ASIAN INFRASTRUCTURE INVESTMENT BANK

August 29, 2025

Sovereign-backed Financings

Approval Project Document

P000913 Pakistan: Reconstruction of National Highway N-5 under Pakistan's Resilient Recovery, Rehabilitation and Reconstruction Framework Project

Currency Equivalents

As of July 31, 2025

Currency Unit – Pakistani Rupee (PKR)
USD 1.00 = PKR 283.55

Fiscal Year

July 1 – June 30

Abbreviations

AADT	Annual Average Daily Traffic
AGP	Auditor General of Pakistan
AIIB	Asian Infrastructure Investment Bank
B&A	Budget & Accounting (a division of NHA)
CBA	Cost-Benefit Analysis
CBC	Cross Border Connectivity
CDWP	Central Development Working Party
CRA	Climate Resilience Assessment
CRVA	Climate Risk and Vulnerability Assessment
EAD	Economic Affairs Division
EALS	Environment, Afforestation, Land and Social (a division of NHA)
ECNEC	Executive Committee of the National Economic Council
EFF	Extended Fund Facility
EIRR	Economic Internal Rate of Return
ENPV	Economic Net Present Value
EPC	Engineering Procurement and Construction
ES	Environmental and Social
ESF	Environmental and Social Framework
ESS	Environmental and Social Standard
ESMPF	Environmental and Social Management Planning Framework
ESIA	Environmental and Social Impact Assessment
ESIMC	Environmental and Social Independent Monitoring Consultant
ESMP	Environmental and Social Management Plan
EV	Electric Vehicle
FIRR	Financial Internal Rate of Return
FM	Financial Management
FY	Fiscal Year
GAP	Gender Action Plan
GBV	Gender-based Violence
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GL	General Ledger
GM	General Manager
GoP	Government of Pakistan
GRM	Grievance Redress Mechanism
GST	Goods and Services Tax

HDM-4	Highway Development and Management Model Four
HH	Households
HQ	Headquarters
IMF	International Monetary Fund
iRAP	International Road Assessment Program
IRI	International Roughness Index
ITS	Intelligent Transportation System
km	Kilometer
km/h	Kilometer per hour
KP	Khyber Pakhtunkhwa (a province of Pakistan)
LMP	Labor Management Plan
LOS	Level of Service
LWC	Labor and Working Conditions
MDB	Multilateral Development Bank
ML-1	Main Line-1
mm	Millimeter
M&E	Monitoring and Evaluation
NDC	Nationally Determined Contribution
NEVP	National Electric Vehicles Policy
NHA	National Highway Authority (of Pakistan)
NHEB	National Highway Executive Board
NESPAK	National Engineering Service Pakistan (Pvt.) Limited
N-5	National Highway 5
OD	Origin and Destination
OHS	Occupational Health and Safety
O&M	Operations and Maintenance
PA	Paris Agreement
PC-1	Planning Commission Form-1
PDS	Project Delivery Strategy
PIE	Project Implementing Entity
PIM	Project Implementation Manual
PIU	Project Implementation Unit
PP	Procurement Plan
PPM	Project-affected People's Mechanism
PPSF	Project Preparation Special Fund
PSC	Project Steering Committee
PT	Project Team
P&CA	Procurement & Contract Administration (a division of NHA)
RAMD	Road Asset Management Division (a division of NHA)
RAP	Resettlement Action Plan
RD	Reference Distance
REOI	Request for Expression of Interests
RIU	Regional Implementation Unit
RMF	Results Monitoring Framework
RoW	Right-of-way
RPF	Resettlement Planning Framework
R&R	Resettlement and Relocation

SC	Specific Criteria
SDG	Sustainable Development Goal
SEA	Sexual Exploitation and Abuse
SEP	Stakeholder Engagement Plan
SH	Sexual Harassment
TOR	Terms of Reference
VOC	Vehicle Operating Costs
VOT	Value of Time
WACC	Weighted Average Cost of Capital
4RF	Resilient Recovery, Rehabilitation, and Reconstruction Framework

Table of Contents

1. Executive Summary

1.1 The Reconstruction of National Highway N-5 under Pakistan's Resilient Recovery, Rehabilitation, and Reconstruction Framework Project (the Project) is a critical infrastructure initiative of Pakistan aimed at enhancing climate resilience, road safety, and operational efficiency along Pakistan's most vital transport corridor, the 1,819-kilometer N-5 highway, which carries 55 percent of the country's inter-city passenger traffic and 65 percent of freight and commercial traffic. This Project, comprising four geographically dispersed road sections and one major bridge totaling 210 kilometers along the N-5, constitutes the first phase of the National Highway Authority's (NHA) comprehensive four-phase plan to upgrade the entire N-5 corridor.

1.2 The approval of a financing of USD 500 million is being sought for the Project, which forms part of AIIB's USD 1 billion pledge made in Geneva in January 2023 in response to the 2022 floods. The financing is proposed to be committed in two loan tranches, through two separate loan agreements, within a five-year period. This approach is being sought to address the phased construction readiness and the complexity of managing multiple construction sites across a vast geographic area. The first loan tranche of USD 320.16 million will be committed following the Board approval and will finance the reconstruction of three sections of the N-5: Ranipur-Sukkur, Rawalpindi-Hasanabdal, and Nowshera-Peshawar. The second loan tranche, totaling USD 179.84 million, will be committed following Management's verification of the conditions as set out in this Project Document (section 4.10), and will support the reconstruction of the Lahore-Gujranwala section and the Nai Baran Bridge.

1.3 The Project is aligned with Pakistan's post-2022-flood Resilient Recovery, Rehabilitation and Reconstruction Framework (4RF) and the National Road Safety Strategy 2018-2030. It incorporates a comprehensive set of climate-resilient engineering measures and road safety design features, and is expected to deliver significant economic and social benefits. It directly supports the United Nations Sustainable Development Goals (SDGs) related to infrastructure (SDG 9), health and well-being (SDG 3), and climate action (SDG 13).

1.4 However, the Project faces notable challenges, particularly in resettlement and relocation (R&R), given the large number of informal settlements within the right-of-way of N-5. To mitigate potential R&R-related risks, the Project has significantly increased its R&R budget to USD 17.55 million, established a USD 6.17 million R&R reserve fund, and onboarded international and local social development consultants. In addition, road safety concerns during both construction and operations will be addressed through a comprehensive safety plan that includes carefully designed road safety measures, stringent contractor qualification requirements, targeted worker training programs, and other interventions.

1.5 AIIB's involvement adds substantial value by leveraging a USD 2 million Project Preparation Special Fund (PPSF) grant to enhance climate resilience, road safety, environmental and social safeguards, and digital project management. The Project also strengthens institutional capacity at the NHA, paving the way for more effective future multilateral development bank financing. While fiduciary risks such as procurement delays and financial management are rated as moderate, robust mitigation measures, including capacity-building and third-party monitoring, are in place. Overall, the Project balances transformative

economic and social benefits with diligent risk management, making it a strategic investment in Pakistan's sustainable development.

<table>
<tr><td>Project No.</td><td colspan="3">P000913</td></tr>
<tr><td>Project Name</td><td colspan="3">Reconstruction of National Highway N-5 under Pakistan's Resilient Recovery, Rehabilitation and Reconstruction Framework Project</td></tr>
<tr><td>AIIB Member</td><td colspan="3">Pakistan</td></tr>
<tr><td>Borrower</td><td colspan="3">Islamic Republic of Pakistan</td></tr>
<tr><td>Project Implementing Entity</td><td colspan="3">National Highway Authority (NHA) of Pakistan</td></tr>
<tr><td rowspan="2">Proposed Amount of AIIB Financing (USDm)</td><td rowspan="2">The Project:
USD 500.00 million

1st loan tranche:
USD 320.16 million

2nd loan tranche:
USD 179.84 million</td><td>Instrument type (Instrument subtype)</td><td>Loan (Direct Sovereign)</td></tr>
<tr><td>Currency of financing requested</td><td>US Dollar</td></tr>
<tr><td>Sector (Subsector)</td><td colspan="3">Transport (Roads)</td></tr>
<tr><td>Environmental and Social Category and Comments</td><td colspan="3">A
As per the Bank's Environmental and Social Policy, the Project has been classified as Category A, considering the significant resettlement and relocation of informal settlers required for Project construction.</td></tr>
<tr><td>Project Objective</td><td colspan="3">To improve the climate resilience, operational efficiency, and road safety in the road sections of Ranipur-Sukkur, Rawalpindi-Hassanabdal, Nowshera-Peshawar, Lahore-Gujranwala, and the Nai Baran Bridge of the National Highway N-5 in Pakistan.</td></tr>
<tr><td>Project Description</td><td colspan="3">As part of AIIB's USD 1 billion Geneva pledge in response to the 2022 floods, the Project aims to enhance climate resilience, operational efficiency, and road safety by reconstructing and upgrading critical four-lane sections of the N-5 into a safer, climate-resilient six-lane dual carriageway. It supports phase 1 of the NHA's 20-year, four-phase plan to upgrade the entire 1,819-kilometer N-5 corridor. The implementation of the Project will be carried out over five years through two subphases, 1A and 1B. The financing of the Project will be committed in phases through two loan tranches, corresponding to two separate loan agreements. This phased approach aligns with implementation readiness and supports the staged construction rollout, enabling effective management of multiple construction sites spread across a broad geographic area.

Subphase 1A will reconstruct three priority sections totaling 141 km: Ranipur-Sukkur (70 km) in Sindh Province, Rawalpindi-Hasanabdal (40 km) in Punjab Province and Islamabad Capital Territory, and Nowshera-Peshawar (31 km) in Khyber Pakhtunkhwa (KP) Province.</td></tr>
</table>

<table>
<tr><td></td><td colspan="3">Subphase 1B will reconstruct the Lahore-Gujranwala section (68 km) in Punjab Province and the Nai Baran Bridge (1km) in Sindh Province. Triggers for AIIB Management to commit the second loan tranche for subphase 1B include: at least 15 percent completion of both physical works and disbursement under subphase 1A, disbursement of at least 80 percent of Resettlement and Rehabilitation (R&R) funding to eligible beneficiaries in subphase 1A, and high readiness of the Resettlement Action Plan (RAP) implementation for subphase 1B, among others set forth in section 4.10 of the Project Document.

To strengthen project preparation, AIIB has mobilized a USD 2 million Project Preparation Special Fund (PPSF) grant, supporting enhanced assessments on climate resilience, road safety, environmental and social (ES) safeguards, and digital project management tools.

The Project marks AIIB's first standalone operation in Pakistan.</td></tr>
<tr><td>Co-financing type</td><td>Stand-alone</td><td>Following other financier's E&S Policy?</td><td>No</td></tr>
<tr><td>Lead financier</td><td>AIIB</td><td>Following other financier's Procurement Policy?</td><td>No</td></tr>
<tr><td>Implementation Period</td><td>01/01/2026 – 12/31/2030</td><td>Expected Loan Closing Date</td><td>06/30/2031</td></tr>
<tr><td>Financing Plan</td><td colspan="3"><u>Total Project cost: USD 555.03 million</u>
AIIB financing: USD 500.00 million (90%)
Government of Pakistan (GoP): USD 55.03 million (10%)

<u>1st tranche cost: USD 355.73 million</u>
AIIB Loan (1st loan tranche): USD 320.16 million (90%)
GoP: USD 35.57 million (10%)

<u>2nd tranche cost: USD 199.30 million</u>
AIIB Loan (2nd loan tranche): USD 179.84 million (90%)
GoP: USD 19.46 million (10%)</td></tr>
<tr><td>Risk (Low/Medium/High)</td><td colspan="3">High</td></tr>
<tr><td>Retroactive Financing (Loan % and dates)</td><td colspan="3">None</td></tr>
<tr><td>Policy Assurance</td><td colspan="3">The Vice President, Policy and Strategy, confirms an overall assurance that the proposed Bank Financing complies with the applicable Bank operational policies.</td></tr>
</table>

Risks	
Key Risks	**Mitigation Measures**
The Project has significant resettlement and relocation (R&R) needs for informal settlements operating within the right of way of N-5, while NHA faces capacity constraints in implementing the R&R.	▪ The Project significantly increased its R&R budget to USD 17.55 million based on the latest RAP estimates. Additionally, a USD 6.17 million R&R Reserve Fund has been established to account for unexpected or complicated situations during R&R implementation. ▪ PPSF grant-supported International Social Development Consultant is onboard to support NHA on R&R and other social aspects. ▪ Timely recruitment of the Design Review and Construction Supervision Consultant (DRCSC) with demonstrated R&R expertise is required to enable timely implementation of Resettlement Action Plans (RAPs) as well as compliance with AIIB's ESS2. ▪ Component B of the Project budgeted USD 2 million for PMU capacity building and training, including hiring additional R&R consultants to support NHA. ▪ AIIB Project Team's (PT's) social team, including a Social Development Specialist at AIIB headquarters and a local Social Development Consultant based in Islamabad will work closely with NHA on R&R. ▪ AIIB PT will arrange in-person or virtual R&R trainings to PIU, RIUs, and DRCSC.
Road safety after the completion of the Project, and traffic or occupational health and safety (OHS) accidents during construction.	▪ The PPSF grant-funded safety consultant will holistically assess road safety during construction and after construction completion and propose improvements. ▪ Embed safety requirements and qualifications in procuring the construction contractor and the DRCSC. ▪ Provide training to site workers on traffic and OHS safety.
Traffic disruptions during construction.	▪ The PPSF grant-funded safety consultant, contractor, the DRCSC, and NHA will collaborate to develop and enforce a robust traffic management plan during construction. ▪ NHA will consider lower toll rates on M-1 Motorway, which runs nearly parallel to N-5, to redirect some of N-5's traffic to M-1.
Economic Capital (ECap) Consumption (USDm)	The Project: 152.87 (30.57%) 1st loan tranche: 97.88 (30.57%) 2nd loan tranche: 54.98 (30.57%)

Strategic Alignment				
Alignment with AIIB's thematic priorities	Green infrastructure; Connectivity and Regional Cooperation			
Alignment with AIIB's strategies	Transport Sector Strategy			
Key Outcomes	**Indicator**	**Unit of measure**	**Baseline (2024)**	**Target (2030)**
Green infrastructure	Share of population serviced by the Project having access to climate-resilient N-5	Percentage (%)	0%	100%
Connectivity and Regional Cooperation	Annual Average Daily Traffic (AADT) of the Project-covered four sections of N-5	Number of vehicles	43,000*	49,000*
Connectivity and Regional Cooperation	Average speed of the Project-covered four sections of N-5	Kilometers per hour	50*	60*

*Calculated based on the Project's Results Monitoring Framework (RMF) in Annex 1. The AADT is weighted (by section length) average of all four sections in the Project and rounded to the closest 1,000. The speed is calculated by section length divided by travel time, weighted by section length.

Other Key Financing Requirements	
Conditions of Effectiveness	The Project Implementation Manual has been furnished to the satisfaction of the Bank.
Key Covenants	1) The Project Management Unit, including the Project Implementation Unit at the NHA Headquarters and the Regional Implementation Units at the Project sites, is established and maintained throughout the Project Implementation with staff and budget. 2) Project Consultants are hired by NHA according to the Terms of References (TORs) agreed by the Bank and their engagement is maintained throughout Project Implementation.
Key Conditions for 1st Disbursement	Public Consultation with Project-affected people and relevant stakeholders is conducted, and Resettlement Planning Framework (RPF) and section specific Resettlement Action Plans (RAPs) are furnished to the satisfaction of the Bank.

President	Liqun Jin
Chief Investment Officer	Konstantin Limitovskiy
Director General	Xiaohong Yang
Team Leader	Wenjing Pu, Investment Officer
Team Members	Haseeb Ahmed, Economist Drona Ghimire, Senior Environment Specialist Monyrath Nuth, Social Development Specialist Swithun Rumble, Environment and Social Analyst Natan Jere, Senior Procurement Specialist Shonell Robinson, Financial Management Specialist Alberto Alcubilla Arribas, Sr. Investment Solutions Specialist Luiz Eduardo Rodrigues, Counsel Liu Yang, Alternate Counsel Mengmeng He, Finance Officer

	Elle Yanyang Shi, Project Assistant Sheraz Hussain, Social Development Consultant Tahir Sheikh, Liaison Consultant Pakistan

2. Context

2.1 **Country and Macroeconomic Overview.** Pakistan, the fifth most populous nation in the world, is a lower-middle income country with a per capita Gross Domestic Product (GDP) of around USD 1,570.[1] Pakistan has experienced longstanding macroeconomic challenges, including recurrent fiscal and current account deficits, protectionist trade policies, low productivity growth, and a growing public debt burden. Because of these challenges, Pakistan's economy grew at an average rate of 3.5 percent over the last decade, much lower than growth rates of regional economies. The economy has remained vulnerable to external and domestic shocks including energy price shocks, supply chain disruptions, and fluctuations in the value of the Pakistani rupee. Fiscal management has been strained by low tax revenues (only about 10 percent of its GDP) and high government expenditures, particularly on debt servicing, defense, and subsidies. This has led to a persistent lack of investment in several important sectors including education, health, social protection, and infrastructure. Consequently, over one-third of school-age children across Pakistan are out of school, children stunting rates of 40 percent persist, and lower-middle income poverty rate (defined as USD 3.65/day 2017 purchasing power parity (PPP) per capita) in Fiscal Year 2024 (FY24) is estimated at 40.5 percent.[2]

2.2 The post-pandemic recovery was driven by expansionary fiscal policies that led to macroeconomic imbalances. These imbalances were further worsened by spikes in food and fuel prices following the geopolitical tensions in Europe and global monetary tightening. At the same time, devastating floods in 2022 caused approximately USD 16 billion damage to public infrastructure and significantly affected agricultural output, which still employs about 40 percent of the labor force. Due to the confluence of COVID-19, floods, and macroeconomic and political volatility, poverty rate increased, with an additional 2.6 million people falling below the middle-income poverty rate in FY24.

2.3 To stabilize the economy, in July 2023, Pakistan signed the International Monetary Fund (IMF) Standby-Agreement and began to restore exchange rate flexibility, relax import controls, and contain the fiscal deficit. Sustainable macroeconomic practices along with easing of external conditions and favorable weather for agricultural output growth, economy began to recover in FY24. Stabilization efforts during the Standby-Agreement also led to the signing of a 3-year IMF Extended Fund Facility (EFF) program of around USD 7 billion in September 2024. Growth rebounded to 2.4 percent in FY24 and is expected to be around 2.6 percent in FY25. Stability in current accounts as well as foreign exchange markets has enabled the rebuilding of reserve buffers. Business confidence has also improved with the recent credit rating upgrades and fiscal tightening measures, such as the devolvement of constitutionally mandated expenditures to the provinces and higher agricultural income taxes. The improvement in macroeconomic conditions illustrates that the acute financial crisis is averted and that there will be more fiscal space to finance development projects. However, long-term growth rates are expected to remain below potential as fiscal restraint weighs down on aggregate demand, income, and employment.

[1] WEO Database October 2024
[2] https://thedocs.worldbank.org/en/doc/7008031a15959f10bde28b6c56767d59-0310062024/original/Pakistan-Development-Update-The-Dynamics-of-Power-Sector-Distribution-Reforms-Oct-24-FINAL.pdf

2.4 Despite this stabilization, debt sustainability risks remain high. These risks include heavy banking sector exposure to the sovereign, domestic policy uncertainty, federal-provincial government political misalignments and geopolitical instability. The sustainability of growth and positive economic outlook is conditional on successful implementation of the three-year IMF-EFF program as well as broader and faster fiscal and economic reforms, including energy sector reforms, increasing the tax-to-GDP ratio, enhancing competitiveness and rationalization of subsidies, improving productivity, and building climate resilience. In the short to medium-term, debt sustainability will critically depend on financial commitments by multilateral and bilateral partners and the ability of the banking system to roll over domestic debt.

2.5 Pakistan's economy is also increasingly becoming susceptible to climatic change and the country consistently ranks among the most vulnerable countries to climate change in the world. The cost of climate adaptation and resilience in the context of Pakistan is estimated to be approximately USD 348 billion by 2030.[3] However, high external financing needs, low government revenue, and risks related to debt sustainability prevent meaningful investment in climate adaptation and mitigation. Thus, the appetite for and success of economic reforms undertaken during the current IMF program become even more critical in climate-proofing and improving Pakistan's economy over the long-term.

2.6 **Transport Sector Overview.** The transport sector in Pakistan is pivotal to the country's economic and social development, contributing approximately 10 percent to the GDP and employing over 6 percent of the workforce. Road transport is by far the dominant mode of transportation, carrying around 90 percent of both passenger and freight traffic. Pakistan's extensive road network covers 493,000 kilometers (km), with approximately 14,633 km of national highways (including 3,423 km of Motorways, 10,931 km of Highways, and 279 km of Strategic Roads) and 93,000 km of provincial highways, while the remaining roads are classified as district or urban roads. Despite comprising less than 3 percent of the total road network, national highways are crucial to the economy, handling around 80 percent of commercial traffic. The National Highway Authority (NHA)[4] of Pakistan manages these national highway network, while provincial and district roads fall under local authority supervision.

2.7 In recent years, Pakistan's road transport sector has witnessed notable progress, particularly with the completion and advancement of several key infrastructure projects. Roads like the Zhob-Quetta (N-50) (305 km), Khuzdar-Basima (N-30) (106 km), and Hoshab-Awaran (M-8) (146 km) are vital to enhancing connectivity between remote regions and economic centers. These projects are fostering greater regional integration, enabling better access to markets, and contributing to economic growth. In addition, public-private partnership initiatives, such as the Karachi-Hyderabad and Lahore-Sialkot Motorways, have significantly improved travel efficiency and boosted regional trade. These upgraded routes are facilitating the movement of goods and services, benefiting local businesses and attracting investments in previously underserved areas.

[3] FCDO (2024). Bridging Pakistan's Adaptation Financing Gap: Developing Evidence-based Climate Adaptation and Resilience Solutions

[4] The NHA is a statutory body under the Ministry of Communications of Pakistan, established by the National Highway Authority Act, 1991. The purpose and functions of the NHA are to plan, promote, organize and implement programs for construction, development operation, repairs and maintenance of national highways, motorways and strategic roads specially entrusted to it by the Federal Government, or by a Provincial Government or other authority concerned. https://nha.gov.pk/

2.8 Despite the progress, Pakistan's road sector faces multiple challenges that threaten to hinder its long-term growth and efficiency. 1) Climate change. The devastating floods of July-August 2022, which inundated nearly one-third of the country, highlighted the sector's vulnerability to climate change and its impact on infrastructure resilience. The floods caused widespread disruptions to road connectivity, emphasizing the need for more robust, climate-resilient infrastructure. 2) Insufficient capacity and low efficiency. Rapid urbanization and the presence of nonmotorized and slow-moving traffic along major highways are reducing road capacity and lowering average vehicle speeds. 3) Road safety issues. Pakistan's road safety record remains concerning, with insufficient regulatory enforcement, a lack of public awareness, and an absence of a comprehensive road safety framework. And 4) Lack of technology adoption. The deployment of Intelligent Transportation Systems (ITS) is limited to certain motorways, leaving much of the national highway network without modern traffic management and safety technologies.

2.9 In response to the devastating 2022 floods in Pakistan, the Government of Pakistan (GoP), with support from the Asian Development Bank (ADB), United Nations Development Programme (UNDP), and the World Bank (WB), developed the Resilient Recovery, Rehabilitation, and Reconstruction Framework (4RF)[5]. This strategic roadmap integrates sustainable recovery with long-term development goals, focusing on resilience-building across sectors. In the road and transport sector, the 4RF prioritizes the rehabilitation and reconstruction of critical infrastructure to restore connectivity and support economic recovery. It emphasizes climate-resilient designs to safeguard roads and bridges from future disasters, enhancing accessibility to affected areas and ensuring safe and sustainable mobility for communities. These measures are essential for driving economic activity, facilitating relief efforts, and building resilience against climate-induced challenges.

2.10 **Addressing Key Development Challenges: Project Contributions.** Addressing these challenges will require significant investments in infrastructure upgrades, particularly with a focus on climate resilience, capacity and efficiency enhancement, road safety, and technology integration. Improving road capacity, adopting ITS across the wider network, and enhancing enforcement of safety regulations will be critical to ensuring that Pakistan's road transport sector can meet the demands of a growing economy while supporting sustainable development and regional connectivity.

2.11 The 1,819-kilometer-long North-South National Highway 5 is the lifeline of Pakistan's economy. It connects the port city of Karachi in the south to the provincial capital of Peshawar in the northwest and extends all the way to the Afghanistan border. It serves most of the country's large urban centers and economic areas. The National Highway 5 (N-5) carries about 55 percent of the inter-city traffic and 65 percent of the freight and commercial traffic in Pakistan.

2.12 Despite its significance and economic importance, the N-5 suffers from infrastructure deficiencies and other constraints, which reduce the efficiency that a modern road network is needed to provide. At the same time, N-5 is extremely vulnerable to climate and climate-related threats, as manifested during the 2022 floods. Approximately 100 km of crucial links

[5] Government of Pakistan, Resilient Recovery, Rehabilitation, and Reconstruction Framework (4RF), December 2022. https://www.undp.org/pakistan/publications/pakistan-floods-2022-resilient-recovery-rehabilitation-and-reconstruction-framework-4rf. Accessed November 21, 2024.

of the N-5 were severely damaged in these floods, disrupting cross-country traffic. In certain sections of the N-5, such as Rawalpindi – Hassanabdal, the annual average daily traffic (AADT) exceeds 50,000 vehicles, far exceeding the design capacity of the road. This significantly higher-than-design traffic not only deteriorates the pavement but also poses and escalates safety risks. As a result, most sections of the road receive ratings below 3 stars on the International Road Assessment Program (iRAP), which employs a 5-star maximum rating system. Such low rating reveals a pressing need for improvement, signaling safety risks to users of this critical road.

2.13 The NHA has developed a 20-year plan to reconstruct and widen the 1,819-kilometer N-5 highway in four phases. As part of a broader effort in response to the devastating 2022 floods, the Asian Infrastructure Investment Bank (AIIB or the Bank) has proposed USD 500 million towards this initiative, which is part of the Bank's USD 1 billion Geneva pledge made in January 2023.

2.14 Improving the N-5 is essential despite the presence of parallel motorways and the planned upgrade of the Main Line-1 (ML-1) railway. Unlike motorways—which are tolled at a much higher rate than the N-5, access-controlled, and primarily serve long-distance traffic—the N-5 provides open access to a wide range of users, including local and regional traffic, small and medium enterprises, and low-income travelers. It directly connects numerous towns, cities, and industrial hubs not served by the motorway network, making it a vital link for freight, public transport, and informal vehicles. With many N-5 segments already operating over capacity of the 2+2 lane highway (e.g., AADT exceeding 30,000–50,000 vehicles/day), congestion and safety issues persist even where motorways exist. Public transport and freight operators continue to favor N-5 due to affordability, direct urban access, and flexibility.

2.15 Moreover, ML-1's full functionality is still years away, and even post-upgrade, it will not replace short-haul or local freight demand currently handled by N-5. Widening the N-5 enhances network resilience by providing redundancy during motorway closures or emergencies and supports equitable access to transport infrastructure across income groups. In urban areas, it also plays a key role in easing congestion and improving industrial access. Looking ahead, overall corridor demand is expected to exceed the combined capacity of rail and motorways. Therefore, N-5 widening is a strategic, inclusive, and future-proof investment that strengthens the national multimodal transport system.

3. Rationale

3.1 The NHA has developed a 20-year plan to reconstruct and widen the entire N-5 highway in four phases, with each phase covering 200-430 km and comprising 4-8 sections, extending from south to north[6]. This Project focuses solely on phase 1, which includes four road sections and one bridge of the N-5, spanning Sindh, Punjab, the Islamabad Capital Territory, and Khyber Pakhtunkhwa (KP). Phase 1 is further divided into subphases 1A and 1B, considering project readiness and the challenges of managing multiple construction sites across a vast geographic area. To navigate these complexities, the Bank proposed to structure the financing of the Project in two loan tranches, which was agreed upon by the Client. The first loan tranche will finance subphase 1A, while the second tranche will support subphase 1B. This approach also helps alleviate Pakistan's foreign debt burden, reduce their financing costs, and mitigate the Bank's credit risk, given that Pakistan's sovereign credit rating remains "B-" or lower.

3.2 **Project Objective.** To improve the climate resilience, operational efficiency, and road safety in the road sections of Ranipur-Sukkur, Rawalpindi-Hassanabdal, Nowshera-Peshawar, Lahore-Gujranwala, and the Nai Baran Bridge of the National Highway N-5 in Pakistan.

3.3 **Expected Beneficiaries.** The beneficiaries of this Project would span a wide range of sectors. Local communities and businesses along the corridor will benefit from enhanced accessibility, reduced travel times, and lower transportation costs, thereby serving as catalyst for economic growth. Key industries, such as agriculture and manufacturing, which rely heavily on this route for transporting goods, would benefit from greater efficiency and lower logistics costs. In the short term, job creation in construction and related services would provide a much-needed boost to local economies, while in the long term, increased commercial activity would follow as the improved road conditions attract more business and trade.

3.4 Additionally, regional trade and logistics would experience a boost as the N-5 is a critical artery connecting major cities and ports. Transport operators, freight companies, and commuters would benefit from enhanced safety and reduced vehicle wear-and-tear due to better road conditions. The Project could also contribute to environmental benefits by reducing fuel consumption through smoother traffic flow and lower congestion. This Project would align with broader regional development goals, improving connectivity within Pakistan and strengthening its trade ties with neighboring countries.

3.5 Road Safety is a significant issue in Pakistan. In 2021, the World Health Organization (WHO) estimated 27,568 road crash fatalities on Pakistani roads, with 41 percent and 16 percent being pedestrians and light duty vehicles (LDVs), respectively. 2-wheeler represents the prevailing vehicle share, amounting to 78 percent in 2022. While Pakistan's fatality rate per 100,000 population is lower than the regional average, the country lags in terms of reducing fatalities and improving road infrastructure safety. The National Road Safety Strategy 2018-2030[7] set targets to be achieved by 2030, including that national highways with more than 50,000 vehicles per day have a minimum of three stars for all users and that sections of

[6] The four-phase plan does not include the Moro-Ranipur section (86 km), which is currently (as of June 2025) under construction as part of the Asian Development Bank's Emergency Flood Assistance Program, nor the Hala-Moro section (66 km), which is funded by a Chinese grant and is currently (as of June 2025) under Engineering, Procurement, and Construction (EPC) contractor procurement, with construction expected to begin in December 2025.
[7] https://phkh.nhsrc.pk/sites/default/files/2020-01/Pakistan-National-Road-Safety-Strategy-2018-2030%20%281%29.pdf

the national highway network passing through linear settlements have a minimum four-star standard for motorcyclists, pedestrians and bicyclists. Investment in improving the road safety system in Pakistan is necessary to enhance the reduction in road accidents, injuries and fatalities. The Project is expected to significantly enhance road safety, climate resilience, and operational efficiency along the N-5 corridor. By integrating climate-adaptive materials and design features, the upgraded highway will be better prepared to withstand extreme weather events, minimizing disruptions from flooding, heat-related damage, and other climate impacts. Modernized road safety measures—including improved geometric design, signage, and protected pedestrian crossings and U-turns—will reduce accident rates and promote smoother traffic flow. These improvements will enhance transport efficiency for freight operators, commuters, and logistics providers, transforming the N-5 into a safer, more resilient, and efficiently managed transport corridor that supports long-term economic growth and social development in Pakistan.

3.6 **Expected Results.** The following Project Objective level indicators have been agreed by the NHA to gauge the expected results of this Project. Annex 1 outlines the detailed Results Monitoring Framework (RMF) for the Project.

i. Enhancement in climate resilience – Share of population serviced by the Project sections having access to climate-resilient N-5 highway.
ii. Increase in efficiency – Travel time (minutes) of each Project section.
iii. Increase in efficiency – Annual Average Daily Traffic (AADT) of each Project section.
iv. Improvement in safety – Share of reconstructed N-5 highway (length) with a safety rating of 3-star and above.
v. Improvement in safety – Road fatalities (number) of all Project sections.

3.7 **Strategic Fit for AIIB.** This Project is being prepared as an emergency response to the devastating floods that struck Pakistan in 2022 and forms part of AIIB's USD 1 billion commitment to support Pakistan's resilient recovery in line with the IFI-supported 4RF. The Project aligns closely with the thematic priorities outlined in AIIB's Corporate Strategy as follows:

i. Green Infrastructure. Aligned with Pakistan's 4RF, this Project adopts a climate-resilient and inclusive design that aligns with AIIB's commitment to green infrastructure, emphasizing climate resilience and adaptation. The Project will implement climate mitigation measures to reduce carbon emissions, as well as incorporate air quality and noise monitoring and improvement activities. To comprehensively enhance road safety, the Project will conduct a full-scale assessment of current road conditions, propose targeted safety improvements, review engineering designs for safety integration, address safety risks during construction, and validate safety standards at project completion and early operations. The goal is to achieve a 3-star safety rating for all road users, in accordance with iRAP standards.

ii. Connectivity and Regional Cooperation. The 1,819-kilometer-long N-5 highway is a critical corridor for national and cross border connectivity (CBC), serving as an economic lifeline for Pakistan. It supports approximately 55 percent of the country's inter-city traffic and 65 percent of its freight and commercial transport. The N-5 links

major urban centers across Sindh, Punjab, and KP, extending to Torkham at the Pakistan-Afghanistan border, which enhances economic connections with Afghanistan and Central Asia. On its southern end, the N-5 reaches Karachi, connecting Pakistan to global markets via marine transport. The four road sections and the bridge proposed for improvement contribute to CBC, as they form integral parts of the N-5 corridor linking major cities across Pakistan to the Afghan border. In particular, the Ranipur-Sukkur and Nowshera-Peshawar sections play a critical role in facilitating cross-border trade and freight movement—Ranipur-Sukkur by connecting inland transport routes to Karachi's international port, and Nowshera-Peshawar by improving access to the Afghan border, with Peshawar serving as the last major urban center before the crossing.

3.8 The Project aligns with AIIB's Transport Sector Strategy in several ways: it supports trunk linkages by enhancing project capacity and reducing bottlenecks between major urban centers; it advances cross-border connectivity by facilitating international trade; and it addresses the upgrading of existing infrastructure by improving the capacity and climate resilience of this essential corridor. Additionally, the Project strengthens national trade as well as commercial and social linkages.

3.9 The Project contributes to several key Sustainable Development Goals (SDGs). It aligns with SDG 3: Good Health and Well-being, specifically target 3.6, by improving road safety and saving lives, which aims to halve global deaths and injuries from road traffic accidents by 2030. It also supports SDG 9: Industry, Innovation, and Infrastructure, particularly target 9.1, by developing low-carbon and resilient road infrastructure to foster sustainable economic development. Furthermore, the Project advances SDG 11: Sustainable Cities and Communities, contributing to target 11.2 by providing safe, accessible, and sustainable transport systems for all. Additionally, it supports SDG 13: Climate Action through its focus on building climate-resilient infrastructure, in line with target 13.2, which seeks to integrate climate change measures into infrastructure planning and policies.

3.10 **Paris Agreement Alignment (PAA) and Climate Finance.** In line with AIIB methodology for assessing the alignment with the mitigation and adaptation goals of the Paris Climate Agreement, the Project is assessed as aligned. Details of the assessment are provided in Annex 5. In line with the joint Multilateral Development Bank (MDB) methodology for tracking mitigation finance, it is estimated that USD 8.81 million of the total Project cost contributes to supporting mitigation; in line with the joint MDB methodology for tracking adaptation finance, it is estimated that USD 67.31 million of the total Project cost contributes to supporting adaptation.

3.11 Total climate finance (summing climate mitigation finance and climate adaptation finance) is USD 76.12 million, equivalent to 15.22 percent of AIIB's total financing of the Project.

3.12 **Value Addition by AIIB.** Beyond the provision of financing, AIIB's participation strengthens the Project in the following aspects: (i) the quality enhancement of Project design and preparation in its climate, environmental and social (ES), safety, and digital project management aspects by mobilizing the USD 2 million Project Preparation Special Fund (PPSF) grant; (ii) enhancement of the ES aspects of the institutional setup of NHA by recommending

hiring specialists in Resettlement and Relocation (R&R), social safeguards, Occupational Health and Safety (OHS), labor management, and climate resilience, benefiting not only this Project but also NHA's other projects and operations; (iii) integration of climate adaptation measures into the Project, ensuring that the reconstructed infrastructure is resilient against future floods and other natural disasters, in alignment with AIIB's commitment to environmental sustainability; (iv) the application of global best practices in project management, upholding high quality standards and adherence to robust ES criteria, fostering environmental sustainability within the Project, and enhancing the proficiency of implementing agencies; (v) capacity-building support to the implementing entity, encompassing the integration of international best practices in managing environmental, social, procurement, and financial risks, setting the foundation for NHA to receive further international financing from MDBs in the future; and (vi) AIIB's involvement in the N-5 corridor may help NHA attract other MDBs to join the forces to improve the country's lifeline.

3.13 The AIIB has approved the USD 2 million PPSF grant on September 30, 2024, and signed the Grant Agreement with Pakistan on November 6, 2024. This grant enables NHA to hire international consultants to: 1) conduct a comprehensive climate mitigation and adaptation assessment, including proposing measures to enhance the climate resilience of the N-5; 2) strengthen the environmental and social assessment; 3) carry out a comprehensive road safety improvement for the design, construction, and operations of the N-5 Project; and 4) create a digital project management platform to improve transparency and efficiency in project management. Procurement for the PPSF-supported activities is underway with the two individual ES consultants already commenced work. The safety and climate consultants will be onboard in Q3 2025, and the digital project management consultant will be recruited by Q4 2025.

3.14 **Value Addition to AIIB.** N-5 is extremely important for Pakistan's economy. By supporting this Project, AIIB demonstrates its commitment to Pakistan's development, improves its climate and flood resilience, and partially fulfils AIIB's USD 1 billion pledge for Pakistan's resilient recovery from the 2022 floods. As the first AIIB standalone Project in Pakistan, this financing plays a key role in reinforcing the partnership between the Bank and the country. The experience and relationship accumulated in this Project will further strengthen AIIB's connection to NHA, a key Client in a country with enormous development needs and large potential to expand the Bank's portfolio.

3.15 **Lessons Learned.** Lessons learned from MDB projects in the road and transport sector, particularly in Pakistan and similar developing countries, offer valuable insights for improving the design, implementation, and sustainability of the proposed Project and future projects. These lessons highlight the importance of addressing local challenges, incorporating flexibility in project design, and ensuring robust institutional capacity.

a) Capacity Building and Institutional Strengthening. A recurring lesson from MDB-funded road projects is the importance of strengthening the capacity of local implementing agencies. In Pakistan, for instance, the NHA has made progress in managing large infrastructure projects but still faces capacity constraints, particularly in social and environmental management. Projects often require the addition of skilled consultants or new staff to supplement the existing workforce, especially for complex tasks like R&R and environmental impact assessments. Thus, MDBs should prioritize institutional capacity-building, providing technical

assistance for project management, procurement, and environmental and social safeguards. This enables that local agencies can effectively manage and sustain the infrastructure over the long term for the Project as well.

b) Effective Stakeholder Engagement. Many MDB projects in the transport sector face challenges related to stakeholder engagement, particularly with local communities, vulnerable groups, and informal settlers in countries like Pakistan, where the road network expansion may displace informal businesses or affect marginalized communities, it is crucial for projects to adopt proactive, inclusive consultation mechanisms. Effective stakeholder engagement requires early and continuous involvement of local communities in the decision-making process, ensuring that their concerns are addressed and that they benefit from the Project. One key lesson is the importance of embedding gender-sensitive consultations into the design and implementation phases, as women and marginalized groups are often overlooked in traditional infrastructure development processes.

c) Risk Management and Safety Measures. Safety concerns, both during construction and operation, have been a major challenge in many MDB road projects. In countries with developing road safety cultures, such as Pakistan, the construction phase can exacerbate the risks of traffic accidents and OHS issues. Lessons learned, including those from the Karachi Bus Rapid Transit Red Line Project, suggest that safety must be embedded in all stages of the Project, from planning through construction and operation. This includes the requirement for a comprehensive road safety audit, clear safety standards for contractors, and training for local workers on OHS best practices. Furthermore, as seen in several MDB projects, careful attention for the Project must be paid to mitigating risks such as labor influx, which may cause safety concerns and exacerbate social tensions.

d) Climate Resilience and Sustainability. One of the most significant lessons from MDB-funded road projects in developing countries is the need to integrate climate resilience into design and construction. Many road projects in flood-prone regions like Pakistan have faced setbacks due to the lack of climate adaptation measures. In some cases, roads were built without sufficient consideration of changing climate patterns, such as increased flooding and higher temperatures, which led to rapid degradation of infrastructure. As a result, the Project places emphasis on climate resilience, including the construction of flood-resistant road surfaces, better drainage systems, and climate-responsive planning. Additionally, addressing the environmental impacts of road projects and enhancing biodiversity through mitigation measures such as reforestation or habitat preservation are key components of sustainable transport development.

e) Traffic Management and Operational Sustainability. Traffic congestion and disruptions during construction are common issues in high-traffic areas, such as urban corridors or main highways like Pakistan's N-5. A lesson learned from the Karachi Bus Rapid Transit Red Line Project is the critical need for effective traffic management plans during construction and operations. These plans should account for alternative routes, safety for pedestrians, and enable smooth traffic flow to minimize disruptions to the local economy and daily life. Operational sustainability also depends on a robust maintenance plan. In Pakistan, where the toll revenue from roads like N-5 supports not only the road's upkeep but also other

infrastructure projects, lessons from previous projects highlight the importance of ensuring adequate and continuous funding for road maintenance, both during and after construction.

f) Social and Economic Impact Management. Finally, projects must pay close attention to the social and economic impacts on communities along the route, particularly informal settlements, and economically displaced groups. In developing countries, the scale of economic displacement due to land acquisition and resettlement often requires extensive planning and compensation, which can be a lengthy and complicated process. Key lessons from past projects, including the Karachi Bus Rapid Transit Red Line Project, for the Project underscore the importance of early planning for R&R, integrating detailed plans into the Project design to avoid delays. Ensuring that compensation is fair and that displaced people have access to alternative livelihoods is critical for the social acceptance and success of the Project.

3.16 In conclusion, MDB road and transport projects in developing countries, including Pakistan, offer several lessons in the areas of institutional capacity, stakeholder engagement, safety, climate resilience, traffic management, and social impacts. By incorporating these lessons into the planning and execution phases, the proposed Project and future projects can achieve better outcomes and contribute more effectively to sustainable, inclusive development.

4. Project Description

4.1 **Overview.** The Project will reconstruct and rehabilitate four critical sections of the N-5 highway – Ranipur-Sukkur, Rawalpindi-Hassanabdal, Nowshera-Peshawar, and Lahore-Gujranwala – and reconstruct the Nai Baran Bridge on N-5. It will upgrade existing four-lane sections of the N-5 to a six-lane highway and enhance climate resilience and road safety. In urban areas, service lanes will be constructed on both sides to better manage local traffic and reduce direct access to the main carriageway. The Project includes the following three components. A more detailed Project description is provided in Annex 2.

4.2 **Component A: Reconstruction and Rehabilitation of 209 km of N-5 and the Nai Baran Bridge (Total USD 448.76 million; AIIB USD 448.76 million).** This is the main component of this Project, which will reconstruct and modernize four sections of the N-5 and the Nai Baran Bridge. Fully financed by the Bank, this component includes five subprojects:

1) Ranipur-Sukkur (70 km). The Ranipur-to-Sukkur section of N-5 is a 70 km, four-lane dual carriageway and one of the most critical segments of the corridor. Some portions of this section are flanked by urban areas, contributing to congestion caused by mixed traffic, including heavy freight vehicles traveling between Karachi Port, industrial cities, and up-country destinations. Traffic congestion along this stretch not only disrupts mobility but also leads to frequent and severe road accidents. While the overall road condition is fair, certain sections on both the northbound and southbound carriageways suffer from deteriorated pavement. To address these challenges, the Project will add a dedicated lane in each direction for heavy traffic to reduce road deterioration and enhance traffic efficiency. Additionally, service lanes will be constructed in urban areas to better manage local traffic and minimize direct access to the main carriageway. Further improvements include designated U-turns, controlled access points, pedestrian bridges, bus bays, and other measures to enhance road safety, as well as widened culverts, water bridges, and other measures to strengthen climate resilience.

2) Rawalpindi-Hassanabdal (40 km). The Rawalpindi-to-Hassanabdal section of N-5 is a 40 km, four-lane dual carriageway and the busiest segment of the corridor, with an AADT of 50,000 to 60,000 vehicles. This critical section connects major highways, including the Lahore-Islamabad Motorway (M-2) and the Islamabad-Peshawar Motorway (M-1). The route is flanked by densely populated areas, contributing to frequent congestion and a high incidence of road crashes due to numerous uncontrolled access points. To address these challenges, the Project will upgrade and expand the corridor into a six-lane dual carriageway from the Golra Mor Underpass in Rawalpindi to the Burhan Interchange on the M-1. To further improve traffic flow and alleviate congestion, service roads will be constructed on both sides, while road safety will be enhanced through the addition of dedicated U-turns and controlled access points for local traffic, among other measures. Improvements also include widened culverts, water bridges, and other measures to enhance climate resilience.

3) Nowshera-Peshawar (31 km). The Nowshera-to-Peshawar section of the N-5 is a 31 km four-lane dual carriageway that passes through densely populated areas, linking Nowshera District at the N-5/N-45 junction to Peshawar, the provincial capital of KP. It serves as a vital corridor for freight traffic from Torkham at the Afghanistan border.

However, this section experiences high traffic density, congestion, and challenges from urban sprawl and ribbon development, making current speed limits of 100 kilometers per hour (km/h) for light duty vehicles and 80 km/h for heavy duty vehicles largely unachievable. Development along the route has also caused drainage problems and road degradation due to lowered road levels. The Project aims to address these issues by widening the carriageway into a six-lane dual carriageway, adding service lanes on both sides, and rehabilitating and widening bridges. It also includes measures to improve traffic regulation, enhance safety, reduce travel time, and enhance climate resilience for both passenger and freight traffic.

4) Lahore-Gujranwala (68 km). This section is located primarily within the Sheikhupura and Gujranwala districts of Punjab Province. It begins approximately 800 meters from Shahdara Chowk near Lahore, turns onto the Gujranwala Bypass at Chan-da-Qila Chowk (53 km), and continues to Aziz Cross Flyover Chowk – also known as Jinnah Interchange – near Gulshan Aziz Colony (15 km), totaling 68 km in length. The existing road from Shahdara Chowk to Chan-da-Qila is a six-lane divided carriageway, while the Gujranwala Bypass section is a four-lane divided carriageway. Both segments suffer from deteriorated pavement and insufficient capacity for current traffic volumes. The Project will include pavement rehabilitation, geometric improvements at hazardous points (such as U-turns), widening of the Gujranwala Bypass to three lanes, and expansion of existing structures to ensure safer and smoother traffic flow, among other improvements. Damaged or clogged side drains will also be cleared and extended to prevent waterlogging, alongside broader climate resilience and road safety enhancements.

5) Nai Baran Bridge (1 km). The bridge is located in the Sindh Province at Nai Baran, along the Karachi-Thatta-Hyderabad Highway (N-5/KTHH). Nai Baran is a stormwater river prone to torrential flash floods during the monsoon season. The existing bridge at this location, known as the Nai Baran (Bulari) Bridge, is a 164-year-old masonry arch structure comprising 32 spans with a total length of more than 500 meters. The bridge has significantly deteriorated, with decayed stones, cracked masonry arches, and structural damage, having fully exceeded its service life. Its condition continues to worsen over time, posing safety risks. The Project will construct a new bridge 25 meters upstream from the existing structure and preserve the current bridge as a historical heritage site.

4.3 **Component B: Consultancy Support and Capacity Building (Total USD 15.46 million; AIIB USD 15.46 million).** This Component will cover the costs of engaging a Design Review and Construction Supervision Consultant (DRCSC) and an Environmental and Social Independent Monitoring Consultant (ESIMC). Additionally, it will finance the capacity building costs for NHA, such as hiring individual consultants to support NHA in Project-related functions, providing trainings to the Project Steering Committee (PSC), the Project Management Unit (PMU), which includes both the Project Implementation Unit (PIU) at the NHA Headquarters (HQ) in Islamabad and the five Regional Implementation Units (RIUs) at the five Project sites, and supporting relevant PSC and PMU personnel to participate in relevant workshops and trainings. The Bank will fully finance this Component except for 16 percent of the Goods and Services Tax (GST).

4.4 **Component C: Baseline Cost and Improvements (Total USD 90.81 million; AIIB USD 35.78 million; GoP USD 55.03 million).** This Component includes standard cost items usually associated with NHA projects plus improvements featured in this Project. The GoP will fully finance the R&R cost, the R&R Reserve Fund to account for unexpected or complicated situations in implementing R&R, NHA establishment charges, shifting of utilities, and contingencies. The Bank will finance landscaping and horticulture works, air quality and noise monitoring and modeling, climate mitigation and adaptation improvements, road safety, community and occupational health & safety improvements, environmental and social improvements, and the front-end-fees of the two loan tranches. The Bank and the GoP will co-finance the price escalation.

4.5 **Project Cost and Financing Plan.** Table 1 below provides the cost estimation and finance plan for the Project, which is in line with the cost estimation and budget request in the PC-1[8]. The Project is subject to the GoP's approval of the PC-1, a key project proposal document. Upon PC-1 approval, the entire GoP's share of the total Project cost will be allocated for the full duration of the Project implementation period, with annual budgets allocated to the NHA as the Project Implementing Entity (PIE) on a quarterly basis. The PC-1 has been approved by the Technical Working Party – I (TWP-1) and the National Highway Executive Board (NHEB) in March 2025 and the Central Development Working Party (CDWP) in May 2025, still pending approval by the Executive Committee of the National Economic Council (ECNEC) chaired by the Prime Minister, which are expected Q3 2025. Signing of the Project legal documents shall only take place after the ECNEC approval of the PC-1.

Table 1. Project Cost and Financing Plan

Item	Project Cost (USD M)	Financing (USD M and %)	
		AIIB	GoP
Component A: Reconstruction and Rehabilitation of 209 km of N-5 and the Nai Baran Bridge	**448.76**	**448.76 (100%) ***	
1. Ranipur – Sukkur Road (70km)	*121.26*	*121.26*	
2. Rawalpindi – Hassanabdal Road (40km)	*95.52*	*95.52*	
3. Nowshera – Peshawar Road (31 km)	*70.69*	*70.69*	
4. Lahore–Gujranwala (68km)	*155.47*	*155.47*	
5. Nai Baran Bridge (1km)	*5.82*	*5.82*	
Component B: Consultancy Support and Capacity Building	**15.46**	**15.46 (100%) ****	
1. Design Review and Construction Supervision Consultant	*12.46*	*12.46*	
2. Environmental and Social Independent Monitoring Consultant	*1.00*	*1.00*	
3. PMU capacity building, incl. individual consultants to support the PMU, training, workshops, conferences, etc.	*2.00*	*2.00*	

[8] PC-1 (Planning Commission Form-1) is a key project proposal document in Pakistan used for planning, approving, and implementing public sector development projects. It outlines the Project's objectives, scope, cost, funding sources, implementation plan, and socioeconomic impacts. PC-1 is reviewed by provincial or federal authorities, such as the Provincial Development Working Party (PDWP), the Central Development Working Party (CDWP), or the Executive Committee of the National Economic Council (ECNEC) chaired by the Prime Minister, depending on the Project's scale. It ensures alignment with national priorities, transparency, and efficient resource allocation. This N-5 Project is subject to ECNEC's approval.

Component C: Baseline Cost and Improvements	**90.81**	**35.78 (39%) ***	**55.03 (61%)**
1. Resettlement & Relocation Cost	*17.55*		*17.55*
2. Resettlement & Relocation Reserve Fund	*6.17*		*6.17*
3. NHA Establishment Charges	*4.49*		*4.49*
4. Shifting of Utilities	*5.95*		*5.95*
5. Contingencies	*12.21*		*12.22*
6. Price Escalation	*17.50*	*8.85*	*8.65*
7. Landscaping and Horticulture Works	*4.49*	*4.49*	
8. Air Quality and Noise Monitoring and Modeling	*1.43*	*1.43*	
9. Climate Mitigation & Adaptation Improvements	*4.32*	*4.32*	
10. Road Safety, Community and Occupational Health & Safety Improvements	*10.51*	*10.51*	
11. Environmental & Social Improvements	*4.93*	*4.93*	
12. Front-End Fee (FEF) Capitalization	*1.25*	*1.25*	
Total	**555.03**	**500.00 (90%)**	**55.03 (10%)**

* Inclusive of taxes: 8% withholding Income Tax.
** Inclusive of taxes: 15% withholding Income Tax (except 16% Goods and Services Tax or GST, which is not eligible under the Loan).
Note: Numbers may not add up due to rounding.

4.6 **Financing Structure.** Approval is being sought for financing up to USD 500 million for the Project. The financing is proposed to be committed in two loan tranches, through two separate Loan Agreements, within a five-year period.

4.7 The financing for the Project is proposed to be committed in loan tranches in order to: 1) meet Pakistan's long-term development needs, particularly in balancing the large scale of infrastructure investment demand and its long-term debt sustainability; 2) accommodate varying levels of implementation readiness across different Project sections; and 3) more effectively manage the complexity of executing works across multiple sites along a corridor spanning a considerable distance.

4.8 Subject to the approval of the financing, the first loan tranche, in the amount of USD 320.16 million, will be committed for the Project following the Board approval. This first loan tranche will finance subphase 1A of the NHA's phase 1 of the four-phase 20-year plan to reconstruct the entire N-5, including three sections of N-5 totaling 141 km: Ranipur-Sukkur, Rawalpindi-Hassanabdal, and Nowshera-Peshawar.

4.9 The second loan tranche of the financing, in the amount of USD 179.84 million, will be committed within approximately 18-24 months, following Management's verification of the conditions set forth in Section 4.10 of the Project Document. The second loan tranche will support subphase 1B of the NHA's phase 1 of the four-phase plan to reconstruct the entire N-5, including the Lahore-Gujranwala section and the Nai Baran Bridge, totaling 69 km.

4.10 **Conditions for the Commitment of the Second Loan Tranche.** The conditions for proceeding with the commitment of the second loan tranche are: 1) the implementation

performance of the first loan tranche is satisfactory to the Bank[9]; 2) achieving at least 15 percent of completion of both physical works and disbursement under the first loan tranche; 3) disbursement of at least 80 percent of R&R funding to eligible beneficiaries under the first loan tranche; 4) completion of site-specific environmental and social assessments including the ESIA and RAP, and high readiness of RAP implementation for the second loan tranche; 5) high readiness of procurement for the second loan tranche including completion of the PDS and PP; 6) a separate formal request by the Borrower for the second tranche financing; and 7) the availability of AIIB funds and GoP counterpart funding for the second loan tranche.

4.11 **Project Financing Plan by Tranches.** The Project financing plan by loan tranches is provided in Table 2. The Bank plans to finance up to USD 500 million for the Project, with USD 320.16 million towards the first loan tranche, and USD 179.84 million for the second loan tranche.

Table 2. Project Cost and Financing Plan by Tranches

Source	**Total Financing** (210km)		**1st financing tranche (141km)** 1) Ranipur-Sukkur (70km) 2) Rawalpindi-Hassanabdal (40km) 3) Nowshera-Peshawar (31km)		**2nd financing tranche (69km)** 1) Lahore-Gujranwala (68km) 2) Nai Baran Bridge (1km)	
	USD M	%*	USD M	%*	USD M	%*
AIIB	500.00	90%	320.16	58%	179.84	32%
GoP	55.03	10%	35.57	6%	19.46	4%
Total	**555.03**	**100%**	**355.73**	**64%**	**199.30**	**36%**

*Percentage of total Project cost.

4.12 **Implementation Arrangements and Readiness**

4.12.1 **Implementation Arrangements**

(i) Institutional Arrangement

a. The Loan Agreements (LAs) will be signed between the Bank and the Islamic Republic of Pakistan (the "Borrower"), represented by the Economic Affairs Division (EAD), Ministry of Economic Affairs. The Project Agreements (PAs) will be signed between the Bank and the NHA (the PIE).

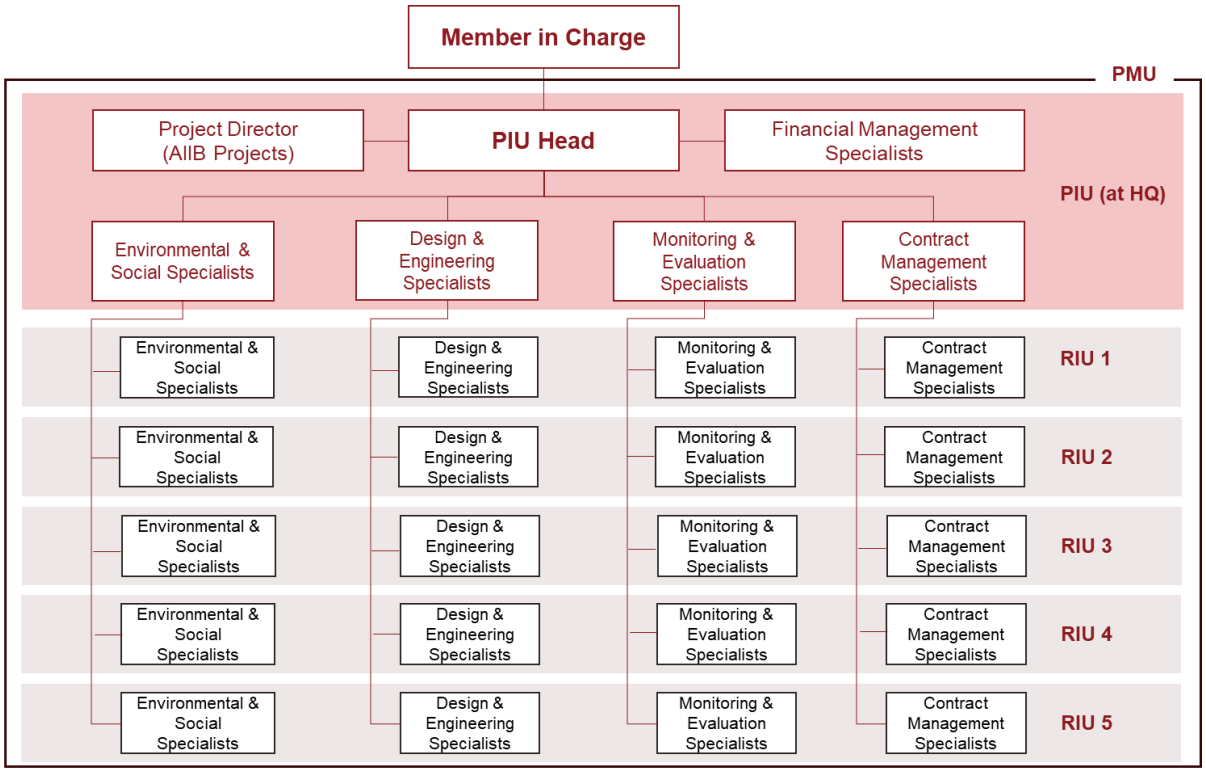
b. The NHA has established a PIU and a PSC at its headquarters in Islamabad during the Project preparation phase. The PSC provides strategic guidance to the PIU. The PSC consists of the General Managers (GMs) from six key functional divisions: Road Asset Management Division (RAMD), Planning, Procurement & Contract Administration (P&CA), Budget & Accounting (B&A), Design, and Environment Afforestation Land Social (EALS). During implementation, the PIU will serve as the central management and coordination body for the Project. To conduct day-to-day activities at the five Project sites, the NHA will establish RIUs responsible for managing their respective N-5 sections and the bridge: RIU 1 (Ranipur-Sukkur), RIU 2 (Rawalpindi-

[9] Assessment will focus on the performance of 1) the procurement of the Design Review and Construction Supervision Consultant and the Construction Contractor, 2) the implementation of the resettlement and relocation, 3) road safety and OHS during construction, and 4) traffic management plan implementation to mitigate traffic disruptions.

Hassanabdal), RIU 3 (Nowshera-Peshawar), RIU 4 (Lahore-Gujranwala), and RIU 5 (Nai Baran Bridge). The PIU and the five RIUs are collectively called the PMU. Figure 1 illustrates NHA's institutional arrangement for Project implementation.

c. The PIU is headed by the GM of the RAMD, supported by the dedicated Project Director for AIIB projects and other RAMD staff. The PIU Head reports to the Member in Charge, who holds a position equivalent to that of a Vice Chairman of the NHA. The PIU consists of five essential functions: ES, Design and Engineering (D&E), Monitoring and Evaluation (M&E, i.e. supervision), Contract Management (CM), and Financial Management (FM). Each of the RIU also has ES, D&E, M&E, and CM functions, and there is a clear communication line within each of the functional areas. The PIU's FM unit is responsible for both the PIU and the RIUs' FM functions.

Figure 1. NHA Institutional Arrangement



PMU = Project Management Unit. PIU = Project Implementation Unit. RIU = Regional Implementation Unit.

(ii) Procurement Arrangement

a. Procurement of goods, works, non-consulting and consulting services contracts wholly or partly financed by the AIIB loan shall be carried out according to AIIB's Procurement Policy (June 26, 2024) as well as the Directive on Procurement Instructions for Recipients (PIR) (July 26, 2024). Given that the NHA is a state-owned entity as per AIIB's Procurement Policy, the specific procurement provisions under Section 2 Procurement by Public Entities under PIR shall apply to the procurement of the Project. In this Project, the Bank's Project Procurement Management System (PPMS) will be used to prepare,

clear, and update Procurement Plans and conduct all procurement transactions. NHA has registered in the PPMS. Subsequently, all procurement activities under the proposed Project will be entered into, tracked, and monitored online through the system.

b. The PIU has been established under NHA with two designated procurement Deputy Directors, one for the procurement of works and goods, and the other for the selection of consulting and non-consulting services. The PIU will be responsible for the procurement and the RIUs will be responsible for contract implementation of the Project.

c. The PIU has prepared a Project Delivery Strategy (PDS) and a Procurement Plan (PP) for the first loan tranche covering procurement arrangements, including contract packaging, cost estimates, selection of templates of tender documents, procurement methods, review methods, and procurement timelines, which will constitute the basis for the Project's first loan tranche's procurement. The Bank has reviewed the PDS, including the PP, and found them acceptable to the Bank. Any updates to the PDS and PP will be submitted to the Bank for review and no objection during the Project implementation. The PIU will prepare the PDS and PP for the second loan tranche, which is a prerequisite for the Bank to process the tranche.

d. Advance procurement will be expected under the proposed Project, however, considering that these advance procurement contracts may not be signed prior to the signing of the legal agreements, retroactive financing will not be applicable under these contracts. The advance procurement contracts may include the DRCSC contract, three (3) Construction Works contracts and the ESIMC contract. The Terms of Reference (TOR) of the Design Review and Construction Supervision Consulting Services contract has been prepared, and the draft Tendering Documents for the three Works contracts, including the Commercial Part and the Works' Requirements, are being prepared. Given that it typically takes around eight (8) months from the issuance of the Specific Procurement Notice (SPN) or Request for Expressions of Interest (REOI) to contract signing for procurements conducted through International Open Competitive Tendering (IOCT) and Quality- and Cost-Based Selection (QCBS), it is recommended that NHA issue the SPNs for works contracts and REOIs for consulting services as early as possible after the Bank approves the Terms of Reference (TORs) and tender documents. This will help accelerate the procurement process and enable construction on the three sections to commence by early 2026. The PIU will prepare the procurement for the second loan tranche, including TORs for consulting services and bidding document for works, which will be assessed prior to the Bank's processing of the second loan tranche.

(iii) Financial Management Arrangement

a. The Project's FM function will be integrated into NHA's existing arrangements for foreign-aided projects. FM responsibilities will be managed by the B&A Division, specifically the Foreign-aided Branch, which will execute budget planning, payment processing, accounting, financial reporting, and coordination of internal and external audits.

b. NHA's Finance Manual serves as a guiding framework for the overall financial management process of the Project. Project-specific details will be outlined in the Project Implementation Manual (PIM).

c. NHA will submit quarterly interim unaudited financial reports within 45 days of the corresponding calendar quarter's end. Annual Project audits will be conducted by the Office of the Auditor General of Pakistan, and the audit report, along with the management letter, must be submitted to the Bank within six months after the financial year-end.

(iv) Environmental and Social Management Arrangement

a. The EALS division of the NHA at the headquarters, PIU, and the ES teams at the RIUs are responsible for ensuring the Project's compliance with national legislation and AIIB's ES standards and policies.

b. Currently, the EALS unit has only two types of specialists: Environmental Experts and Land Management Experts. Despite NHA's extensive engagement with MDBs, the EALS division needs additional support from dedicated specialists and supporting staff in areas of R&R. NHA, in general, lacks expertise in other key areas such as Social Safeguards, OHS, Labor Management, and Climate Resilience. The AIIB Project Team (PT) has strongly recommended that the NHA enhances its ES capabilities by recruiting specialized professionals or implementing a comprehensive training program for its staff. To strengthen the capacity of EALS, two individual international ES consultants have been hired through the PPSF Grant. To strengthen ES implementation, the Project will hire ES specialists, both at the PIU-HQ level and the field RIU level during implementation.

(v) Project Implementation Plans and Project Implementation Manual (PIM): Before signing the Loan Agreement and Project Agreement, the NHA will develop detailed Project implementation plans with associated quarterly disbursement forecast during the Project implementation period. A PIM will also be prepared before Loan Effectiveness, as a one-stop information compilation for operating the Project.

4.12.2 **Implementation period.** The Project is expected to be implemented over a 60-month period, from January 1, 2026, to December 31, 2030. The first loan tranche will be committed upon Board approval, while the second tranche is expected to be committed in 2027.

4.12.3 **Implementation readiness**

(i) Status of feasibility studies: The PC-1 preparation incorporates elements of a feasibility study, including the Project's objectives, scope, cost, funding sources, implementation plan, and socioeconomic impacts. The PC-1 for the Project has been approved by the TWP-1 and the NHEB in March 2025 and the CDWP in May 2025, pending approval by the ECNEC chaired by the Prime Minister, which is expected in Q3 2025.

(ii) Procurement: The P&CA division of the NHA is responsible for managing the Project's procurement activities. With over a decade of experience in preparing and overseeing projects funded by MDBs, the P&CA has demonstrated sufficient capacity to effectively handle the procurement requirements of this Project. Once the Project's procurement is completed, the RIUs will be responsible for contract management during implementation.

(iii) Land acquisition and resettlement: While land within the N-5 right-of-way (RoW) is fully owned by NHA, anticipated risks and impacts related to resettlement remain significant, as in some sections of N-5, some local residents, businesses, communities have extended their residences, assets/structures within the RoW. The widening of N-5 will thus lead some local residents, businesses and communities to lose their livelihoods, facilities and structures. Resettlement and Relocation activities will be required for this Project, in accordance with Environmental and Social Standard 2 (ESS2). The Resettlement Action Plans (RAPs) for the first loan tranche sections have been prepared to manage these R&R risks and impacts in close consultation with Project-affected people and relevant stakeholders. Furthermore, the GoP has committed a resettlement budget (USD 10.41 million under the first loan tranche financing and USD 7.14 million for the second loan tranche financing) as per the PC-1, aligning with the budget estimates in the RAPs. Additionally, the PC-1 includes an R&R Reserve Fund (USD 4.14 million under the first loan tranche and USD 2.03 million for the second loan tranche) to account for unexpected or complicated situations in implementing R&R. Site-specific ES assessments, including the ESIA and RAP, must be completed prior to the Bank's process of the second loan tranche.

(iv) Required clearances/approvals for project implementation: The PC-1 approval is the primary authorization required for the Project to proceed.

4.12.4 **Monitoring and Evaluation.** The NHA will oversee the overall implementation of the Project. To support this, NHA will, under Component B, engage a DRCSC to assist in implementing civil works, supervision/implementation of ES activities, as well as in monitoring and evaluation. An ESIMC will also be hired to specifically monitor the ES implementation. Project progress will also be jointly monitored by the Bank and the EAD through semiannual progress reports prepared by the NHA, contractors, and the DRCSC.

4.12.5 **AIIB's Implementation Support.** AIIB will conduct supervision missions semiannually to extend comprehensive implementation support, including visiting all sections of the Project. In addition to the biannual visits, the AIIB PPSF grant-supported consultants will assist the NHA in implementing and monitoring climate resilience and safety initiatives. For procurement, AIIB has been providing capacity building through training and guidance on policies and procedures, ensuring transparency and efficiency in the procurement process. In terms of ES support, AIIB requires the NHA to engage an ESIMC, and the Bank team will assist the NHA with stakeholder engagement if necessary. Furthermore, additional meetings will be organized as needed to provide in-time support to the Borrower and to the PIE.

5. Project Assessment

A. Technical

5.1 **Project Design.** The NHA has engaged National Engineering Service Pakistan (Pvt.) Limited (NESPAK) to prepare the PC-1 submission, conduct detailed design, and develop tender documents for construction procurement. Upon submission of deliverables, NHA's Planning, Design, Engineering Coordination, and EALS divisions review them to confirm compliance with national standards. Additionally, international consultants supported by the PPSF grant, specializing in climate resilience, road safety, ES management, and digital project management, are further enhancing the Project design to incorporate international best practices.

5.2 The prioritization of the four N-5 sections under the Project was guided by a combination of factors, including traffic volume and road conditions, climate vulnerability, environmental and social impacts, the scale of resettlement and relocation efforts required, and the engineering judgment of NHA and NESPAK. The Nai Baran Bridge was selected due to its severely deteriorated structural condition, which posed significant safety risks and disrupted traffic along this critical segment of the N-5 corridor. Located in Sindh Province, the bridge is a key link on a major logistics route connecting agricultural and industrial areas to southern ports. Its high exposure to flooding and lack of climate resilience further underscored the urgency of its replacement.

5.3 Widening the N-5 from a four-lane to a six-lane divided highway—by adding one lane in each direction—is a necessary investment to accommodate current and future traffic volumes, enhance operational efficiency, and improve safety. With average daily traffic on many segments exceeding 30,000–50,000 vehicles, including a high share of heavy trucks and buses (e.g., 30-40 percent between Ranipur and Sukkur), the existing 2+2 configuration frequently experiences congestion, slower travel times, and elevated crash risks. The added third lane will help restore and sustain Level of Service C or better for most sections, reduce vehicle conflicts, and improve overtaking and merging, especially in mixed-traffic conditions. While not exclusively for heavy trucks, the additional lane will significantly benefit freight movement by reducing speed differentials and providing operational flexibility for large vehicles, particularly in industrial and peri-urban zones. This upgrade also enhances network resilience, supports projected growth of domestic and cross-border logistics, and strengthens the N-5's role as a backbone of equitable and efficient national mobility.

5.4 The Project focuses on two key themes: **climate resilience** and **safety**. NESPAK has incorporated some of these elements into project design, and international consultants supported by the PPSF grant will further refine and enhance them to align with international best practices. The Project's Component C has budgeted additional funding for climate and safety improvements.

5.4.1 **Climate Resilience.** The Project Preparation and Design Consultant, NESPAK, conducted comprehensive studies in hydrology, hydraulics, climatology, and geology, including a Climate Risk and Vulnerability Assessment (CRVA) to identify and mitigate climate-related risks affecting road infrastructure. The CRVA identified two high risks—river flooding and extreme heat—and two medium risks—earthquakes and water scarcity—across all four Project sections, while the

Ranipur-Sukkur section also faces a medium risk of urban flooding. To mitigate flood risks, NESPAK proposed widening 224 culverts and 34 water bridges. Extreme heat risks will be addressed through tree plantations, landscaping, and heat-resilient pavement materials. Earthquake resilience is achieved by adhering to Pakistan's 2021 construction codes, while water scarcity concerns are mitigated through low-water landscaping. A significant portion of the USD 2 million PPSF grant has been allocated to hiring an international consultant for a comprehensive climate mitigation and adaptation assessment, with procurement near finalization and onboarding expected in Q3 2025. This consultant is tasked to conduct an independent CRVA and a thorough review of NESPAK's detailed design and recommend additional measures to enhance climate resilience. Additionally, USD 4.32 million has been budgeted under Component C of the Project for climate mitigation and adaptation improvements. More detailed information on climate resilient features of the Project is provided in Annex 5.

5.4.2 **Safety.** The Project plans to construct 44 new pedestrian bridges and upgrade 34 existing ones, build 68 new protected U-turns, add 37 new bus bays, and modify 9 existing bus bays to enhance road safety and accessibility along the corridor. As required by the Scope of Work, NESPAK has engaged an independent certified road safety auditor to assess the detailed designs. The auditor has identified various safety improvement measures, such as speed controls at urban areas and high pedestrian volume locations, and efforts are underway to incorporate some of these recommendations into the detailed design in collaboration with NESPAK. To further enhance road safety throughout the Project's lifecycle, the PPSF grant is funding the engagement of an international safety consulting firm, with procurement near finalization and onboarding anticipated in Q3 2025. This firm will review and strengthen NESPAK's safety design while also improving safety measures during construction and operations. Additionally, USD 10.51 million has been budgeted under Component C of the Project for road safety, community and occupational health & safety improvements.

5.5 The Project is located at a considerable distance from international waterways and national boundaries and disputed areas. An assessment suggests that AIIB's Operational Policy on International Relations (OPIR) is not applicable in this context.

5.6 **Operational Sustainability.** The Operations and Maintenance (O&M) cost of the Project will be covered by NHA's overall O&M budget upon completion. As a tolled highway, N-5 generates revenue that supports both its own O&M and the maintenance of other highways managed by NHA. The anticipated capacity expansion and traffic growth following Project completion are expected to generate higher toll revenues. According to NHA's estimate, over the next 10 years after Project completion, the Project's O&M costs are projected to be only half of the toll revenue collected from its sections. Given NHA's technically proficient team and its decade-long record of consistent O&M funding, the Project is considered operationally sustainable.

5.7 However, Pakistan continues to face significant funding shortfalls for road maintenance across its national highway network. Tolls collected from the Project sections may be reallocated to other parts of the network with more urgent maintenance needs, potentially

resulting in insufficient funding for the proper upkeep of the Project sections themselves. Addressing these funding gaps will require not only increased budgetary allocations and enhanced toll revenues, but also the development of complementary revenue streams. Potential options include monetizing roadside real estate through advertising rights, leasing service areas and rest stops, and permitting the use of highway rights-of-way for fiber optic lines or energy pipelines. Additional avenues could involve vehicle weigh station concessions, naming rights for major infrastructure, and carbon credit schemes linked to emissions reductions from improved road operations. Strengthening the institutional capacity to transparently manage and reinvest these revenues, particularly along strategic corridors such as the N-5, will be essential to ensuring long-term operational sustainability, safety, and economic benefits.

B. Economic and Financial Analysis

5.8 **Economic Analysis** or Cost-Benefits Analysis (CBA) assesses the economic viability of the Project using the 25-year Project cycle and comparing with/without Project scenarios. The scope of CBA considers all the AIIB-financed four road sections and the bridge to provide an overall analysis of this Project. The analysis includes a standardized demand analysis (see Annex 3 for details) to forecast AADT demand and calculation of the economic internal rate of return (EIRR) and economic net present value (ENPV). The demand analysis of AADT is based on the estimated growth of AADT count of each section from base year, by major types of vehicles including trucks, cars, bus and motorcycles.

5.9 **Traffic Demand Forecast.** The NHA collected data for the AADT for all Project sections for major types of vehicles including cars, buses, trucks and motorcycles. The Bank adopted the AADT count from the NHA, then forecasted average AADT for each section (see Table 3 and Table 4 below) using different growth assumptions for different types of vehicles (Annex 3 shows details). Overall, the Bank's forecast adopts IMF macro growth assumptions and careful comparison with other similar assessment reports. Because these sections connect key populated cities, the demand growth is likely to remain robust. The forecasted traffic demand AADT is used to form CBA.

Table 3. 2026 Baseline AADT Estimates

	Length (km)	Total	Trucks	Cars	Buses	Motorcycles	Others[10]
Average of 1st loan tranche (subphase 1A) sections	141	34,633	6,046	16,561	1,565	7,868	2,592
Average of 2nd loan tranche (subphase 1B) sections	69	59,991	2,921	25,946	4,941	20,122	6,060

Notes: Average AADT was forecasted for 2026 based on 2024 data from the PC-1 report.

[10] Others include rickshaws, animal drawn vehicles, and tractor trolleys.

Table 4. AADT Growth Assumptions

	Trucks	Cars	Buses/Motors/Others
Periods	GDP total %	GDP per capita %	Population %
2026-2030	4.3%	1.7%	1.97%
2031-2035	3.1%	1.7%	1.97%
2036-2040	3.1%	1.7%	1.97%
2041-2045	3.1%	1.5%	1.00%
2046-2050	3.1%	1.5%	1.00%

5.10 Main economic benefits in the baseline model include savings from vehicle operating costs (VOC), value of time (VOT), and greenhouse gas (GHG). We also augmented the baseline model to estimate the benefits related to road safety in the extended model. These savings are largely due to better road quality after rehabilitation and less congestion due to widening of the roads, leading to faster speed and smoother road surface. The passengers and vehicles thus benefit from shorter travel time, less costs on fuels/tires, which also translate into fewer carbon emissions. Regarding economic costs, the analysis is based on Capex and maintenance costs adjusted by AIIB, excluding cost items such as tax, financial cost per MDB CBA practices.

Table 5. Total Economic Benefits (in Million USD) Over the Project Cycle (25 Years)

Economic Benefits	1st loan tranche	2nd loan tranche	Total
VOC Savings	1,972.71	1,131.92	3,104.62
VOT Savings	496.64	552.60	1,049.24
GHG Savings	62.20	33.82	96.03
Total	2,531.55	1,718.34	4,249.89

Table 6. Economic Costs Over the Project Cycle (25 Years)

Economic Costs	Million USD
Capex	531.14
1st loan tranche	341.17
2nd loan tranche	189.97
Operational and maintenance cost	40.56
1st loan tranche	27.23
2nd loan tranche	13.33

Notes: Capex excluded government taxes, duties, and financial costs.

5.11 The Project is economically viable. EIRR and ENPV appear to be resilient and remain above the accepted threshold in the sensitivity analysis. Overall baseline EIRR for the Project is 20.4 percent. For the 1st tranche, the EIRR is estimated to be 19.2 percent, while for the 2nd tranche, it is estimated to be 22.5 percent. The ENPV of the Project is estimated at USD 437 million, with USD 235 million attributed to the first tranche and USD 202 million to the second tranche. EIRR remains resilient under most extreme scenarios where traffic projections drop by 25 percent and cost overrun increases by 25 percent. There are two key reasons behind the attractive EIRR estimate for the Project. First, the N-5 remains the country's most important trade corridor, offering the most affordable connectivity between major urban centers. In

contrast, motorways continue to be perceived as costly due to higher tolls. Second, the proposed N-5 sections serve rapidly growing urban areas where demand is expected to remain strong, leading to higher AADT projections and, in turn, a robust EIRR. After including the road safety benefits (details in Annex 3) in the extended model, the EIRR for the overall Project increases to 24 percent (an EIRR of 22 percent and 26 percent for the 1st tranche and the 2nd tranche, respectively).

5.12 **Financial Analysis** (FA) evaluates the financial viability of the Project over a 25-year Project cycle. The scope of the FA encompasses all four road sections and the bridge to be financed by the AIIB in the Project. The analysis adopts 2026 as the starting year, in alignment with the most recent Project implementation plan.

5.13 The findings indicate that toll revenues are sufficient to cover O&M costs through the Project cycle. However, the substantial capital investment renders the Project financially unviable on a standalone basis. The toll revenue from this Project will be contributed to NHA's Road Maintenance Fund, which primarily supports highway maintenance throughout the country. The GoP is funding 10 percent of the total cost of the Project (majority of which budgeted for R&R and contingencies as per the PC-1 document), reflecting that the counterpart funding for the Project is arranged. NHA's financial resources beyond the toll revenues are covered through allocations from the federal Public Sector Development Program (PSDP) and other government grants. While the Financial Internal Rate of Return (FIRR) for the Project is negative (-4.13 percent), the Project boasts a healthy EIRR. Moreover, the N-5 highway provides several additional economic benefits not estimated in the CBA, including intra- and inter-province connectivity, and is the backbone of trade between landlocked Afghanistan, Pakistan, and the Arabian sea.

5.14 To realize the anticipated socio-economic benefits, the Project requires significant upfront capital expenditure, making it financially unviable on a standalone basis. However, the combination of a negative FIRR and a positive EIRR underscores the critical need for AIIB's sovereign-backed financing. This contrast highlights the Project's far-reaching socio-economic advantages – beyond financial returns – including improved public welfare, enhanced infrastructure, and sustained economic growth. AIIB's support is essential in bridging the financial gap, enabling the Project's feasibility, and aligning it with broader public interests and development objectives.

C. Fiduciary and Governance

5.15 **Procurement.** The NHA has extensive procurement experience, having successfully implemented almost 30 projects financed by International Financial Institutions (IFIs) in the past two decades. The PIU has been established with two designated Deputy Directors for procurement – one focusing on goods and works, and the other on consulting and non-consulting services – both supported by junior staff. NHA's field RIUs will be responsible for implementing works contracts including contract management. This arrangement will provide the PIU with adequate procurement capacity to implement the Project effectively.

5.16 A detailed procurement capacity and risk assessment was conducted during Project appraisal. The major potential procurement-related risks were identified, which include: (i) potential non-compliance with the Bank's procurement requirements and procedures in the procurement process due to NHA's lack of familiarity with the Bank's requirements as this is

the Bank's first standalone Project with NHA; (ii) possible delay in the procurement process; and (iii) possible insufficient capacity for NHA to manage the three large works contracts in the first tranche and potential 2nd tranche procurements and contracts starting in 2026. The proposed measures to mitigate the above major risks will include the following: (i) the Bank has provided procurement training on the Bank's procurement requirements and procedures during the preparation, and will continue to provide such training to NHA including contract management throughout the Project implementation; (ii) the Bank has developed an eight-hour procurement E-learning course for clients, which is freely accessible by the NHA through the Bank's website[11]. The NHA procurement staff are required to participate in the course and obtain the completion certificate, which is issued once the course is completed with qualifying scores; (iii) To accelerate the multi-layer review and approvals, such as tender documents, evaluation reports, complaints, contract variations etc., the PIU is being prepared to strengthen its coordination with the multi-layer approving bodies to fast-track the review; and (iv) The DRCSC will be hired to assist NHA in the contract implementation, i.e. to supervise construction of the road sections in terms of construction progress, quality control, cost, variations etc. Based on the assessment, the procurement capacity-related risks for the Project are rated as "Medium".

5.17 **Financial Management.** The FM assessment, conducted in accordance with the Operational Policy on Financing (November 2024), concluded that the proposed financial management arrangements, together with the implemented risk mitigation measures, should enable timely and accurate financial reporting on Project implementation and help confirm that Project funds are used for their intended purposes.

5.18 The FM risk is assessed as Moderate, as the B&A Division of NHA has extensive experience managing the FM aspects of MDB-financed operations. The current staffing is adequate, and internal controls in place feature authorization and segregation of duties over transactions. A general ledger (GL) accounting system is designed to enable the accurate accounting and classification of Project transactions. Additionally, there are established external and internal audit arrangements in place.

5.19 The key risk factors identified are: (i) delays in counterpart funding and unrealistic budget formulation, which may lead to insufficient resources and Project implementation delays; (ii) potential inadequate staffing capacity, resulting from increased workload, which may hinder the timely execution of financial management requirements; (iii) inconsistencies in contract administration databases across NHA divisions, potentially misaligning contract records and creating challenges in accurately tracking contractual performance; and (iv) delayed audit reports, which may result in non-compliance with financing agreement covenants.

5.20 The identified risks will be mitigated through several measures: (i) the Project budget has been revised and will be approved by the ECNEC before signing the Loan Agreement and Project Agreement. Once approved by the ECNEC, the GoP's entire share of the total Project cost will be allocated for the full duration of the Project implementation period; (ii) a capacity building sub-component (Component B.3) has been included in the Project, allowing for the recruitment of a Financial Management Consultant, if needed; (iii) NHA's PIU and RIUs will maintain contract information to support proper reconciliation and minimize discrepancies; and (iv) time-bound actions for the preparation, approval, and authorization of accounts and annual

[11] https://learn.aiib.org/enrol/index.php?id=3

financial statements will be incorporated into the PIM to achieve timely submission to auditors. Additionally, the GM of Internal Audit of NHA will help coordinate with the Auditor General of Pakistan (AGP) to facilitate the timely execution of audits and submission of reports to AIIB.

5.21 *Staffing:* The B&A's Foreign-aided Branch is led by a Director of B&A, who reports directly to the GM of B&A. The Director is supported by 10 Accounting and Finance Professionals, experienced in several foreign aided Projects financed by AIIB, ADB and WB amongst others. The roles and responsibility of each staff position are clearly defined with limits of authorization approvals and included in the NHA Financial Manual.

5.22 *Budgeting:* The B&A consolidates the NHA's annual entity budget which is approved by the National Highway Council. However, projects of this nature must also obtain approval from ECNEC before being included in the proposed federal budget, which is ultimately approved by parliament. Each year, the approved project budget will be shared with AIIB, and a quarterly variance analysis will be conducted and included in the interim unaudited financial reports submitted to the Bank.

5.23 *Accounting and Reporting:* NHA prepares its accounts and financial reports in accordance with International Financial Reporting Standards (IFRS). However, the Project-specific interim unaudited financial reports will be prepared on a cash basis and in dual currency. The report template will be agreed upon and included in the PIM. Transactions are recorded and maintained in the GL Accounting System, which will also be used for project accounting. The system's Chart of Accounts allows for the creation of a project-specific code, classifying transactions by sources of funds, project components, subcomponents, and categories. This should enable a streamlined process for preparing financial reports in accordance with the Bank's requirements while reducing the potential for inaccuracies.

5.24 *The Internal Control:* Notably, NHA's internal controls incorporate segregation of duties and authorization processes which are embedded in the GL Accounting System. Bank reconciliations are conducted monthly, and there are established checks and balances across contract administration database (manual and excel).

5.25 The GL system also includes a fixed asset module; however, physical verification of fixed assets is conducted every three years in line with the period for revaluing assets. While this does not present a significant risk to the Project based on the nature of the activities financed, NHA should consider gradually transitioning towards best practices by implementing annual physical verifications, especially for assets at higher risk of damage or pilferage.

5.26 *Internal Audit:* The Internal Audit Division is led by the GM of Internal Audit, who reports to the Audit Committee, which includes the Chairman of NHA. The function is guided by an Internal Audit Charter, and risk-based audits are conducted annually in accordance with the approved audit plan. Audit reports will be shared with the Bank upon request. While the overall staffing capacity of the Internal Audit Division appears constrained, the department prioritizes the internal audits of foreign-aided projects as per established practices.

5.27 *External Audit:* NHA's entity audits are conducted by a private sector audit firm following International Standards on Auditing (ISA). However, the AGP will audit the Annual Project Financial Statements in accordance with International Standards for Supreme Audit Institutions. The Project audit report and management letter should be submitted to the Bank

within six months of NHA's financial year-end. The audited entity financial statements and management letter will be made available to the Bank upon request. In line with the Bank's General Conditions (Oct 2021), NHA will make the Project audited financial statements publicly available.

5.28 *Disbursements:* The primary disbursement method will be Direct Payment, with Advance and Reimbursement options used to maintain flexibility in funds flow, especially for the processing of smaller-value payments. Expenditures financed by AIIB will be inclusive of taxes but excluding Goods and Sales Tax (GST) on consultancy contracts which will be paid using counterpart funding. This is due to GST being under litigation between NHA and the Province of Punjab.

5.29 Specifically, for Advances, AIIB will process requests through a withdrawal application supported by a six-month cash forecast statement. For any subsequent request following the initial application, a summary of expenditure must also be provided. Upon AIIB's approval, funds will be disbursed to a designated account (the Revolving Fund Account – RFA), which will be established at the National Bank of Pakistan and managed in accordance with the Revised Accounting Procedures for the RFA (August 2013). A separate account will be maintained for processing counterpart funding.

5.30 **Financial Crime and Integrity (FCI) and Counterparty Due Diligence/Know Your Counterparty (CDD/KYC).** Integrity screenings of the Borrower and the PIE have been performed through WCOne. No critical findings were found.

5.31 **Governance and Anti-corruption.** AIIB's Policy on Prohibited Practices (2016) applies to the Project. AIIB is committed to preventing fraud and corruption in the projects it finances and will ensure strict compliance with AIIB's Policy on Prohibited Practices. The Bank reserves the right to investigate, directly or indirectly through its agents, any alleged corrupt, fraudulent, collusive, coercive, or obstructive practices, and misuse of resources and theft or coercive practices relating to the Project and to take necessary measures to prevent and redress any issues in a timely manner, as appropriate.

5.32 **Cybersecurity.** The infrastructure financed is not considered as Critical Infrastructure.

D. Environmental and Social

5.33 **Environmental and Social Policy and Categorization.** AIIB's Environmental and Social Framework (ESF), including its Environmental and Social Policy (ESP) and Environmental and Social Exclusion List (ESEL), applies to the Project. Specifically, ESS1 (Environmental and Social Assessment and Management) and ESS2 (Involuntary Resettlement) are relevant to the Project, while ESS3 (Indigenous Peoples) is not triggered, as no indigenous peoples are present or have a collective attachment to the Project area. Based on the potential environmental and social risks and impacts identified by the ES assessments, the Project has been categorized as "A" due to its significant ES risks and impacts. These include large-scale construction activities and significant risks and impacts related to R&R of informal settlers, and some physical and economic displacement, as well as labor and working conditions, including OHS. Community health and safety concerns, such as traffic and road safety risks and the potential for gender-based violence/sexual exploitation and abuse/sexual harassment (GBV/SEA/SH), further elevate the risk profile. In addition,

there is the potential lack of inclusion of vulnerable and disadvantaged groups, particularly women, in Project benefits. Environmental impacts, including pollution, dust, noise, and vibration, are anticipated in and around the Project area. Compounding these challenges is the Client's limited capacity and resources to effectively manage diverse ES risks and impacts. This risk categorization underscores the importance of implementing robust risk management and mitigation strategies throughout the Project's preparation and execution phases.

5.34 **Environmental and Social Instruments.** The Project adopts a multi-loan tranche financing approach, where only the first three priority N-5 sections have undergone detailed engineering design prior to Project appraisal. As a result, both a framework approach and site-specific ES assessments are required in compliance with Pakistani national and state legislations, AIIB's ESF, and international good practices. During Project preparation, the Client has prepared, for ES risks and impacts management, the following framework instruments that are applicable to the entire Project: an Environmental and Social Management Planning Framework (ESMPF), a Stakeholder Engagement Plan (SEP), a Labor Management Plan (LMP), a Resettlement Planning Framework (RPF), and a Gender Action Plan (GAP). In addition, an Environmental and Social Action Plan (ESAP) has been prepared, outlining the Client's commitment to manage relevant ES risks and impacts as per the requirements of AIIB's ESF, alongside specific time-bound actions, responsibilities, and required resources. These framework documents are complemented by site-specific instruments prepared by the Client, including an Environmental and Social Impact Assessment (ESIA) with corresponding Environmental and Social Management Plan (ESMP) that covers all the three road sections under the 1st loan tranche, and a Resettlement Action Plan (RAP) for the three road sections under the 1st loan tranche, respectively. These ES instruments were published on both the AIIB and NHA websites[12] on April 20, 2025.

5.35 **Environmental Aspects.** The Project involves widening and upgrading of the existing highway from four lanes to six lanes, along with the construction of a bridge. The primary environmental risks and impacts are associated with these activities and could be exacerbated due to the potential capacity constraints within the NHA in ensuring environmental and social compliance and considering the extensive geographic scope of the proposed operations. Although many environmental risks and impacts are already present due to the highway's current state, the proposed upgrades could introduce new impacts. In the meantime, the widening and improvement efforts may offer an opportunity to address and mitigate these existing issues, potentially improving the overall environmental and social conditions along the corridor.

5.36 The draft ES assessment documents have identified several key environmental concerns, including potential receptors such as, small streams and water bodies, traffic congestion, accidents, drainage and waterlogging issues, and the presence of trees and vegetation within the RoW of N-5. The Margalla Hills National Park is located near the Rawalpindi-Hasanabdal section but away from the RoW, with its buffer zone approximately 500 meters from the RoW. The ESMPF highlights potential environmental risks, including tree and vegetation removal, disruption to infrastructure and utilities, increased noise and air pollution from construction activities, solid waste and wastewater generation, and the risk of

[12] AIIB website: https://www.aiib.org/en/projects/details/2024/proposed/pakistan-reconstruction-national-highway-pakistan-resilient-recovery-rehabilitation-reconstruction-framework-project.html. NHA website: https://nha.gov.pk/documents/topic/26544

soil and water contamination from oil spills. Occupational and community health and safety concerns, as well as traffic congestion and road safety hazards, are also anticipated. During the operation and maintenance phase, key concerns include health and safety risks associated with road maintenance and heavy traffic. The ESMPF provides generic/framework level mitigation measures to address these risks.

5.37 The draft ESIA for the three road sections under the first loan tranche concludes that physical-environmental impacts are moderate, while social impacts are significant. These impacts can be managed through the mitigation measures outlined in the ESMP, RAPs, and the SEP. Key environmental risks include noise and vibration from construction machinery, contamination of water sources due to uncontrolled wastewater disposal, soil and groundwater pollution from improper waste management and vehicular movement, air quality degradation from fugitive dust and emissions, and solid waste pollution from construction camps. Land clearing, including within the RoW/median, will result in tree loss, and increased road safety risks may impact local communities and institutions. As land clearance and physical construction activities are confined within the RoW, tree loss will be limited to those within the RoW, including trees in the median and along the road edges. No trees will be removed from any natural forest outside the RoW. Noise measurements at 11 locations indicate already high existing noise levels. The NHA plans to conduct a comprehensive noise assessment[13], including additional measurements and noise modeling at various locations, particularly near noise-sensitive receptors. Based on the findings, tailored mitigation measures will be adopted to address site-specific conditions. To mitigate these impacts, the draft ESMP proposes measures such as noise and vibration control (using quieter equipment, barrier protection, and scheduled work adjustments as well as speed restrictions, vegetation, improved pavement etc.), wastewater management (septic tanks, soakage pits, and compliance monitoring), solid waste management (proper waste collection and disposal systems), and air quality control (dust suppression, emissions control, and vehicle maintenance). The estimated number of trees to be felled is 2,550 in the Ranipur-Sukkur section, 2,350 in the Rawalpindi-Hassanabdal section, and 3,500 in the Nowshera-Peshawar section, with corresponding estimated compensatory plantations of 25,500, 23,500, and 35,000 saplings, respectively. Forest Departments, EPAs, and other stakeholders were consulted during the ESIA process, and consultations will continue. Consultations with the Forest Departments of Khyber Pakhtunkhwa (KP), Punjab, and Sindh emphasized the need to minimize tree cutting, jointly verify the trees to be removed with forest officers, obtain No Objection Certificates (NOCs) as required prior to construction, and allocate budget for compensatory plantation. The Sindh Forest Department confirmed that there are no reserved or important forests in the vicinity of the road. The Punjab Forest Department noted that plantations along roadsides, maidans, canals, and railway lines are protected. The KP Forest Department advised that an NOC should be obtained prior to the felling of roadside trees managed by the department. The Project will comply with the country's regulatory requirements, including obtaining clearances, permits, and NOCs from relevant competent authorities before construction or as required. Safety and environmental protection measures will also be implemented to minimize road accidents and community disruptions. The draft ESMP includes institutional responsibilities, mitigation strategies, monitoring requirements, and a budget for mitigation measures. The NHA will oversee the ESMP implementation, integrate it into design, bidding documents, and contractor agreements, and monitor environmental compliance throughout all Project phases.

[13] These and other ES commitments will be reflected, inter alia, in the ESAP.

5.38 **Social Aspects.** The Project is expected to generate positive social benefits for the local population, including enhanced climate resilience, improved travel conditions, better road safety, reduced transportation costs, shorter travel times, alleviated congestion, and opportunities for local employment. Yet, both the Project-level ESMPF, RPF, GAP and LMP and the site-specific ESIA and RAPs have identified potential social risks and impacts which need to be addressed. These include R&R, the potential lack of inclusion of vulnerable and disadvantaged groups in the Project benefits, inadequate and ineffective stakeholder engagement, restrictions on land use, and physical and economic displacement due to civil works. Implementation of the R&R may result in tension between the Project and affected local communities and other relevant stakeholders. These risks and impacts have been identified in respective site-specific RAPs and the SEP, which include a requirement for a meaningful and informed consultation process with the affected people and other relevant stakeholders, including religious scholars/leaders where appropriate. These instruments and the stakeholder engagement aim to enable that the implementation of R&R is carried out in accordance with national requirements, the Bank's ESF, as well as in a manner that is inclusive and culturally and religiously appropriate according to local customs and practices. Additionally, the LMP and site-specific ESIA have identified risks associated with labor and working conditions, including OHS and community health and safety (CHS) due to labor influx. All these identified social risks and impacts have been mitigated in the ESMP, relevant code of conduct, and across the ES instruments.

5.39 The site-specific ESIA has identified other social risks hailing from the potential for poor construction practices, leading to land use restrictions, property damage, road safety hazards, traffic disruption, utility relocation, among others. During the construction phase, the nearby communities may face health and safety risks, including exposure to noise, waste, traffic accidents, public safety issues (due to improper housekeeping and open excavation), and access restrictions to properties or community facilities.

5.40 The LMP and the ESIA have identified labor influx as a potential social risk, which could result in GBV/SEA/SH, as well as in the spread of communicable diseases due to migrant workers' overcrowding and poor living conditions. If not properly managed, these risks could negatively impact both the migrant workers and host communities. The potential impact of Project activities on women have been assessed in both the GAP and the site-specific ESIA. Measures to address the potential negative impacts, particularly from labor influx and associated risks of GBV/SEA/SH have been included in the GAP and in the section-specific ESMPs/draft RAPs.

5.41 The RPF identified that all required land for construction/rehabilitation of N-5 is within the NHA's RoW. Despite this, given that many sections of the N-5 have been encroached, the construction/rehabilitation of N-5 will impact on residential and community structures, such as religious and educational buildings. In addition, the Project will potentially cause economic displacement, and livelihood impacts on informal businesses and residents due to road widening. The RPF provides detailed policies and procedures to assess and manage resettlement impacts, including a livelihood restoration framework to restore/enhance the livelihoods of Project-affected people, including women and vulnerable groups, in line with the objective of ESS2.

5.42 Site-specific RAPs for the three sections under the first loan tranche have been prepared based on detailed measurement surveys (DMSs) and consultations with Project-affected people and other relevant stakeholders. The draft RAP for the Ranipur–Sukkur section indicates that three residential structures, 124 commercial structures, and nine community/religious structures will be affected. Likewise, the draft RAP for the Rawalpindi–Hasanabdal section identifies three households (HHs) with residential structures and assets extending into the RoW, along with impacts on 118 commercial structures, of which only three will be severely affected (defined as losing 10 percent or more of the structure). Additionally, 16 community/religious structures will be impacted, with three severely affected.

5.43 The magnitude of resettlement impacts for Section 8 of the road is higher, compared to Sections 2 and 7. The RAP for the Nowshera-Peshawar section identifies 23 HHs as having impacts on their residential structures, with six HHs facing significant impacts (defined as losing 10 percent or more of their main residential units). A total of 665 commercial structures will be affected, of which 233 will be severely impacted. A total of 86 community/religious structures (including mosques and graveyards) will be affected, 16 of which are severely affected.

5.44 Given that resettlement impacts significantly concentrate on community/religious structures, including mosques, the implementation of relocation measures such as the shifting of graves, shrines, and other religious assets shall proceed sensitively. Implementation shall be carried out with utmost care and respect for the affected communities' cultural and religious practices. Before the relocations, comprehensive and meaningful consultation will be undertaken with all relevant stakeholders, including local communities, religious leaders, Ulemas (scholars of Islamic doctrine and law), and relevant authorities, to obtain broad community support. Local religious leaders and Ulemas will play a critical role in upholding respect for religious beliefs and practices throughout the process, guiding the community in understanding the spiritual and cultural significance of the relocation. The consultation process will incorporate their inputs and actively involve their leadership in all decisions related to the relocation of religious structures.

5.45 Consistent with AIIB ESS2 requirements, the draft site-specific RAPs incorporate measures to mitigate physical and economic displacement impacts, including compensation for lost assets at replacement cost and R&R assistance to cover transitional support, transportation, and additional entitlements for severely affected or vulnerable individuals. These additional entitlements encompass livelihood restoration and improvement support, such as cash assistance, preferential access to Project-based employment or training, microcredit facilities, and logistical aid for alternative income-generating activities, alongside special provisions for vulnerable groups. The specific entitlements for each affected people per household are determined through an entitlement matrix detailed in the RAPs. Furthermore, the RAPs include Livelihood Restoration Plans (LRPs), which outline targeted initiatives—such as vocational training and commercial trade linkages—to strengthen the socioeconomic conditions of displaced persons.

5.46 The RAPs will be financed through counterpart funds provided by the GoP. NHA as the PIE will be the responsible entity managing delivery of the RAPs following the provisions outlined in AIIB's ESF and the national legal framework, with implementation coordinated between the PIU at the NHA HQ and the field RIUs. The DRCSC includes safeguards

specialists for assisting NHA in the implementation and monitoring of the RAPs during the execution of the Project. A three-tier Grievance Redress Mechanism (GRM) will be established at the community, RIU, and PIU levels to support NHA to fairly and efficiently resolve complaints regarding entitlements. The commencement of civil works for each section is conditional upon satisfactory progress in the implementation of the RAPs and the establishment of the GRMs.

5.47 **Occupational Health and Safety, Labor and Working Conditions (LWC).** The Project will involve typical construction work-related OHS risks such as work-related accidents, hazards associated with the use of explosives and hazardous chemicals, electric shock, mechanical and load handling hazards, health issues from work environment (emissions, noise, vapours, extreme temperature, weather condition, contaminants, etc.), traffic and road safety, such as vehicular accidents, operations of machinery, road-crash kills to livestock, road detours, etc. Relevant mitigation measures are formulated in the ESMP and in the Traffic Management Plan. Construction-specific risks and impacts considered in the Project are related to labour influx and potential social tensions with the host communities. There could be potential issues on labour and working conditions due to sub-standard working practices and sub-contracting arrangements. The LMP and the ESMP include relevant procedures to manage LWC risks and impacts during both the construction and operational phases. The procedures will be included in the bidding documents. The LMP will be implemented, monitored, and reported to address these OHS/LWC impacts.

5.48 **Stakeholder Engagement, Consultation, and Information Disclosure.** Consultations with key stakeholders, including local women and vulnerable groups, have been carried out by NHA and NESPAK as part of Project preparation to confirm that stakeholder views were duly considered and associated actions identified in finalizing Project design and the ES instruments. A SEP has been prepared identifying and analyzing stakeholders, including Project-affected people and vulnerable/disadvantaged groups, civil society organizations (CSOs) and various national/provincial government agencies, amongst others. The SEP also outlines measures to maintain the engagement of key stakeholders throughout the Project cycle, including ongoing consultations, outreach programs, and the establishment and socialization of the three-tier GRM (see para. 5.48). In terms of information disclosure, the ES instruments identified above will be disclosed in English, and in summary form in Urdu, on both the Borrower's and AIIB's websites at least 60 days before AIIB Board approval, in line with AIIB's ESF.

5.49 **Project Grievance Redress Mechanism.** Given the Project geographical scope and associated ES risks, a three-tier GRM has been agreed, with the first tier at the community level, the second tier at RIU level, and the third at the PIU level. Any complaints that cannot be resolved at each level will be escalated to the next tier. The availability of the GRM will be duly communicated across the Project area so that all Project-affected people are appropriately informed. Targeted trainings sessions will be organized for the Grievance Redressal Committee (GRC) members which cover the GRM framework, processes, and tools, including grievance documentation, escalation pathways, and reporting. The GRM will be complemented by a GBV Committee at the RIU level, which will operate to facilitate women's adequate access to the various tiers of the GRM and to handle complaints in a gender-sensitive manner. A worker-specific GRM will also be established to manage specific risks and impacts related to OHS/LWC. The Project GRM will be established and operational

prior to the commencement of any Project activities, construction work, or R&R, and will be maintained throughout Project implementation. All complaints received will be documented by a designated staff member in the Complaint Register, and ongoing monitoring of the GRM will be conducted by the Supervision Consultant.

5.50 **ES Monitoring**. The aim of the ES monitoring is to provide timely information, identify and address bottlenecks, and confirm compliance with the ESIA and ESMP, as well as the standalone plans like the RAPs. During the implementation phase, the ES staff of each RIU will hold monthly meetings to discuss routine activities, non-compliance, and corrective measures. Various periodic reports will be produced, which will include ES monitoring results, and shared with relevant stakeholders, including the respective Environmental Protection Agencies (EPAs) and AIIB. The PIU and RIUs will be responsible for monitoring throughout all Project phases, ensuring that contractors implement ES instruments and relevant permits. The PIU will manage ES aspects, prepare and submit monitoring reports to AIIB and relevant agencies, monitor compliance, and identify corrective actions. ES staff at the RIUs will monitor on-site implementation of ES instruments, confirm compliance, and report any ES incidents to the PIU. Third-Party Validation (TPV) will be carried out by the ESIMC under Component B, who will monitor the implementation of ES instruments and provide biannual/six-monthly reports (including annual, and final evaluations). The DRCSC will prepare monthly reports, summarizing Project's performance/compliance with ES instruments and requirements, and submit findings to the RIUs, PIU, and AIIB.

5.51 **ES Capacity**. Despite NHA's experience in managing and implementing resettlement, its capacity and resources are limited, particularly within the EALS division, to effectively manage ES risks and impacts across a large portfolio of projects. These include other ES tasks in the projects funded by MDBs and domestic sources. The current staffing level is inadequate relative to the volume of projects, resulting in an overstretched team. Additionally, existing staff tend to lack the necessary specialization, expertise, and exposure to MDB ES requirements and emerging international good practices in ES risk management. To strengthen ES implementation, the Project will engage ES specialists at both the PIU-HQ level and the field RIU level in Component B. Capacity-building measures, including ES training, will be provided to Project implementation stakeholders. Moreover, there is a broader need for institutional capacity enhancement at NHA to align with international good practices, MDB policies, and national ES regulations. Building on previous capacity-building recommendations, NHA plans to undertake a strategic institutional ES capacity assessment with the support of the international environmental and social consultants funded by the PPSF grant. The assessment will provide recommendations on institutional arrangements, staffing needs, ES systems including environmental and social management system (ESMS) development, resource requirements, training, exposure visits, and overall system functionality.

5.52 **Bank's Project-Affected People's Mechanism (PPM).** AIIB's Policy on the PPM applies to this Project[14]. The PPM has been established by AIIB to provide an opportunity for an independent and impartial review of submissions from Project-affected people who believe they have been or are likely to be adversely affected by AIIB's failure to implement the ESP in situations when their concerns cannot be addressed satisfactorily through the Project-level GRM or the processes of AIIB's Management. For information on how to make submissions

[14] https://www.aiib.org/en/policies-strategies/operational-policies/policy-on-the-project-affected-mechanism.html

to the PPM, please visit the PPM webpage: https://www.aiib.org/en/about-aiib/who-we-are/project-affected-peoples-mechanism/how-we-assist-you/index.html.

E. Climate Change

5.53 **Paris Agreement Alignment.** The loan proceeds will finance three components in the Project, with the primary focus on Component A: Reconstruction and Rehabilitation of 209 km of N-5 and the Nai Baran Bridge. Some sections will undergo capacity expansion from a four-lane to a six-lane carriageway, making them ineligible for Universal Alignment. As a result, these sections are subject to a Specific Criteria (SC) assessment to determine their compliance with the mitigation goals of the Paris Agreement (BB1). The remaining two Components (Component B and Component C) primarily involve consultancy support, capacity building, baseline costs and other improvements. Due to their neutral impact on climate mitigation and minimal climate resilience risks, both are classified as aligned with adaptation and mitigation objectives.

5.54 Based on the analysis conducted for SC1-5, the Project is considered aligned with the Paris Agreement's (PA) climate mitigation goals (BB1). This alignment is supported by its compatibility with the country's Nationally Determined Contribution (NDC) and Long-Term Strategies, adherence to low-carbon pathways, absence of carbon lock-in risks, availability of low-carbon alternatives, and positive economic returns when accounting for shadow carbon pricing. A detailed analysis is provided in Annex 5.

5.55 The Project sites were initially assessed using the Physical Climate Screening Tool (PhyCST), developed in-house by the AIIB's Climate Team, which identified significant climate risks, including high temperatures, heavy precipitation, and floods. As a result, a Climate Resilience Assessment (CRA) was conducted following AIIB's methodology to evaluate alignment with the adaptation goals of the Paris Agreement (BB2). The CRA process involved a CRVA, identification of measures to address climate risks, and an evaluation of the Project's compatibility with the NDC and national adaptation strategies. Individual CRAs were carried out for each road section, with NESPAK performing a CRVA using CMIP6 climate projection data for two scenarios (SSP 2-4.5 and SSP 5-8.5) over 25-, 50-, and 100-year return periods. The assessment found that increased temperatures and rainfall-induced flooding pose high risks to all Project sections, while the Ranipur-Sukkur section also faces urban flooding. To mitigate these risks, the Project will incorporate climate resilience measures as outlined in the BB2 section of Annex 5. Given that these measures address material climate hazards and that the Project aligns with the NDC and national adaptation strategies, it is considered aligned with the adaptation goals of the Paris Agreement (BB2).

5.56 **Climate Finance.** Certain elements of the Project qualify as climate mitigation finance, including landscaping, afforestation, solar street lighting, bus bays, and pedestrian bridges and tunnels. The total climate mitigation finance claimed for the Project amounts to USD 8.81 million, representing 1.76 percent of AIIB's investment.

5.57 As the Project falls under Climate Adaptation Type 1 (adapted project) and incorporates primarily structural adaptation measures, a 15 percent climate adaptation finance allocation is applied to the Engineering Procurement and Construction (EPC) cost based on AIIB's proportional approach following the joint MDB methodology for tracking climate adaptation

finance. This results in an allocation of USD 67.31 million, equivalent to 13.46 percent of AIIB's investment.

5.58 The total climate finance, combining both climate mitigation finance (USD 8.81 million) and climate adaptation finance (USD 67.31 million), amounts to USD 76.12 million, representing 15.22 percent of AIIB's investment.

F. Gender Aspects

5.59 Access to safe, sustainable, and high-quality transportation infrastructure and services is essential for empowering women to fully participate in socioeconomic activities. However, in Pakistan, multiple barriers hinder women's ability to reap the benefits associated with improving road transport infrastructure. These barriers include GBV/SEA/SH, accessibility constraints, limited representation in management bodies, and safety concerns. Furthermore, during project implementation, women face additional risks, including GBV/SEA/SH, potential displacement and health concerns. The Project aims to tackle these challenges through both targeted technical design and comprehensive gender planning measures, with the objective of promoting more equitable benefit sharing, and avoiding or mitigating project risks.

5.60 To facilitate the development of relevant and feasible solutions, a gender assessment was conducted to inform a GAP for the Project. This gender assessment, supplemented by a series of consultations with women and their representatives in local communities along each section of the road, identified specific gender-related issues. These issues include limited economic empowerment and job opportunities, risks of exposure to GBV/SEA/SH and inadequate enforcement of national laws, insufficient healthcare services and vulnerabilities to human trafficking and health concerns linked to potential labor influx. The insights gained from the gender assessment have been used to inform the GAP, which outlines a series of mitigation measures, such as integrating gender-specific indicators in the RMF (e.g., tracking women's access to employment). The GAP further integrates measures to address gender gaps in specific key areas, including (i) information and resource management, (ii) women's safety, mobility and well-being, (iii) women's economic empowerment, and (iv) gender-inclusive governance & awareness.

5.61 Furthermore, gender actions tailored to the local context with measures to promote gender equality have been embedded within the RAP/ESMP, and SEP. These actions will be overseen by a Gender Committee established for each package and supported by the tracking of gender-disaggregated data, for instance on compensation disbursement. Key actions to enhance benefit sharing and avoid/mitigate project risks will include, amongst others, conducting awareness training sessions on human trafficking and GBV/SEA/SH for community members and construction workers and gender inclusive skill development trainings; supporting women entrepreneurs by providing business opportunities; providing business opportunities; establishing a gender-responsive GRM; and hiring and training women security personnel.

G. Risks and Mitigants

Table 7: Summary of Risks and Mitigating Measures

Risk Description	Assessment (H/M/L)	Mitigation Measures
Project Implementation Risks		
Resettlement and Relocation		
▪ The Project sections have significant R&R needs for informal settlers within its RoW, while NHA faces capacity constraints in managing these requirements.	H	▪ The Project significantly increased its R&R budget to USD 17.55 million based on the latest RAP estimates. Additionally, a USD 6.17 million R&R Reserve Fund has been established to account for unexpected or complicated situations during R&R implementation. ▪ PPSF grant-supported International Social Development Consultant is onboard to support NHA on R&R and other social aspects. ▪ Timely recruitment of the DRCSC with demonstrated R&R expertise is required to enable timely implementation of RAP as well as compliance with AIIB's ESS2. ▪ The Project's Component B budgeted USD 2 million for NHA capacity building and training, including hiring additional R&R consultants to support NHA. ▪ AIIB PT's social team, including a Social Development Specialist at HQ and a local Social Development Consultant will work closely with NHA on R&R. ▪ AIIB PT will arrange in-person or virtual R&R trainings to PIU, RIUs, and DRCSC.
Safety		
▪ Traffic or OHS accidents during construction.	H	▪ The PPSF grant-funded safety consultant will holistically assess road safety during construction and after construction completion and propose improvements. ▪ Embed safety requirements and qualifications in procuring construction contractor and supervision consultant. ▪ Provide training to site workers on traffic and OHS safety.
Traffic disruptions		
▪ Project sections experience heavy traffic, and construction may lead to significant traffic disruptions.	H	▪ The PPSF-grant-funded safety consultant, contractor, supervision consultant, and NHA will collaborate to develop and enforce a robust traffic management plan during construction. ▪ NHA to consider reducing toll rates on parallel motorways to encourage diversion

Risk Description	Assessment (H/M/L)	Mitigation Measures
		of traffic from the N-5 to the motorways.
Procurement of large and complex packages		
▪ Timely processing and approval of procurement packages.	M	▪ The PIU will be equipped with technical and non-technical staff for the overall management of the Project. The Project DRCSC will also be engaged to support the PIU. ▪ To accelerate the multi-layer review and approvals, such as tender documents, evaluation reports, complaints, contracts and variations, the PIU will need to strengthen its coordination with the approving bodies to fast-track the review and avoid delays in the procurement process.
Financial management		
▪ Delay in submitting financial audit reports, as evidenced by another NHA project funded by AIIB. ▪ Delays in counterpart funding and unrealistic budget formulation. ▪ Inadequate Staffing Capacity. ▪ Inconsistencies in contract administration databases.	M	▪ Time-bound procedures for preparing the annual financial statement for submission to the AGP will be outlined in the PIM. ▪ The Project budget will be approved by ECNEC before signing legal documents. ▪ Under Component B.3, there is provision for the hiring of an FM Consultant. Additionally, continuous FM & Disbursement Training to be provided as needed. ▪ NHA's PIU and RIUs will maintain contract information to enable proper reconciliation and minimize discrepancies.
ES risks and impacts during construction and operation		
▪ Challenges in ensuring the effective and timely application of ES policies due to large-scale construction across a wide geographic area and the NHA's limited capacity to manage these risks. Key ES risks identified include R&R, loss of livelihoods, ineffective stakeholder engagement, occupational and community health and safety issues, including SEA/SH, pollution, air and noise emissions, impacts on forests, water bodies, waterlogging, traffic & safety, etc.	H	▪ The Project will strengthen NHA's ES capacity through targeted training, additional staffing, and necessary tools and resources for its EALS unit. The AIIB's Project PPSF grant will provide further capacity assessment and capacity-building support (including international ES consultants), with AIIB staff offering guidance as needed. ▪ Appropriate ES instruments, including ESMPF, ESIA/ESMP, RAP, GAP, LMP, and SEP, are being developed to manage the risks and impacts.

Annex 1: Results Monitoring Framework

Project Objective (PO):	**To improve the climate resilience, operational efficiency, and road safety in the road sections of Ranipur-Sukkur, Rawalpindi-Hassanabdal, Nowshera-Peshawar, Lahore-Gujranwala, and the Nai Baran Bridge of the National Highway N-5 in Pakistan**								
Indicator Name	**Unit of measure**	**Base-line Data 2024**	**Cumulative Target Values**				**End Target 2030**	**Data source / Methodology**	**Responsibility**
			2026	**2027**	**2028**	**2029**			
Project Objective Indicators:									
1. Share of population serviced by the Project having access to climate-resilient N-5	%	0%	25%	50%	80%	95%	100%	Annually	NHA
2. Efficiency – Travel time of each Project section[15]									
2.1 Travel time between Ranipur-Sukkur (70km)	Minute	84	105	105	90	80	70	Annually	NHA
2.2 Travel time between Rawalpindi-Hassanabdal (40km)	Minute	48	65	65	60	50	40	Annually	NHA
2.3 Travel time between Nowshera-Peshawar (31km)	Minute	37	60	60	50	40	31	Annually	NHA
2.4 Travel time between Lahore-Gujranwala (68km)	Minute	82	82	85	100	82	68	Annually	NHA
3. Efficiency – Annual Average Daily Traffic (AADT) of each Project section									
3.1 AADT of Ranipur-Sukkur	Number of vehicles	21,000	22,000	22,000	23,000	24,000	24,000	Annually	NHA
3.2 AADT of Rawalpindi-Hassanabdal	Number of vehicles	58,000	60,000	61,000	63,000	64,000	65,000	Annually	NHA
3.3 AADT of Nowshera-Peshawar	Number of vehicles	36,000	38,000	39,000	40,000	40,000	41,000	Annually	NHA

[15] The increase of travel time during Project implementation years reflects expected traffic disruptions and delays caused by construction activities.

Project Objective (PO):	To improve the climate resilience, operational efficiency, and road safety in the road sections of Ranipur-Sukkur, Rawalpindi-Hassanabdal, Nowshera-Peshawar, Lahore-Gujranwala, and the Nai Baran Bridge of the National Highway N-5 in Pakistan								
Indicator Name	**Unit of measure**	**Base-line Data 2024**	**Cumulative Target Values**				**End Target 2030**	**Data source / Methodology**	**Responsibility**
			2026	**2027**	**2028**	**2029**			
3.4 AADT of Lahore-Gujranwala	Number of vehicles	61,000	63,000	65,000	66,000	67,000	68,000	Annually	NHA
4. Share of road length of the Project with iRAP 3+ star rating	%	32%	32%	45%	65%	90%	100%	Annually	NHA
5. Safety – Number of fatalities of all Project sections	Number	18	18	15	12	9	6	Annually	NHA
Intermediate Results Indicators:									
1. Roads constructed, rehabilitated, or maintained[16]	Kilometer	0	50	120	170	200	210	Annually	NHA
2. Share of female employees in direct jobs created	%	0%	5%	7%	9%	10%	10%	Annually	NHA
3. Percentage of grievances resolved within the timeframes stated in the GRM	%	0%	80%	85%	85%	90%	>95%	Annually	NHA

[16] A “Certified Indicator” suggested in the RMF in IMIS. This measures the length of N-5 highway reconstructed.

Annex 2: Detailed Project Description

The Project includes four priority sections of N-5 (Ranipur-Sukkur, Rawalpindi-Hassanabdal Nowshera-Peshawar, and Lahore-Gujranwala) and the Nai Baran Bridge. Below is a detailed description of each of the Project location:

1. **Ranipur-Sukkur**

- **Location**: This section is located in the districts of Khairpur and Sukkur in the Sindh Province of Pakistan. Ranipur is a town in Khairpur District, while Sukkur is a city along the western bank of the Indus River.
    - Lat-long of one end point: Lat 27.256527, Long 68.484411
    - Lat-long of the other end point: Lat 27.683664, Long 68.937544
- **Length**: The section covers a total length of 70 km.
- **Existing Facility**: The existing road is a four-lane highway (2 lanes in each direction).
- **Start and End Points**: The Project starts 1 km away from Gadegi town on N-5 and terminates at the point where the Sukkur bypass ends.
- **Current Condition**: The existing carriageway is a 2+2 lane dual carriageway with 2 to 3 meters of outer shoulder and 1 meter of inner shoulder, along with a 7 to 8 meters wide median. The north side of the carriageway has a mix of rigid and flexible pavements, while the south side is entirely flexible. The condition of the rigid pavement sections is good, but the flexible pavement sections are deteriorated.
- **Proposed Improvements**: In this section, the Project will undertake a comprehensive set of improvements to enhance road safety, capacity, and resilience. These works include widening seven existing water bridges, upgrading two existing railway flyovers, and widening 142 culverts. The Project will also construct 20.18 kilometers of service roads on both sides of the N-5, improve 14 existing weigh stations, and construct three new ones. In addition, 12 new bus bays will be added, one existing pedestrian bridge will be widened, and 21 new pedestrian bridges will be built. The scope also includes constructing 18 new protected U-turns and modifying the existing toll plaza at Ranipur. Safety and climate resilience consultants funded under the PPSF grant may propose additional measures, which will be reviewed and incorporated into the design as appropriate.
- **Key design features:**
    - **Design Speed**: 100/80/60 km/h (Rural/Semi-Urban/Urban).
    - **Road Widening**: Conversion of the existing 4-lane (2+2) dual carriageway to a 6-lane (3+3) dual carriageway.
    - **Pavement Design**:
        - **Widening Portion**:
            - Asphalt Concrete Wearing Course: 50 millimeters (mm).
            - Asphalt Concrete Base Course: 190 mm.
            - Aggregate Base Course: 300 mm.
            - Granular Subbase: 250 mm.

        - **Rehabilitation of Existing Road**:
            - Asphalt Concrete Wearing Course: 50 mm.
            - Asphalt Concrete Base Course: 190 mm.
            - Aggregate Base Course: 150 mm.

2. **Rawalpindi-Hassanabdal**

- **Location**: This section is located in the districts of Rawalpindi and Attock in the Punjab Province. Rawalpindi is situated along the historic Grand Trunk Road, which connects Peshawar to Islamabad and Lahore. Hassanabdal is located 40 km northwest of Islamabad.
    - Lat-long of one end point: Lat 33.634168, Long 72.933062
    - Lat-long of the other end point: Lat 33.819594, Long 72.607532
- **Length**: The section covers a total length of 40 km.
- **Existing Facility**: The existing road is a mix of six-lane and four-lane highway (2 and 3 lanes in each direction).
- **Start and End Points**: The Project starts at the IJP Flyover near Quad-e-Azam Hospital on N-5 and terminates at the intersection of N-5 with N-35 after Hassanabdal.
- **Current Condition**: The existing carriageway is a mix of 2+2 and 3+3 lane dual carriageway with 2 to 3 meters of outer shoulder and 1 meter of inner shoulder, along with a 2 to 28 meters wide median. The road has unprotected U-turns, pedestrian bridges, and underpasses throughout its length.
- **Proposed Improvements**: In this section, the Project will deliver a broad range of infrastructure upgrades aimed at improving traffic flow, road safety, and climate resilience along the N-5 corridor. Planned works include widening five water bridges and rehabilitating four others, upgrading one existing railway flyover, and expanding 33 culverts to improve drainage and structural capacity. The Project will also construct 24.24 kilometers of service roads on both sides of the highway and upgrade four existing weigh stations. To improve public transport access and pedestrian safety, 12 new bus bays will be added, 22 pedestrian bridges will be widened, and 12 new pedestrian bridges will be constructed. The scope further includes the installation of 20 new protected U-turns and the modification of the existing toll plaza at Sangjani. In addition, safety and climate consultants supported by the PPSF grant may recommend further measures, which will be reviewed and integrated into the design as appropriate.
- **Key design features:**
    - **Design Speed**: 100/80/60 km/h (Rural/Semi-Urban/Urban).
    - **Road Widening**: Conversion of the existing 4-lane (2+2) and 6-lane (3+3) dual carriageway to a 6-lane (3+3) dual carriageway.
    - **Pavement Design**:
        - **Widening Portion**:
            - Asphalt Concrete Wearing Course: 50 mm.
            - Asphalt Concrete Base Course: 180 mm.
            - Aggregate Base Course: 300 mm.

        - Granular Subbase: 250 mm.
    - **Rehabilitation of Existing Road**:
        - Asphalt Concrete Wearing Course: 50 mm.
        - Asphalt Concrete Base Course: 180 mm.
        - Aggregate Base Course: 150 mm.

3. **Nowshera-Peshawar**

- **Location**: This section is located in the KP Province. The start point is Chamkani, which is located alongside N-5, and the road passes through small towns like Taru Jabba, Pabbi, and Amangarh before ending at Nowshera, which is also located on N-45.
    - Lat-long of one end point: Lat 34.005907, Long 72.086899
    - Lat-long of the other end point: Lat 34.019343, Long 71.652726
- **Length**: The section covers a total length of 31 km.
- **Existing Facility**: The existing road is a four-lane highway (2 lanes in each direction).
- **Start and End Points**: The Project starts at Chamkani and ends at Nowshera.
- **Current Condition**: The existing carriageway is a 2+2 lane dual carriageway with 2 to 3 meters of outer shoulder and 1 meter of inner shoulder, along with a 2 to 6 meters wide median. Unprotected U-turns are located at intervals of approximately 1 km.
- **Proposed Improvements**: This section of the Project will implement a targeted set of infrastructure enhancements to improve mobility, safety, and climate resilience along the N-5 corridor. Key interventions include the widening of 15 existing water bridges, the upgrade of one railway flyover, and the expansion of 30 culverts to strengthen drainage and structural performance. Additionally, the Project will construct 12.74 kilometers of service roads on both sides of the highway and rehabilitate one existing weigh station. To enhance accessibility and pedestrian safety, one new bus bay will be added and nine existing ones upgraded, while one pedestrian bridge will be widened and 11 new pedestrian bridges constructed. The works will also include 13 new protected U-turns to improve traffic flow and reduce collision risks. Further road safety and climate adaptation measures may be proposed by consultants engaged under the PPSF grant and will be considered for inclusion as appropriate during final design.
- **Key design features:**
    - **Design Speed**: 100/80/60 km/h (Rural/Semi-Urban/Urban).
    - **Road Widening**: Conversion of the existing 4-lane (2+2) dual carriageway to a 6-lane (3+3) dual carriageway.
    - **Pavement Design**:
        - **Main Road**:
            - Asphalt Concrete Wearing Course: 50 mm.
            - Asphalt Concrete Base Course: 180 mm.
            - Aggregate Base Course: 300 mm.
            - Granular Subbase: 250 mm.

        - **Rehabilitation of Existing Road**:
            - Asphalt Concrete Wearing Course: 50 mm.
            - Asphalt Concrete Base Course: 180 mm.
            - Aggregate Base Course: 150 mm.

4. **Lahore-Gujranwala**

- **Location**: This section is located primarily within the Sheikhupura and Gujranwala districts of Punjab Province. It begins approximately 800 meters from Shahdara Chowk near Lahore, turns onto the Gujranwala Bypass at Chan-da-Qila Chowk (53 km), and continues to Aziz Cross Flyover Chowk – also known as Jinnah Interchange – near Gulshan Aziz Colony (15 km).
    - Lat-long of one end point: Lat 31.627761, Long 74.28829
    - Lat-long of the other end point: Lat 32.264790, Long 74.157895
- **Length**: The section covers a total length of 68 km.
- **Existing Facility**: The existing road from Shahdara Chowk to Chan-da-Qila is a six-lane divided carriageway, while the Gujranwala Bypass section is a four-lane divided carriageway.
- **Start and End Points**: The Project section starts approximately 800 meters from Shahdara Chowk near Lahore and ends at the Jinnah Interchange near Gulshan Aziz Colony.
- **Current Condition**: This N-5 section suffers from deteriorated pavement and insufficient capacity for current traffic volumes.
- **Proposed Improvements**: This section of the Project will implement targeted infrastructure enhancements to improve mobility, safety, and climate resilience along the N-5 corridor. Key interventions include the widening of seven existing water bridges, the upgrade of one flyover, and the expansion of 30 culverts to enhance drainage capacity and structural integrity. The Project will also construct 53.32 kilometers of service roads on both sides of the highway and retain 59 existing weigh stations. To improve accessibility and pedestrian safety, 12 new bus bays will be added, ten pedestrian bridges will be widened, and nine existing pedestrian tunnels will be retained. Additionally, 17 new protected U-turns will be constructed, and one existing U-turn will be upgraded to facilitate safer and more efficient traffic flow. Further road safety and climate adaptation measures may be recommended by consultants engaged under the PPSF grant and will be considered for inclusion, as appropriate.
- **Key design features:**
    - **Design Speed**: 100/80/60 km/h (Rural/Semi-Urban/Urban).
    - **Road Widening**: Conversion of the existing 4-lane (2+2) dual carriageway to a 6-lane (3+3) dual carriageway, and rehabilitate existing 6-lane (3+3) segments.
    - **Pavement Design**:
        - **Main Road**:
            - Asphalt Concrete Wearing Course: 50 mm.

        - Asphalt Concrete Base Course: 160 mm.
        - Aggregate Base Course: 300 mm.
        - Granular Subbase: 200 mm.
    - **Rehabilitation of Existing Road**:
        - Asphalt Concrete Wearing Course: 50 mm.
        - Asphalt Concrete Base Course: 160 mm.
        - Aggregate Base Course: 150 mm.

5. **Nai Baran Bridge**

- **Location**: The bridge is located in the Sindh Province at Nai Baran, along the Karachi–Thatta–Hyderabad Highway (N-5/KTHH).
    - Lat-long of one end point: Lat 25.2948, Long 68.2039
    - Lat-long of the other end point: Lat 25.3037, Long 68.2033
- **Length**: slightly over 500 meters.
- **Existing Facility**: The existing bridge, known as the Nai Baran (Bulari) Bridge, is a 164-year-old masonry arch structure comprising 32 spans.
- **Current Condition**: The bridge has significantly deteriorated, with decayed stones, cracked masonry arches, and structural damage, having fully exceeded its service life.
- **Proposed Improvements**: The Project will construct a new bridge 25 meters upstream from the existing structure and preserve the current bridge as a historical heritage site.
- **Pavement Design**:
    - Asphalt Concrete Wearing Course: 50 mm.
    - Asphalt Concrete Base Course: 80 mm.
    - Aggregate Base Course: 300 mm.
    - Granular Subbase: 300 mm.

Annex 3: Economic and Financial Analysis

A. EA Approach and Methodology

1. **General.** Economic Analysis or CBA is to identify and quantify key economic benefits and costs associated with the Project. The CBA identified benefits and costs for all the four N-5 sections and the Nai Baran Bridge. The proposed construction and rehabilitation will improve the local road quality, therefore generate savings in VOT, VOC and GHG, along with other benefits such as reduced traffic accidents. We assume that the benefits all come from the forecast of traffic demand based on different growth assumptions as highlighted in the economic analysis section.

2. The CBA was carried out by using the discounted cash flow (DCF) to obtain the EIRR and ENPV for the proposed investments linked with the Project. This is followed by a standard sensitivity analysis that tests the viability of EIRR and ENPV under optimistic/pessimistic scenarios of traffic and cost projections.

3. **Analytical Framework.** The CBA calculations are based on the net benefits and costs, by comparing with and without Project scenarios described below.

- **Without the Project:** This scenario means the status quo is maintained without major rehabilitation in the future. Traffic demand in terms of AADT will grow along with income level, population, and GDP growth. However, due to poor road surface conditions, all types of vehicles currently traveling on these roads suffer from the deteriorating conditions and extended travel time, higher operating costs and carbon emissions. According to NHA, the existing International Roughness Index (IRI) of the road sections financed is about 7 m/km.

- **With the Project:** The rehabilitation will significantly improve the highway conditions and capacity and strength its road safety and climate resilience performance. AADT is assumed to stay the same as without the Project scenario for both phases of the Project, but the vehicles will travel faster while having lower operating costs. We assume that benefits would start accruing 4 years into the Project. The average IRI after the Project will aim to reach 2 m/km, given the design and materials used.

4. **Benefits Calculation.** The baseline model economic benefits related to VOT, VOC and GHG savings. We further extend this model to include road safety benefits. At the end, EIRR and ENPV are the results of adding all these positive/negative items together.

5. **Approach.** Approaches to identify and quantify benefits are based on consultations with the PC-1, literature of similar highway projects done by other MDBs and various databases providing essential parameters to the estimates. The quantified benefits include the following items.

Table 3-1. Identified Economic Benefits

Benefits:
VOT savings: Average driving speed will increase from 40 to 60 km/h after the Project due to smoother road surface and safer road design.
VOC savings: IRI of the Project roads will improve from 7 to 2 after the Project. Accordingly, unit VOC will be reduced per vehicle based on Highway Development and Management Model Four (HDM-4) model calculations.
GHG savings: Gasoline consumption will be reduced due to better road conditions. This will translate into carbon savings.
Road safety benefits: Traffic collision and fatality rates will be reduced due to better road design, though these are estimated only for the extended model.

6. **AADT Traffic Demand and Key Assumptions.** The CBA assumed no benefits would accrue in the first 4 years of construction (2026-2029) and then these benefits would accrue for 21 years of operations (2030-2050). Below are the key assumptions used in the analysis:

i. **AADT Traffic Demand Forecast.** Based on the baseline data input AADT in 2026, AADT is forecasted assuming trucks will grow at GDP total growth. Cars/Jeeps are assumed to grow along with average GDP per capita growth, while buses/motors/others are at population growth. Growth assumptions are drawn from IMF World Economic Outlook October 2024 and World Development Indicators (2024), with downward adjustments in later years assuming all growth will converge at slower pace. Below shows the forecasted average AADT for the Project. Overall, cars account for the biggest share of traffic, more than 40 percent. Motorbikes rank second and constitute 22-33 percent of the traffic demand.[17]

Table 3-2. AADT Forecast (Number of Vehicles)

	Average AADT of sections under the 1st tranche						Average AADT of sections under the 2nd tranche					
Year	**Trucks**	**Cars**	**Buses**	**Motors**	**Others**	**Total**	**Trucks**	**Cars**	**Buses**	**Motors**	**Others**	**Total**
2026	6389	17287	1628	8186	2697	36188	3087	27100	5141	20935	6305	62568
2027	6658	17581	1660	8348	2750	36997	3216	27561	5242	21347	6429	63796
2028	6957	17880	1693	8512	2804	37847	3361	28030	5346	21768	6556	65060
2029	7270	18184	1726	8680	2860	38720	3512	28506	5451	22196	6685	66351
2030	7597	18493	1760	8851	2916	39618	3671	28991	5558	22634	6817	67670
2031	7833	18808	1795	9025	2973	40434	3784	29484	5668	23080	6951	68967
2032	8076	19127	1830	9203	3032	41268	3902	29985	5779	23534	7088	70288
2033	8326	19452	1867	9384	3092	42121	4023	30495	5893	23998	7228	71636
2034	8584	19783	1903	9569	3153	42992	4147	31013	6009	24471	7370	73011
2035	8850	20119	1941	9757	3215	43883	4276	31540	6128	24953	7515	74412
2036	9125	20462	1979	9950	3278	44793	4408	32076	6248	25444	7664	75841
2037	9408	20809	2018	10146	3343	45723	4545	32622	6372	25945	7814	77298
2038	9699	21163	2058	10346	3408	46674	4686	33176	6497	26457	7968	78784
2039	10000	21523	2098	10549	3476	47646	4831	33740	6625	26978	8125	80300
2040	10310	21889	2140	10757	3544	48640	4981	34314	6756	27509	8285	81845
2041	10629	22217	2160	10862	3578	49447	5135	34829	6821	27776	8366	82927

[17] Since the model accounts for the differences in assumptions related to VOT, VOC, and GHG costs for different vehicle types, the conversion of different vehicle types to Passenger Car Units (PCUs) is not needed.

2042	10959	22550	2181	10967	3613	50271	5295	35351	6887	28046	8447	84025
2043	11299	22889	2203	11073	3648	51111	5459	35881	6954	28318	8529	85141
2044	11649	23232	2224	11181	3684	51969	5628	36420	7022	28592	8612	86273
2045	12010	23580	2245	11289	3719	52844	5802	36966	7090	28870	8695	87423
2046	12382	23934	2267	11399	3755	53738	5982	37520	7158	29150	8780	88590
2047	12766	24293	2289	11509	3792	54650	6168	38083	7228	29432	8865	89776
2048	13162	24658	2311	11621	3829	55580	6359	38654	7298	29718	8951	90980
2049	13570	25027	2334	11734	3866	56531	6556	39234	7369	30006	9038	92203
2050	13991	25403	2357	11847	3903	57501	6759	39823	7440	30297	9125	93445

ii. **VOC Assumptions.** VOC savings are estimated using the World Bank's simplified HDM-4 model, by inputting key parameters specific to the Project. These include: IRI for all roads will change from 7 to 2. Other road and vehicles specific to Pakistan as below, collected based on desktop research and PC-1 document on various price items in 2024. This input resulted in unit VOC savings (see Table 3-4).

Table 3-3. HDM-4 VOC Input

	Economic Unit Costs ($)					Basic Vehicle Fleet Characteristics					
	New Purchase	New Tire	Fuel	Lubricants	O&M Labor	Annual km Driven	Annual Working Hours	Service Years	Private Use	No. of Pax	Gross Weight
	($/vehicle)	($/tire)	($/liter)	($/liter)	($/hour)	(km)	(hours)	(years)	(%)	(#)	(t)
Motors	845	8.0	0.92	10	1.0	6400	2096	10	100	1	0.2
Cars	18500	108	0.92	20	2.0	22131	2096	10	100	2	1.2
Trucks	50000	370	0.93	20	2.0	40000	2096	10	0	1	12
Buses	40000	103	0.93	20	2.0	67200	2096	9	0	25	6
Others	900	14	0.92	10	1.0	6400	2096	10	100	2	0.5

Table 3-4. Unit VOC Savings (USD/vehicle-km)

Trucks	0.090
Cars	0.030
Buses	0.075
Motorbikes	0.004
Others	0.005

iii. **VOT Assumptions.** The Project is assumed to increase the average speed from 40 km/h to 60 km/h for all types of vehicles. This leads to 0.008-hour savings per km by vehicles. The current average speed on the Project roads is all around 40 km/h based on the PC-1 report. In fact, the PC-1 reports speeds for some types of vehicles to be much lower, around 20-30 km/h, due to congestion and unsafe road conditions. Hence, the VOT savings are likely to be higher than the estimates. Other VOT assumptions include hourly wage workers (USD 0.75 per hour) based on GDP per capita USD current (USD 1572).

Table 3-5. VOT Assumptions

GDP Per Capita, USD Current	1572
Total working hours, Hrs	2096
Per hour wage (working), USD	0.75

Per hour wage (non-working), USD	0.23
Labor participation rate, %	0.43
Weighted hour wage, USD	0.45

iv. **GHG.** Improved road conditions can save gasoline consumption compared to without Project scenario, leading to savings of carbon dioxide emissions per vehicle-km (see below). These will translate into GHG savings in terms of USD values using the AIIB CBA carbon price forecast.

Table 3-6. tCO2 Savings Per Vehicle-km

	Without	With	Savings
Trucks	0.000532	0.00049471	0.00003709
Cars	0.000341	0.00033539	0.00000560
Buses	0.000514	0.00048137	0.00003270
Motors	0.000077	0.0000757	0.00000176
Others	0.00032	0.00031431	0.00000576

B. Economic Analysis Summary

7. Overall economic benefits and costs per year of the Project are summarized in Table 3-7, based on the baseline model. EIRR is 20.4 percent and ENPV is USD 437 million (social discount rate = 12 percent). For the 1st tranche, the EIRR is 19.2 percent with VOC savings being the dominating factor (~73 percent) contributing to the Project's economic benefits, while VOT savings account for 25 percent and GHG savings for 2 percent.[18]

Table 3-7. Economic Benefits and Costs (USD Million)

	VOC	VOT	GHG	**Total Benefits**	Capex	O&M	**Total Costs**	**Net Benefits**
	Total	Total	Total	**Total**	Total	Total	**Total**	**Total**
2026	-	-	-	**-**	265.57	-	**265.57**	**-265.57**
2027	-	-	-	**-**	265.57	-	**265.57**	**-265.57**
2028	-	-	-	**-**	-	1.76	**1.76**	**-1.76**
2029	-	-	-	**-**	-	1.76	**1.76**	**-1.76**
2030	117.56	41.79	2.78	**162.13**	-	1.76	**1.76**	**160.37**
2031	120.23	42.60	2.92	**165.75**	-	1.76	**1.76**	**163.99**
2032	122.97	43.43	3.07	**169.47**	-	1.76	**1.76**	**167.71**
2033	125.77	44.27	3.19	**173.23**	-	1.76	**1.76**	**171.47**
2034	128.65	45.13	3.35	**177.13**	-	1.76	**1.76**	**175.37**
2035	131.60	46.01	3.52	**181.12**	-	1.76	**1.76**	**179.36**
2036	134.62	46.90	3.69	**185.21**	-	1.76	**1.76**	**183.44**
2037	137.71	47.81	3.87	**189.39**	-	1.76	**1.76**	**187.63**
2038	140.88	48.74	4.06	**193.68**	-	1.76	**1.76**	**191.92**
2039	144.13	49.69	4.25	**198.07**	-	1.76	**1.76**	**196.31**
2040	147.46	50.65	4.46	**202.57**	-	1.76	**1.76**	**200.81**

[18] The total O&M costs are evenly distributed over the entire Project cycle. However, in practice, major repairs—and therefore significant O&M expenditures—may occur at 10-year intervals. An assessment of this alternative scenario indicates that the EIRR remains largely unaffected. Nonetheless, the EIRR is reported based on the more conservative assumption of evenly distributed O&M costs, in line with AIIB's standard practice for economic analysis.

2041	150.48	51.27	4.65	**206.40**	-	1.76	**1.76**	**204.64**
2042	153.56	51.91	4.85	**210.32**	-	1.76	**1.76**	**208.55**
2043	156.72	52.54	5.06	**214.33**	-	1.76	**1.76**	**212.56**
2044	159.96	53.19	5.28	**218.43**	-	1.76	**1.76**	**216.66**
2045	163.27	53.85	5.50	**222.62**	-	1.76	**1.76**	**220.86**
2046	166.67	54.52	5.78	**226.97**	-	1.76	**1.76**	**225.21**
2047	170.15	55.19	6.02	**231.37**	-	1.76	**1.76**	**229.61**
2048	173.72	55.88	6.27	**235.87**	-	1.76	**1.76**	**234.11**
2049	177.38	56.58	6.59	**240.54**	-	1.76	**1.76**	**238.78**
2050	181.13	57.28	6.86	**245.26**	-	1.76	**1.76**	**243.50**
	3104.62	**1049.24**	**96.03**	**4249.89**	**531.14**	**40.56**	**571.70**	**3678.19**

8. **Sensitivity Analysis.** EIRR and ENPV remain robust under extreme scenarios where costs overrun by 25 percent and AADT forecast is reduced by 25 percent.

Table 3-8. Sensitivity Analysis

Overall EIRR		AADT				
	20.4%	-25%	-15%	0%	15%	30%
Cost	-20%	19.5%	21.3%	23.8%	26.0%	28.2%
	-15%	18.7%	20.4%	22.8%	25.1%	27.1%
	0%	16.5%	18.2%	20.4%	22.5%	24.4%
	15%	14.8%	16.3%	18.5%	20.4%	22.3%
	25%	13.8%	15.3%	17.4%	19.3%	21.0%
1st tranche EIRR		AADT				
	19.2%	-25%	-15%	0%	15%	30%
Cost	-20%	18.3%	20.0%	22.4%	24.6%	26.6%
	-15%	17.5%	19.2%	21.5%	23.7%	25.6%
	0%	15.5%	17.0%	19.2%	21.2%	23.0%
	15%	13.8%	15.3%	17.3%	19.2%	21.0%
	25%	12.8%	14.3%	16.3%	18.1%	19.8%

9. **Model Extension.** We extend the baseline model to include benefits related to decreased accidents due to updated road design. Fatality costs are calculated based on the iRAP guidelines. We assume a 5 percent decline due to this Project in fatality and serious injury, based on estimates from National Transport Research Center (NTRC) Pakistan. The $/vehicle-km savings from road safety are then estimated through the HDM-4 model.

Table 3-9. Unit Road Safety Benefits (USD/vehicle-km)

Trucks	0.010
Cars	0.008
Buses	0.011
Motorbikes	0.013
Others	0.010

10. The overall EIRR due to the inclusion of road safety benefits increases to 24 percent in the extended model, as compared to 20.4 percent in the baseline model. We report the

more conservative number as our main estimate of EIRR, which is in line with the conventional practices of AIIB's previous economic analyses.

C. FA Approach and Methodology

11. **General.** A comprehensive financial analysis was conducted to evaluate the financial sustainability of the Project. The assessment considered the required Capex investments, toll revenue and O&M costs. The analysis was carried out by using DCF to obtain the FIRR and financial net present value (FNPV) for the proposed investments linked with the Project.

12. **Assumption on toll revenue.** The toll revenue is calculated based on the AADT of each type of vehicle, toll rates (see Table 3-10) and the number of days in a year. The toll rates of vehicles are based on the rates published by NHA.

Table 3-10. Toll Rates per Types of Vehicles (PKR/vehicle)

Trucks	375
Cars	60
Buses	200
Motorcycles	0
Others	60

13. **Assumption on costs.** The capital costs (with the inclusion of R&R costs) and O&M costs are aligned with the assumptions in the Economic Analysis.

14. **Assumption on weighted average cost of capital (WACC).** The WACC of the Project is calculated based on the weighted average of the cost of debt and equity. Considering the AIIB is the sole lender of the Project, the cost of debt is assumed to be the AIIB Sovereign-backed financing (SBF) variable spread loan (VSL) interest rate[19]. The equity is assumed to be contributed by the GoP; hence, the long-term sovereign bond yield is assumed to be the proxy of the cost of equity.

Table 3-11. WACC Assumptions and Computation

Cost of debt	
SOFR 6M	4.30%
AIIB SBF VSL Spread	1.34%
Cost of debt	5.64%
% of debt	90%
Cost of equity	
Pakistan long-term bond yield	12.57%
% of equity	10.00%
WACC	**6.33%**

D. Financial Analysis Summary

[19] AIIB Sovereign-backed financing interest rate. https://www.aiib.org/en/treasury/_common/_download/AIIB_Sovereign-backed-Financing-SBF-FactSheet.pdf

15. Overall financial return and costs per year of the Project are summarized in Table 3-12, based on the baseline model. FIRR is -4.13 percent and FNPV is USD -402 million (WACC = 6.33 percent).

Table 3-12. Financial Return and Costs (PKR)

Year	Toll revenue	O&M Costs	Capex	Project Free Cashflow
2026	-	-	(77,704,201,420)	(77,704,201,420)
2027	-	-	(77,704,201,420)	(77,704,201,420)
2028	3,136,574,407	493,920,000	-	3,630,494,407
2029	3,231,382,295	493,920,000	-	3,725,302,295
2030	3,329,619,690	493,920,000	-	3,823,539,690
2031	3,409,833,489	493,920,000	-	3,903,753,489
2032	3,492,120,037	493,920,000	-	3,986,040,037
2033	3,576,536,104	493,920,000	-	4,070,456,104
2034	3,663,140,083	493,920,000	-	4,157,060,083
2035	3,751,992,042	493,920,000	-	4,245,912,042
2036	3,843,153,765	493,920,000	-	4,337,073,765
2037	3,936,688,810	493,920,000	-	4,430,608,810
2038	4,032,662,561	493,920,000	-	4,526,582,561
2039	4,131,142,276	493,920,000	-	4,625,062,276
2040	4,232,197,149	493,920,000	-	4,726,117,149
2041	4,324,352,476	493,920,000	-	4,818,272,476
2042	4,418,881,528	493,920,000	-	4,912,801,528
2043	4,515,851,638	493,920,000	-	5,009,771,638
2044	4,615,332,145	493,920,000	-	5,109,252,145
2045	4,717,394,449	493,920,000	-	5,211,314,449
2046	4,822,112,079	493,920,000	-	5,316,032,079
2047	4,929,560,753	493,920,000	-	5,423,480,753
2048	5,039,818,452	493,920,000	-	5,533,738,452
2049	5,152,965,480	493,920,000	-	5,646,885,480
2050	5,269,084,540	493,920,000	-	5,763,004,540

Annex 4: Environmental and Social

This Annex summarizes the ES instruments adopted by the Project (Table 4-1) and the ES impacts, risks, and their mitigants (Table 4-2).

Table 4-1 Environmental and Social Instruments

No.	Type	Instrument
1	Framework	Environmental and Social Action Plan (ESAP)
2		Environment and Social Management Planning Framework (ESMPF)
3		Resettlement Planning Framework (RPF)
4		Gender Action Plan Framework (GAPF)
5		Stakeholder Engagement Plan (SEP)
6		Labor Management Plan (LMP)
7	Site specific	Environmental and Social Impact Assessment (ESIA) including Environmental and Social Management Plan (ESMP)
8		Resettlement Action Plan (RAP) for Section 2 Ranipur-Sukkur
9		Resettlement Action Plan (RAP) for Section 7 Rawalpindi-Hassanabdal
10		Resettlement Action Plan (RAP) for Section 8 Nowshera-Peshawar

Table 4-2 Environmental and Social Impacts and Mitigants

Impacts / Risks	Mitigants
Significant Resettlement and Relocation (R&R) Impacts on Local Communities. The Project will have significant R&R impacts due to the presence of residential and commercial informal settlers, community and religious structures (e.g., mosques, shrines, graveyards), and public structures (e.g., police stations, schools, gas stations, boundary walls) within the right-of-way (RoW) of N-5. According to the draft Resettlement Action Plans (RAPs), approximately 2,039 households (HHs) (about 13,190 people) across the three sections under the 1st tranche financing (141 km) will be affected at varying levels. Of these, 894 HHs will be severely impacted, which is defined as losing 10 percent or more of their residential or commercial units. In addition, 1,404 individuals could experience income loss due to the impact on commercial structures. The	In line with AIIB's Environmental and Social Standard 2 (ESS2), the National Highway Authority (NHA) of Pakistan has undertaken careful measures to avoid and minimize resettlement impacts by exploring Project alternatives, ensuring that civil works for N-5 reconstruction remain within the client-owned RoW. Where resettlement or relocation is unavoidable, meaningful consultations with affected people are being conducted, and provisions for support and compensation at replacement cost, coupled with livelihood restoration programs, are in place to help restore and enhance their livelihoods or functions, with special attention to women, vulnerable groups, and community and religious structures. To facilitate effective management of R&R risks and impacts in compliance with the ESS2, the NHA's Aided Project (AP) division will establish five Regional Implementation Units (RIUs), supported by NHA's Environment, Afforestation, Land, and Social (EALS) division at headquarters before construction begins to implement the Project including its R&R. The NHA has experience in implementing land acquisition and R&R for nearly 30 foreign-aided projects over the past two decades. Their capacity is being strengthened by the International Social Development Consultant engaged through the Project Preparation Special Fund (PPSF) Grant provided by AIIB and the Local Social Development Consultant hired directly by AIIB. The R&R

Project will also affect 56 places of worship, including mosques, shrines, and Imam Bargahs (Shia Muslim congregation sites), as well as five graveyards containing 209 graves, all at different levels of impact.	will also be supported by the Design Review and Construction Supervision Consultant (DRCSC), which is currently under procurement and will be onboard Q3/Q4 2025. Demonstrated R&R experience is a key selection criterion in the procurement of the DRCSC. The Project has allocated USD 17.55 million for R&R, an estimate prepared by the RAP consultancy and verified by NHA's field offices. To account for unexpected or complicated situations during R&R, a USD 6.17 million R&R Reserve Fund was established by NHA. Additionally, the Project's Component B has earmarked USD 2 million for the Project Management Unit (PMU) (including the Project Implementation Unit or PIU at the NHA Headquarters and the five RIUs at the five project sites) capacity building, including the recruitment of additional R&R consultants and the implementation of training programs, as needed. The supervision of the Project will be strengthened by the Project's engagement of ES Independent Monitoring Consultant who will provide regular reports to NHA and the Bank, including on the implementation of R&R. Recognizing the sensitivity of relocating religious structures and tombs, the Project incorporates appropriate procedures and measures in the RAPs and SEP to guide their relocation process. The International Social Development Consultant is reviewing the detailed design to identify ways to avoid and minimize impacts on culturally and religiously significant structures. The Project will involve specialists with relevant expertise from the Bank team (i.e., the Local Social Development Consultant) and the NHA to supervise the relocation process and confirm that the procedures outlined in the RAPs and SEP reflect the views of religious leaders and affected communities. Relocation of religious structures and tombs shall be carried out with utmost care and respect for the affected communities' cultural and religious practices. Before the relocations, comprehensive and meaningful consultation will be undertaken with all relevant stakeholders, including local communities, religious leaders, Ulemas (scholars of Islamic doctrine and law), and relevant authorities, to obtain broad community support and address any concerns. Local religious leaders and Ulemas will play a critical role in ensuring that the process is conducted with respect for religious beliefs and practices, guiding the community in understanding the spiritual and cultural significance of the relocation. The consultation process will incorporate their input and involve their leadership in all decisions regarding the relocation of religious structures.
Safety Risks. During construction, there is a heightened risk of traffic	To mitigate these safety risks, a PPSF grant-funded safety consultant will conduct a comprehensive

incidents and occupational health and safety (OHS) accidents, particularly in countries where road safety and OHS practices are still developing. This risk is underscored by severe accidents observed in another Multilateral Development Bank (MDB) project in Pakistan.	assessment of road safety during construction and recommend necessary improvements. Additionally, safety protocols, requirements, and qualifications will be integrated into the procurement process, including the Environmental and Social Management Plan (ESMP) for both construction contractors. The implementation of these safety protocols will be subject to close supervision by the supervision consultant as per their TORs Furthermore, all site workers will undergo safety training before construction commences and adhere to their code of conduct.
Significant Traffic Disruptions. The Project sections experience heavy traffic, and the construction activities may cause significant disruptions to traffic flows.	To mitigate these disruptions, the PPSF grant-funded safety consultant, contractor, supervision consultant, and NHA will work together to develop and enforce a comprehensive traffic management plan during construction. Additionally, the AIIB Project Team has asked NHA to explore the option of lowering the toll rates on the M-1 Motorway, which runs nearly parallel to N-5, to divert some of the traffic from N-5 to M-1, alleviating congestion and reducing traffic-related disruptions.
Noise. The noise levels measured at the 11 locations are already high and several noise-sensitive receptors, including schools and hospitals, have been identified.	Building on the noise level measurement undertaken during preparation, the Project will undertake a detailed, comprehensive noise level baseline measurement particularly in all sensitive receptors, undertake modelling to forecast operation level noise, and recommend site specific appropriate noise mitigation measures. Meaningful consultations with representatives of sensitive receptors must be conducted before determining mitigation measures to obtain their endorsement or majority support.

Annex 5: Paris Agreement Alignment and Climate Finance

1. The Bank has committed to align all its new financing operations with the Paris Agreement's (PA) goals by July 1, 2023. To achieve that target, in July 2023, the Bank launched its Methodology for Assessing the Alignment of AIIB Investment Operations with the PA. The document elaborates the application of the joint MDB methodological framework to aligning AIIB investment operations with the PA (specifically, the mitigation dimension or BB1 and the adaptation aspects or BB2). The AIIB Methodology has been followed to assess the alignment of the Project with the PA.

BB1: Alignment with the Mitigation Goals of the Paris Agreement

2. The use of the loan proceeds will finance three components of the Project.

3. **Component A**, comprises reconstruction and rehabilitation of 209 km of N-5 and the Nai Baran Bridge:

- Ranipur – Sukkur Road (70km)
- Rawalpindi – Hassanabdal Road (40km)
- Nowshera – Peshawar Road (31 km)
- Lahore–Gujranwala (68km)
- Nai Baran Bridge (1km)

4. **Component B**, comprises consultancy support and capacity building, including: i) Design Review and Construction Supervision Consultant, ii) ES Independent Monitoring Consultant, and iii) PMU capacity building, incl. individual consultants to support the PMU, training, workshops, conferences, etc.

5. **Component C,** comprises baseline cost and improvements, including Resettlement & Relocation, Resettlement and Relocation (R&R) Reserve Fund, NHA Establishment Charges, Shifting of Utilities, Contingencies, Price Escalation, Landscaping and Horticulture Works, Air Quality and Noise Monitoring and Modeling, Climate Mitigation & Adaptation Improvements, Road Safety, Community and Occupational Health & Safety Improvements, Environmental & Social Improvements, and the capitalization of the Front-End-Fee of AIIB loans.

6. In Component A, some of the road sections will have a capacity increase from a two-lane carriageway to a six-lane carriageway and thus **cannot be considered Universally Aligned** and thus, are subject to **Specific Criteria assessment** to determine its alignment with the mitigation goals of the Paris Agreement (BB1). The SC1-SC5 assessment is exposed below.

7. Components B and C can be classified as aligned both for adaptation and mitigation due to its neutral impact on climate mitigation and the immateriality risk from the climate resilience perspective.

SC1 and SC2: Nationally Determined Contributions and (Long-term Low-GHG Emissions Development Strategy) LTS Alignment:

8. Pakistan intends to set a cumulative ambitious conditional target of overall 50 percent reduction of its projected emissions by 2030, with 15 percent from the country's own resources

and 35 percent subject to provision of international grant finance that would require USD 101 billion just for energy transition. To reach the target, Pakistan aims to shift to 60 percent renewable energy, and 30 percent electric vehicles (EVs) by 2030 and completely ban imported coal.

9. The GoP has approved Some Long-Term Strategies, such as the National Electric Vehicles Policy 2020-25 (NEVP 2019) stipulating a target of 30 percent and 90 percent share in sales of passenger vehicles and heavy-duty trucks by 2030 and 2040. Also, the National Energy Efficiency and Conservation Authority (NEECA) is developing Minimum Energy Performance Standards (MEPS) for electric motors, air conditioners, and LED lights. NEECA's Draft Strategic Plan (2020-2023) will reduce 3 million Tons of Oil Equivalent (MTOE) from the country's primary energy supply contributing to 6.4 MtCO2e carbon emissions reduction. More importantly, however, the GoP endeavors to meet the demand with the Indicative Generation Capacity Expansion Plan (IGCEP 2021- 30), National Electricity Policy (NEP) 2021, and Alternative and Renewable Energy Policy (ARE 2019), included together with hydropower, to prioritize transition to demand side management.

10. The Project is not incompatible with either the NDC or LTS of Pakistan as the road is a carrier agnostic to types of motorized vehicles and the Country is taking efforts (reflected on the NDC and NEEP) to electrify its pull of vehicles. Also, Component C includes landscaping and afforestation which is in line with the Ten Billion Tree Tsunami Program of the GoP, explicitly mentioned on the Country's NDC. This four-year flagship national program (2019-2023) will increase the existing forest area. During phase one of the national program, an ambitious target of 3.29 billion plants will be planted and/or regenerated to restore nine different forest categories over an area of 1.2 million hectares by 2023. During phase two, 750 to 850 million plants/year will continue over the next six years up to 2030.

11. *Therefore, the Project adheres to the SC1 and SC2 criterion.*

SC3: Low Carbon Pathway (LCP) Test:

12. Low carbon pathways for the road sector in Pakistan orbit around the electrification of the fleet, specifically with the NEVP.

13. At present, the penetration of EVs in Pakistan is limited and the market is dominated by oil-based vehicles. There are significant barriers to transitioning to EVs, such as limited charging infrastructure and power outages. Electricity breakdowns are a frequent occurrence, and hence EVs may not work very successfully in the short term. However, there have been policy initiatives to support an ambitious such as the mentioned NEVP and there has been private sector investment in the sector and the formation of the Pakistan Electric Vehicles Manufacturing Association. The low-carbon scenario assumes that these barriers can be overcome and suggests a major fall of 21 percent in Total Final Energy Demand from transport by 2050 relative to the business-as-usual (BAU) scenario.[20]

14. Pakistan's NEVP 2019 has set ambitious sales targets. Yet EVs are still a nascent transport mode in Pakistan, with only about 2,000 fully electric cars and a few e-buses in

[20] Pakistan's Low-Carbon Energy Outlook and Technology Road Map

Karachi and Punjab. The limited penetration means a small impact on emissions—less than a 1 percent reduction by 2030. It will be at least 15–20 years before e-mobility can make a significant impact. By 2050, however, EVs could yield about 57 percent of the emissions reduction (relative to a BAU baseline) in the passenger sector. Given the influence of government in public transport, e-buses represent low hanging fruit for the e-mobility transition agenda.[21]

15. The Project is not inconsistent with any of the low carbon pathways policies such as the National Electric Vehicles for a smooth transition to net-zero transportation.

16. Therefore*, the Project adheres to the SC3 criterion.*

SC4a Alternatives Test:

17. An existing more efficient transport infrastructure cannot serve the current and forecasted passenger and/or freight demand, with a similar level of service (LOS). This part of the assessment considers whether the Project demand can or cannot be served by an existing less carbon intensive transport infrastructure with a similar LOS. If there is no comparable alternative to the proposed investment, then the SC4a test is passed. The following steps should be followed:

Step 1: Identify what potential lower-carbon transport alternatives exist that provide access to the main origins and destinations (ODs) within the proposed road's influence area (RIA).

18. The 1,819-kilometer-long North-South N-5 is the main transport connection of Pakistan. It connects the port city of Karachi in the south to the provincial capital of Peshawar in the northwest and extends all the way to the Afghanistan border. It serves most of the country's large urban centers and economic areas. The N-5 carries about 55 percent of the inter-city traffic and 65 percent of the freight and commercial traffic in Pakistan. The NHA has outlined a 20-year plan to reconstruct and widen the entire 1,819-kilometer N-5 highway in four phases. This Project, encompassing four sections of the N-5, totaling 209 km across Islamabad Capital Territory, Punjab, KP, and Sindh provinces, and the reconstruction of a 1-km-long bridge in Sindh province.

19. Although the Project will focus only on four road sections and one bridge, the origins and destinations have to be attributed not only to these sections, but to the whole N-5, which serves the most of the Country's urban centers, including Rawalpindi, Islamabad, Lahore, Hyderabad and Karachi. Also, the N-5 provides cross border services with Afghanistan.

20. The Road's Influence Area would be the North, East and South-East of the Country, being the ODs the urban nucleus around the existing N-5 and Afghanistan thought the cross-border connection.

21. The main lower-carbon alternative connecting the main ODs would be the existing railway line running in parallel to the N-5, PR Main Line-1 (ML-1), which passes through a

[21] https://openknowledge.worldbank.org/server/api/core/bitstreams/2d1af64a-8d35-5946-a047-17dc143797ad/content

similar route as the N-5 Highway and connects most of the same cities through which N-5 passes, although does not offer cross border connection.

Step 2: Assess whether the alternatives identified in the previous step are comparable to the proposed Project by comparing them to the Project in terms of LOS.

22. The ML-1 Railway line is planned to go through a multibillion modernization program, which still has not started the implementation phase.

23. Pakistan railways' rolling stock is in poor condition and track and bridge infrastructure needs immediate overhaul Pakistan's. This is reflected in the passenger traffic decline from 41 percent to 10 percent since 1960. The Audit Report of the Accounts of Pakistan Railways, 2021/22, mention the unpunctuality, uncleanliness, detention of trains, overcharging, safety and security issues, missing facilities, lack of/poor implementation of policies, obsolete technology, poor infrastructure, managerial incapability, declining market share in freight, and occasional accidents and derailments as some of the key areas of deterioration. This is why almost 90 percent of passenger and freight traffic in Pakistan is via roads.

24. Currently, the ML-1 line accommodates only 34 trains per day – 10 freight and 24 passenger trains – with freight volumes totaling 8.3 million tons annually.

Step 3: Analyze and document whether the Project demand can or cannot be served by the lower-carbon alternative(s) identified with a similar LOS.

25. The financed road provides higher LOS compared to the existing railway line as i) provides a much larger capacity than the existing railway line which is extremely limited (34 trains a day), ii) offers more flexibility when it comes to door-to-door transportation, consignment size, and distance, which means that the rail line complements rather than replaces the highway, and iii) provides cross-border trade with Afghanistan, which is not currently available under the ML-1 railway line.

26. It is worth mentioning that the N-5 expansion is not expected to cause any material intermodal shift from rail to road. The capacity made available by the additional two lanes on N-5 is expected to be absorbed by increased traffic (Pakistan's population is growing at a rate of 2.4 percent p.a. approx.).

27. *It is concluded that the Project demand cannot be served by the lower-carbon alternative identified with a similar LOS given its constraints in terms of capacity, reliability, lower transport flexibility, and lack of cross-border connectivity with Afghanistan, not fully covering of the main ODs*.

28. *Therefore, the* Project *adheres to the SC4a criterion.*

SC4b: Lock-in Test:

29. As a common carrier agnostic to types of motorized vehicles, roads are typically not subject to technological lock-in of a particular type of fleet. The Project can be considered as future-proof, as it will be able to accommodate the infrastructure required to enable the deployment of future lower-carbon fleets, once available. The Project will be designed to allow

the future deployment of more energy-efficient public transport fleet, vehicle types, or road operations, as well as other Paris-aligned activities.

30. *Therefore, the* Project *adheres to the SC4b criterion.*

SC5: Economic Evaluation:

31. The Project is still economically viable when considering the carbon emissions due to the operation stage, valued using the shadow carbon price recommended by AIIB's Economic department based on the CBA using the 25-year Project cycle.

32. The EIRR of the Project is estimated to be 20.4 percent. The ENPV for the Project is USD 437 million. EIRR and ENPV remain resilient under most extreme scenarios where traffic projections drop by 25 percent and cost overrun increases by 25 percent. Please refer to Annex 3 for further information.

33. *Therefore, the Project adheres to the SC5 criterion.*

BB1 conclusion: Based on the analysis performed for SC1-5, the Project can be considered aligned with the PA's climate mitigations goals (BB1).

BB2: Alignment with the Adaptation Goals of the Paris Agreement

34. The Project sites have been initially assessed using the Physical Climate Screening Tool developed in house at AIIB by the Climate Team. This screening assessment found that the Project is likely to be materially affected by climate risks – specifically high temperatures, heavy precipitation, and flooding. As a result, a Climate Risk Assessment (CRA) following AIIB's methodology was required to determine the Project's alignment with the Paris Agreement's adaptation goals (BB2). The methodology has 3 steps: 1) a climate risk and vulnerability assessment; 2) the identification of measures addressing the climate risk found on the previous step; and 3) the compatibility of the Project against the NDC and other climate adaptation national strategies. Individual CRAs have been carried out for the different sections of the Project.

Climate Risk and Vulnerability Assessment (CRVA):

35. The consultant (NESPAK) has performed a CRVA using climate projection data from the CMIP6, model for 2 different scenarios, SSP 2-4.5 and SSP 5-8.5 for a 25, 50 and 100 years return period. The assessment found that increased temperatures and rainfall floods are common climate risks that will materially affect all Project sections, whereas the Peshawar-Nowshera section would be affected by riverine floods too. The sensitivity of the different sections to rainfall and riverine floods are evaluated below.

Ranipur-Sukkur Road section:

36. In the road project area, average monthly temperatures are projected to rise significantly by 2085, with increases as high as 4°C. Under the SSP 2-4.5 scenario, temperatures are expected to increase by 1.8°C by 2050 and 2.8°C by 2085, whereas under

SSP 5-8.5, the rise could reach 2.4°C by 2050 and 4.9°C by 2085. Additionally, annual rainfall is anticipated to rise by 28.8 percent by 2050 and 43.5 percent by 2085 under SSP 2-4.5, while under SSP 5-8.5, rainfall could increase by 43 percent by 2050 and 76 percent by 2085.

37. Floods and extreme temperatures are identified as key climate-related hazards that the Project will face in the future. The scope of hydraulics studies includes assessment of flow capacity and to check the adequacy of cross drainage structures present on this road i.e. Ranipur to Sukkur section for safely pass the design floods with climate change effect under SSP 5-8.5 for 6.8 percent, 4.3 percent and 2.2 percent increase on rainfall for 25-, 50- and 100-year return period floods respectively.

38. Considering the floods estimated through hydrologic studies, hydraulic design review of existing twenty-four box culverts, four pipe culverts and one bridge have been carried out by adopting comprehensive methodology available in the NESPAK report.

39. Hydraulic design review of the culverts and bridge have been carried, by extracting required input parameters from available road layout plans, condition survey, natural topographic and google earth maps to check the adequacy for safely pass the design floods with climate change effect under SSP 5-8.5. Existing box culverts are found on small drains and nullahs, while bridges span larger nullahs in the Ranipur-Sukkur section. Considering the topography of the Project area, some development and huge agricultural land on the sides of the road at different locations, the hydraulic analyses for the cross-drainage structures have been taken up. Here, in this reach the structures with individual design discharge have been reviewed as individual for capacity check. The analysis came up with the next key findings:

- The results of the hydraulic analyses show that culverts at RDs 45+772 and 55+770 (both sides) are not capable of passing design floods. Hence, these culverts are required to increase the number of cells/barrels to achieve adequate capacity as shown in the summary table.
- Some culverts are moderately choked, minor damaged and filled with mud. Hence, cleaning, repairing and periodic maintenance for the proper drainage of the design floods is needed. Some culverts in poor condition are also suggested to be replaced with new box culverts as mentioned in remarks.
- In this reach of road only one bridge existed at RD 68+275 with a capacity of about 600 m3/s as indicated in the summary table. Here, one side (R-S) of bridge is filled with mud and requires cleaning.

Rawalpindi – Hassanabdal Road section:

40. In the road project area, average monthly temperatures are projected to rise significantly by 2085, with increases as high as 4°C. Under the SSP 2-4.5 scenario, temperatures are expected to increase by 1.8°C by 2050 and 2.5°C by 2085, whereas under SSP 5-8.5, the rise could reach 2.9°C by 2050 and 4.9°C by 2085. Additionally, annual rainfall is anticipated to rise by 8.2 percent by 2050 and 7.4 percent by 2085 under SSP 2-4.5, while under SSP 5-8.5, rainfall could increase by 11 percent by 2050 and 21 percent by 2085.

41. Floods and extreme temperatures are identified as key climate-related hazards that this project will face in the future. The analysis shows that extreme rainfall is expected to intensify. An ensemble of bias-corrected GCMs predicts a rise in rainfall by 2.5 percent for a

25-year return period, 2.3 percent for a 50-year return period, and 2.1 percent for a 100-year return period under SSP 2-4.5. Under SSP 5-8.5, the projected increases are 3.9 percent, 4.1 percent, and 4.3 percent, respectively, all of which have been incorporated into the Project's engineering design.

42. Hydraulic design review of the existing culverts and bridges, being used for storm-water drainage, has been carried out to check the adequacy to safely pass the design floods with climate change effect under SSP 5-8.5. It is observed that existing box culverts, pipe culverts are present on small drain/ nullahs, and bridges exist on some bigger nullahs at Rawalpindi-Hassanabdal section.

43. Considering the slopes, topography of the Project area and development on the sides of the road at some locations, the hydraulic analyses for the cross-drainage structures have been taken up. As per hydraulic design guidelines, the hydraulic design and review have been carried out for the culverts against 25-year return period flood and checked to pass 50-year return period flood, while, 100-year return period flood is used for the bridges. Here, in this reach the structures with individual estimated discharge have been reviewed for capacity check and proposed additional barrels where required. The analysis came up with the next key findings:

- Some structures are moderately choked and filled with mud. At some locations as mentioned in the summary at remarks, the existing cross drainage structures with mud blockage and minor damage are required cleaning, repair and periodic maintenance for the proper drainage of the design floods. Culverts at three locations are required to have an additional barrel for safely passing the flood discharge with climate change effect.

Peshawar and Nowshera Road section:

44. In the road project area, average monthly temperatures are projected to rise significantly by 2085, with increases as high as 4°C. Under the SSP 2-4.5 scenario, temperatures are expected to increase by 1.9°C by 2050 and 3.0°C by 2085, whereas under SSP 5-8.5, the rise could reach 2.5°C by 2050 and 5.3°C by 2085. Additionally, annual rainfall is anticipated to rise by 6.0 percent by 2050 and 5.0 percent by 2085 under SSP 2-4.5, while under SSP 5-8.5, rainfall could increase by 8.4 percent by 2050 and 15.4 percent by 2085.

45. The analysis shows that extreme rainfall is expected to intensify. An ensemble of bias-corrected GCMs predicts a rise in rainfall by 3.6 percent for a 25-year return period, 3.7 percent for a 50-year return period, and 3.7 percent for a 100-year return period under SSP 2-4.5. Under SSP 5-8.5, the projected increases are 11.0 percent, 12.0 percent, and 13.4 percent, respectively, all of which have been incorporated into the Project's engineering design.

46. The Kabul River significantly influences the N-5 Nowshera-Peshawar road section, particularly in terms of flood risks. The road's proximity to the river near Nowshera (RD 0+000 to 1+250) increases its vulnerability to potential damage during high flood events, which can disrupt transportation and hinder economic activities.

47. The scope of hydraulics studies includes assessment of flow capacity and to check adequacy of each cross-drainage structures present on this road for safely passing the design

floods with climate change effect under SSP 5-8.5 for 11 percent, 12 percent and 13.4 percent increase on rainfall for 25-, 50- and 100-year return period floods respectively. It is observed that existing box culverts are present on small drain/nullahs and bridges exist on some bigger nullahs/river at Nowshera–Peshawar section.

48. Considering the floods estimated through hydrologic studies, a hydraulic design review was conducted for 32 existing box culverts, 5 pipe culverts, and 8 bridges using a comprehensive methodology detailed in a NESPAK report. The analysis resulted in the following key findings:

- The results of the hydraulic analyses show that bridges at Reference Distances (RDs) 1+272, 2+160, 5+202 and 6+332 are adequate for passing design floods, whereas bridges at RDs 8+256, 10+599, 13+136, 17+497, and 25+118 are not capable of passing 100–yr. design flood.
- Culverts at RD 0+465, 10+599, 21+210, 25+205,25+405 (both sides) and 15+500, 20+468 (one side) are not capable of passing design floods. Hence, these culverts are required to increase the number of cells/barrels to achieve adequate capacity as shown in summary table (Table 5-1).
- Some cross drainage structures are moderately choked, minor damaged and filled with mud. Hence, cleaning, repairing and periodic maintenance for the proper drainage are needed.

Lahore–Gujranwala Road Section:

49. In the road project area, average monthly temperatures are projected to rise significantly by 2085, with increases as high as 4.1°C. Under the SSP 2-4.5 scenario, temperatures are expected to increase by 1.3°C by 2050 and 2.4°C by 2085, whereas under SSP 5-8.5, the rise could reach 2.4°C by 2050 and 4.1°C by 2085. Additionally, annual rainfall is anticipated to rise by 16.3 percent by 2050 and 21 percent by 2085 under SSP 2-4.5, while under SSP 5-8.5, rainfall could increase by 19.4 percent by 2050 and 37.6 percent by 2085.

50. Floods and extreme temperatures are identified as key climate-related hazards that this road section will face in the future. The analysis shows that extreme rainfall is expected to intensify. An ensemble of bias-corrected GCMs predicts a rise in rainfall by 2.5 percent for a 25-year return period, 2.7 percent for a 50-year return period, and 2.9 percent for a 100-year return period under SSP 2-4.5. Under SSP 5-8.5, the projected increases are 10.6 percent, 11.8 percent, and 13 percent, respectively, all of which have been incorporated into the Project's engineering design.

51. Hydraulic design review of the existing culverts and bridges, being used for storm-water drainage, has been carried out to check the adequacy to safely pass the design floods with climate change effect under SSP 5-8.5. It is observed that existing box culverts, pipe culverts are present on small drain/ nullahs, and bridges exist on some bigger nullahs at Lahore – Gujranwala section.

52. Considering the mild slopes, topography of the Project area and development on the sides of the road at some locations, the hydraulic analyses for the cross-drainage structures have been taken up. As per hydraulic design guidelines, the hydraulic design and review have been carried out for the culverts against 25-year return period flood and checked to pass 50-

year return period flood, while, 100-year return period flood is used for the bridges. Here, in this reach the structures with individual design discharge have been reviewed as individual, while remaining structures are checked for capacity in range of RDs as shown in Table-1. The analysis came up with the next key findings:

- At some locations, the existing cross drainage structures are choked with mud and some minor damages are required cleaning, repair and periodic maintenance for the proper drainage of the design floods. Some structures are completely choked from one side and some on both sides, where flood overtopping may occur. Only one box culvert at RD. 56+650 is required an additional barrel of the same size for safely pass the flood discharge with climate change effect.

Nai Baran Bridge:

53. NESPAK, using the tool developed by the Global Facility for Disaster Reduction and Recovery (GFDRR) in collaboration with the World Bank Group (WBG) have identified and assess the level of river flood, urban flood, coastal flood, earthquake, landslide, cyclone, water scarcity, extreme heat, wildfire, tsunami, volcano, within the Project area to facilitate the Project planning and design team for the consideration of these risks along with their vulnerabilities during the design phase accordingly.

54. The model identified the following climate hazards as potentially material to the Project: i) River flooding, particularly at major water crossings such as Nai Baran (Baran Nullah), ii) Extreme heat, as high daytime temperatures are prevalent in the surrounding areas during summer.

55. The Nai Baran Bridge will incorporate measures to address the identified climate hazards. These measures will be defined during subphase 1B of the Project, and their implementation will be included as a covenant.

Climate Adaptation Measures:

56. The Project incorporates measures tackling the climate hazards found (on the CRVA) as likely to materially affect the Project such as increasing temperatures (all the sections), Rainfall floods (all the sections) and Riverine flood (Peshawar-Nowshera section only). The whole list of measures is as follows in Table 5-1:

Table 5-1 Summary of Climate Risks and Adaptation Measures

Climate Hazard	Measure and Justification
Rainfall floods (Ranipur-Sukkur section)	• Culverts at RDs 45+772 and 55+770 (both sides) will increase the number of cells/barrels to achieve adequate capacity. • The cross-drainage structures and culverts to be found choked, damaged or filled with mud will be cleaned and periodically maintained (including the replacement with new box culverts when necessary). • Bridge at RD 68+275 will go through a deep cleaning and maintenance process. • Emergency Preparedness Plans: Development of response plans for road closures, detours, and disaster recovery.

Rainfall floods (Rawalpindi – Hassanabdal section)	• The cross-drainage structures and culverts to be found choked, damaged or filled with mud will be cleaned and periodically maintained (including the replacement with new box culverts when necessary). • The Culverts identified on the NESPAK reports (1563+520, 1563+690 and 1583+460) will get an additional barrel for each of the size mentioned in the report for safely passing the flood discharge with climate change effect. Emergency Preparedness Plans: Development of response plans for road closures, detours, and disaster recovery.
Riverine floods (Peshawar-Nowshera section)	NESPAK has recently worked on flood protections measures against the Kabul River floods as part of the "*Emergency Flood Assistance Project for Reconstruction and Rehabilitation of Irrigation, Drainage, and Flood Protection Works."* The proposed flood protection works, designed against 25-year return period flood event, offers a comprehensive and robust safeguard against potential flood risks along the N-5 Nowshera-Peshawar section. By mitigating the impact of floods, these measures are expected to preserve the structural integrity of the road and minimize disruptions to transportation and economic activities. Furthermore, the design accounts for climate change impacts under SSP-5 8.5, ensuring the road remains protected even during projected peak flood scenarios. These protections works also include: • Development of National Flood Protection Plan-IV (NFPP-IV) and Related Studies to Enhance Capacity Building of Federal Flood Commission (FFC), 2016 • Strengthening of the existing bunds along the road. • Systematic monitoring including regular inspections.
Rainfall floods (Peshawar-Nowshera section)	• Culverts and bridges are provided as cross drainage structures where natural drains and nullahs cross this roadway. Cross-drainage structures comprising box culverts and bridges are provided at 45 locations in order to pass the flood discharges. • The bridges with insufficient capacity to pass design discharge (RDs 8+256, 10+599, 13+136, 17+497 and 25+118) will increase the number of bays to sort it out. • Culverts at RDs 0+465, 10+599, 21+210, 25+205,25+405 (both sides) and 15+500, 20+468 (one side) will increase the number of cells/barrels to achieve adequate capacity. • The cross-drainage structures to be found choked, damaged or filled with mud will be cleaned and periodically maintained. • Emergency Preparedness Plans: Development of response plans for road closures, detours, and disaster recovery.
Rainfall floods (Lahore-Gujranwala section)	• The cross-drainage structures and culverts to be found choked, damaged or filled with mud will be cleaned and periodically maintained (including the replacement with new box culverts when necessary).

	• The Culverts identified on the NESPAK reports (RD. 56+650) will get an additional barrel of the same size for safely pass the flood discharge with climate change effect. • Emergency Preparedness Plans: Development of response plans for road closures, detours, and disaster recovery.
River floods (Nai Baran bridge)	• Climate Resilient Design of Structures will be defined and implemented during subphase 1B.
Extreme Heat (Nai Baran Bridge)	• Engineering and Design Measures (Thermal Expansion Joints and Reflective Geometry options will be ensured). • Environmental and Nature-Based Solutions (Reforestation and Vegetation Zones: Plant trees near approaches (start and end points) for natural cooling. • Emergency Preparedness Plans: Development of response plans for road closures, detours, and disaster recovery.
Extreme Heat (All the road sections)	• Heat-resistant asphalt will be used in all 4 sections. • Reforestation and Vegetation Zones: Plant trees along roadsides to provide shade and reduce pavement temperature, reduce soil erosion and reduce wind and storm impact. • Implement xeriscaping (low-water landscaping). • Minimizing Water Use in Construction and optimizing concrete mix designs to reduce water consumption.

57. The Project does not pose a risk of maladaptation.

Non-incompatibility with the NDC and other Adaptation Strategies:

58. The Project is not incompatible with the NDC or any other national climate adaptation strategy.

BB2 Conclusion: The Project incorporates measures that tackle the climate hazard that might materially affect it, and it is not incompatible with the NDC and other national adaptation strategies, thus it is considered aligned with the adaptation goals of the PA (BB2).

Climate Mitigation Finance

59. Some elements of the Project qualify as climate mitigation finance (Landscaping, afforestation, Solar Street lighting, bus bays and pedestrian bridges). The total climate mitigation finance claimed in the project is USD 8.81 million, equivalent to 1.76 percent of AIIB's investment.

Climate Mitigation Finance Activity	CAPEX (USD million)	Justification and Comments
Landscaping and Horticultural Works	4.49	Qualifying under the next sections of the joint MDB common principles for tracking climate mitigation finance: 9.3. Measures that reduce net energy consumption, resource consumption or CO2e emissions, or increase plant-

		based carbon sinks in public areas or installations.
Other Climate Mitigation Improvements	4.32	We have grouped the rest of the climate mitigation works there (Solar Street lighting, bus bays and pedestrian bridges). These elements qualify under the next sections of the joint MDB common principles for tracking climate mitigation finance: 9.3. Measures that reduce net energy consumption, resource consumption or CO2e emissions, or increase plant-based carbon sinks in public areas or installations for Solar Street lighting, 8.1. Urban and rural public transport projects for bus bays' and 8.2. Non-motorized transport (NMT) or electric personal mobility for pedestrian bridges.
Total	**8.81**	

Climate Adaptation Finance

60. The joint MDB methodology specifies three criteria that need to be met simultaneously for a project or activity to be considered as adaptation finance. These criteria and the justification for this Project is explained below:

> **Criteria 1, the climate risk context of the activity or project is clearly set out:** Please refer to the CRVA on the BB2 section above.
>
> **Criteria 2, a statement is explicitly made for the Project to reduce the climate vulnerability and/or to enhance the climate resilience**: The Project construction related costs will include climate resilience measures, identified through a thorough climate risk and vulnerability assessment. It is therefore the explicit intent of those activities to reconstruct a road in a way that is resilient to the impacts of climate change. Project has allocated appropriate climate change measures as part of climate adaptation solutions, which are listed in the BB2 section above.
>
> **Criteria 3, there must be a logic and direct link between an activity or project and the climate risk context established within the Project:** As mentioned on the adaptation section above, Climate adaptation measures (that can be considered substantial contributors) have been incorporated into the different road sections.

61. Given that the Project belongs to the climate adaptation type 1 (adapted project) and the measures taken on it (mostly structural) listed above, using the AIIB's proportional approach based on the joint MDB methodology for tracking climate adaptation finance, we can allocate a 15 percent climate adaptation finance to the EPC cost of the Project (15 percent of USD 448.76 million) equivalent to USD 67.31 million.

62. Total climate finance (summing climate mitigation finance and climate adaptation finance) would be USD 76.12 million, equivalent to 15.22 percent of AIIB's investment.

Annex 6: Country Credit Fact Sheet

1. **Background**: Pakistan is a lower-middle-income country with a GDP per capita of approximately USD1,600 (or USD7,000 in purchasing power parity) and a population of around 240 million. Pakistan's economic prospects have been constrained by longstanding structural challenges. Economic growth and living standards have trailed regional peers, reflecting policy missteps, underinvestment in human and physical capital, distortions from an outsized state presence in the economy, and persistent fiscal weaknesses. Pakistan's economy grew at an average annual rate of 3.5 percent over the last decade. Since mid-2021, macroeconomic instability has intensified due to a combination of domestic and external shocks. Political volatility, especially in 2022, further undermined confidence and raised doubts about the government's ability to stabilize the economy. Delays in the IMF program and concerns about debt sustainability triggered market anxiety, curtailed external financing, and led to a downgrade of Pakistan's sovereign credit rating to the 'CCC' range, pushing yields sharply higher. As a result, growth came to a standstill in FY23, the rupee depreciated by 50 percent, and foreign exchange reserves fell by 75 percent between mid-2021 and mid-2023.

2. Since mid-2023, Pakistan has resumed engagement with the IMF. The initial 9-month program has provided a policy anchor and restored confidence. New official financing, including support from Gulf Cooperation Council (GCC) bilateral partners, signaled sustained international backing. The program has been implemented effectively and contributed to macroeconomic stabilization. The IMF's subsequent 37-month, USD 7 billion Extended Fund Facility (EFF) program, since September 2024, focuses on macroeconomic stability – through fiscal consolidation, tax reform, tight monetary policies, and higher foreign exchange (FX) reserves – strengthening competitiveness, reforming state-owned enterprises (SOEs) and improving the energy sector. The economy started to recover in FY24 with higher growth and lower inflation.

Selected Economic Indicators	FY23*	FY24*	FY25*	FY26*	FY27*	FY28	FY29
Real GDP growth (% change)	-0.2	2.5	2.6	3.6	4.1	4.5	4.5
Inflation (end-of-period, change)	%29.4	12.6	6.5	6.6	6.5	6.5	6.5
Fiscal balance 1/	-7.7	-6.8	-5.6	-5.1	-3.9	-3.4	-3.2
Public debt 1/	78.2	70.1	73.6	71.9	70.0	67.0	63.9
Current account balance	-1.0	-0.5	-0.1	-0.4	-0.5	-0.8	-0.9
External debt	34.8	33.7	33.9	33.1	31.9	35.1	32.2
Gross external financing need	7.1	5.7	4.0	4.7	4.5	6.7	4.6
FX reserves (USD billion) 2/	4.4	9.4	11.4	..	..	..	..
Exchange rate (PKR/USD) 2/	287.6	278.3	282.2	..	..	..	,,

Source: IMF Country Report No. 25/109; in percentage of GDP, unless otherwise indicated; * denotes projections; fiscal year runs July-June. Notes: 1/ General government, including IMF obligations; 2/ Data from central bank, end-of-period, for FY25: as of May 29, 2025

3. **Recent developments.** The IMF has recently completed the first review of Pakistan's program, with overall performance assessed as strong. Pakistan met key program targets, particularly in reserve accumulation and fiscal performance. The budget is on track to meet the full-year target of 2.1 percent primary surplus. Provincial governments implemented

increases in agricultural income tax, fulfilling a major reform milestone. The parties also agreed to a new USD 1.3 billion Resilience and Sustainability Facility (RSF) program, aimed at strengthening Pakistan's climate resilience.

4. Inflation fell to a historic low of 0.3 percent in April, although core inflation remains at around nine percent. Strong disinflation has enabled the central bank to cut the policy rate from a peak of 22 percent in FY24 to 11, as of May 2025. Meanwhile, foreign exchange reserves surpassed targets, rising from USD 9.4 billion in August 2024 to USD 11.4 billion, as of May 2025, while public debt fell from 78 to 70 percent of GDP.

5. **Outlook and risks.** Growth in FY25 is projected at 2.6 percent. Forecasts for inflation and the current account deficit have been revised downward to 6.5 percent and -0.1 percent, respectively. The narrower current account deficit reflects strong export performance and recovering remittances, supported by improved macroeconomic and exchange rate stability. Over the medium term, it is expected to widen to around one percent of GDP as imports rebound. Reserves are set to further strengthen, aided by multilateral and bilateral financing. For example, the World Bank has recently committed USD 20 billion over the next 10 years under its Country Partnership Framework for Pakistan.

6. The main risks to the outlook include potential slippage in the IMF program, political volatility, and social unrest that could derail reforms efforts. The main external risks include higher commodity prices, geopolitical tensions, and elevated global economic policy uncertainty, which could further tighten already constrained global financial conditions. Additionally, Pakistan remains highly vulnerable to climate related risks.

7. According to the IMF, public debt continues to be sustainable. However, this critically hinges on a decisive implementation of the IMF-supported economic reforms, the gradual resumption of growth and the continued financial support from partners. Under such a scenario, public debt remains contained at around 70 percent of GDP by 2027 and falls afterwards. However, 70 percent of GDP remains high compared with peers. Risks to debt sustainability are high, key of them related to liquidity, namely high external financing needs and low FX reserves (less than half of what the IMF deems adequate), while interest payments are absorbing more than half of government revenue. Debt sustainability could also come under further pressure in case of policy slippage, higher interest rates, lower growth, and exchange rate volatility.

8. Because of recent macroeconomic improvements, Pakistan's sovereign credit ratings have been upgraded, and international borrowing spreads have narrowed, reflecting stronger investor confidence. Moody's upgraded the rating to Caa2 and changed the outlook to positive in august 2024. In April 2025, Fitch upgraded the country to B- (from 'CCC') with stable outlook, on account of progress being made on narrowing the budget deficit and implementing structural reforms, S&P rates Pakistan at CCC+ (stable).