential threats and risks. It involves the strategic planning, coordination, and oversight of security measures to ensure the confidentiality, integrity, and availability of critical resources. Security management includes risk assessment, threat analysis, and the development of countermeasures to mitigate vulnerabilities. This multifaceted discipline also involves the establishment of access controls, monitoring systems, incident response protocols, and ongoing training to enhance the organization's resilience against evolving security challenges. Effectively managing security requires a comprehensive and adaptive approach, staying abreast of emerging threats and continually refining strategies to address the dynamic nature of the security landscape.

Objective of the SMP

SMP provides and maintain a safe physical environment and manage staff activities to reduce the risk of personal injury and property loss during the implementation of the BEST-PAK MPA Program Phase 1 Project.

Security Approach

The Project Director will ensure that security procedures and criteria are fully designed and updated, and the means are fully available to ensure security for project operations.

The security plan describes how security is organized to face identified threats and how security is continuously reassessed and reorganized in correlation with security situations and operations being undertaken.

The Project Director will leverage in using the existing national and local security infrastructure to access and share conflict related information and encouraging local police leaders to specifically address conflict risks in community engagement activities in timely manner.

STANDARDS and GOOD INTERNATIONAL PRACTICE

This security management plan is anchored on World Bank Environmental and Social Standard 4 (ESS4) that covers Community Health and Safety on sub section (b) Personnel Security in line with the World Bank Good Practice Note on Assessing and Managing Risks and Impacts of the Use of Security and the Guidelines for Implementation of the UN Basic Principles on the Use of Force and Firearms by law Enforcement Officials.

The standard role of the public security will be to maintain the rule of law, including safeguarding human rights and deterring act that threaten the project personnel and facilities. The public security forces to be deployed shall be competent, appropriate, and proportional to the threat. The security force shall abide by the World Bank Good Practice Note on

Assessing and Managing Risks and Impacts of the Use of Security to comply with the commitments on human rights bolstered by its compliance with:

- World Bank Good Practice Note on Assessing and Managing Risks and Impacts of the Use of Security Personnel, 2018,
- Voluntary Principles on Security and Human Rights Toolkit Version 3, 2008,
- Guidelines for Implementation of the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials, 2016, and
- The Universal Declaration of Human Rights, 1948.

SECURITY MANAGEMENT

Security Management for the project lies under the oversight and responsibility of the Project Director at provincial level and will work closely with the Ministry of Interior/home and local administration in the deployment of the security officers to the project. The command and communication structure of the Police Service will be adopted. The management of security for the project will comply with the four basic pillars of security management:

- DETECT an adversary.
- DETER an adversary if possible.
- DELAY the adversary until appropriate authorities can intervene.
- RESPOND to the adversary's actions.

OVERVIEW OF THE SECURITY SITUATION

Different security risks exist in the project area and may impact on the project. The main security risks within the project area include:

- Criminal offences;
- Terrorism;
- Inter-tribal or communal violence which could pose a threat to project personnel;
- Reaction of community to an incident or accident involving project personnel or asset;
- Threat of armed attack;
- Theft/ Larceny;
- Kidnapping; and
- SEAH/GBV.

Security Risk Assessment (SRA):

The project will adopt a systematic and careful examination of the workplace, work activity, working environment and those people who may be at any security risk. Risk assessments shall identify what might go wrong and how, with an evaluation of any security hazards undertaken, this will determine the control measures needed to prevent or minimize the potential security risks.

The SRAs will be commissioned by the PMU and contractors deployed to the GS sites. The SRA findings will be used to develop site specific SMPs and feed into the method statements. The contractors shall submit their SMPs as part of site specific CESMPs and SRAs findings will be incorporated into work method statements and submitted to PMU for review and approval.

An impact and likelihood risk matrix has been adopted to determine the security risk level.



Below table shows the three security risk levels (Low, Medium, and High) and how they are determined based on likelihood and consequences/sensitivity. Likelihood and consequence values range from 1 to 4 as follows; very low=1, low=2, medium=3, or high=4. Security risk level is determined by multiplying the consequence and likelihood values for each identified risk.

Security Risk Level Determination Matrix

Risk Level		Consequence			
		C1	C2	C3	C4
Likelihood	L1	1 Low	2 Low	3 Low	4 Medium
	L2	2 Low	4 Medium	6 Medium	8 Medium
	L3	3 Low	6 Medium	9 High	12 High
	L4	4 Medium	8 Medium	12 High	16 High



Security Risk Level Findings, Mitigation and Contingent Actions

Risk description	Risk Category			Responsibility	Mitigation	Contingent action	Useful resources
	L	C	R				
Criminal offences Theft/Larceny	L2	C1	L	PMU, Contractor	Use of physical security personnel e.g., unarmed guards, etc. Staff crime security awareness Permanently etching on equipment (spray paint and initials on a piece of equipment does not qualify as being “positively” identified) Installation CCTV and Alarm Systems: either standalone or integrated combined with wireless communication to an off-site Establish formal and consistent reporting and communications mechanisms with public security forces and other stakeholders Adequate lighting Perimeter fencing especially material storage areas.	Escalate to the Local Police Undertake joint risk assessment process including representatives of public security forces in use Maintain close contact with representatives of public security forces at different levels	VPSHR toolkit https://www.miga.org/sites/default/files/archive/Documents/VPSHR_Toolkit_v3.pdf
Terrorism	L4	C4	H	PMU, Contractor	Enhance inter/intra agency cooperation within the project area. Meet on regular basis with the security apparatus at the sub-county and county level. Assess the security situation and make changes to the security management plan. Ensure travelling project staff have police escort. Engage with local communities as key contributors in local security and management, Implement Community Policing programs, Implement information exchange programs and mechanisms.	Conduct effective risk analysis assessments, and SWOT analyses and Force-Field Analyses related to gaps and needs assessments.	VPSHR toolkit https://www.miga.org/sites/default/files/archive/Documents/VPSHR_Toolkit_v3.pdf
Armed attack/ Kidnapping	L3	C4	H	PMU, Contractor	Use of physical security personnel Conduct project staff crime security awareness. Permanently etching on equipment (spray paint and initials on a piece of equipment does not qualify as being “positively” identified)	Never fight back when apprehended with armed people. Listen carefully to instructions and do as you are told (if instructions are difficult to hear, ask politely but firmly for them to be repeated),	VPSHR toolkit https://www.miga.org/sites/default/files/archive/Documents/VPSHR_Toolkit_v3.pdf



Risk description	Risk Category			Responsibility	Mitigation	Contingent action	Useful resources
	L	C	R				
					Installation CCTV and alarm systems: either standalone or integrated combined with wireless communication to an off-site Establish formal and consistent reporting and communications mechanisms with public security forces and other stakeholders. Adequate lighting Perimeter fencing especially materials storage areas	Inform the victim's family timely manner. Do not make any sudden movements that might startle the criminals or be interpreted as an attempt to resist or escape. Do not hesitate if told to move and do so in a controlled manner. Do not try to argue or make provocative comments. Do not stare or make eye contact with the criminals.	
Labor Riots	L1	C4	M	PMU, Contractor	Adhere to all provisions in the Project Labour Management Procedure (LMP) Understand the nature of the dispute the stated reasons, the underlying reasons. Ensure all wages are paid to labours as per contracts and national laws. Ensure that all worker wellbeing standards are being implemented.	Use the alternative dispute resolution: Conciliation, mediation and or arbitration, Identify the legal strategy to be pursued and associated consequences.	NGC's LMP
Community Hostility	L1	C1	L	PMU, Contractor	Adhere to all provisions in the Project Stakeholder Engagement Plan (SEP)	Set some ground rules within the community groups, and Revisit the group's purpose.	NGC's SEP
SEA/GBV, and incident response	L1	C4	M	PMU, Contractor	Adhere to all provisions in the Project Grievance Redress Mechanism (GRM) Abide by the requirements of SEA/GBV Action Plan for the project being prepared	Continuous SEA/GBV awareness creation the hired firm.	NGC's GRM NGC's SEA/GBV Action Plan

In counties with low-risk security threat, the Project could consider using private unarmed security personnel. Due diligence involving background checks can be undertaken to ensure that only those from reputable security firms are engaged. The unarmed security personnel can undertake basic security duties such as access control and perimeter security management; and if deemed necessary, the police may be engaged on a reactive basis. This approach will alleviate undue pressure on local policing resources and reduce the risks of engaging armed officers. An appropriate, formal agreement will be developed to support service delivery and mitigate the identified security risks and respond to any stakeholder concerns.

NB: Care will be taken to ensure that security response or presence of security forces will not result in additional risks to communities or individuals within the project implementation areas.

ALERT STATES

The PMU will adopt the BEST-PAK project area alert status in evoking the security state response levels, triggers and actions specific to the project site. Table A, B, C and D with the color shades of Green, Yellow, Orange and Red respectively are the security level responses to be adhered to. Local and regional events (triggers) will be linked to the alert states; the local security situation will be monitored daily and all available information assessed to ensure early identification of increases in risk, which may require a change in alert state.

A. Security Response Level: Green- Business as Usual- Security Risks Effectively Controlled

Security Response Level GREEN	
Business as Usual- Security Risks Effectively Controlled	
Event Indicator	Recommended Action(s)
No direct threat exists, and no incidents have taken place to warrant heightened security measures: Under this level the status remains at GREEN. • Site operations are running normally with employees going about their lives with no, or very limited, restrictions. • There are no restrictions on vehicle movement or crew changes. • Occasional unrest or demonstrations away from operational sites. No direct threat to the operation • Effective government control and/or rule of law in place. Liaison remains regular and effective. • Continued goodwill of the majority of the local community remains assured.	No restriction on normal movement compliant with local police advisory requirements. Staff and vehicles may move around the area within the protective envelope of the project area security. • Complete all pre-planning actions. • Train staff and ensure awareness of actions to be taken- site drills. • All crisis management and evacuation plans are in place and are maintained as 'living documents'. • The security situation, crime levels, political and social events are monitored closely. On-going collection and assessment of information through liaison with authorities and local community, • Ensure daily Personnel on Board (POB) is maintained. • All stakeholders are aware of the contents of the evacuation plan and understand their role within it • Vehicle Escorts taken when traveling to areas where civil unrest has occurred. • Maintain close liaison and good Community Relations.

B. Security Response Level: Yellow- Enhanced Security Measures Required

Security Response Level Yellow	
Enhanced Security Measures Required	
Event Indicator	Recommended Action(s)
Increased level of disturbance and/or increased probability of impact to operations. Sporadic civil disorder events. A direct threat has been detected to one or more areas of the operation, but it is not considered imminent. - Area-wide protests and/or - Increase in inter-tribal violence adjacent to project area of operations or camp locations. - Vehicle movement is disrupted. - Increased difficulty in accessing mission critical items or functions due to local security situation. - Significant police or paramilitary deployment required to maintain rule of law; localized curfews in place. - Heavy handed response from police and security service - Erosion of the support and goodwill of local communities - Difficulties in maintaining good relations with local authorities and traditional leaders.	Project operations continue. Enhanced security controls and operational restrictions required: - Necessary communications equipment available and all systems checked. - Ensure site specific security plans are available and have been revised and practiced. - Ensure all security, crisis and evacuation plan representatives' understand their roles and responsibilities. - Brief local security forces on roles and responsibilities - Maintain regular communication with all stakeholders, including authorities, local community, other sites and activities. - If situation likely to continue, re-assess stocks of resources at operational sites and ability to re-supply (food / water / fuel / people). - Assess requirements to increase physical security controls, access, perimeter protection, and road escorts. - Issue "Business Essential" travel advisory (If not already done). - All employees are briefed / updated on the security situation and controls- revise the evacuation plan. - Consideration given to recommending changes to the daily routine to include: - identification of any out of bounds areas; - local travel restrictions; - Review which business critical and sensitive documents need to be protected and how.

C. Security Response Level: Orange-Increased Security Measures

Security Response Level Orange	
Implementation of Increased Security Controls and Preparation for Lock Down and/or Site Evacuation	
Event Indicator	Recommended Actions
Significant obstacle or direct threat has been detected to operations and is deemed imminent, or a security incident has taken place close to one of the project sites: - Widespread civil unrest, not contained by police or paramilitary forces. - Frequent acts of violence close to project operations. - NGC specifically threatened and/or targeted. - Reinforcement of police by military forces to enforce martial law and impose curfews in key areas. - Substantial political or inter-tribal violence - Government ordered curfew in place. - Law and order become fragile, shortages of food / water / supplies / power / communication outages. - Failure to observe security restrictions regarded as life-threatening. - Loss of support and goodwill of majority of local community, - Liaison with authorities and traditional leaders breaks down	Project operations are suspended. Significant increase in security controls and operational restrictions. All movement outside camps ceases. - All external movement ceases. - Twice daily call schedule with Client Security Manager - Ensure sites including material and equipment are secured – security protection in place. - Consider further increase in security controls including; further reinforcement of security guarding (police support). - Briefings to local security forces on roles and responsibilities- liaison with local commanders increased. - Consider resupply requirements for all locations and caretaker maintenance and security of unmanned locations. - Instigate evacuation drills and brief all staff on actions. - Prepare vehicles for possible road moves and ensure thorough rehearsals have been conducted for any moves under escort.

D. Security Response Level: Red-Cease Operations, Lock down & Evacuation

Security Response Level RED	
Cease Operations and Lock Down or Evacuate Site	
Event Indicator	Recommended Actions
The operation has experienced a direct attack or there is credible evidence of an imminent attack. • Direct threats against project operations • Major civil disorder in areas of operation • Lines of supply untenable (road closures / security risks) • Total collapse of law and order • No or limited local security forces protection. • Security force reaction may damage reputation. • Major difficulties in accessing basic necessities. • Frequent power and communications disruption.	Suspension of operations and/or activation of total lock down or evacuation plan: • Confirm operational plan and nomination of key points of contact during evacuation. • Implement evacuation plan. • Ensure adequate caretaker security in place if full operations are suspended. • Ensure all critical or sensitive documents have been collected and are ready for destruction or removal. • Detailed briefing of all remaining personnel on situation and emergency response plans. • Provide ongoing communications, guidance and assistance to local and security staff remaining in the project area

ALERT STATE STATUS BOARDS

Alert State boards are to be displayed at the camp and indicate the current security alert state and associated restrictions to movement in the project area.

SITE SECURITY LAYERS

All project facilities will undergo the following security layers/protocols.

- i. Physical security (guards).
- ii. Access control system.
- iii. Intelligence Network.
- iv. Security induction.
- v. Awareness.
- vi. Trainings.

These different security layers together reduce the risk of having one system being bypassed. They are implemented by the Security commanders.

Physical Security

This will comprise of fences, gates, guard posts, surveillance / electronic cameras which will be staffed by trained personnel who will document and record daily incidents at the various points and provide reports to their superiors for appropriate action.

Security operating Procedures

This shall entail the key security operating procedures which will comprise of:

- **Boundary security:** Security will maintain control of the project's perimeter by deploying personnel at strategic points along the boundaries of the project facilities and also channel people to access-control points that will have security personnel (both armed and unarmed);
- **Access Control Policy and Procedures:** Access to project sites by project personnel and visitors will be through formal, documented access control procedures to facilitate the implementation of access control policy and associated access controls. Project personnel will be issued with badges and will at all times carry and display these badges when in the field. The badges will enable the bearer to access project facilities upon site security enquiry. Visitor badges will be issued to all visitors who are not employees of the project.
- **Luggage search:** A search for personal luggage will be performed by the guards at the access control point to ensure no access of all the prohibited items into the project facilities.
- **Vehicle Access Control Procedures:** All Vehicles accessing project facilities will be accessed through with the driver only after going through a security check/search for prohibited items. The driver must declare his entire luggage at the main gate (Personal luggage) for checking as well.
- **Decision tree model:** the project security shall adopt a structured approach using the collaborative approach for all the armed security operatives in prioritizing the collection of relevant data during incident response. The structured tree model approach help to define how questions are answered, allowing the incident response team to respond consistently with predictable results. The structured approach also provides for definable, reproducible structures to be created facilitating controlled cost exposure during an incident response cycle.
- **Information and Communication:** The project will detail procedures for categorizing, handling, and controlling sensitive information.
- **Code of conduct:** Every police officer shall be subject to Force standing orders and to the provisions of the Code of Regulations for the time being in force.
- **Firearms Security:** The project will adhere to the relevant legislation regarding firearms storage on-site, as well as the responsibilities and procedures for issuing and storing any security firearms, ammunition, and non-lethal weapons. This shall include location for storage; how weapons are properly secured during storage; records for issuance; who they may be issued to; safeguarding while in possession of the personnel; and audits.

- **Special Situations:** There may be instances where large-scale events (e.g., criminal activity, demonstrations, civil disorder) require interventions by public security which is not specifically associated with the project. When planning for such events or emergencies, there shall be clarity on how project security passes control over to formal public security (for example, police, military, emergency responders in conjunction with the project established decision tree).

SECURITY SUPERVISION AND CONTROL

The project will have a clearly defined management structure and responsibility, including overall lines of control, accountability, and supervision for the security effort. In making such arrangements, the project will be guided by the principles of proportionality and GIIP, and by applicable law, in relation to hiring, rules of conduct, training, equipping, and monitoring of such security workers. The project will seek to ensure that government security personnel deployed to provide security services act in a manner consistent with paragraph 24 of ESS 4, and encourage the relevant authorities to proactively engage with local communities on security issues and address any concerns, subject to overriding security concerns.

The Project coordinator will (i) make reasonable inquiries to verify that the direct or contracted workers retained to provide security are not implicated in past abuses; (ii) train them adequately (or determine that they are properly trained) in international human rights standards or minimal use of force techniques (less use of firearms), and appropriate conduct toward workers (in line with the Labor Management Plan) and affected communities (in line with ESMP); and (iii) require them to act within the applicable law and any requirements set out in the ESCP.

All incidents including thefts, attempted, attempted break-ins must be reported to the center manager and the local police authorities, who will initiate an investigation to determine sequence of events, what may have contributed to the incident, probable cause(s) and contributing factors), and recommendations, corrective actions, and mitigation measures (based on investigative findings) – an incident report will be issued to the Project Coordinator with details of the above actions.

Site specific project requirements such as stakeholder engagement, security arrangements disclosure, incident response, and grievance management would be formally agreed with the appropriate authorities in line with the Project Stakeholder engagement Plans and Grievance Redress Mechanism.

The security responsibilities, authorities and communication process shall follow Government directives and legal provisions from project management through the project staff when communicating instructions and reporting security breaches.

All project personnel are required to be aware of the need for constant vigilance, care, and compliance with security procedures, as well as the necessity to report any incident or suspicion to the OCS.

Security personnel / the police will be deployed to provide security to all project sites and facilities. Their roles and responsibilities are detailed below;

- To Implement the Standard Operating Procedures properly without fear or

discrimination.

- To ensure respect for the access control procedures and make sure that they are applied to all project personnel.
- Perform interior Patrols days and nights to ensure there are no intruders within the project facilities.
- Check the border status on a regular basis using back tracking security method.
- To report any security incident to the guard posts or security commanders.
- Maintain constant communication with the control room on hourly basis while on duty.
- Report to the control room in case of any technical issues.
- Ensure a proper behavior at all time while applying the SOP; avoid exchanging of words with the project staff.

The relevant parties shall further examine the security risk assessment process. This may result in a project level Memorandum of Understanding (MOU) with state security institutions or private security companies, setting out a framework for cooperation and setting standards and expectations. Key clauses for drafting MOU have been adopted from international literature and customized to suit the project including:

- Building trust among relevant stakeholders, especially the Local Government, NGOs, civil society, and community members to prepare the ground for a meaningful MoU,
- Adherence to the provisions contained in the VPs (Voluntary Principles on Security and Human Rights) and the UN Code of Conduct for Law Enforcement Officials and the UN Basic Principles on the Use of Force and Firearms by Law Enforcement Officials,
- Institute a vetting procedure to ensure that no one is allegedly implicated in past human rights and law abuses (i.e., there is a conviction, pending case or very strong evidence) provide security to the company.
- Institute a training program, for public security forces assigned to the project operations,
- Develop an acceptable protocol for equipment transfers in a manner aligned with the VPs;
- An agreed system of information-sharing around security issues, with due regard for necessary Confidentiality.

Other softer measures to be included in the MOU include the camp access protocols, grievance mechanisms, engagement commitments that can, without concern for confidentiality, be made publicly available in order to build trust and or promote cooperation.

JOURNEY MANAGEMENT

Each site manager has the overarching responsibility for project-wide journey management. A journey management log is to be maintained at the control room whereupon vehicle movements are logged and monitored. This will be shared with the National PMU safeguards team by email.

Project staff will be required to complete a Journey Management Plan form, which has to be authorized by the site / station manager.

Security Grievance Redress Mechanism

To extent possible, the SMP shall adopt the Project Grievance Redress Mechanism in managing the security related grievances. Key areas of emphasis will be on the following steps:

- Step 1: Publicizing Grievance Management Procedures,
- Step 2: Receiving and Keeping Track of Grievances,
- Step 3: Reviewing and Investigating Grievances,
- Step 4: Developing Resolution Options and Preparing a Response,
- Step 5: Monitoring, Reporting, and Evaluating a Grievance Mechanism, and
- Step 6: Dedication of adequate resources both human and capital.

Basic Principles on the Use of Force and Firearms by Law Enforcement Officials

The project will adopt the basic principles from the guidelines for implementation of the UN basic principles on the use of force and firearms by law enforcement officials. The principles include:

1. IP and appointed law enforcement agency shall adopt and implement rules and regulations on the use of force and firearms against persons by law enforcement officials.
2. IP and the law enforcement agency shall develop a range of means as broad as possible and equip law enforcement officials with various types of weapons and ammunition that would allow for a differentiated use of force and firearms.
3. The use and deployment of non-lethal incapacitating weapons shall be carefully evaluated in order to minimize the risk of endangering uninvolved persons,
4. Law enforcement officials, in carrying out their duty, shall, as far as possible, apply non-violent means before resorting to the use of force and firearms. They may use force and firearms only if other means remain ineffective or without any promise of achieving the intended result,
5. Whenever the lawful use of force and firearms is unavoidable, law enforcement officials shall:
 - a) Exercise restraint in such use and act in proportion to the seriousness of the

- offence and the legitimate objective to be achieved;
- b) Minimize damage and injury, and respect and preserve human life;
 - c) Ensure that assistance and medical aid are rendered to any injured or affected persons at the earliest possible moment;
 - d) Ensure that relatives or close friends of the injured or affected person are notified at the earliest possible moment.
6. Where injury or death is caused by the use of force and firearms by law enforcement officials, they shall report the incident promptly to their superiors. A detailed report shall be sent promptly to the PMU for responsible administrative review and judicial control, and also to the World Bank,
 7. IP shall ensure that arbitrary or abusive use of force and firearms by law enforcement officials is punished as a criminal offence in line with relevant National and provincial laws,
 8. Exceptional circumstances such as internal political instability or any other public emergency may not be invoked to justify any departure from these basic principles,
 9. The law enforcement agency shall ensure that all law enforcement officials are selected by proper screening procedures, have appropriate moral, psychological and physical qualities for the effective exercise of their functions and receive continuous professional training, and
 10. IP and the law enforcement agency(ies) shall undertake the policing of unlawful assemblies, policing persons in custody or detention in line with the provision of the UN basic principles on the use of force and firearms by law enforcement officials, 2016.

Annex 7 :Emergency Response Plan (ERP) Template

1. Introduction

This Emergency Response Plan (ERP) template serves as a guiding framework for Contractors to develop site-specific ERPs tailored to each project location. Contractors must adapt and expand this template based on the identified risks and specific conditions of each site. The ERP aims to safeguard workers, communities, project assets, and the environment.

2. Scope of the ERP

This ERP applies to all construction, operational, transportation, and field activities associated with the Project. It covers site workforce, visitors, machinery, equipment operations, hazardous material handling, environmental and health-related emergencies, and natural disasters and external threats.

The Contractor is responsible for ensuring that all personnel working on-site are familiar with the procedures outlined in the site-specific ERP.

3. Objectives

- Establish a clear and effective emergency response structure.
- Protect life, property, and the environment.
- Minimize disruption to project activities.
- Ensure rapid communication and coordination with emergency services.
- Define staff responsibilities for emergency preparedness and response.
- Ensure compliance with national laws, health and safety standards, and ESMP requirements.

4. Emergency Management Structure

The emergency management structure shall include the following positions (to be filled by the Contractor):

- **Site Emergency Coordinator:** Overall command during emergencies; ensures activation of emergency procedures; liaises with emergency services.
- **Deputy Emergency Coordinator:** Assumes command in absence of the primary coordinator.
- **E&S Focal Person:** Leads on-site emergency response, oversees reporting, trains staff, and maintains equipment.
- **Fire Wardens:** Guide workers during fire incidents and evacuations.
- **First Aid Officers:** Provide immediate medical assistance.
- **Assembly Point Monitors:** Account for evacuated personnel.

Each site-specific ERP must include names, contact numbers, and responsibilities for each role.

5. Identification of Potential Hazards and Emergency Scenarios

Each Contractor must conduct a site risk assessment to identify emergency scenarios. Typical emergency situations include:

- Fire or explosion
- Fuel, chemical, or hazardous waste spills

- Worker injuries or fatalities
- Flooding, heavy rainfall, or storms
- Earthquakes
- Structural collapse or equipment failure
- Traffic or vehicle accidents
- Security incidents (theft, assault, vandalism)
- Public demonstrations affecting site operations

The site-specific ERP must include a Hazard Identification & Risk Analysis (HIRA).

6. Emergency Preparedness Measures

- Develop and display emergency floor plans and evacuation routes at visible locations.
- Ensure emergency exits always remain unobstructed.
- Post updated lists of emergency contact numbers.
- Maintain fully stocked first-aid kits at strategic locations.
- Maintain spill kits, fire extinguishers, alarms, and protective equipment.
- Conduct regular inspections to ensure equipment availability and functionality.
- Determine assembly points, safe zones, and communication points.
- Conduct regular toolbox talks on emergency readiness.
- Ensure generators, lighting, and communication tools are operational during emergencies.

7. Emergency Response Procedures

The response procedures should include step-by-step actions for each emergency type.

7.1 Fire Emergencies

- Activate alarm and alert staff.
- Evacuate personnel through designated routes.
- Use appropriate fire extinguishers if safe to do so.
- Shutdown machinery and electrical systems if feasible.
- Contact fire services.
- Conduct headcount at assembly point.

7.2 Spill Response Procedures

- Identify type and source of spill.
- Evacuate unnecessary personnel.
- Stop the spill at source if safe.
- Use spill kits, absorbents, and PPE.
- Prevent spill from entering drains or water bodies.
- Collect contaminated material for safe disposal.

7.3 Medical Emergencies

- Provide first aid using trained personnel.
- Call emergency medical services.
- Transport victim to hospital if required.
- Secure the area to avoid secondary accidents.

7.4 Natural Disasters (Flood, Earthquake, Storm)

- Guide workers to predetermined safe areas.
- Suspend all work until conditions are safe.
- Communicate with local disaster authorities.
- Inspect for structural damages before resuming work.

7.5 Security Incidents

- Notify security forces.
- Evacuate if situation escalates.
- Identify and record incident details.
- Resume work only when declared safe.

8. Communication and Reporting Lines

Communication protocols must be clear and immediate:

Internal Communication:

Worker → Supervisor → E&S Focal Person → Site Emergency Coordinator → Contractor Management → PMU E&S Specialists.

External Communication:

- Fire brigade
- Police
- Medical services
- Environmental protection agencies
- Local authorities

Each site-specific ERP must include a communication flowchart and emergency contact directory.

9. Incident Reporting and Investigation Procedures

- All incidents must be reported within 24 hours.
- Serious or significant incidents must be reported immediately to PMU.
- Use SIRT methodology for reporting.
- Secure the scene for investigation unless hazardous.
- Document witness statements, photographs, and evidence.
- Conduct root cause analysis using models such as:
 - 5-Why Analysis
 - Fishbone Diagram
- Develop corrective and preventive actions (CAPA).
- Submit an investigation report to PMU within contract specified timeline.

10. Emergency Drills and Simulation Exercises

- Conduct fire drills at least twice a year.
- Spill simulation drills must be held annually.
- Conduct evacuation exercises and communication tests.
- Record attendance, performance gaps, and recommendations.
- Improve ERP based on drill results.

11. Training and Capacity Building

- Mandatory induction training for all workers.

- Periodic refresher courses.
- Specialized training for first aiders, spill responders, and fire wardens.
- Training records must be maintained on site.
- PMU may conduct or supervise training as required.

12. Emergency Equipment Requirements

- Fire extinguishers (ABC, CO2, Foam) – inspected monthly.
- First aid kits – replenished weekly.
- Spill control kits – placed near storage and fuel areas.
- PPE – gloves, boots, goggles, helmets, respiratory masks.
- Communication tools – radios, alarms, sirens.
- Emergency lighting and backup power sources.

The Contractor must maintain an equipment inventory and inspection log.

13. Review, Evaluation, and Updating of the ERP

- The ERP shall be reviewed annually or after major incidents.
- Revisions must reflect lessons learned, operational changes, or regulatory updates.
- Updated versions must be shared with all staff.
- PMU will review and approve the final site-specific ERP for each site.

14. Required Annexes in Each Site-Specific ERP

Each Contractor must attach the following:

- Site-specific risk assessment
- Emergency contact directory
- Site layout showing evacuation routes
- List of emergency equipment and inspection logs
- Emergency drill reports
- Incident reporting templates

These annexes must be updated regularly.

Annex 8: Code of Conduct

I, _____, acknowledge that that adhering to environmental, social, health and safety (ESHS) standards, following the project's environmental, social, health and safety (OHS) requirements, preventing GBV/SEA/SH and child abuse/exploitation is important. Any activity, which constitutes acts of gross misconduct is therefore grounds for sanctions, penalties, or even termination of employment. All forms of misconduct are unacceptable be it on the work site, the work site surroundings, or at worker's camps. Prosecution of those who commit any such misconduct will be pursued as appropriate. I agree that while working on this project, I will:

Consent to a security background check;

Treat women, children (persons under the age of 18), project staff including other workers, and persons with disability with respect regardless of race, color, language, religion, political or other opinions, national, ethnic, or social origin, property, birth, or another status;

Not use language or behavior towards men, women, or children/learners that are inappropriate, harassing, abusive, sexually provocative, demeaning, or culturally inappropriate;

Carry out his/her duties competently and diligently;

Comply with all applicable national/provincial laws, regulations, and World Bank requirements.

Comply with the CESMP as approved by the Client to meets its ESHS and OHS objectives as well as preventing and/or mitigating the risks of GBV.

Maintain a safe working environment including but not limited to:

Ensuring that workplaces, machinery, equipment, and processes under each person's control are safe and without risk to health, preventing avoidable accidents, and reporting conditions or practices that pose a safety hazard or threaten the environment.

Wearing required personal protective equipment;

Using appropriate measures relating to chemical, physical and biological substances, and agents; and

Following applicable emergency operating procedures.

Not engage in any form of sexual harassment including unwelcome sexual advances, requests for sexual favors, and other unwanted verbal or physical conduct of a sexual nature at work site, the work site surroundings/nearby communities, or at worker's camps

Not participate in sexual activity with children/learners—including grooming or online grooming. Mistaken belief regarding the age of a child and consent from the child is not a defense;

Not exchange money, employment, goods, or services for sex, with community members including sexual favors or other forms of humiliating, degrading, or exploitative behavior;

Refrain from all forms of GBV, are unacceptable, regardless of whether they take place on the work site, the work site surroundings, at worker's camps or within the local community.

Attend training related to HIV and AIDS, SEA/SH, occupational health, and any other relevant courses/Trainings as a part of this project;

Report to the relevant committee any situation where I may have concerns or suspicions regarding acts of misconduct by a fellow worker, whether in my company or not, or any breaches of this code of conduct provided it is done in good faith;

Regarding children (under the age of 18):

Refrain from hiring children for labor, which is inappropriate given their age, or developmental stage, which interferes with their time available for education and recreational activities, or which places them at significant risk of injury.

Bring to the attention of my manager the presence of any children on the construction site or engaged in hazardous activities.

Comply with all relevant local legislation including labor laws and World Bank requirements in relation to child labor and forced labor.

Refrain from any form of theft for assets and facilities including from surrounding communities.

Remain in the designated working area during working hours;

Refrain from possession of alcohol and illegal drugs and other controlled substances in the workplace and being under the influence of these substances on the job and during working hours;

Follow prescribed environmental occupation health and safety standards;

Channel grievances through the established grievance redress mechanism.

I do hereby acknowledge that I have read the foregoing Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to ESHS, OHS, and GBV issues. I understand that any action inconsistent with this Code of Conduct or failure to act mandated by this Code of Conduct may result in disciplinary action which could include:

Informal warning.

Formal warning.

Additional Training.

Loss of up to one week's salary.

Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.

Termination of employment.

Report to the Police if warranted.

Signed by: _____

Signature: _____

Date: _____

For the Employer/Contractor

Signed by: _____

Signature: _____

Date: _____