*OFFICIAL USE ONLY

NATIONAL HIGHWAY AUTHORITY, PAKISTAN

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANNING FRAMEWORK (ESMPF)

WIDENING & IMPROVEMENT OF PRIORITY SECTIONS OF N5 (487 KM)

APRIL, 2025

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD.
HEAD OFFICE: NESPAK HOUSE, 1-C, BLOCK-N, MODEL TOWN EXTENSION LAHORE, PAKISTAN

REPORT ISSUE & REVISION RECORD

REVISION RECORD				
Description	**Issue**	**Revision**	**Date**	**Changes made**
Environmental and Social Management Planning Framework (ESMPF)	01	00	11/12/2024	--
Updated ESMPF by addressing comments from AIIB and Independent Consultants	02	01	12/03/2025	Structural change, minimize repetition with ESIA and by cross referencing Chapters and Sections of the ESIA
Updated ESMPF by the International Environmental Consultant	03	02	19/04/2025	Improvement made by the International Environmental Consultant

WIDENING & IMPROVEMENT OF PRIORITY SECTIONS OF N5 (487 KM)

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANNING FRAMEWORK (ESMPF)

TABLE OF CONTENTS

Page No.

ANNEXES

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATONS

AIIB	Asian Infrastructure Investment Bank
AoI	Area of Influence
BOD	Biochemical Oxygen Demand
BoQ	Bill of Quantity
CCR	Community Complaints Register
CHS	Community Health and Safety
COD	Chemical Oxygen Demand
CSC	Construction Supervision Consultant
dB	Decibels
DG	Director General
E&S	Environmental and Social
EA	Environmental Assessment
EALS	Environment Afforestation and Land Section
ECO	Economic Cooperation Organization
EHS	Environment, Health and Safety
EIA	Environmental Impact Assessments
EP&CCD	Punjab Environmental Protection and Climate Change Department
EPA	Environmental Protection Agency
EPA KP	Environmental Protection Agency Khyber Pakhtunkhwa
ERP	Emergency Response Plan
ESEL	Environmental and Social Exclusion List
ESF	Environment and Social Framework
ESHS	Environmental, Social, Health and Safety
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ESMPF	Environmental and Social Management Planning Framework
ESP	Environmental and Social Policy
ESS	Environmental and Social Standard
FAO	Food and Agriculture Organization
FATA	Federally Administrated Tribal Areas
FIs	Financial Intermediaries
GAP	Gender Action Plan
GBV	Gender-Based Violence
GEA	General Environmental Approval
GFDRR	Global Facility for Disaster Reduction and Recovery
GoP	Government of Pakistan
GoPb	Government of Punjab
GoS	Government of Sindh
GRC	Grievance Redress Committees
GRM	Grievance Redress Mechanisms
HQ	Head Quarter
ICT	Islamabad Capital Territory
IEE	Initial Environmental Examinations
IFC	International Finance Corporation
ILO	International Labour Organization
KP	Khyber Pakhtunkhwa
LAA	Land Acquisition Act
LMP	Labor Management Plan
LRP	Livelihood Restoration Plan
MSDS	Material Safety Data Sheets
N5	National Highway 5

NCCP	National Climate Change Plan
NCS	National Conservation Strategy
NDMA	National Disaster Management Authority
NEQS	National Environmental Quality Standards
NGOs	Non-Governmental Organizations
NHA	National Highway Authority
NOC	No Objection Certificate
O&M	Operation & Maintenance
OHS	Occupational Health & Safety
OIC	Organization of the Islamic Cooperation
P&D	Planning & Development
Pak-EPA	Pakistan Environmental Protection Agency
PAPs	Project Affected Parties
PCEA	Prohibition of Child Employment Act
PCR	Project Completion Report
PD	Project Director
PEPA	Pakistan Environmental Protection Act
PEPC	Punjab Environmental Protection Council
PEQS	Punjab Environmental Quality Standards
PIU	Project Implementation Unit
PM	Particulate Matter
PMU	Project Management Unit
PPE	Personal Protective Equipment
PS	Performance Standards
QESMR	Quarterly Environmental and Social Monitoring Report
RAP	Resettlement Action Plan
RNR	Renewable Natural Resources
ROW	Right Of Way
RPF	Resettlement Policy Framework
SAARC	South Asian Association for Regional Cooperation
SAEESMR	Semi-Annual External Environmental and Social Monitoring Report
SDS	Social Development Specialist
SEP	Stakeholder Engagement Plan
SEPA	Sindh Environmental Protection Agency
SEQS	Sindh Environmental Quality Standards
SSSD	Sindh Strategy for Sustainable Development
TBT	Toolbox Talk
TMP	Traffic Management Plan
TORs	Terms of References
TPV	Third Party Validation
UNCRPD	United Nations Convention on the Rights of Persons with Disabilities
UNO	United Nations Organization
VES	Valued-Environmental Component
WBG	World Bank Group
WHO	World Health Organization

EXECUTIVE SUMMARY

ES-1 Introduction

National Highway N5 having a total length of 1,819 km is the lifeline for Pakistan's economy, linking the port of Karachi to Peshawar and the Afghan border, via almost all of the country's main population and economic centers of Hyderabad, Multan, Lahore, Gujranwala, Rawalpindi / Islamabad, and via the Karakorum Highway up to the international border of Peoples Republic of China.

The current capacity of the N5 highway is inadequate to meet the continuously growing demands for traffic flow. Furthermore, in the 2022 flood events, many segments of the N5 highway experienced significant damage, resulting in traffic interruptions, particularly within the Sindh province.

The Project will involve the detailed design for improvement and widening of the selected sections of the N5 which will facilitate the improvement of traffic flows on N5 and increase the traffic-carrying capacity of the road and reduce traffic congestion in major urban areas.

As per the Terms of Reference (TOR), the Project has been divided into eight (08) Sections, i.e., Section 01: Hyderabad to Hala, Section 02: Ranipur to Rohri, Section 03: Okara to Manga, Section 04: Lahore to Gujranwala, Section 05: Kharian to Dina, Section 06: Dina to Rawat, Section 07: Rawalpindi to Burhan, and Section 08: Nowshera to Peshawar.

The Project follows a Multi-Phased Program (MPP) approach, under which only the first three priority sections of the N5 highway (Phase 1A) have undergone detailed engineering design prior to Project Appraisal. Consequently, both a framework-based and site-specific environmental and social (E&S) assessment approach is required to ensure compliance with national and provincial legislation in Pakistan, AIIB's Environmental and Social Framework (ESF), and international good practices. Environmental and Social Impact Assessment (ESIA), Resettlement Action Plan (RAP), and Gender Action Plan (GAP) were prepared for the Phase 1A sections of the highway.

To manage environmental and social risks and impacts for the subsequent sections of the MPP, NHA has prepared several framework instruments. These include:

- Environmental and Social Management Planning Framework (ESMPF)
- Stakeholder Engagement Plan (SEP), applicable for the entire MPP.
- Labor Management Plan (LMP), applicable for the entire MPP.
- Resettlement Policy Framework (RPF)
- Gender Action Plan Framework (GAPF)

Additionally, an Environmental and Social Action Plan (ESAP) has been prepared, outlining the NHA's commitments to manage identified E&S risks and impacts in accordance with the AIIB's ESF and National Laws and Guidelines. The ESAP includes specific time-bound actions, assigned responsibilities, and required resources.

These framework instruments are complemented by site-specific documents for Phase 1A as stated above.

ES-2 Regulatory Review

National and provincial regulations require the Project Proponent to carry out an Environmental and Social Assessment and obtain approval from the relevant provincial Environmental Protection Agency prior to the commencement of construction.

To secure financing from the AIIB, the Project must also comply with the AIIB's ESF and the applicable Environmental and Social Standards (ESSs), specifically:

- ESS 1: Environmental and Social Assessment and Management
- ESS 2: Land Acquisition and Involuntary Resettlement

In accordance with the Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021, Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations, 2022, Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000, and Khyber Pakhtunkhwa Environmental Assessment Rules, 2021, along with AIIB's ESF, the Phase 1B and Phase 2 road sections have been classified as Category A. This classification necessitates the preparation of a comprehensive ESMPF prior to project appraisal.

ES-3 Environmental and Social Baseline

The Improvement and Widening of Priority Sections of the N5 highway across Sindh, Punjab, Khyber Pakhtunkhwa, and the Islamabad Capital Territory, involves diverse physical and topographical features. The N5 highway traverses varied landscapes and presents unique topographical features ranging from flat, floodplain terrains to rugged terrain with landslide risks. Similarly, the soil conditions range from rich alluvial soils to loamy and clay soils to rocky soils. Seismically the project area falls under two different categories i.e., Zone 2A and 2B as per the classification of Seismic Building Code of Pakistan 2007/2021.

The climate across the N5 highway varies significantly depending on the geographical location, from the arid conditions in Sindh to the more temperate climate in Islamabad. In addition to tropical climate in southern Pakistan, the rest belongs to subtropical climate. Southern area is humid and hot with relatively long rainy season affected by the monsoon; the northern part is dry and cold, and some places are covered by snow all the year. The average temperature is 27℃. The overall climate is characterized by increased rainfall from the south to the north, increased air humidity and gradually well-developed vegetation.

Currently, the drainage system along N5 is in extremely poor condition and will require major upgrades as a result of this project. Flooding is a concern, particularly in the flat, low-lying areas near rivers and agricultural lands. Currently the air quality on the road/N5 sections is in poor condition due to exhaust and dust on the road. Similarly, noise levels are also high, due to traffic congestions and horn blowing.

The ecological environment across the project Sections highlights diverse yet heavily impacted flora and fauna due to anthropogenic and natural pressures. Section 01, from Hyderabad to Hala, emphasizes a rich agricultural area with diminishing natural vegetation, replaced largely by crops and orchards. Flora includes tropical thorn forest species like Kikar, Shisham, and Tamarix, while fauna comprises domestic pests, small mammals, and reptiles, with declining bird populations due to pesticide use and hunting. Similarly, the Ranipur to Rohri section sees tropical thorn forest remnants with hardy species like Neem and Date Palm, while the faunal diversity includes mammals, reptiles, and endangered birds like falcons due to excessive hunting. In the Okara to Manga region, human activity and

climate variation have transformed the area, reducing native vegetation to xerophytic species and agricultural land, with terrestrial fauna showing significant degradation. From Lahore to Gujranwala, the semi- arid region now supports urban flora such as Eucalyptus and Shisham, with mammals like mongoose and urban bird species adapting to altered habitats. Sections from Kharian to Dina and Dina to Rawat highlight degraded tropical thorn eco-zones with remnants of thorny vegetation, limited natural habitats, and declining fauna such as wild boar and jackals due to urban encroachment. The Rawalpindi to Burhan area, part of the sub-tropical broad- leaved evergreen scrub zone, is characterized by sparse vegetation and heavily impacted wildlife, including diminishing bird and reptile species.

It was observed during the reconnaissance survey of the proposed Project that the alignment of the N5 sections passed through almost sixteen (16) districts of the Sindh, Punjab and Khyber Pakhtunkhwa Provinces which are Jamshoro, Hyderabad, Matiari, Khairpur, Sukkur, Okara, Kasur, Lahore, Sheikhupura, Gujranwala, Jhelum, Gujrat, Rawalpindi, Attock, Islamabad, Nowshera, and Peshawar. In the project areas, several social issues related to vulnerability are likely to emerge, particularly for marginalized and disadvantaged segments of the population due to clearance of the Right of Way (ROW). Vulnerable groups such as women, children, the elderly, persons with disabilities, migrant workers and refugees, and low-income households, and other site-specific groups (e.g., seasonal fruits and vegetable vendors in movable carts) are at heightened risk of negative impacts from removal of encroachment and/or construction work in their communities.

The removal of encroachments from the ROW will pose significant social risks, particularly to both formal and informal settlers residing in and along the ROW. The clearance of ROW can lead to the loss of homes, livelihoods, and community networks. Such disruptions can disturb the social fabric of the community, leading to increased vulnerability, social unrest, and a sense of insecurity. The adjacent population may also experience negative impacts, such as disruption of access to services and economic opportunities. To mitigate these risks, the project framework includes a comprehensive approach to resettlement, compensation, and livelihood restoration, along with community engagement and consultation processes that ensure the affected populations are included in decision-making.

The dominant religion across the districts is Islam. The most widely spoken language is Punjabi, especially in the central and eastern parts of Punjab like Lahore, Kasur, Gujranwala, and Sheikhupura. In Sindh, particularly in districts such as Hyderabad, Sukkur, and Khairpur, Sindhi is the predominant language. Urdu, being the national language, is also commonly spoken and understood across these regions, especially in urban centers like Islamabad, Rawalpindi, and Peshawar, where it serves as a lingua franca. In areas like Peshawar, Pashto is widely spoken, reflecting the Pashtun population of Khyber Pakhtunkhwa. The availability of clean drinking water varies, with urban areas typically having better infrastructure like piped water systems and filtration plants. In rural areas, however, water sources may include hand pumps, wells, and tube wells, though the quality of water can sometimes be a concern due to contamination. Urban areas like Lahore, Islamabad, and Peshawar generally have more advanced infrastructure, with well-established road networks, reliable electricity supply, and modern healthcare and education systems. In contrast, rural districts may have limited access to such utilities, and improvements are needed.

ES-4 Potential Environmental and Social Impacts and Mitigation Measures

Following potential adverse impacts have been anticipated during different stages of the Project with most linked to/emerging during the construction phase:

- Temporary land acquisition on rental/lease basis for temporary site facilities like camps, storage, workshops, equipment parking and washing areas;
- Loss or disruption of livelihoods (seasonal fruits and vegetable vendors in movable carts);
- Disturbance and relocation;
- Cutting of trees/bushes falling within the Project RoW;
- Disturbance to infrastructure and public utilities;
- Disturbance to the public movement during construction;
- High noise level and air pollution due to the operation of construction machinery and increased traffic operation;
- Solid waste and wastewater generation during construction;
- Potential oil spillages from construction machinery, resulting in soil and water contamination;
- Occupational and community health and safety issues;
- Traffic congestion and road safety;
- Gender inequality and disempowerment;
- Gender based violence (GBV), Sexual Exploitation and Abuse (SEA)/Sexual Harassment (SH) and Child Abuse (CA);
- Child and forced labor;
- Impacts on vulnerable and disadvantaged groups, including constraints in accessing Project benefits;
- Social and cultural conflicts; and
- Potential risk for cultural heritage and archaeological sites.

A preliminary level climate change risk identification and risk assessment was carried out which reveals that out of eleven different hazard[1], river flood, earthquake, water scarcity and extreme heat are the major climate change risk for the Project which will be further assessed Section wise along with appropriate mitigation and adaptation measures during the Section-specific ESIA stage.

However, it is anticipated that with the appropriate mitigation and control measures, most of these impacts will either be avoided altogether, or their likelihood of occurrence and severity will be reduced, thus making this project environmentally viable and socially benign.

ES-5 Stakeholder Consultations

The consultations were conducted by the E&S team of NESPAK along with NHA's Regional offices from September to November 2024. 47 consultations were carried out during the Project preparatory stage in which 454 male and female community members participated (approx. 37% female participation). Out of 47, gender consultations were carried out at 19 localities along the ROW. A total of 37 institutional consultations were held during this period. In addition, consultations were also carried out during socioeconomic and census surveys. More detail information is presented in Chapter 7 of the Phase 1A ESIA.

The main concerns of the stakeholders were related to the displacement of their temporary structures falling in the Project area which will cause livelihood impacts due to temporary displacement and access restriction. The stakeholders also pointed out that due to the number of accidents on this road on a daily basis, many injuries and casualties take place on this road. Special provisions should be considered during design, construction and operation stages. Crossings, pedestrian bridges and bus stops with partitions for men and women should be built for the local community along the road at suitable locations. Locals also

showed their concerns related to the worsening of poor road infrastructure due to excavation. They also recommended that the project should proceed on the fast track with minimum disturbance of the social amenities and ensure provision of employment opportunities for local people. These concerns/suggestions of stakeholders have been addressed in consultation with NHA and embedded into the design of the Project.

ES-6 Environmental and Social Management Planning Framework (ESMPF)

ESMPF is an instrument that examines the issues and impacts associated when a project consists of a program and/or series of Sections, and the impacts cannot be determined until the program or Section details have been identified. This ESMPF covers all the Sections proposed to be funded under the Asian Infrastructure Investment bank's multi-phase program (MPP). The purpose of the ESMPF is to ensure E&S safeguards are compiled and E&S risks and impacts at all the stages of the project are mitigated and controlled. And all Sections comply with the E&S management plan provided in this framework. ESMPF also provide guidelines for screening and developing site specific instruments, (RAP, ESIA/ESMP) based on categorization of each Section of the highway. It provides institutional arrangement of the proposed Project which will be administrated by the PIU-HQ NHA during the pre-construction/design stage

The proposed N5 will be managed by the NHA during the O&M phase through EALS and Maintenance Sections. The National and AIIB's E&S screening mechanism will be applied to all investments proposed for financing. The screening will be carried out by assessing the individual Section as per its E&S impacts/risks along with their extent and magnitude. ESMPF will also provide the framework of mitigation measures against identified and assessed impacts which needs to be implemented during design, construction and operation phases accordingly.

After the screening process and classification of the category of the project, the type and extent of the ESIA required is decided and executed. NHA will prepare the Terms of References (TORs) for the ESIA and recruit the necessary experts to carry it specific srudy. It is expected that all eligible Sections will require ESIA (Phase wise) and its corresponding Environmental and Social Management Plan (ESMP).

To enhance the capacity of the Proponent as well as the Contractor, capacity development will be imparted related to the environmental and social (including gender) issues of the proposed project, implementation of mitigation measures and the monitoring protocols and reporting mechanism will also be carried out.

The ESIA/ESMP including management action plans, provide the basis for supervising the environmental and social aspects of project implementation. Site specific ESIAs including ESMPs, and RAPs including LRP will be prepared for various project Sections, as directed by this ESMPF and the RPF. PIU-HQ-NHA will include the Environmental, Social, Health and Safety (ESHS) conditions in the bidding documents to ensure all mitigation measures proposed in the ESIA and other E&S instruments are effectively implemented.

ES-7 Monitoring and Reporting

PIU-HQ and RIU of NHA will be responsible for all the monitoring activities (compliance monitoring and effect monitoring). All the findings and results in the form of monitoring report will be finally shared with respective EPA as well as AIIB as per the reporting mechanism. Monthly meetings will be held by E&S Staff of RIU(s) at site during the construction phase. The purpose of these meetings will be to discuss the routine activities, non-compliances and their remedial measures. Various reports will also be produced at periodic time intervals.

Stakeholder consultations will be carried out during all phases of the project in accordance with AIIB's ESF and the SEP. The implementation of the proposed ESIA and ESMP involves inputs from various functionaries. The Contractor will be primarily responsible for ensuring implementation of the mitigation measures proposed in the ESIA and ESMP, which will be part of the contract documents.

ES-8 Grievance Redress Mechanism

The NHA will establish a Grievance Redress Mechanism (GRM) to facilitate the resolution of community complaints and grievances. The formal GRM will be set up with a three-tiered structure; the first at the community level enabling immediate local responses to grievances, second at RIU Level and third at PIU-HQ level for reviewing and addressing the grievances. Under this mechanism, a Grievance Redress Cell (GRC) will be established in the RIU and PIU-HQ of NHA. At least there will be one focal person for GRM at each construction sites during construction stage. The GRM will communicate with the public and particularly the affected community through print and electronic media and during public consultations and community engagement events. All written and oral grievances will be recorded. The complaints received will be properly recorded and documented in the Complaint Register. The register will also record the actual measures taken to mitigate these concerns. The aggrieved stakeholders will be kept informed about the actions on their complaints till its resolution. NHA staff will be responsible for maintaining community complaints records and their resolution.

ES-8 Budget

The tentative budget under different cost headings is proposed. Total estimated cost for ensuring compliance with AIIB ESF requirements is about 1.895 Billion PKR. This includes the cost for preparation of site-specific ESIA/ESMP as per National and AIIB's Requirements, the cost for PIU-HQ and RIU (E&S) Staffing Cost, and the tentative cost of ESMP implementation (Pre-Construction, Construction and O&M).

1 INTRODUCTION

This chapter provides background of the proposed Project and its sections which will be financed by the Asian Infrastructure Investment Bank (AIIB), profile of the proponent and the need and objectives of the Environmental and Social Management Planning Framework (ESMPF). This ESMPF should be read in conjunction with the other Environmental and Social instruments developed for the Multi-Phased Program. These include the Resettlement Policy Framework (RPF), which outlines the principles and procedures for addressing land acquisition and involuntary resettlement; the Stakeholder Engagement Plan (SEP), which details strategies for meaningful consultation and information disclosure; Gender Action Planning Framework (GAPF), ensuring that gender considerations are systematically integrated into project planning, implementation, and monitoring; and the Labor Management Plan (LMP), which defines measures for fair labor practices, worker rights, and grievance mechanisms. Together, these documents form an integrated framework for the identification, assessment, and management of E&S risks and impacts throughout the project lifecycle.

1.1 BACKGROUND

1,819 km long National Highway N5 is the lifeline for Pakistan's economy, linking the port of Karachi to Peshawar and the Afghan border, via almost all of the country's main population and economic centers of Hyderabad, Multan, Lahore, Gujranwala, Rawalpindi / Islamabad, through Karakorum Highway up to the international border of the Peoples Republic of China.

N5 while serving the domestic needs of about 80% of Pakistan's urban population in the provinces of Sindh, Punjab, and Khyber Pakhtunkhwa also carries 65% of the country's freight traffic, especially in its southern sections. Out of a total 28,000 to 62,000 daily traffic, a high percentage of heavy traffic coupled with overloading is causing colossal damage to the road network precluding the achievement of a sustainable national highway network. The current capacity of the N5 highway is inadequate to meet the continuously growing demands for traffic flow. Furthermore, in the 2022 flood events, numerous segments of the N5 highway (specifically from Hyderabad to Rohri, segment of Sindh province and Peshawar to Rawalpindi segment of Khyber Pakhtunkhwa and Punjab provinces) were severely affected due to heavy rainfall and flash floods from adjoining hilly terrain, experiencing significant impacts, resulting in traffic interruptions, particularly within the Sindh province.

1.2 THE PROPONENT: NATIONAL HIGHWAY AUTHORITY (NHA)

The proponent of the project is the ‘‘National Highway Authority (NHA)’’. NHA was established, in 1991, through an Act of the Parliament, for Planning, Development, Operation, Repair and Maintenance of National Highways and Strategic Roads specially entrusted to NHA by the Federal Government or by a Provincial Government or other authority concerned.

NHA is responsible for the management of 48 National Highways, Motorways, Expressways, and Strategic Routes, spanning a total length of 14,480 km. Although this represents only 4.6% of Pakistan's total road network (263,775 km), it accommodates approximately 80% of the country's commercial traffic. Among these routes, the N5 highway alone carries about 65% of the total commercial traffic load.

1.3 THE PROJECT: DETAILED DESIGN FOR WIDENING & IMPROVEMENT OF PRIORITY SECTIONS OF N5 (487 KM)

The Project will involve the detailed design for improvement and widening of N5. The widening and improvement of N5 will facilitate the movement of various types of traffic, including trade, construction materials, agricultural goods, industrial products, and commercial freight, along the N5 route from Karachi to Torkham. Widening and improving of existing patches of N5 will increase the traffic-carrying capacity of the road and reduce traffic congestion in major urban areas. The proposed Project will also involve widening and improvement of existing structures to cater to the local catchment hydrology. Additionally, geometry of sharp curves and turns will also be improved. The Project is also expected to have significant positive impacts on economic development, as employment and business will be generated in the vicinity by implementing the project. The objectives of the proposed Project are as under:

- To ensure that the N5 provides a safe, sustainable, and disaster-resilient road corridor.
- To provide dedicated heavy traffic lanes to minimize road deterioration.
- Provision of service lanes in urban areas to manage the local traffic and reduce their direct accessibility on the main carriageway.
- Enhance road safety through Star Rating improvements up to 3 Star or better.

1.4 COMPONENTS OF THE PROJECT

The project is divided into two zones, i.e., North Zone (339km) and South Zone (135km). These two zones are further divided into eight (08) different sections. The zone-wise details of the sections are provided in **Table 1.1** below and map has been provided as **Figure 1.1**.

Table 1.1: Section Detail and Length

Section No.	Name	Length (km)
1	Hyderabad – Hala (Phase 2)	65
2	Ranipur – Rohri (Phase 1B)	70
3	Okara – Manga (Phase 2)	83
4	Lahore – Gujranwala (Phase 1B)	68
5	Kharian – Dina (Phase 2)	41
6	Dina – Rawat (Phase 2)	72
7	Rawalpindi – Burhan (Phase 1A)	44
8	Nowshera – Peshawar (Phase 1A)	31
GRAND TOTAL		**474**

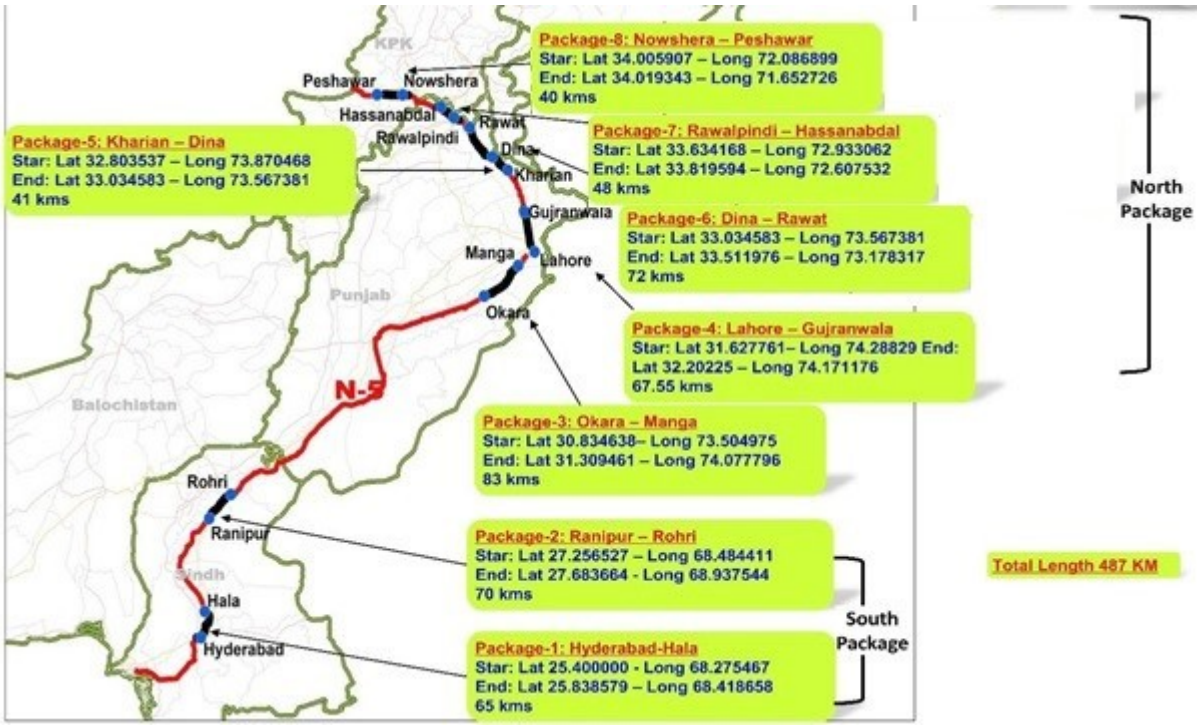


Figure 1.1: Map Showing all Sections under proposed Project

1.5 PROJECT PHASING:

The E&S team in coordination with technical and design team worked out the prioritization of each project section based on environment, social, resettlement risks along with other technical parameters like road condition, traffic situation and Climate & Hydrology/Hydraulics.

The project is overall divided into two (02) phases i.e., Phase 1 and 2. Phase 1 is further divided into Phase 1A and Phase 1B projects. The Phase 1A includes Section 2, Section 7 and Section 8 while Phase 1-B includes Section 4 alongside the reconstruction of the Nai Baran Bridge located southwest of Hyderabad in Sindh province. Phase 2 project includes all of the remaining sections. This phasing is conducted to prioritize the most urgent projects on the basis of economic & financial plan of AIIB, traffic conditions, road condition, environment, social and resettlement impacts. The framework level E&S instruments (this ESMPF together with LMP, GAPF, SEP, RPF) has been prepared for Phase 1B, Phase 2 and subsequent phases of the MPP, while site-specific ESIA/ESMP, RAP including Livelihood Restoration Plan) are prepared for Phase 1A on a priority basis.

1.6 PROJECT ACTIVITIES

General construction activities involve following:

- Earth work (clearing of vegetation/ trees and top soil);
- Roadwork (levelling, preparation of sub grade, sub base, base and wearing course); and
- Structural works.

The roadwork process includes surface milling, excavation, and grading to adjust elevation, followed by installing a new base layer and overlaying it with asphalt or concrete. Compaction ensures stability. Bridge rehabilitation covers structural repairs, expansion

joints, bearings, and guardrails. Culvert work involves removal, replacement, relining, or maintenance to enhance drainage. Road shoulders are repaired, graded, and re-graveled as needed. Additional maintenance includes patching, resurfacing, crack sealing, and leveling. Final steps include refreshing road markings, replacing signage, and ensuring compliance with safety regulations.

1.7 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLANNING FRAMEWORK (ESMPF)

The E&S assessment studies including an ESMPF are required for the proposed Project to comply with the AIIB E&S requirements as per the AIIB's Environmental and Social Framework (ESF) 2016 (as amended 2024) and national/provincial environmental legislative requirements. Considering the AIIB-ESF 2016 (as amended in 2024), compliance with the following Environmental and Social Standards (ESSs) and the Environmental and Social Exclusion List (ESEL) – ***refer AIIB's ESF*** - will be ensured to meet the mandatory Environmental and Social (E&S) requirements.

- ESS 1: Environmental and Social Assessment and Management;
- ESS 2: Land Acquisition and Involuntary Resettlement (ESS 2); and

In addition to the above AIIB's requirements, local environmental legislative requirements will also be considered while conducting the E&S assessment studies. Considering the scope and location, the proposed Project falls in three provinces (Sindh, Punjab and Khyber Pakhtunkhwa) thus following three Environmental Protection Agencies (EPA)s asthe main regulatory agencies:

- Sindh Environmental Protection Agency (SEPA)
- Punjab Environmental Protection and Climate Change Department (EP&CCD)
- Pakistan Environmental Protection Agency (Pak-EPA)
- Environmental Protection Agency Khyber Pakhtunkhwa (EPA-KP)

In consistent with the requirements of Environmental and Social Standard (ESS-1), the proposed project may cause significant impact due to physical interventions thus categorized as Category A based on the scale, cost and nature. Accordingly, ESMPF is required to ensure the compliance with environmental safeguard requirements in line with the national laws and AIIB's ESF for those project activities that are not yet defined and/or whose locations are unknown at the time the Bank appraises the project.

1.7.1 Purpose of ESMPF

The main objective of the document is to provide a framework for the E&S assessment and mitigation of potential E&S risks and impacts of the proposed project components (where engineering design and specifics are yet to be defined) on surrounding environment and communities. The purpose of the ESMPF is to ensure E&S safeguards compliance and mitigate E&S risks and impacts at all the stages of the project and sections as per the E&S management plan provided in this framework.

1.7.2 Role of ESMPF for Managing E&S Risks and Impacts

ESMPF is an instrument that examines the issues and impacts associated when a project consists of a program and/or series of sections, and the impacts cannot be determined until the program or section details have been identified. The ESMPF sets out the principles,

rules, guidelines and procedures to assess the E&S impacts. It also contains measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive impacts, provisions for estimating and budgeting the costs of such measures, and information on the agency or agencies responsible for addressing project impacts.

ESMPF has been prepared based on primary and secondary information. Most of the information was collected from literature, reconnaissance surveys, and consultations with community and institutional stakeholders. This framework will be followed once the section related details are available. This framework establishes the requirements and procedures for the stakeholder engagement and involvement throughout the project life cycle including mechanism to disclose project information to them and redress the grievances of the affected community.

Adequate information has been included in the ESMPF about the area in which sections are located, including any potential E&S vulnerabilities of the area; and on the potential impacts that may occur and mitigation measures that might be expected to be used.

1.7.3 Approach and Methodology of ESMPF

The ESMPF has been prepared following the standard methodology consisting of the steps listed below:

- Review of the program details and meeting/discussions with the NHA team;
- Review of the policy and regulatory requirements of GoP and AIIB;
- Conduct recon naissance field visit by group of experts and NHA team and initial scoping and screening to determine the key environmental and social parameters and aspects that are likely to be impacted by the program activities;
- Collect and analyze of baseline environmental and social data with the help of secondary literature review and field data collection;
- Consult with the stakeholders including beneficiary/affected communities and developing the consultation process;
- Assess the potential and likely impacts of the program activities;
- Prepare an outline environmental and social management issues according the requirements of the 3 ESSs of the AIIB ESF;
- Compile of the individual associated framework documents (LMP. SEP, and RPF) together with ESMPF

2 REGULATORY AND INSTITUTIONAL FRAMEWORK

This chapter provides an overview of the policy framework and legislation that applies to control the E&S risks and impacts as a result of proposed project implementation and operation. The proposed project needs to comply with all the applicable E&S policies, laws, guidelines, acts and legislations of Government of Pakistan and the provincial governments. The Project will also comply with AIIB's ESF. This chapter lists only the relevant national and provincial legislation, guidelines, policies and AIIB's ESF. Details of these are presented in the Chapter 2 of the Phase 1A ESIA.

2.1 SUMMARY OF RELEVANT STRATEGIES, POLICIES, ACTS AND LEGISLATION

A summary of the major relevant strategies, policies, acts, and legislation from the environmental perspective are briefly discussed as below:

Policy/Strategy

- National Conservation Strategy, 1992
- National Environmental Policy, 2005
- Pakistan Labour Policy, 2010
- National Climate Change Policy, 2012
- National Disaster Risk Reduction Policy, 2013
- National Forest Policy, 2015
- National Sustainable Development Strategy, 2012
- National Water Policy, 2018
- National Resettlement Policy, 2002
- Sindh Strategy for Sustainable Development, 2007
- Punjab Climate Change Policy & Action Plan 2024
- Khyber Pakhtunkhwa Climate Change Policy 2016

Laws and Regulations

Federal

- Pakistan Environmental Protection Act, 1997
- Pakistan Environmental Protection Agency, (Review of IEE and EIA) Regulations, 2000
- Guidelines for the Preparation and Review of Environmental Reports, 1997
- National Environmental Quality Standards (2010)
- Building Code of Pakistan, Seismic Provisions 2007 & 2021
- Explosives Act, 1884
- Pakistan Antiquities Act 1975
- Pakistan Penal Code, 1860
- The Protection against Harassment of Women at the Workplace Act, 2010
- Labour Laws as part of Constitution of Pakistan 1973,
- Employment of Children Act, 1991
- Guideline for Solid Waste Management, 2005
- Guidelines for the Preparation and Review of Environmental Reports, 1997
- Cutting of Trees (Prohibition) Act, 1975
- National Disaster Management Act (NDMA), 2010
- Pakistan Climate Change Act, 2016

- Land Acquisition Act, 1894 with later amendments

Sindh

- Sindh Environmental Protection Act, 2014
- Sindh Environmental Protection Agency, (Review of EC, IEE and EIA) Regulations, 2021
- Sindh Environmental Quality Standards (2016)
- Sindh Forest Act, 2012
- Sindh Wildlife Protection, Preservation, Conservation and Management Act 2020
- Sindh Cultural Heritage (Preservation) Act, 1994 -
- Sindh Factories (Amendment) Act, 2021
- The Sindh Occupational Safety and Health Act, (2017)
- Sindh Prohibition of Child Employment Act, 2017
- Sindh Bonded Labor (Abolition) Act 2015
- The Sindh Minimum Wages Act, 2015
- The Sindh Differently Able Persons (Employment, Rehabilitation and Welfare (Amendment) Act, 2017
- The Sindh Commission on the Status of Women Act, 2015

Punjab

- Punjab Environmental Protection Act, 1997 (as Amended up to 2017)
- Punjab Environmental Protection Agency, (Review of IEE and EIA) Regulations, 2022
- Punjab Environmental Quality Standards (PEQS), 2016
- Punjab Wildlife Act, 1974
- Punjab Plantation and Maintenance of Trees Act, 1974
- The Punjab Water Act, 2019
- Punjab Environmental Protection (Motor Vehicles) Rules, 2013
- The Punjab Occupational Safety and Health Act, 2019
- Punjab Restriction on Employment of Children Act, 2016
- Punjab Protection of Women against Violence Act, 2016
- Punjab Forest Act (Amended), 2016
- The Punjab Protected Areas Act, 2020
- The Punjab Heritage Foundation Act, 2005
- The Punjab Emergency Services Act, 2006
- Punjab Irrigation, Drainage and Rivers Act, 2023
- Pakistan Antiquities Act 1975 & Punjab Antiquities Amendment Act 2012
- Hazardous Substances Rules, 2014
- Punjab Environmental Protection (Smog Prevention and Control) Rules 2023

Khyber Pakhtunkhwa

- Khyber Pakhtunkhwa Environmental Protection Act 2014
- Khyber Pakhtunkhwa Environmental Assessment Rules, 2021
- Khyber Pakhtunkhwa Wildlife and Biodiversity Act, 2015
- Khyber Pakhtunkhwa Forest Ordinance 2022
- Khyber Pakhtunkhwa Antiquities Act, 2016
- Khyber Pakhtunkhwa Prohibition of Employment of Child Act, 2015
- Khyber Pakhtunkhwa Protection of Trees and Brushwood Act, 1949
- Khyber Pakhtunkhwa Land Acquisition (Amendment) Act, 2020
- Khyber Pakhtunkhwa River Protection (Amendment) Act, 2014

2.2 ASIAN INFRASTRUCTURE INVESTMENT BANK'S ENVIRONMENT AND SOCIAL FRAMEWORK AND STANDARDS

AIIB's ESF provides an overview of the AIIB concerning, (a) environmental and social sustainability; and (b) its role in meeting the challenge of sustainable development in Asia. The pursuit of complete objectives of development is framed within the ESF in terms of both local impacts, and global challenges, especially in climate change. The Environmental and Social Policy (ESP) in the ESF comprises essential E&S requirements for each Project and is accompanied by: (a) three associated mandatory E&S Standards (ESSs) setting out requirements applicable to clients on, respectively, E&S Assessment and Management, Land Acquisition and Involuntary Resettlement and Indigenous Peoples; (b) an E&S Exclusion List (ESEL); and (c) a Glossary of certain terms used in the ESP and ESSs.

ESF 2024 has also provisions for identify measures to avoid, minimize, or mitigate potentially adverse impacts on and risks to physical, biological, socioeconomic and cultural resources, safety of both workers and affected community and natural resources during the design, construction, operation, and decommissioning of the project. Specific AIIB funded Investment Project Financing are required to follow the ESF consisting of three (3) ESS's. ESS2 and ESS3 are only triggered in specific projects, i.e., when land acquisition, resettlement and/or Indigenous People are present.

Table below discusses the relevance of ESF Policy, each of the three standards and associated Directive; their requirements are tabulated in **Table 2.4**.

Table 2.2: Applicability of the AIIB ESS to the Project

AIIB ESS Policy and Standards	Objectives	Requirements	Relevance to Project
AIIB Environmental and Social Policy of ESF	It sets out the mandatory requirements of the Bank in relation to the projects it supports through investment Project Financing.	The types of E&S risk and impacts that should be considered in the environmental and social assessment. The use and strengthening of the Borrower's environmental and social framework for the assessment, development and implementation of AIIB financed projects where appropriate.	Applicable to ensure the project aligns with AIIB's Environmental and Social Framework, covering all relevant impacts and actions.
ESS-1 Environmental and Social Risks Assessment and Management	To conduct an environmental and social assessment relating to these risks and impacts, and design appropriate measures to avoid, minimize, mitigate, offset or compensate for them, all as required under ESS 1. Adopt differentiated	The types of E&S risk and impacts that should be considered in the environmental and social assessment. The use and strengthening of the Borrower's environmental and social framework for the assessment, development and	The proposed project will involve tree cutting, disturbance to national park/forest areas, climate change vulnerability, risks to women and vulnerable groups, air, dust and noise pollution, impact on water bodies which requires detailed ESIA to ensure

AIIB ESS Policy and Standards	Objectives	Requirements	Relevance to Project
	measures so that adverse impacts do not fall disproportionately on the disadvantaged or vulnerable, and they are not disadvantaged in sharing development benefits and opportunities	implementation of AIIB financed projects where appropriate.	sustainable construction practices, avoiding or minimizing adverse impacts on communities and ecology in Pakistan. E&S risks and Impacts have been preliminary identified based on consultations with primary stakeholders including communities and implementing agency. Detailed ESIA/ESMP of each section will be prepared in addition to this ESMPF.
ESS-2 Involuntary Resettlement	Avoid or minimize involuntary resettlement by exploring project design alternatives. Avoid forced eviction. Mitigate unavoidable adverse impacts from land acquisition or restrictions on land use by providing compensation at replacement cost and assisting displaced persons in their efforts to improve, or at least restore, livelihoods and living standards to pre-displacement levels or to levels prevailing prior to the beginning of project implementation, whichever is higher. Improve living conditions of poor or vulnerable persons who are physically displaced, through provision of adequate housing, access to services and facilities, and security of tenure. Conceive and execute resettlement activities as sustainable development programs.	Applies to permanent or temporary physical and economic displacement resulting from different types of land acquisition and restrictions on access. Does not apply to voluntary market transactions, except where these affects third parties. Provides criteria for "voluntary" land donations, sale of community land, and parties obtaining income from illegal rentals. Prohibits forced eviction (removal against the will of affected people, without legal and other protection including all applicable procedures and principles in ESS 2). Requires that acquisition of land and assets is initiated only after payment of Compensation and resettlement has occurred. Requires community engagement and consultation, disclosure of information and a grievance mechanism.	Land will be required for widening, upgradation works in identified sections and possibly for rehabilitation works, curve/geometric improvements, blind spots, construction of bridges and other infrastructures, etc. Hence impacts on land, private and community owned assets including structures, trees and crops within existing and proposed ROW is likely. Considering the possible encroachment in the existing ROW of the project, physical and economic displacement too is very likely. Detailed Resettlement Action Plan (RAP) for each section will be prepared.
ESS-3 Indigenous Peoples	Ensure that the development process fosters full respect for	Applies when the Indigenous Peoples are present or have a	As per the AIIB definition, there are no groups of people in the project area

AIIB ESS Policy and Standards	Objectives	Requirements	Relevance to Project
	affected parties' human rights, dignity, aspirations, identity, culture, and natural resource-based livelihoods. Promote sustainable development benefits and opportunities in a manner that is accessible, culturally appropriate and inclusive. Improve project design and promote local support by establishing and maintaining an ongoing relationship based on meaningful consultation with affected parties. Obtain the Free, Prior, and Informed Consent of affected parties in three circumstances. Recognize, respect and preserve the culture, knowledge, and practices of Indigenous Peoples, and to provide them with an opportunity to adapt to changing conditions in a manner and in a timeframe acceptable to them.	collective attachment to the land, whether they are affected positively or negatively and regardless of economic, political or social vulnerability. The option to use different terminologies for groups that meet the criteria set out in the Standard. The use of national screening processes, providing these meet AIIB criteria and requirements. Coverage of forest dwellers, hunter gatherers, and pastoralists and other nomadic groups. Requirements for meaningful consultation tailored to affected parties and a grievance mechanism. Requirements for a process of free, prior and informed consent in three circumstances.	who could be categorized as indigenous people, therefore this policy does not apply to the proposed project.

The key gaps between AIIB's Environmental and Social (ES) Policy/requirements and Pakistan's national policies/requirements include:

- **Environmental and Social Screening & Risk Categorization** – In Pakistan, projects are categorized based on Environmental Impact Assessment (EIA) and Initial Environmental Examination (IEE) thresholds, ensuring compliance with national environmental regulations. However, aligning this approach more closely with the risk-based categorization outlined in the AIIB guidelines could enhance project risk assessment.
- **Scope and Comprehensiveness of ESIA Requirement** – Pakistan has established frameworks to assess both E&S impacts, following the mitigation hierarchy and considering transboundary issues. Strengthening alignment with AIIB guidelines can further enhance the comprehensiveness of Environmental and Social Impact Assessments (ESIAs).
- **Strategic Environmental and Social Assessment (SESA) & Cumulative Impact Assessment (CIA)** – While Pakistan has a strong foundation for environmental assessments, there is an opportunity to introduce clearer requirements and guidance on SESA and CIA to align with AIIB standards and ensure long-term sustainability.
- **Biodiversity Considerations** – Pakistan follows the mitigation hierarchy, including avoidance, minimization, mitigation/restoration, and offsetting. Further incorporating specific provisions for critical habitats and enhancing measures for No Net Loss (NNL) or Net Gain (NG) can bring national policies closer to international best practices.

- **Stakeholder Engagement** – Pakistan has made significant progress in stakeholder engagement particularly for major infrastructure projects. Expanding meaningful engagement with affected communities, including vulnerable/disadvantaged groups, civil society organizations (CSOs) (including, amongst other groups, community-based organizations (CBOs), and non-governmental organizations (NGOs)) can further strengthen transparency and inclusivity in line with AIIB guidelines.
- **Disclosure & Transparency** – Pakistan has established procedures for public access to environmental and social documents. Enhancing the consistency of disclosure practices in terms of timing, language accessibility, and document availability can further align with AIIB standards and international best practices.
- **Grievance Redress Mechanism** – Pakistan has structured processes for addressing community concerns, including project-level grievance redress mechanisms. Strengthening worker grievance mechanisms and ensuring access to independent accountability mechanisms can further improve the effectiveness of these systems.
- **Associated Facilities** – Pakistan considers the direct environmental and social impacts of projects, and expanding the assessment of indirect or related infrastructure can enhance holistic project planning and sustainability.
- **Consideration to Climate and Greenhouse Gas Emission** – Pakistan has taken steps to integrate climate risks and adaptation measures into development planning. Further mainstreaming climate resilience strategies and greenhouse gas reduction measures can enhance alignment with AIIB climate commitments
- **Resettlement & Rehabilitation (R&R)** – Pakistan recognizes the importance of fair compensation and livelihood restoration for displaced communities. Strengthening policies on replacement costs and the recognition of informal settlers will enhance social safeguards in alignment with international standards.

2.3 COMPARISON OF INTERNATIONAL AND LOCAL ENVIRONMENTAL LEGISLATIONS

The AIIB's ESF emphasizes the use of pollution prevention and control technologies that align with international best practices, consistent with globally recognized standards. According to the ESF, if host country regulations differ from these standards, the ESIA/ESMP will comply with the more stringent requirements to ensure optimal environmental protection.

For the proposed Project, all local (Environmental Quality Standards – NEQS/PEQS/SEQS) and international standards (International Finance Corporation - IFC) have been selected to establish the most stringent environmental guidelines. Specifically, the World Bank Group (WBG) Environmental, Health, and Safety (EHS) Guidelines, which include recommendations on noise management, have been adopted. These guidelines set acceptable noise levels for both daytime and nighttime.

2.4 INTERNATIONAL PROTOCOL / CONVENTIONS

International environmental treaties endorsed by Pakistan and that may have relevance to the Project are presented in the Phase 1A ESIA.

2.5 ADMINISTRATIVE FRAMEWORK

The major administrative departments at National, Provincial, Local Level for E&S compliances, regulatory clearances, issuing permits, enforcement, oversight, compliance, penalties, are discussed in Phase 1A ESIA.

3 ENVIRONMENTAL AND SOCIAL BASELINE

3.1 Geography

The N5 highway, a critical transport artery in Pakistan, traverses three provinces—Sindh, Punjab, and Khyber Pakhtunkhwa—as well as the Islamabad Capital Territory, through a series of designated priority sections. These sections," are divided into southern and northern segments based on their geographic locations.

These priority sections collectively cover 487 kilometers that traverses a diverse landscape, moving through coastal plains, fertile valleys, deserts, and mountainous areas. This variation includes the West Pakistan Fold Belt, the Indus Plain, and the Himalayan foothills, adding significant environmental and topographical diversity to the project route. These landforms from south to north along route alignment are as follows;

A. The West Pakistan Fold Belt
B. The Indus Plain
C. The Himalayas

The detail will be provided in the specific ESIA(s)/ESMP(s).

3.2 Topography

The topography of the N5 highway project varies significantly across its different sections, each presenting unique challenges for construction and environmental management. Topographical Map of the sections of the Project are shown in **Figure 3.3** below. The Section 1 lies in the flat, low-lying Indus River floodplain, composed predominantly of floodplain deposits. While terrain of Section 2, 3 and 4 are primarily flat with minor undulations, characterized by sandy soils and vast open plains. In contrast to these, Section 5, 6 and 7 of Punjab transitions from flat plains to more undulating and hilly terrain as it moves northward. Cut-and-fill operations will be critical to maintaining structural integrity in these regions. The Section 8 of Khyber Pakhtunkhwa lies in flat plains near Nowshera to rugged mountainous terrain as it approaches Peshawar. Section-wise elevations are provided in **Table 3.1** below.

Table 3.3: Section wise Topographic Features of N5

Section No.	Section Name	District	Tehsil	Elevation (m) (min-max)
1	Hydrabad to Hala	Jamshoro Hyderabad Matian	Kotri Hyderabad Hyderabad City Qasimabad Hala Matiari	13-48
2	Ranipur to Sukkur	Khairpur Sukkur	Khairpur Gambat Sobho Dero Rohri	48-77
3	Okara to Mangla	Lahore Okara Kasur	Lahore City Renala khurd Okara Pattoki	176-206
4	Lahore to Gujranwala	Gujranwala Lahore Sheikhupura	Gujranwala Kamoke Lahore City Muridke	206-229
5	Kharian to Dina	Gujrat Jhelum	Kharian Sarai Alamgir Dina Jhelum	220-330
6	Dina to Rawat	Rawalpindi Gujrat	Gujar Khan Rawalpindi Taxila Kharian Sarai Alamgir	275-575

Section No.	Section Name	District	Tehsil	Elevation (m) (min-max)
7	Rawalpindi To Burhan	Islamabad Rawalpindi Attock	Gujar Khan Rawalpindi Taxila Hasan Abdal	375-600
8	Nowshera to Peshawar	Nowshera Peshawar	Nowshera Pabbi Jehangira Town-II Town-III	282-315

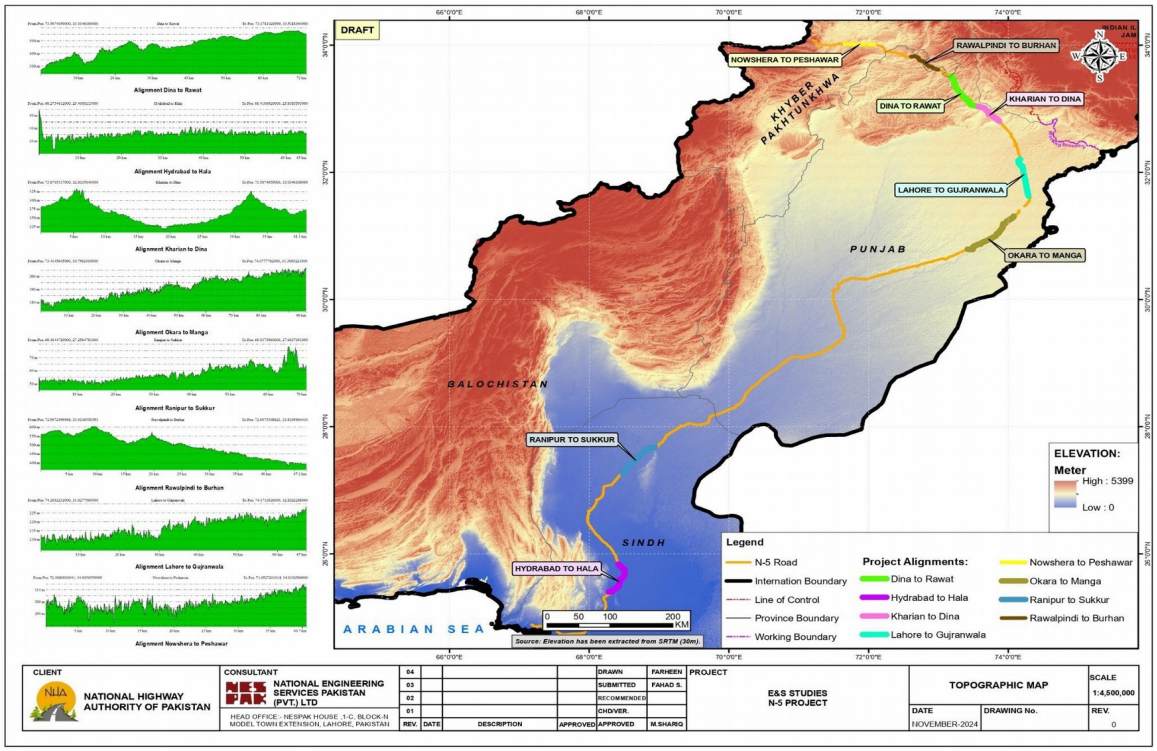


Figure 3.2: Topographic Map of the Project

3.3 Geology

The N5 Priority sections run through a variety of terrains including rugged mountainous topography, gently sloping valley side slopes and nearly horizontal valley flats, and vast plains. The highlands among these terrains are generally covered by rocks which exhibit a great diversity among rock types, spatial distribution and their origin. Likewise, the soils covering the low-lands, intermountain valleys and vast plains, comprise a wide range of consolidated and unconsolidated sediments having discrete types and origin.

A major part of the route runs through Quaternary soil units ranging in age from Sub Recent to Recent. The Recent deposit comprises a host of materials including wind blows and, alluvial fans, flood plain deposits, etc. These deposits mostly occupy the sites of present-day accumulation. Sub recent deposits; being in a state of degradation due to their position in the erosion cycle, are mostly deeply gullied and eroded. Geological conditions across the N5 highway project area range from sedimentary deposits and alluvial soils to more complex rock formations as the road moves northward. Geologically, the section 1 to 4 majorly falls in flood plain deposits while section 5 to 8 are majorly categorized as Q “HOLOCENE” i.e. Unconsolidated surficial deposits of silt, sand, and gravel. A geological Map of the Project is shown in **Figure3.3** while section wise brief geological features are presented in **Table 3.2** below.

Table 3.4: Section wise Geological Features of N5

Section No.	Section Name	Geological Features
1	Hydrabad to Hala	**Qmx, Qfx DEPOSITS OF EXTINCT STREAM:** Streambed and meander-belt deposits, Qmx. Flood-plain deposits (lower terrace, Qfx) **Tel: EOCENE:** Laki Formation (Tel,) fossiliferous limestone and shale, and upper dominantly shale sequence
2	Ranipur to Sukkur	**Qf,Qm STREAM DEPOSITS:** 'Flood-plain Deposits, Qf Streambed and meander-belt deposits, Qm **Qcm OLDER TERRACE DEPOSITS:** loess and flood-plain deposits of the middle terrace, Qcm **Qmx,Qfx DEPOSITS OF EXTINCT STREAM:** Streambed and meander-belt deposits, Qmx. Flood-plain deposits (lower terrace, Qfx)
3	Okara to Mangla	**Qc OLDER TRACE DEPOSITS:** Chung Formation: mostly loess deposits of the upper terrace, Qc **Qfx DEPOSITS OF EXTINCT STREAM:** Flood-plain deposits (lower terrace, Qfx)
4	Lahore to Gujranwala	**Qf STREAM DEPOSITS:** 'Flood-plain Deposits, Qf **Qfx: DEPOSITS OF EXTINCT STREAM:** Flood-plain deposits (lower terrace, Qfx) **Qbf PIEDMONT AND RELATED DEPOSITS** sheet flood and flood-plain deposits of braided streams, Qbf
5	Kharian to Dina	**Q: HOLOCENE:** Unconsolidated surficial deposits of silt, sand, and gravel. see indus plain for Holocene details. **Qp PLEISTOCENE ROCKS** Lei conglomerate in north potwar: Kalabagh around the river indus, and equivalents elsewhere (Qp). **Qm: STREAM DEPOSITS:** Streambed and meander-belt deposits. **Qf: STREAM DEPOSITS:** Streambed and meander-belt deposits, Qm, Flood-plain Deposits
6	Dina to Rawat	**Q: HOLOCENE:** Unconsolidated surficial deposits of silt, sand, and gravel. see indus plain for Holocene details. **Qp: PLEISTOCENE ROCKS** Lei conglomerate in north potwar: Kalabagh around the river Indus, and equivalents elsewhere.

Section No.	Section Name	Geological Features
		Tmd: MIOCENE ROCKS Component formations of the Siwalik Group as (from young to old) Dhok Pathan formation (Tmd),
7	Rawalpindi To Burhan	**Q: HOLOCENE:** Unconsolidated surficial deposits of silt, sand, and gravel. see indus plain for Holocene details. **MZ: MESOZOIC ROCKS:** Includes Cretaceous, Jurassic and Triassic rocks: **Tep: EOCENE AND PALEOCENE ROCKS** Shallow marine foraminiferal limestone and grey fossiliferous shales, divided into several formations.
8	Nowshera to Peshawar	**Q: HOLOCENE:** Unconsolidated surficial deposits of silt, sand, and gravel. see indus plain for holocene details.

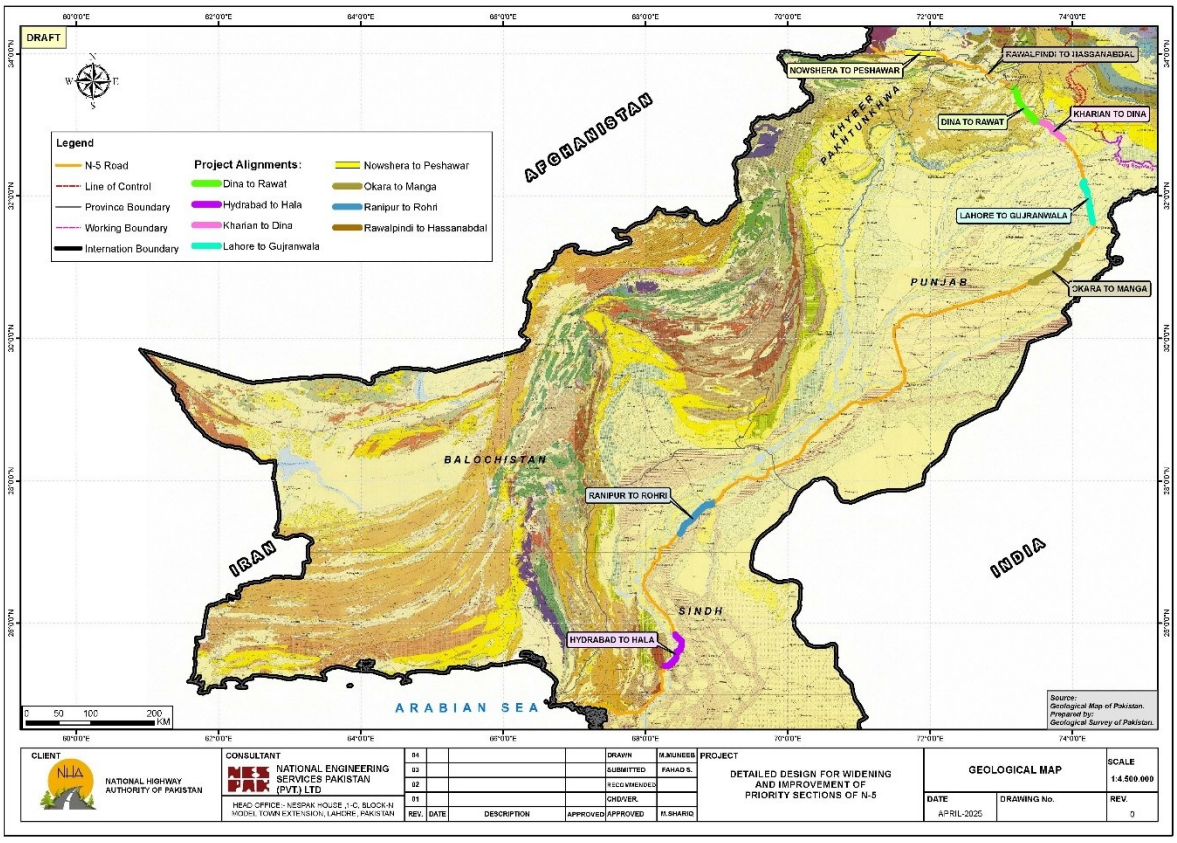


Figure 3.3: Geological Map of the Project Sections

3.4 Soil

Soil conditions across the project vary, with agricultural soils, sandy loams, and rocky soils present in different sections. The properties of soil directly affect construction techniques, foundation design, and long-term stability.

Section 01: The soil in this section is primarily alluvial, rich in nutrients for agriculture but prone to erosion. Soil conditions can vary, with areas of loose sand, silt, and clay. These types of soils are susceptible to compaction and need careful attention during road

construction. Specialized techniques such as soil stabilization and geotextile use may be needed to ensure road durability.

Section 02: Fertile alluvial soil is widespread, ideal for agriculture but prone to erosion and water retention. Loose soils near riverbanks require soil stabilization to prevent instability, especially when exposed to seasonal rains. Drainage systems will be important in managing excess water and ensuring soil stability.

Section 03: The region features fertile sandy to loamy soils, ideal for farming. However, loose sandy soils may pose challenges in terms of construction stability. They require stabilization to prevent settling, particularly during periods of rainfall. The soils' moisture content will be a key factor in construction plans, requiring proper engineering solutions to ensure a strong foundation.

Section 04: Fertile clay and loamy soils support local agriculture. However, in areas with high clay content, the soils may become too sticky and difficult to compact, requiring additional compaction and stabilization efforts. Erosion can also be a concern along the riverbanks, requiring additional protective measures.

Section 05: Loamy and sandy soils dominate this section, but the clay-rich soils in some northern areas may be prone to water retention and erosion. The construction process will need to address soil stabilization in areas with high clay content, ensuring strong foundations and proper drainage solutions.

Section 06: In the more mountainous northern areas, rocky soils are common, often interspersed with sandy soils in the flatter regions. The soil in the hilly sections will require specialized construction techniques to address the rocky composition. In the flatter areas, loamy soils may be prone to erosion, requiring protective measures like embankments or riprap.

Section 07: The region around Rawalpindi and the Margalla Hills is dominated by rocky soils, with occasional sandy and clay-rich soils in flatter areas. The rocky nature of the soil in hilly regions will require blasting or excavation techniques to facilitate road construction. Soil erosion control will be essential to stabilize the slopes.

Section 08: Sandy and clayey soils are present in the flatter regions of Peshawar, while rocky terrain prevails in the mountainous sections. These areas require careful planning for stabilization and drainage, especially in the clay-rich soil sections. The presence of rock formations will necessitate specialized excavation methods to build a secure road base.

3.5 Seismology

According to available Pakistan's seismic research data, the seismic and geological zoning of the existing N5 is shown in **Figure 3.4**. The project area is associated with different ground motions at different locations. The N5 highway spans across diverse regions, with varying seismic characteristics based on topography and geological composition. While the southern and central sections of the highway (Sindh and Punjab) are relatively seismically stable, the northern sections, particularly around the Margalla Hills near Islamabad and the Khyber Pakhtunkhwa region, are closer to the seismically active zones of the northern tectonic plate boundaries. Section 1 to 4 falls in seismic zone 2A (moderate hazard) while section 5 to 8 fall in zone 2B (moderate hazard). It depicts that the overall project falls under seismic zones of lower intensity, with moderate earthquake activity recorded Section.

3.6 Climate and Meteorology

The climate across the N5 highway varies significantly depending on the geographical location, from the arid conditions in Sindh to the more temperate climate in Islamabad. In addition to tropical climate in southern Pakistan, the rest belongs to subtropical climate. Southern area is humid and hot with relatively long rainy season affected by the monsoon; the northern part is dry and cold and some places are covered by snow all the year. The average temperature is 27℃. The overall climate is characterized by increased rainfall from the south to the north, increased air humidity and gradually well-developed vegetation.

Sindh (Section 01 and Section 02): The climate is hot and dry, with temperatures reaching up to 45°C in summer. The region experiences very little rainfall (approximately 100-150 mm annually) with hot winds during the summer and mild winters.

Punjab (Section 03 to Section 05): The climate in Punjab is more temperate, with hot summers (reaching up to 40°C) and cold winters. Rainfall is more frequent in this region, particularly from July to September, with averages ranging from 250 to 500 mm annually. This will impact road construction, with considerations for drainage and erosion control.

Islamabad and Khyber Pakhtunkhwa (Section 06 to Section 08): These regions experience moderate to cool temperatures, with more pronounced seasonal variations. Winters can be cold with snowfalls in the northern parts. Rainfall averages between 1,000 and 1,500 mm annually, which could lead to challenges related to water runoff and potential flooding in the hillier terrains.

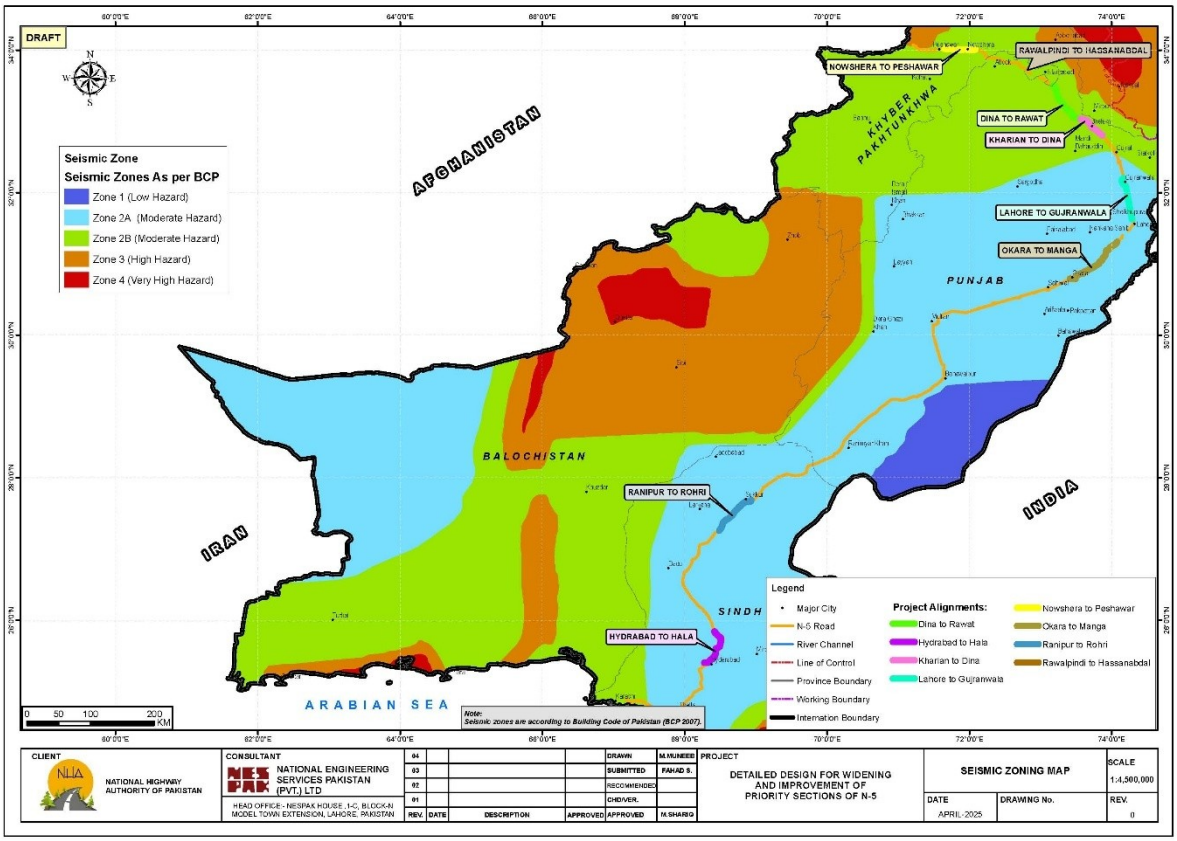


Figure 3.4: Seismic Zoning Map of the Project Sections

3.7 Surface Water Hydrology

The N5 highway is crossed by several major rivers, streams, and drainage systems that will affect the hydrological assessment of the project. The hydrological map of the Project sections are shown in **Figure 3.5 below,** whereas the Section wise crossings of the surface water resources with N5 are provided in **Table 3.3** below.

Table 3.5: Section wise Surface Water Crossings of N5

Section No.	Section Name	Hydrology
1	Hydrabad to Hala	Major water bodies crossing include Shahdara Distributary, Upper Chenab Link Canal along with other distributaries and Nullahs (Sem Nullah, Degh Nullahs and Laila Nullah).
2	Ranipur to Sukkur	Major water bodies crossing the alignment include Rohri, Mirwah and Nara Canals along with other distributaries and Nullahs.
3	Okara to Mangla	Major water bodies crossing the alignment include Lower Bari Doab Canal and Baloki Sulaimanki Link canal along with other distributaries and Nullahs.
4	Lahore to Gujranwala	Major water bodies crossing include Shahdara Distributary, Upper Chenab Link Canal along with other distributaries and Nullahs (Sem Nullah, Degh Nullahs and Laila Nullah).
5	Kharian to Dina	Major water bodies crossing include Jhelum River, Upper Jhelum Canal, Teenpur Khas along with other distributaries and Nullahs.
6	Dina to Rawat	Major water bodies crossing include Dab Kas and Kas Chhejjedo Streams (dried), Mangla Lake Tributary along with other distributaries and Nullahs.
7	Rawalpindi To Burhan	Major water bodies crossing include tributary of Haro River along with other Nullahs.
8	Nowshera to Peshawar	Major water bodies crossing includes Nullahs and flood channels. Tributary of Kabul River is also exist in nearby vicinity.

3.8 Ground Water Aquifer

The groundwater aquifer situation varies across the project, from areas with shallow groundwater levels to deeper aquifers in the northern sections.

Sindh: Groundwater in the Sindh region is relatively shallow but may be saline in areas closer to the coast. This will affect the design of water management systems and irrigation in nearby agricultural areas.

Punjab and Islamabad: Groundwater resources are generally better, with fresh water available in many areas. However, in flood-prone zones, the groundwater table may rise during the monsoon season.

Khyber Pakhtunkhwa: The northern sections have deeper groundwater resources, and the availability of groundwater can vary with local topography.

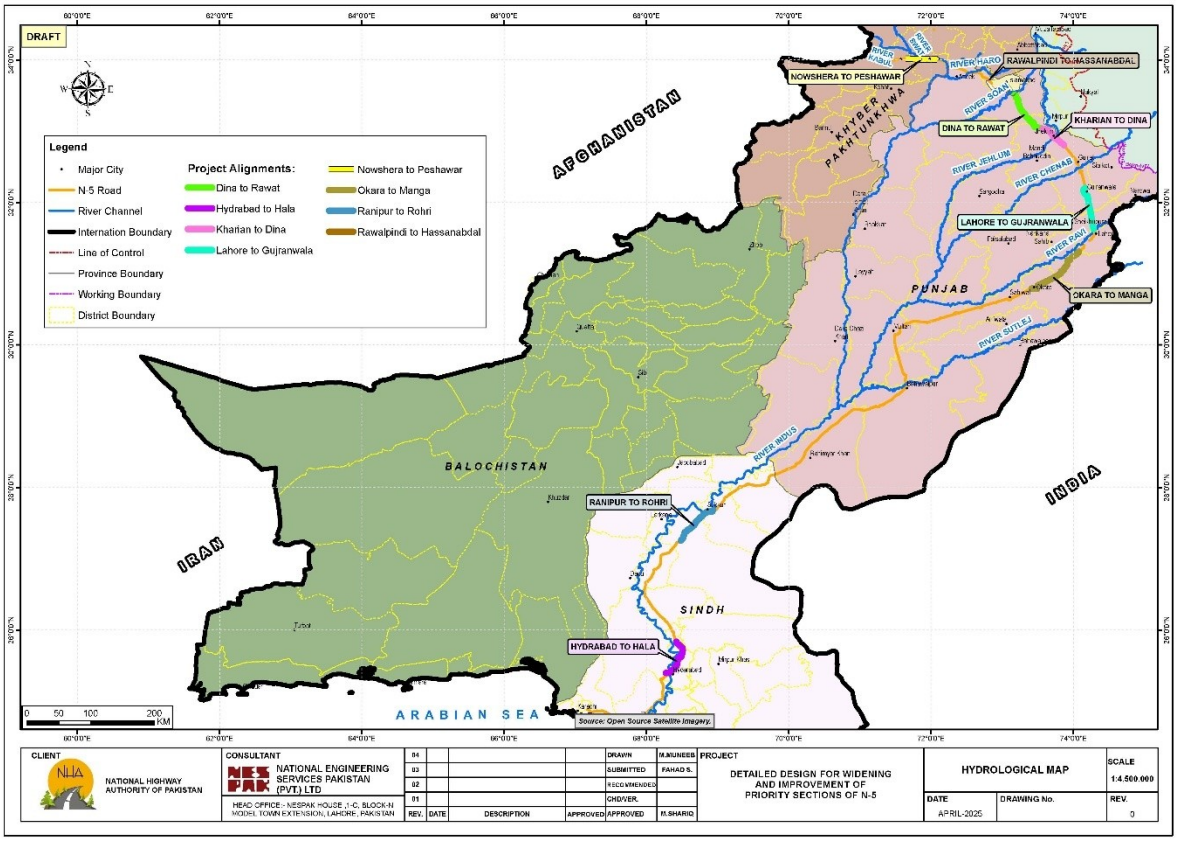


Figure 3.5: Hydrological Map of the Sections of the Project

3.9 Draining and Floods

The proposed Project has been initiated as a response to recent climate change induced events where floods have caused destruction to N5 sections. Currently, the drainage system along N5 is in extremely poor condition and will require major upgrades as a result of this project. Flooding is a concern, particularly in the flat, low-lying areas near rivers and agricultural lands. Furthermore, in the 2022 flood events, numerous segments of the N-5 highway (specifically from Hyderabad to Rohri, segment of Sindh province and Peshawar to Rawalpindi segment of Khyber Pakhtunkhwa and Punjab provinces were severely affected due to heavy rainfall and flash floods from adjoining hilly terrain. experienced significant impacts, resulting in traffic interruptions, particularly within the Sindh province. The primary cause was the severe flooding in the region.

During the 2022 floods in Pakistan, several rivers experienced significant peak discharges. Below are the peak discharges recorded for major rivers:

- Indus River
  - Tarbela Reservoir: Peak discharge of 11,190 m³/s.
  - Kalabagh: Recorded a peak of 12,096 m³/s.
  - Chashma: Reached a peak discharge of 14,700 m³/s.
  - Taunsa: Maximum flow was 17,620 m³/s.
  - Guddu: Peak discharge recorded at 15,920 m³/s.
  - Sukkur: Maximum flow reached 16,430 m³/s.
  - Kotri: Continued to rise with significant increases noted into early September.
- Chenab River: Peak discharge at the Qadirabad Barrage reached approximately 2,832 m³/s during the flood period.

- Ravi River: The peak discharge was recorded at the Balloki Barrage, reaching around 1,698 m³/s.
- Sutlej River: The peak discharge was noted at the Sutlej Barrage, reaching about 1,416 m³/s.

Sindh and Punjab Sections: Areas near the Indus, Sutlej, and Ravi Rivers are prone to seasonal flooding during the monsoon period.

Islamabad and Khyber Pakhtunkhwa Sections: While the northern regions experience lower annual rainfall, the mountainous areas can cause flash floods, especially in monsoon months.

3.10 Air and Noise Quality

Continuous environmental monitoring will be necessary throughout the construction and operational phases. This includes monitoring air quality, water quality, noise levels, and soil conditions. Currently the air quality on the road/N5 sections is in poor condition due to exhaust and dust on the road and high background concentration contributed from transboundary pollution. Similarly, noise levels also fall on the higher side due to traffic congestion and horn blowing. The quality of water and surface water resources is also required to be properly checked during the ESIA/ESMP studies. Some general air quality measurements and noise levels are presented in the tables below to provide an idea of the existing conditions.

Table 3.6: Ambient Air Quality Analysis

Sr. No.	Location	Monitoring Duration	Parameters				
			NO_2 µg/m³	SO_2 µg/m³	CO mg/m³	$PM_{2.5}$ µg/m³	PM_{10} µg/m³
1.	Kotri	24 Hrs	<0.01	<0.01	2.29	40.2	110.7
2.	Rohri		<0.01	<0.01	1.84	39.6	109.16
3.	Gujranwala		<0.01	<0.01	1.5	46.6	128.4
4.	Attock		<0.01	<0.01	1.5	46.7	128.4
5.	Rawalpindi		20.54	25.89	2.47	44.2	121.79
6.	Rawalpindi		20.54	25.89	2.47	44.3	121.79
7.	Lahore		11.17	12.24	2.98	37.7	103.75
Stringent Limits (24 hours averaging time, except CO, which is 8 hours average)			**25**	**40**	**5**	**15**	**45**

µg/m³ = micrograms per cubic meter mg/m3 = milligrams per cubic meter

It is seen from the previous test results that all the parameters, i.e., NO_2, SO_2 and CO are within the permissible limits of stringent standards while $PM_{2.5}$ and PM_{10} are exceeding limits.

Table 3.7: Noise Levels

Sr. No.	Location	Noise Level (dB)	
		Avg. Day Time 06:00 am – 10:00 pm	Avg. Night Time 10:00 pm – 06:00 am
1.	Kotri	68.14	64.11
2.	Rohri	69.91	69.85
3.	Gujranwala	60.15	61.0
4.	Rawalpindi	66.10	64.48
5.	Attock	63.63	57.98
6.	Lahore	73.3	72.3
7.	Peshawar	60.55	52.28

Stringent Limits	**65**	**55**

From the table above, it can be seen that during day time the average noise levels at Lahore, Rawalpindi, Kotri. and Rohri are higher than standard for the daytime (i.e., 65 dB) due to the higher number of commercial activities. Similarly, in night hours the noise levels at Lahore, Attock, Rawalpindi, Gujranwala, Kotri, and Rohri are higher than nighttime standard (i.e., 55 dB). It was observed from the Phase 1A baseline monitoring data, the locations were selected very close to the road right-of-way, resulting in higher noise values. Subsequent noise level monitoring should be conducted close to the receptors to capture the noise impacts, which may result in slightly lower baseline condition.

3.11 Land Use Pattern

The land use along the N5 highway is predominantly agricultural, especially in the Sindh and Punjab sections, where farming and irrigation are the primary land uses. As the project moves north, urbanized areas around cities like Okara, Lahore, Gujranwala, Rawalpindi, Islamabad and Peshawar become more prevalent. The land use of the project area mainly includes residential and commercial areas, Barren / Open Area, cultivated land around the existing road, green belt, road / track, stream / nullah, trees & bushes along and within the median of N5, water bodies (river, stream, nullah, and irrigation channels, etc.), and forest and protected areas nearby the N5.

3.12 ECOLOGICAL ENVIRONMENT

In general, the areas traversed by the Project Road are ecologically stable and predominantly vegetated through the National Highway Authority (NHA) afforestation program. Due to the region's arid nature and ongoing commercialization along the road's right-of-way, the natural ecology has been significantly altered. No indigenous or conservation-important species were observed along the corridor. The existing flora and fauna within the Area of Influence (AoI) have largely adapted to the road infrastructure and the surrounding modified ecosystem. Roadside vegetation, particularly trees planted under previous NHA afforestation initiatives, remains present along the median and both sides of the highway, albeit with some degree of disturbance due to prolonged human activities and development pressures.

Consequently, the project works, and operations will have small impacts on the Flora and Fauna of the area, if any. Some of the project region has been cleared for different purposes by locals, and remnants of the original habitats are degraded as a result of the growing need for fuel wood, fodder, and timber.

The proposed project falls majorly in Tropical Thorn Forest Eco-zones, however, a portion of section 6 and section 7 falls in sub-tropical broad-leaved evergreen scrub forests. The conditions are dry/arid and having the potential to support xerophytic plant species with associated fauna. The faunal diversity in the area is found degraded as the road side areas are prone to habitation and different threats and some areas are commercialized. As a result, t the local thorny habitat is altered, degraded and modified.

In the AoI, the some of original or natural habitat has been modified and converted into barren land. In some of the Project Area, trees are very less in number populated by Shisham, Kikar, Dhrek, Eucalyptus, Phulai, Mesquite, Van, Ber, Khana, Sanatha and Jhand bushes due to limited resources. The indigenous species of area in the past are hardly found in the area due to human activities. A relatively limited diversity of bird species has been observed in suitable habitats within the proposed project area. Commonly sighted birds include the dove, common myna, bulbul, treepie, crow, and sparrow. Birds of prey are rarely

seen, with occasional sightings of species such as the common pariah kite and the black-shouldered kite. The terrestrial fauna in the area includes commonly found species such as jackals, porcupines, squirrels, mice, mongooses, hares, foxes, and wild boars.

3.12.1 Agriculture

Agricultural land along the route is of high importance, particularly in the Sindh and Punjab regions, where the economy is heavily reliant on agriculture. A variety of agricultural crops, fodders and vegetables are grown in the Project Area, however, wheat (Triticum L) is the dominated food crops, followed by Cotton (Gossypium) and Maize (Zea mays L). Most agricultural activities in the area are confined where irrigation is possible. The main agriculture areas are irrigated, through canal system and tub wells. Strategies to minimize soil erosion, water usage, and disruption to farming activities will be included in the mitigation plan.

3.12.2 Aquatic Ecology

Rivers and streams along the route, such as the Indus, Sutlej, and Ravi, provide habitat for aquatic species. The major water body crossings are provided in **Table 3.3**. As per available data, the common fish species found in these water bodies are Rahu, Mori, Singhara, Mali, Thala, Khaga, Soul, Sira, Bachwa, Grass, Gulfam and Tilapia. Common amphebians are frogs and tods, while common turtle also exists in few major water bodies listed in Table 3.3. Major threats to these water bodies and aquatic life are the contaminated runoff from the agricultural and settlement areas for which community awareness regarding pollution control are being considered, Water quality monitoring and mitigation measures during road construction will be essential to avoid contamination.

3.12.3 Key Biodiversity and Protected Areas

There is no forest/ natural habitat, key biodiversity area, protected area exists within the RoW of the proposed project. However, based on the preliminary site investigation and departmental consultations, two reserve forests (Miani Forest and Hatri Forest) are located along the corridor of Section 1: Hyderabad to Hala, Pabbi National Park is located adjacent to the corridor of Section 5: Kharian to Dina, Lehri National Park is located along the corridor of Section 6: Dina to Rawat, an archeological site (Nicholson Monument) and buffer of Margalla Hills National Park) located along the corridor of Section 7: Rawalpindi to Burhan. Although no direct impact on these protected areas and monuments is anticipated at this stage as the proposed works/interventions are bounded within the existing RoW of NHA. However, special considerations and regulatory requirements as per the national and provincial laws (mentioned in Chapter 2) will be considered and if approvals/permits/NOC (refer Table 6.3) are required as per the law, efforts will be made to obtain them prior to the commencement of construction. The detailed assessment of these areas along with the regulatory requirements will be discussed in project specific ESIA/ESMP.

3.13 SOCIO-ECONOMIC ENVIRONMENT

The overall demographic and social condition of the whole project area is being presented in the following sections. The site-specific socio-economic conditions will be provided in the ESIA/RAP. It was observed during reconnaissance and site survey that all eight (08) sections of the N5 pass through sixteen (16) districts of the Sindh, Punjab and KP Provinces. The respective districts are presented in **Table 3-6.**

Table 3.8: Section wise Districts Falling under N5 Sections

Sr. No.	Name	District
Section 1	Hala to Hyderabad	Jamshoro, Hyderabad and Matiari
Section 2	Roni to Ranipur	Khair pur and Sukkhur
Section 3	Okara to Manga	Kasur, Lahore and Okara
Section 4	Lahore to Gujranwala	Lahore, Gujranwala and Sheikhupura
Section 5	Kharian to Dina	Gujrat and Jhelum
Section 6	Dina to Rawat	Jhelum, Rawalpindi and Islamabad Capital Territory
Section 7	Rawalpindi to Hassanabdal	Rawalpindi Islamabad Capital Territory
Section 8	Nowshera to Peshawar	Nowshera and Peshawar

3.13.1 DEMOGRAPHIC CHARACTERISTICS OF ALL DISTRICTS

Demographic features such as area, population by sex, sex ratio, household size, and annual growth rate play a pivotal role in establishing the socio-economic profile of a specific project area by offering valuable insights into the community's structure and dynamics. The total area and its distribution help assess the spatial layout and infrastructure needs, while population data by sex and sex ratio provide an understanding of gender balance, which can inform policies related to education, healthcare, and employment. Household size is an important indicator of living conditions and resource allocation, highlighting potential challenges in housing, sanitation, and access to services. The annual growth rate reveals trends in population expansion or contraction, which helps project future demand for resources and services, as well as economic opportunities. Together, these demographic indicators enable project planners to tailor interventions more precisely, ensuring that the needs of the local population are met in a sustainable and inclusive manner. **Table 3-7** depicts area, gender wise population, and average household size, sex ratio, and growth rates of all districts falling in project alignment for the year 2023.

Table 3.9: Districts Falling under N5 Sections

Province	Districts	Population-2023						Population 2017	Sex Ratio 2023	2017 to 2023 Average Annual Growth Rate
		Area (m^2)	Male	Female	Transgender	All Sexes	Avg. HH Size			
Sindh	Jamshoro	11,204	578,036	539,205	67	1,117,308	5.2	993,908	107.2	1.98
	Hyderabad	993	1,289,279	1,143,090	171	2,432,540	5.4	2,199,928	112.79	1.69
	Matiari	1,417	430,096	419,262	25	849,383	5.3	770,040	102.58	1.65
	Khairpur	15,910	1,315,925	1,281,472	138	2,597,535	5.7	2,405,190	102.69	1.29
	Sukkhur	5,165	870,094	769,729	74	1,639,897	6.1	1,488,372	113.04	1.63
Punjab	Okara	4,377	1,789,744	1,725,411	335	3,515,490	6.3	3,040,826	103.73	2.45
	Kasur	3,995	2,087,217	1,996,670	399	4,084,286	6.3	3,454,881	104.53	2.84
	Lahore	1,772	6,881,801	6,118,958	3376	13,004,135	6.4	11,119,985	112.47	2.65
	Sheikhupura	3,744	2,079,378	1,969,434	606	4,049,418	6.8	3,460,004	105.58	2.66
	Gujranwala	3,622	3,028,290	2,930,923	537	5,959,750	7.0	5,011,066	103.32	2.94
	Jhelum	3,587	703,667	678,543	98	1,382,308	6.0	1,222,403	103.7	2.08
	Gujrat	3,192	1,608,221	1,610,964	190	3,219,375	6.5	2,756,289	99.83	2.63
	Rawalpindi	5,285	3,109,807	3,007,760	1,344	6,118,911	6.1	5,402,380	103.39	2.1
	Attock	6,857	1,089,655	1,080,687	81	2,170,423	6.1	1,886,378	100.83	2.37
Islamabad Capital Territory (ICT)	Islamabad	906	1,247,693	1,115,900	270	2,363,863	5.7	2,003,368	111.81	2.8
Khyber Pakhtunkhwa	Nowshera	1,748	886,471	854,184	50	1,740,705	6.7	1,520,995	103.78	2.28
	Peshawar	1,518	2,425,808	2,332,767	187	4,758,762	6.8	4,331,959	103.99	1.58

Source: Pakistan Bureau of Statistics (Census 2023)

3.13.2 Religion

The dominant religion across the project districts of Jamshoro, Hyderabad, Matiari, Khairpur, Sukkur, Okara, Kasur, Lahore, Sheikhupura, Gujranwala, Jhelum, Gujrat, Rawalpindi, Attock, Islamabad, Nowshera, and Peshawar is Islam. Most of the population in these districts are Muslim, with Sunni Muslims making up the largest proportion. While there are small minorities of Christians, Hindus, and other religious groups in some of these areas as depicted in the **Table 3-8**, however, Islam remains the central cultural and religious influence in daily life, governance, and societal norms. Major religious events such as Eid-ul-Fitr, Eid-ul-Adha, and Ramadan are widely celebrated, and mosques play a significant role in the communities of these districts. The presence of Sufi shrines in several areas, in Sindh, Punjab and Khyber Pakhtunkhwa, further reflects the deep Islamic cultural heritage of the region. Moreover, religious minorities, including Hindus, Christians, and Sikhs, have the liberty to observe their rituals and religious practices. The religious minorities have freedom to celebrate their festivals, worship in churches, temples, and gurdwaras, and participate in community events.

Table 3.10: Religion wise Distribution of the Population

Province	Districts	Total Population	Muslim	Christian	Hindu	QADIANI/ AHMADI	SCHEDULED CASTES	SIKH	PARSI	OTHERS
Sindh	Jamshoro	1,117,308	1,051,843	11,103	50,906	363	2,223	17	-	853
	Hyderabad	2,432,540	2,205,523	23,019	166,912	542	35,456	75	61	952
	Matiari	849,383	693,657	1,658	137,522	57	15,648	12	4	825
	Khairpur	2,597,535	2,513,840	5,366	63,366	309	12,041	28	2	2,583
	Sukkhur	1,639,897	1,572,888	6,499	55,715	26	3,747	232	3	787
Punjab	Okara	3,515,490	3,458,618	55,735	151	594	63	44	1	284
	Kasur	4,084,286	3,942,302	140,136	415	803	60	53	3	514
	Lahore	13,004,135	12,388,623	602,431	2,487	7,139	324	715	77	2,339
	Sheikhupura	4,049,418	3,896,842	148,784	768	2,638	52	85	7	242
	Gujranwala	5,959,750	5,745,286	208,359	964	4,639	69	149	5	279
	Jhelum	1,382,308	1,366,437	14,973	321	413	22	14	1	127
	Gujrat	3,219,375	3,184,622	30,560	164	3,825	53	38	-	113
	Rawalpindi	6,118,911	5,995,634	118,193	893	2,387	120	197	22	1,465
	Attock	2,170,423	2,155,159	13,704	457	175	44	769	-	115
Islamabad Capital Territory (ICT)	Islamabad	2,363,863	2,261,663	97,900	839	2,398	45	60	10	948
Khyber Pakhtunkhwa	Nowshera	1,740,705	1,730,726	8,886	815	54	47	31	1	145
	Peshawar	4,758,762	4,721,378	33,249	1,708	213	114	1,481	5	614

Source: Pakistan Bureau of Statistics

3.13.3 Language

In the districts of Jamshoro, Hyderabad, Matiari, Khairpur, Sukkur, Okara, Kasur, Lahore, Sheikhupura, Gujranwala, Jhelum, Gujrat, Rawalpindi, Attock, Islamabad, Nowshera, and Peshawar, the most widely spoken language is Punjabi, especially in the central and eastern parts of Punjab like Lahore, Kasur, Gujranwala, and Sheikhupura. In Sindh, particularly in districts such as Hyderabad, Sukkur, and Khairpur, Sindhi is the predominant language. Urdu, being the national language, is also commonly spoken and understood across these regions, especially in urban centers like Islamabad, Rawalpindi, and Peshawar, where it serves as a lingua franca. In areas like Peshawar, Pashto is widely spoken, reflecting the Pashtun population of Khyber Pakhtunkhwa. In addition to these, several local languages and dialects, such as Saraiki in parts of southern Punjab and Hindko in certain areas of Khyber Pakhtunkhwa, contribute to the rich linguistic diversity of these districts. The coexistence of multiple languages reflects the cultural diversity of the regions, with people often being multilingual, speaking their native language alongside Urdu or English in daily life. **Table 3-9** illustrates the different languages being spoken along the project corridor.

Table 3.11: Mother Tongue wise Distribution of the Population

Province	Districts	Total Population	Urdu	Punjabi	Sindhi	Pashto	Balochi	Kashmiri	Saraiki	Hindko	Brahvi	Shina	Balti	Mewati	Kalasha	Kohistani	Others
Sindh	Jamshoro	1,117,308	40,965	26,141	999,091	20,880	16,348	229	4,613	4,372	1,992	2	5	397	0	94	2087
	Hyderabad	2,432,540	1,117,001	75,959	1,048,906	68,878	17,558	575	19,442	18,546	5,479	236	83	3,205	122	170	56,380
	Matiari	849,383	22,605	3,893	789,454	3,599	11,322	8	1,963	11,128	488	0	0	1	1	0	4,889
	Khairpur	2,597,535	10,745	17,339	2,538,366	3,864	13,248	15	5,454	4,442	1,722	9	87	15	0	32	2110
	Sukkhur	1,639,897	145,838	28,352	1,399,164	12,168	15,162	193	12,936	3,002	2,007	79	67	111	0	16	6372
Punjab	Okara	3,515,490	162,585	3,298,765	7,353	12,389	2,175	228	1,243	535	18	363	211	17,043	28	31	484
	Kasur	4,084,286	137,059	3,440,450	7,041	7,855	584	242	3,854	296	15	66	76	470,749	131	53	13097
	Lahore	13,004,135	2,742,020	9,549,169	27,074	267,809	4,266	12,165	62,016	33,061	176	1,282	2675	260,544	179	543	15682
	Sheikhupura	4,049,418	198,075	3,782,194	8,223	38,427	457	1,525	4,775	2,001	517	45	79	10,566	16	34	2443
	Gujranwala	5,959,750	368,882	5,483,918	14,367	46,040	2,089	14,716	5,323	1,730	17	103	97	1468	16	196	1211
	Jhelum	1,382,308	57,980	1,213,526	4,730	37,268	603	1,746	3,649	1,786	11	176	140	33	11	343	44,295
	Gujrat	3,219,375	111,956	3,005,893	9,877	69,402	971	2,329	9,445	1,857	25	369	187	66	14	1243	2366
	Rawalpindi	6,118,911	1,029,015	3,596,866	17,362	630,908	3,911	89,835	40,031	236,986	370	11,101	7,652	522	208	10,921	382,852
	Attock	2,170,423	57,123	1,391,285	6,379	332,481	1,105	4,224	8,665	307,305	125	782	171	100	20	5,798	17442
Islamabad Capital Territory (ICT)	Islamabad	2,363,863	358,922	1,154,540	21,362	415,838	4,503	51,920	46,270	140,780	668	7,099	10,315	1095	182	5,016	64,734
Khyber Pakhtunkhwa	Nowshera	1,740,705	17,226	18,749	2,003	1,649,524	1,962	617	1,039	39,058	60	113	58	18	56	1250	3,956
	Peshawar	4,758,762	85,332	26,133	1,621	4,421,285	5,070	634	3,229	179,879	161	332	318	24	278	1253	24,839

Source: Pakistan Bureau of Statistics

3.13.4 Ownership Status of Houses

Overall, the data shows a high rate of ownership in the project districts, while urban centers exhibit more diverse housing arrangements, including rented and government housing. The data covers districts from Sindh, Punjab, Islamabad Capital Territory (ICT), and Khyber Pakhtunkhwa, highlighting key housing trends.

In terms of residential status, a significant majority of houses are owned, with ownership percentages ranging between 53% (Islamabad) and 92% (Khairpur). Rented houses make up a notable portion, particularly in major urban centers like Islamabad, Lahore, Rawalpindi, and Peshawar. Rent-free housing also exists in varying proportions, with figures as high as 12% in some districts. Government and non-government housing remain a small fraction of total households, with Lahore having the highest number of such residences. Lahore, the provincial capital of Punjab, records the highest number of households (2,010,325), while Jhelum has the lowest (229,064) among the listed districts. Other densely populated districts include Gujranwala, and Rawalpindi, indicating a concentration of residential settlements in Punjab. Gender distribution of home ownership is highly skewed, with male ownership overwhelmingly dominant across all districts. Female ownership remains significantly low, with numbers rarely exceeding a small fraction of total homeowners. Detail of the ownership of the houses in respective districts along the project corridor is given in **Table 3- 10.**

Table 3.12: Distribution of the Population as per Ownership of the Houses

Province	Districts	Households	Residential Status							Owner's Gender	
			Owned House	Percentage	Rented House	Rent Free	Govt. Houses	Non-Govt. Houses	Others	Male	Female
Sindh	Jamshoro	213,493	181,014	85	17,589	6,580	4,062	1,100	3,148	198,263	6,920
	Hyderabad	448,191	325,964	73	84,303	22,718	6,992	1,417	6,797	412,623	20,362
	Matiari	158,463	131,312	83	3,818	16,994	1,418	924	3,997	147,728	4,396
	Khairpur	452,250	416,691	92	14,502	14,83	1,776	406	4,038	433,417	12,613
	Sukkhur	268,588	231,944	86	21,333	6,117	6,798	372	2,024	254,126	5,268
Punjab	Okara	549,724	465,543	85	34,977	38,086	5,664	586	4,868	518,712	19,894
	Kasur	645,308	561,490	87	49,184	27,449	1,840	1,590	3,755	619,082	19,041
	Lahore	2,010,225	1,343,960	67	576,294	46,196	29,668	2,934	11,173	1,871,363	95,087
	Sheikhupura	593,260	503,979	85	69,628	13,536	1,562	2,500	2,055	567,682	19,461
	Gujranwala	849,177	716,119	84	107,582	16,160	5,855	543	2,918	806,383	33,478
	Jhelum	229,064	194,438	85	22,336	6,514	4,424	386	966	209,173	14,115
	Gujrat	489,337	419,515	86	45,581	17,572	4,660	408	1,601	451,203	31,465
	Rawalpindi	998,000	670,535	67	261,871	23,384	37,439	1,394	3,377	907,535	48,255
	Attock	353,973	288,757	82	41,659	9,428	11,356	524	2,249	324,353	15,491
Islamabad Capital Territory (ICT)	Islamabad	410,993	218,953	53	149,403	10,248	28,703	576	3,110	359,426	19,178
Khyber Pakhtunkhwa	Nowshera	259,774	213,095	82	31,983	8,894	4,736	367	699	245,232	8,740
	Peshawar	690,976	472,781	68	180,181	22,859	12,442	224	2,489	659,977	15,844

Source: Pakistan Bureau of Statistics

3.13.5 Source of Drinking Water

Access to safe potable water is crucial for the health and well-being of individuals, as it helps prevent waterborne diseases and supports basic needs like drinking, cooking, and sanitation. In the districts of Jamshoro, Hyderabad, Matiari, Khairpur, Sukkur, Okara, Kasur, Lahore, Sheikhupura, Gujranwala, Jhelum, Gujrat, Rawalpindi, Attock, Islamabad, Nowshera, and Peshawar, the availability of clean drinking water varies, with urban areas typically having better infrastructure like piped water systems and filtration plants. In rural areas, however, water sources may include hand pumps, wells, and tube wells, though the quality of water can sometimes be a concern due to contamination. To address these challenges, local governments, NGOs, and communities have been working on improving water filtration systems, rainwater harvesting, and better sanitation practices to ensure safe and clean drinking water for all. Safe potable water is essential not only for health but also for economic development, as it supports agriculture, industry, and daily life. The information about the sources of drinking water in the districts within the project corridor is provided in **Table 3-11**.

Table 3.13: Source of Drinking Water in Project Area

Province	Districts	Households	Drinking Water											
			Improve Drinking Water	Percentage	Inside	Percentage	Outside	Percentage	Tap Water	Motor Pump	Dug Well	Filtration Plant	Bottle Water	Others
Sindh	Jamshoro	213,493	187,711	88	92,305	43	121,188	57	84,616	55,194	11,929	1,810	1,603	58,341
	Hyderabad	448,191	431,092	96	323,138	72	125,053	28	240,507	146,514	1,982	23,822	16,478	18,888
	Matiari	158,463	154,538	98	131,121	83	27,342	17	81,200	71,264	514	1,389	304	3,792
	Khairpur	452,250	439,782	97	376,733	83	75,517	17	189,075	244,244	5,513	299	2,156	10,963
	Sukkhur	268,588	258,904	96	208,968	78	59,620	22	133,800	115,844	3,476	5,390	1,528	8,550
Punjab	Okara	549,724	539,079	98	415,198	76	134,526	24	67,199	406,596	2,761	59,029	851	13,288
	Kasur	645,308	631,474	98	484,554	75	160,754	25	156,904	432,202	2,997	33,944	2,376	16,885
	Lahore	2,010,225	1,970,418	98	1,278,953	64	731,272	36	827,205	590,053	6,919	492,870	51,868	41,310
	Sheikhupura	593,260	577,164	97	421,347	71	171,913	29	95,714	389,037	2,903	81,964	555	23,087
	Gujranwala	849,177	841,364	99	656,950	77	192,227	23	96,641	655,324	2,284	86,577	261	8,090
	Jhelum	229,064	218,919	96	178,507	78	50,557	22	46,017	151,315	12,045	9,329	146	10,212
	Gujrat	489,337	484,425	99	328,209	67	161,128	33	63,837	377,553	1,639	40,534	485	5,289
	Rawalpindi	998,000	925,220	93	606,621	61	391,379	39	296,814	437,163	65,356	88,751	6,840	103,076
	Attock	353,973	334,084	94	277,958	79	76,015	21	69,241	236,930	27,630	2,578	361	17,233
Islamabad Capital Territory (ICT)	Islamabad	410,993	397,065	97	241,339	59	169,654	41	100,554	200,249	14,331	46,678	10,959	38,222
Khyber Pakhtunkhwa	Nowshera	259,774	245,359	94	206,967	80	52,807	20	61,379	169,030	15,414	1,626	131	12,194
	Peshawar	690,976	670,242	97	599,213	87	91,763	13	295,626	332,657	45,721	686	361	15,925

Source: Pakistan Bureau of Statistics

3.13.6 Public Utilities and Public Infrastructure

The respective project districts are equipped with various public utilities and infrastructure, including roads, electricity, water supply, healthcare, and educational facilities. Urban areas like Lahore, Islamabad, Rawalpindi, and Peshawar generally have more advanced infrastructure, with well- established road networks, reliable electricity supply, and modern healthcare and education systems. In contrast, rural districts may have limited access to such utilities, and improvements are needed. The specific details of public utilities and infrastructure within the project area will be provided after conducting thorough field surveys, which will assess the current status, gaps, and areas requiring development to ensure effective service delivery and enhanced living conditions for the local population. Some public utilities/crossings have been identified at the ESMPF stage (railway crossings, education and health facilities are identified already for Phase 1A)) which are provided in **Table 3.12** below.

Table 3.14: Public Utilities/Crossings in Project Area

Section No.	Section Name	Presentation
1	Hydrabad to Hala	Railway Line Crossing at 1 point.
2	Ranipur to Sukkur	Railway Line Crossing at 2 points.
3	Okara to Mangla	Railway Line Crossing at 1 point.
4	Lahore to Gujranwala	Railway Line Crossing at 1 point.
5	Kharian to Dina	Railway Line Crossing at 5 points.
6	Dina to Rawat	Railway Line Crossing at 3 points.
7	Rawalpindi To Burhan	Railway Line Crossing at 2 points.
8	Nowshera to Peshawar	Railway Line Crossing at 2 points.

3.13.7 Economic Activities along the Project Corridor

The proposed project road sections, which spans from Hyderabad to Peshawar, is a major transportation corridor bustling with a wide range of activities. It was observed during reconnaissance that along this route, various businesses thrive, including shopping malls, retail shops, roadside eateries, service stations, seasonal food and vegetable vendors in movable carts, and farm markets, catering to both local residents and travelers. Industrial establishments, such as manufacturing units and warehouses, are also prevalent at many locations, contributing to the economic activity of the area. Additionally, the road is lined with residential structures, ranging from single homes to multi-story buildings, particularly in urban and suburban areas. Commercial complexes and small-scale industries are common in towns and cities situated along the route, providing essential goods and services. The development along N5 reflects the dynamic nature of this key highway, which serves as both an economic lifeline and a hub of commercial and residential activity.

3.13.8 Settlements along the N5 Corridor with Encroachments and Business Activities

The findings of the reconnaissance site visit revealed that encroachments and business activities were observed in the following settlements along the N5 corridor.

1. ***Hyderabad - Hala section.*** The Right- of- Way (RoW) has been encroached at different location with permanent and moveable structures mainly along the Hyderabad bypass, Talib Mola Colony, Matiari, Goth Wasi Memon, Goth Sohail Akbar Shah, Goth Sherkhan Kalor, Qasim Solangi, Haji Rasool and Goth Khaisrani Khund.

2. ***Ranipur-Rohri Section.*** The RoW has been encroached at different location with permanent and moveable structures at Tando Masti, Ranipur, Hatri Tando Mir Mohsan and scattered locations;

3. ***Okara – Manga Section.*** Major settlements identified include Manga Mandi (District Lahore), Phool Nagar, Jamber, Pattoki (District Kasur), Habbibabad, Renala Khurd and Okara (District Okara)._Encroachment were observed at some places in present ROW. Permanent encroachment included built-up structures and moveable encroachment included wooden, steel, kiosks, rehris and truck addas

4. ***Lahore - Gujranwala Section.*** Major settlements identified include Shahdra (District Lahore), Ferozwala, Kala Shah Kaku, Muridke, Sadhoke, Kamoke (Disrict Sheikhupura), Eimanabad and Gujranwala (District Gujranwala). Major part of the road is already three lanes but encroachments were observed at some places in present ROW. Permanent encroachment included built-up structures and moveable encroachment included wooden, steel, kiosks, rehris and truck addas.

5. ***Kharian - Dina Section.*** Major settlements identified included Kharian, Sarai Alamgir (District Gujrat), Jhelum bypass, Kala Gujran , Dina , (District Jhelum)._A number of shops, kiosks, hotel, building material, workshops, bus bays and land encroached by the filling stations.

6. ***Dina - Rawat Section.*** Major settlements identified included Dina, Ratial, Chak Mehun, Chakoha, Domeli Mor, Tarraki, Sohawa, Missa Keswal, Dhok Chohdrian, Gujjar Khan, Ghungrila, Mandra and Rawat. The present ROW is encroached with moveable and non-moveable structures including but not limited to wooden, steel, kiosks, carts, filling stations, hotels, bus bays and nurseries.

7. ***Rawalpindi - Hassanabdal Section.*** Major settlements identified include Peer Wadhai More, Qasimabad (District Rawalpindi) Jangi Syedian, Tarnol, Sangjani (District Islamabad) Taxila, Wah Cantt. (District Rawalpindi) Hasanabdal, Muno Nagar and Burhan (District Attock), A number of shops, kiosks, hotel, building material, workshops, bus bays and land encroached by the filling stations.

8. ***Nowshera - Peshawar Section.*** Many encroachments were found along the road especially in Taru Jabba and Pabbi bazar Major settlements identified include Surya Khel, Hakeemabad, Nowshera Cantt. Nowshera City, Amangarh, Khushal Kot, Azakhel, Taru Jabba (District Nowshra) Tarnab Farm, Peshawar Fruit Mandi, and Jhagra (District Peshwar).

3.13.9 Socio-economic Condition along the N5 Corridor[1]

Regions along Pakistan's N5 highway, spanning from Hyderabad to Peshawar, face significant socio-economic challenges. As of 2024, the national poverty rate stands at 40.1%, with approximately 75% of those in extreme poverty being women and girls.

The female literacy rate is notably low; especially in Sindh and Khyber Pakhtunkhwa, it was recorded at 23% in rural districts of Sindh along N5 Road. In Khyber Pakhtunkhwa, the overall literacy rate was 55.1% in 2020, with a significant gender gap: 66.67% for men and 34.58% for women.

[1] https://www.worldbank.org/en/country/pakistan/overview, https://www.sbp.org.pk/reports/annual/arFY02/chap11.pdf, https://articles.pakistanlawyer.com/2025/02/22/navigating-challenges-social-inequality-in-modern-pakistan/, https://pakistan.unwomen.org/sites/default/files/2023-07/summary_-nrsw-inl_final.pdf

Employment opportunities along the N5 are also limited, with much of the workforce engaged in informal businesses, many of which have been negatively impacted by infrastructure development projects. Women's workforce participation remains limited, with only 24% of women aged 15–64 engaged in the labor force in 2023, compared to 81% of men.

Health challenges include inadequate healthcare access and road safety concerns, with a high number of traffic-related injuries and fatalities. Health disparities are evident, as urban women have an average life expectancy of 70 years, while rural women average 67 years.

Additionally, the lack of access to quality education prevails economic disparities, as female literacy rates remain low, and in many rural areas, fewer than 10% of women complete secondary school.

Gender inequality is deeply embedded and marginalized communities, informal workers, and vulnerable groups along the N5 corridor often struggle with restricted access to essential services. These statistics underscore the pressing need for targeted interventions to address poverty, educational disparities, employment inequities, health challenges, and gender discrimination in these regions.

More detailed analysis of gender-specific issues in the overall Project area is included in the GAPF. Furthermore, a list of identified vulnerable groups for the Project is included in the SEP, with site-specific groups outlined in the respective RAPs for each section.

4 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS & MITIGATION MEASURES

This chapter describes the potential generic E&S risks and impacts (direct, indirect/induced and cumulative) to be caused by the project's construction and operation phases on surrounding environment and community. It also describes the mitigation measures as per the mitigation hierarchy (avoidance, minimization or reduction, mitigation, compensate/ offset).

4.1 Environmental and Social Impacts, Significance and Mitigation Measures

A brief summary of impacts identified at preliminary stage along with significance and mitigation measures is presented in **Table 4.1** and further details on the potential impacts are presented in Table 8.2 of Phase 1A ESIA Chapter 8.

Table 4.15: Environmental and Social Impacts, Significance and Mitigation Measures

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
	Preconstruction / Design Phase			
1	**Permanent Land Acquisition and Resettlement** At this stage, on the basis of preliminary assessment, no land acquisition is required for the proposed project. However, during ESIA/ESMP stage, if any impact related to land acquisition will be identified, the category of land to be acquired shall be determined and dealt with as per AIIB ESS2 and Land Acquisition Act (LAA) 1894 provisions.	Medium	• Efforts will be made to avoid the land acquisition and resettlement issues to the minimum by design change, optimization. • Mitigation measures in case of unavoidable impact related to land acquisition will mainly include fulfilment of the requirements of AIIB ESS2 and LAA 1894 with latest amendments.	Low
2	Loss of land, crops, infrastructure, religious structures, livelihood, commercial activities, disturbance to people and loss of income sources are the major resettlement issues during the proposed project implementation.	Substantial	• Resettlement and relocation related impacts will be mitigated through proper assessment of the impacts and judicious compensation to the affected persons by providing sufficient budget in the RAP document which will be prepared for each project section.	
3	**Temporary Acquisition of Land** The development of Contractor camps and facilities i.e. storage, workshops, equipment parking and washing areas; aggregate quarries; and access roads/tracks for haulage, transportation etc. will required renting/leasing land which may cause temporary acquisition of land. The approximate area required for the establishment of one Contractor's camp facilities will be 10,000m^2 at the different locations.	Low	• It is the foremost option to establish the construction camps at the acquired land to eliminate the issues of land leased etc., however, if this option is not feasible than the land for above mentioned facilities will be selected and leased prior to the start of construction phase. • Land for the mentioned facilities will be directly rented from the private landowners by the Contractors. Rental terms will be negotiated to the satisfaction of the concerned landowners and the agreement will be in local language to make the process clear. Timely public notification of unexpected disruption of services. • Temporary lease of land from the private owner with an agreed price. • Resettlement of people and houses must be avoided while selecting the location of the camps and yards; • Camp and yard site will be away from the residential areas and sensitive receptors;	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
			• Selection of sites shall be near the Project area having proper access to the nearby main/link road; • The site must be located in a place where the drainage from and through the camps will not threat any domestic or public water supply; • Camp and yard site must be adequate in size to prevent overcrowding of necessary structures (about 1500 m2 land is required for each camp site as per designers' recommendation, which may be finalized during implementation phase as per requirement); • The site will avoid any damage of property, vegetation, irrigation, and drinking water supply systems; • The camp site must not be subject to periodic flooding; and • The site must be away from ecologically sensitive areas, e.g., wildlife sanctuaries, game reserves, national parks, etc.	
Construction Phase				
1.	**Soil Erosion and Degradation** Construction activities such as clearing of earth, levelling, compaction, carpeting, pavement finishing will affect the existing soil condition. Soil erosion may also occur in the workshop areas as a result of improper drainage system of equipment washing-yards and improper management of construction activities.	High	• Good engineering practices will help to control or minimize the soil erosion both at the construction sites and in peripheral areas. All the disturbed areas need to be protected against soil erosion by stripping and stockpiling of all the available topsoil for later re-vegetation. Special slope protection measures will be adopted in the sensitive areas and along the shoulders of roads. Site restoration plan for the Project will be strictly followed.	Medium
2.	**Soil Contamination** Land may be contaminated due to the spillage of chemicals, fuels, solvents, oils, paints, concrete, solid waste generated at campsites etc. This normally happens when these materials are transported in open or loosely capped containers. The possible contamination of soil by oils and chemicals at camp sites, workshop area and	Medium	• The Contractors will be required to instruct and train their workforce in the storage handling and management of materials and chemicals that can potentially cause soil contamination; • Material Safety Data Sheets (MSDS) will be strictly followed during handling and storage of chemicals; • Soil contamination due to concrete transportation and solid waste will be minimized by placing all containers	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
	equipment washing-yards may limit the future use of land for agricultural purposes.		in casings.	
3.	**Construction of Substructure of bridge (pile driving and concreting)** Underwater noise impacts on fisheries and other aquatic life	Substantial	• Use vibratory hammer. Under those conditions where impact hammers are required for reasons of seismic stability or substrate type, it is recommended that the pile be driven as deep as possible with a vibratory hammer prior to the use of the impact hammer. • Monitor sound levels during pile driving to ensure that they do not exceed the NOAA or any other international recognized criteria. • Implement measures to attenuate the sound when sound pressure levels exceed the NOAA or any other international recognized criteria. Methods to reduce the sound pressure levels include, but are not limited to: o installation of underwater enclosures to minimize sound o Surround the pile with an air bubble curtain system or air-filled coffer dam. o Use a smaller hammer to reduce the sound pressure. The sound produced in pile driving has a direct relationship to the force used to drive the pile. A smaller hammer will have less force on the pile therefore, producing less sound. • Use a hydraulic hammer if impact driving cannot be avoided. The force of the hammer blow can be controlled with hydraulic hammers, and reducing the impact force will reduce the intensity of the resulting sound.	

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
4.	**Construction of Substructure of bridge (pile driving and concreting)** Impact on the annual juvenile fish migration and other fish species.		• A construction window can be proposed for piling schedule to reduce the impact on fish migration. Detail study will be conducted during the ESIA preparation of the Nai Baran Bridge to address fish migration and pile driving. • Fish migration monitoring as per the schedule of ecological survey to confirm the actual depth of migration at Nai Baran Bridge site.	
5.	**Climate Change and GHG Abatement** The main sources of greenhouse gases (CO_2, CH_4, NOx etc.) during the construction activities of the proposed Project will include both mobile and stationary sources. Emission of greenhouse gases cause global warming and other climatic changes on regional and global scale.	Medium	• WHO, PEQS/NEQS, IFC guidelines/standards whichever stringent one applicable to gaseous emissions generated by construction vehicles, equipment and machinery shall be enforced during construction works. Alternative energy resources shall be considered where possible. Plantation development as per the tree plantation/reforestation plan is highly recommended for the sequestration of CO2 and vehicle maintenance protocol will be adopted. • Bridges on water channels and road shall be properly designed to accommodate design flows considering design discharge for flood occurrence of 100 years and recent super flood.	Low
6.	**Ambient Air Quality** Airborne dust from access road construction and use, wind erosion of material stockpiles, emissions from diesel vehicles and construction equipment, disposal of waste have potential to adverse impact sensitive receptors in the Project Area.	Medium	• The following effective measures need to be adopted for controlling the potential adverse impacts on ambient air quality: • The existing quarries will be used to borrow the aggregate materials; • Concrete batching plants will be equipped with dust control equipment such as fabric filters or wet scrubbers to reduce the level of dust emissions; • Ensure the proper and periodic tuning of the vehicles; • Dust emissions from trucks will be reduced by a regular sprinkling of water for keeping the dust settled at least twice a day; • Regular water sprinkling of the site or use of chemical	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
			dust suppressants will be carried out to suppress excessive dust emission(s) which will mitigate health effects on locals including children, the elderly, and individuals with pre-existing health conditions. Improved air quality, leading to improve visibility conditions will reduce the probability of accidents • Haul-trucks carrying sand aggregate and other materials will be kept covered with tarpaulin to reduce the dust pollution; • Turn off the engines for all vehicles, while parked on the site; • Regular monitoring of air quality in accordance with monitoring protocols of WHO, SEQS/PEQS/NEQS, IFC guidelines/standards whichever stringent one.	

7.	**Noise Level**
	Noise and vibration generated by the construction machinery during the construction stage is likely to affect the settlements particularly the sensitive receptors, such as, schools, hospitals, houses and settlements etc.
		Medium	• There are a variety of ways by which construction equipment and worksite noise can be controlled such as:
			  • Quieter Equipment
			  • Modifying Existing Old Equipment
			  • Enclosures for the noisy equipment
			  • Work Activity Scheduling
			  • Maintenance
			  • Noise Perimeter Zones
				Low

8.	**Wastewater Generation at Construction Camps** Wastewater will be generated at the construction camps which may affect water bodies if disposed of without proper treatment.	Medium	• To dispose the liquid waste generated from the construction activities, the following steps will be taken by the Contractor: • Domestic and chemical effluents from the construction camp will be disposed by the development of on-site sanitation systems i.e. septic tanks. Proper monitoring to check the compliance of WHO, SEQS/PEQS/NEQS, IFC guidelines/standards whichever stringent one will be carried out; and • Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit.	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
9.	**Solid Waste Generation at Construction Camps** Solid waste will be generated from the construction camp daily. The major components of the labour camp waste will be garbage, putrescible waste, rubbish and small portion of ashes and residues. Other type of wastes may include inorganic construction wastes.	Medium	• All the solid waste from the camps will be properly collected at source and disposed of through proper solid waste management system. The Contractor will coordinate with local representatives and administration concerned department for the disposal of solid waste; • The concerned department must develop a plan of action for transporting the waste to the disposal site for final disposal. It is the responsibility of the concerned department to ensure that the disposal site is properly lined to prevent the leachate from contaminating the groundwater; • Secondly, the disposal site must be located away as far as practical from populated areas and regions that have a high density of Wildlife; • Toxic waste will be handled, stored, transported and disposed separately; • The waste will be properly sealed in containers with proper labels indicating the nature of the waste; and • Solid waste will be segregated at source so that it can be re-used or recycled.	Low
10.	**Waste Generation at Construction Site** The construction waste will include wastewater, oil spillage from machinery and solid waste (damaged or spoiled materials, temporary and expendable construction materials etc.). The handling and storage of oil and other hazardous waste will be a source of environmental pollution during the excavation, foundation, levelling, carpeting and pavement activities.	Medium	• Waste Management Plan will be developed to implement an efficient and responsive solid waste management system during construction phase.	Low
11.	**Borrow Pits** Borrow pits and its excavation activities may result in land disputes, soil erosion, loss of potential cropland, loss of vegetation, landscape	High	• Necessary permits will be obtained for any borrow pits from the competent authorities. • In borrow pits, the depth of the pits will be regulated so that the sides of the excavation will have a slope not	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
	degradation, and damage to road embankments. Borrow pits may also become potential sources of mosquito breeding and may prove hazardous to human beings, livestock and wildlife. This will also degrade hygienic condition of the Project Area.		steeper than 1:4; • Soil erosion along the borrow pit will be regularly checked to prevent/ mitigate impacts on adjacent lands; • In case borrow pits are filled with water, measures have to be taken to prevent the creation of mosquito-breeding sites; and • Borrow pits will be used for construction waste, but during the excavation, top 20 cm soil cover will be • preserved for vegetation after the filling of the pits. This is the best way to restore the flora of that area.	
12.	**Impact on Surface and Groundwater** The proposed project will also cross the numbers of nullahs and drains at different locations. The bridges and culverts are proposed on these water resources these surface water resources may get contaminated by the fuel and chemical spills, or by solid waste and effluents generated by the kitchens and toilets at the construction camp sites. Moreover, runoff from the chemical storage areas may also contaminate the surface water bodies.	Medium	• As a mandatory step, all the effluents will be disposed as per the requirements of WHO, SEQS/PEQS/NEQS, IFC guidelines/standards whichever stringent one. Moreover, to reduce the risk of surface and groundwater contamination, good management practices will be adopted to ensure that fuels, chemicals, raw sewage and wastewater effluent are disposed of in a controlled manner.	Low
13.	**Community Health and Safety** The construction activities and vehicular movement at construction sites may result in roadside accidents deteriorate quality of groundwater and surface water resources, cause air/dust emissions, noise pollution, vibration impact and spread of different transmittable diseases due to outside labor	High	• Proper control on construction activities, restrict entry of labor with different transmittable diseases, adopt mitigations for dust, noise & vibration impacts and create awareness about road safety will be ensured. • Traffic Management Plan and appropriate road safety measures will be implemented to avoid traffic accidents, jams/public inconvenience.	Low
14.	**Occupational Health and Safety** Man-machine conflict, operation of heavy equipment, over-water construction, high occupational noise due to pile driving, crushing plants and use of planers, occurrence of	High	• Safety precautions for the construction workers, Training of workers in construction safety procedures and use of Personnel Protective Equipment (PPE) will mitigate this impact.	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
	accidents / incidents and other natural emergencies during the construction stage is a common phenomenon and workers as well as locals will be more prone to serious accidents.			
15.	**Notified Physical Cultural Resources** As mentioned in the **Table 3.4**, one archaeological site exist in the proximity of the proposed Project.	Medium	• No notified archaeological site will be affected due to the implementation of the proposed Project. However, the Contractors will be required to train the construction crews and the site supervisors in archaeological site recognition, conservation procedures and temporary site protection. • In case of a chance of archaeological find during excavation, the Contractors must halt work at the site immediately and notify the Directorate General (DG) of Archaeology, Government of Punjab or Directorate of Archaeology & Museum Department, Khyber Pakhtunkhwa (depending upon the location) through Project Director. A chance find procedure is developed and included in the Annex 1 of this ESMPF.	Low
16.	Social and Cultural Conflicts (including with migrant workers)	Medium	• Local labor especially from nearby communities will be given preference for the construction works; • Careful planning and training of work force to minimize disturbance to the local people; • Familiarize outside laborers on local etiquettes; • Community unrest can be avoided by properly implementing a grievance redress mechanism. The framework graveness redress mechanism (GRM); • Public notification through print or electronic media during the entire construction phase to avoid any inconvenience in accessibility to the locals; and • Adequate training of especially for the transitive workforce of the station (involved both in the construction process and in the commissioning) to regard the customs of the area so that the locals do not feel insecure.	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
17.	Health Impacts (Communicable Diseases)		• Proper check-up of skilled and unskilled workers before their hiring; • Labor camp will be away from the residential area and workers' management plan will be formulated by Contractor to minimize the adverse impacts on local communities and workers; • Trainings, awareness and campaigns will be conducted for workers and surrounding communities on awareness and prevention of HIV/AIDs and COVID-19; • Workers will be educated for personal hygiene and the sanitation concerns, leading to communicable and non- communicable diseases; • Water will not be allowed to stagnate even if clean, and measures will be taken to cover the area; and • Insecticides will be periodically sprayed.	
18.	**Traffic Management** Due to the proposed construction activities, proper traffic management may be a challenge in the project area, particularly, where the proposed project activities will take place near the towns and settlements; traffic problems may arise for the commuters and transporters travelling to the proposed areas. The movement of vehicles along the haulage routes will cause soil erosion, debris flow, dust emissions etc.	High	• Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the daytime. • Traffic Management Plan will be implemented to avoid traffic accidents, jams/public inconvenience. • Measures of soil erosion and dust emission (as mentioned earlier) will be followed.	Low to Medium
19.	**Natural and Man-Made Disasters** Natural disasters (earthquakes) and accidents such as fire, falls, slips and trips may result in injuries, financial losses and may even lead to deaths.	Low	• An Emergency Response Plan (ERP) for earthquakes and manmade disasters will be developed by the Contractor in coordination with NHA and will implement. • The workers shall be trained and facilitated to cope with such disasters. • Minor incidents and near misses will be reported, and	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
			preventive measures will be formulated accordingly by the NHA Management;	
20.	**Impacts on Livelihood (Loss of income)** The construction activity may disturb the business and livelihoods of the shopkeepers and workers doing their businesses along the alignment. The alignment of the proposed Project is also falling in agricultural area and damage of crops, orchards and trees is expected during construction activities. Standing crops in RoW of the road will result in permanent loss of cultivatable land.	High	• Proper compensation will be provided to all the affectees losing their livelihoods along the route; • Project Construction will be completed on time; • Relevant stakeholders will be engaged to design livelihood restoration measures including affectees of the proposed Project Area; • Proper awareness and training will be conducted among the affectees regarding Project benefits, reasons for acquiring lands and compensations to be provided • The compensation value shall be calculated based on market value of the crops and average yields in the Project Area; and • Removal of all contractors' facilities from the Project Area shall be a contractual requirement, and as such the land used for the sub-camps can be restored to facilitate • agriculture and the land used for the construction camp shall become cultivatable.	Low to Medium
21.	**Gender Based Violence (GBV)** The Project route is passing through the urban and semi urban areas where women are involved in working activities. During construction phase gender-based violence might arise due to discrimination made against women by unequal work distribution and unequal pay structure among others. Sexual exploitation and abuse (SEA) and sexual harassment (SH) against women might occur as a consequence of mixing of men and women at the construction site, and moving on the roads, bus stops and markets. Educational institutions near the Project alignment	Medium	• Awareness will be created among the females at individual and community levels about the construction sites; • The Contractor will make sure that no discrimination is made on the basis of gender while hiring of workers; • Raise awareness among the communities of the potential risks of GBV, and establish response services in the communities that can respond to instances of GBV (particularly those related to issues of labor influx); • Set up and train a GBV Committee to complement the Grievance Redress Mechanism (GRM). • Contractor will take proper measures to address and resolve issues relating to harassment, intimidation,	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
	are also sensitive regarding gender issues.		and exploitation, especially in relation to women.	
22.	**Child Labor** Inhabitants of the Project Area have mix economic background and different sources of income. Children of low income groups mostly involve in different earning activities, as their parents prefer to get their children hired in small shops as helpers, and waiters in hotels for earning money, and supporting household livelihoods.	Low to Medium	• Awareness will be created among the local communities about the adverse impacts of child labor. • Contractor through contractual agreement will be bound to follow the labor standards, rules and regulations during hiring the labor force and all activities will be monitored by the social and environmental staff of the implementing agency; • Contractor will ensure the presence of all persons at site are adults and have their proper identity cards with them.	Low
23.	**Women and Vulnerable Groups are Excluded from Project Benefits.** Individuals in the project area may face additional risks and impacts due to the Project in virtue of their vulnerability or disadvantage. They may also be unable to benefit from project benefits, such as the improved road infrastructure, exacerbating their social exclusion.	Medium	• Gender Action Plan has been prepared to ensure women are included in project benefits, and to outline, specific measures to address risks and enhance opportunities • Site-specific measures targeting vulnerable groups, such as low-income households will be included in the ESAP/RAP for each section. These interventions may include, preferential recruitment for vulnerable groups, sustainable development programs for enhancing livelihoods and addressing sources of poverty/vulnerability.	Low
24.	**Influx of Labor** Social problems and conflicts that are associated with Labor Influx are Risk of social conflict, Increased risk of illegitimate behavior and crime, Impacts on community dynamics, Local inflation of prices, accommodations and rents, Increase in traffic and related accidents, etc.	Medium to High	• Labor camp(s) will be established away from residential population; • Preference will be given to the local people to work with contractor, and contractor will hire maximum labour force from the Project Area because this will reduce the labour influx; • An effective GRM will be established for the Project to resolve all issues related to the community. Thus, progress regarding resolving the issues will be • monitored closely.	Low to Medium
25.	**Impact of Migrant Workers** Based on the requirement in the various sub-projects/Sections, the proposed project will	Medium to High	• To mitigate such issues and risks, employers will comply with national and international labor standards, including fair wages, reasonable working hours, and	Low to Medium

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
	involve migrant workers who might be contracted to perform specific duties that might require special expertise that cannot be sourced locally. In this project, the likelihood of migrant workers is very low. The OHS and CHS related risks and impacts, impact of GBV, SEA/SH, social and cultural issues, risk of unfair wages, unsafe working conditions, and excessive working hours, discrimination based on nationality, ethnicity, or legal status, and lack of social integration can lead to mental health challenges and emotional distress. Details of the risk/impacts are discussed in LMP.		occupational safety. Provision of confidential, accessible mechanisms for reporting and resolving complaints & grievance, ensuring protection against retaliation will be ensured. Employer will provide safe, hygienic, and dignified accommodations with adequate facilities and educate migrant workers on their rights, safety protocols through specified trainings, and access to support services in their language. Independent monitors will be carried out to assess working and living conditions of migrant workers and enforce compliance. Promote community engagement programs to reduce isolation and foster inclusion whoever the issues of labor influx will be also considered in parallel while promoting community engagement.	
26.	**Risks/impacts from Use of Security Force/Guards** The deployment of security guards and forces helps in minimizing theft, vandalism, and sabotage, which are common risks in large-scale construction sites. However, the presence of armed or uniformed personnel can sometimes create an atmosphere of tension, particularly among laborers or local communities, leading to conflicts or misunderstandings. In some cases, excessive use of force or mismanagement of security operations can result in legal issues, labor unrest, or human rights concerns. Additionally, maintaining a full-time security team increases project costs, affecting overall budgeting and resource allocation.	Medium to High	• Proper training should be provided to security personnel on conflict resolution, ethical conduct, and handling emergencies professionally. Implementation of stakeholder/community engagement programs can also help in fostering better relations between security forces and workers, reducing potential conflicts. • Technology-driven security solutions, such as CCTV surveillance, biometric access control, and alarm systems, can reduce the need for excessive manpower while maintaining effective site security. • Establishing clear communication protocols and legal guidelines for security operations will help in preventing misconduct and ensuring a safe yet non-threatening environment on the construction site.	Low to Medium
27.	**Social Risks and Vulnerabilities Associated with the Project Implementation**	Medium to High	• **Resettlement and Compensation Packages** Fair and just compensation on replacement cost for the loss of property, businesses, or livelihoods will be	Low to Medium

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
	Keeping in view the development and existing structures on above mentioned sections along the N5 corridor, the proposed widening of the road and removal of encroachments from the right-of-way (ROW) will lead to several social risks and vulnerabilities for the communities and businesses situated along the route. The widening will result in the displacement of small businesses, roadside vendors, and residential properties that currently occupy land within the ROW, leading to loss of livelihood for those dependent on these activities. Many businesses, such as retail shops, eateries, kiosks, petrol pumps, and service stations, will face relocation, resulting in financial hardships and potential disruption of their operations. Additionally, workers in informal businesses or low-income households living in proximity to the road will face challenges in finding new locations or affordable housing, exacerbating social vulnerabilities. These affected persons will be identified during the detailed social impact assessment. For local populations, particularly in densely populated areas, the loss of income sources will cause social unrest, migration pressures, and strained community ties. Furthermore, the clearance of encroachments will affect the accessibility of essential services and disrupt local supply chains		given to the PAPs due to road widening and encroachment removal. A Resettlement Action Plan (RAP) will be developed to ensure displaced persons are compensated appropriately for both the loss of physical assets and income opportunities. • **Relocation of Affected Businesses** PAPs will be asked about alternative locations for displaced businesses, particularly for those running retail shops, food stalls, service stations, or filling stations etc. Support will be provided for the smooth transition of these businesses to new sites, including financial assistance for relocation. • **Financial Assistance and Livelihood Restoration** Financial support will be provided to affected persons to re-establish their livelihoods. This will include compensation on replacement cost along with resettlement and relocation allowances. Moreover, the project specific livelihood restoration program along with training programs will be established comprising of desired business management, vocational skills, or alternative income-generating activities, to enhance their ability to adapt to the changes. • **Employment Opportunities** The PAPs will be offered with new employment opportunities within the project, prioritizing the hiring of local labor from affected areas. This will include providing jobs during the construction phase of the road project, as well as long-term employment in maintenance and operation of the infrastructure. • **Community Consultation and Participation** It will make sure that affected communities are actively involved in the planning and decision-making processes. Regular consultation sessions will be conducted to inform the public about the project's progress and to gather feedback, ensuring that their	

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
			concerns and needs are adequately addressed. • **Preserve Access to Essential Services** The measures will be implemented to ensure continued access to essential services, such as water, electricity, and healthcare, during the relocation or construction phases. Temporary access routes and facilities will be provided to minimize disruption to daily life and economic activities. • **Public Awareness and Support Programs** Public awareness campaigns by using social media and local means will be launched as comprehensively explained in the SEP to educate affected individuals on the mitigation process, the compensation mechanisms, and the available support. • **Monitoring and Grievance Redress Mechanism** A robust monitoring system will be established to track the progress of the mitigation measures and ensure they are effectively implemented. A grievance redress mechanism (refer SEP for detail) will also be in place to address any concerns or complaints from affected individuals, providing a clear process for resolving issues in a timely manner.	
28.	**Flora** The Project will involve destruction of vegetation cover on construction areas particularly along proposed road construction.	High	• Cutting of trees and disturbance shall be avoided, as far as possible so, that negative effects on the process of natural regeneration of species are minimized; • A tree plantation program shall be formulated with the recommendations and technical support of concerned Forest Departments;	Medium
29.	**Fauna** During construction phase the existing population of mammals and reptiles of the construction areas will be affected due to disturbance arising from construction activities involving excavation, movement of machinery and vehicular traffic, movement of labor, camping, etc.	Medium to High	• Care shall be taken during construction activities for avoiding purposely or chance killing of animals; • If found any wild species and habitat during construction, that must have dealt carefully and local wildlife department officials will be called; • Special measures will be adopted to minimize impacts on birds such as avoiding noise generating activities	Low to Medium

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
			during the critical period of breeding. • Hunting, poaching and harassing of wild animals shall be strictly prohibited, and Contractor shall be required to instruct and supervise its labor force accordingly and clear orders will be given in this regard; • Noise produced by the construction activities may be kept to acceptable level as per WHO, SEQS/PEQS/NEQS, IFC guidelines/standards whichever stringent one.	
30.	**Fisheries** During construction of the proposed road Project, oil spills and wastewater/solid waste discharge into the surface water is expected which may cause negative impact on surface water and disturbed the aquatic life especially fisheries of these water bodies.	Low to Medium	• The contractor will be instructed to avoid the wastewater and the chemical spills into the fresh water; • The awareness campaign among the labor is mandatory to avoid damages to the fisheries; and • Labor will be aware of fisheries and wildlife act concerned jurisdiction. Disturbance to the fisheries (if • reported) during breeding season will be avoided to conserve the natural resources of the region.	Low
Operation & Maintenance Phase				
1	**Air Quality** Improvement in road condition will help reduce traffic related emissions in the short term by allowing a smoother traffic flow. However, in the longer run, increased traffic levels may lead to higher values of emissions.	Low	• Proponent with the help of concerned EPA may set up system to monitor air quality along Project Area in accordance with monitoring protocols of WHO, PEQS/ NEQS, IFC guidelines/standards whichever stringent one respectively for a specific period to record the quality of air during the operation & maintenance phase. • Greenbelt Development Increasing vegetation in the form of greenbelt is one of the preferred methods to mitigate air pollution. Plants generate oxygen, serve as a sink for pollutants, reduce the flow of dust and reduce the noise pollution too alongside the road; • A tree plantation plan is strongly recommended to reduce the pollutant propagation to the receptors as an additional advantage of road aesthetics; • Roadside tree plantations as applicable and feasible	Low

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
			under harsh climatic conditions; These will be selected in accordance to their ability to absorb vehicular emissions; • Regular road maintenance to ensure good surface condition that will help in avoiding air pollution; • Regulating speed limits at sensitive locations by the NHA; and • Enforcement and penalties by the concerned authorities against traffic rules violators.	
2	**Noise** It is anticipated that the noise during operation phase will be increased due to higher speed and better quality of road network.	Substantial	• Noise modeling will be carried out to assess the potential impacts on sensitive receptors. • Based on the modeling results, appropriate and innovative noise mitigation measures will be designed, taking into account the cultural resistance from local communities and businesses toward conventional noise barriers.	Not Applicable
3	**Drainage** During the operational phase, poor maintenance of the road drainage and flood water discharge system, particularly during the monsoon season can cause nuisance to the travelers and public due to flooding in the existing drainage line. In case of chocking of road drainage, the increased surface runoff due to heavy rains will accumulate at the surface and can cause traffic jams. There will be the risk of storm water runoff at the bridges and accidental spill, which may cause pollution to the nearby canals.	Medium	• Implement effective storm water management practices, such as vegetative buffers, and permeable pavement, to capture runoff before it enters canals and direct runoff entering will be controlled; • Speed limit control through enforcement will be ensured during the wet road condition to avoid accidents and accidental spills; • Specific drainage arrangements of road around water courses and emergency stop valves to prevent pollution entering main canals should be considered; • The impact can be controlled/reduced by timely and continuous maintenance/ cleaning of the drainage system; and • Placement of sign boards instructing not to dispose of solid waste to avoid chocking of drain along the road alignment.	Low
4	**Road Safety** Enhanced vehicular movement and speed in the long run may result in road safety issues like	Medium	• The Project has been considering flyovers, protected U-turns, pedestrian bridge, and underpasses to improve traffic safety.	Negligible

Sr. No.	Impacts/Aspect	Impact Significance	Mitigation Measure	Residual Impact Significance
	traffic accidents. This impact is permanent but slightly adverse in nature, since the frequency of accidents may be lowered, but their intensity may be quite severe due to enhanced speeds at which vehicles will move.		• Strict enforcement of speed limits, installation of speed guns and channelization of traffic with respect to categories (heavy vehicle traffic and light vehicle traffic), will be ensured for the smooth flow of traffic moving from major road crossings. • Enforcement of penalties for the violators will reduce the significance of this impact.	
5	**Road Maintenance Works and Heavy Traffic** During the operational phase, different maintenance works will be carried out throughout the Project life. Laborers or the staff involved in these maintenance works are exposed to health and safety issues.	Medium	• NHA's safety protocols as provided in NHA's Code 2005 will be implemented; • Strict implementation of personal protective equipment's PPEs; • Understanding and training of staff on Operation and Maintenance Manual.	Low

4.2 Climate Change Risk and Vulnerability Assessment

4.2.1 Review of Climate Change for Pakistan

Pakistan is influenced by different climate zones, particularly by Monsoon climate in the south and mountain climate in the north. The general climatic conditions are altered by Pakistan's diverse geography with the far north reaching into the Himalayas and the southern and western regions being lowland plains of the Indus River, contributing to the diversity in climatic conditions in different regions of the country. The climate is characterized by diverse conditions. Average temperatures are strongly dependent on the topography, with coolest annual temperatures below zero in the far North (the Himalayan region), and higher average temperatures in the lower-lying south-east. Rainfall is low throughout the year in large parts of the country (20-30mm per month), but the northern regions, on the southern side of the Himalayan mountains, receive rainfall of up to 200mm per month as a result of the summer monsoon through July to September.

4.2.2 Current Climatology

Pakistan's climate context for the current climatology, 1991-2020, derived from observed, historical data (see, Figure 4.1, 4.2 and 4.3). Information should be used to build a strong understanding of current climate conditions in order to appreciate future climate scenarios and projected change. Observed, historical data is produced by the Climatic Research Unit (CRU) of University of East Anglia. Data is presented at a 0.5º x 0.5º (50km x 50km) resolution.

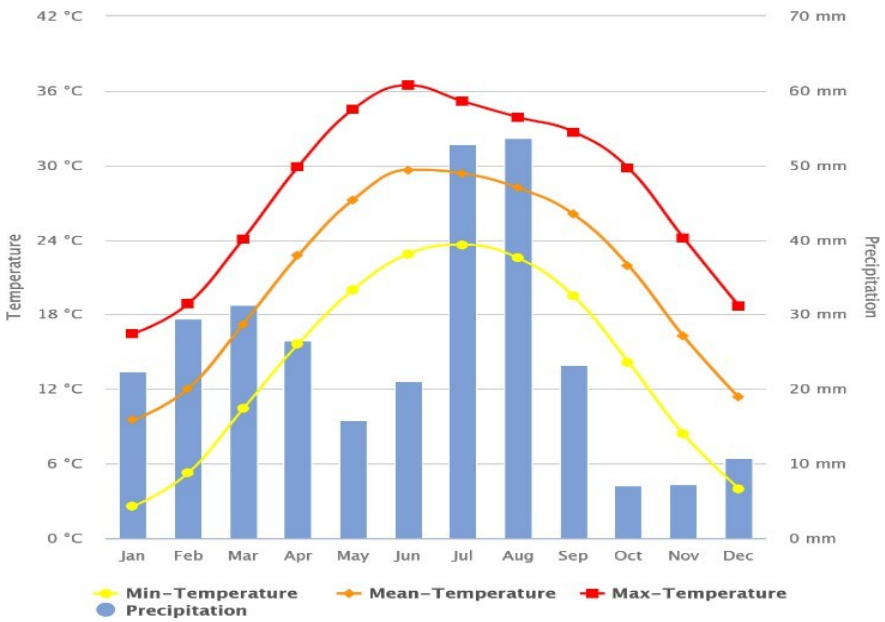


Figure 4.6: Monthly Climatology of Min, Max and Mean Temperature with Rainfall (1991-2020) (Source: World Bank)

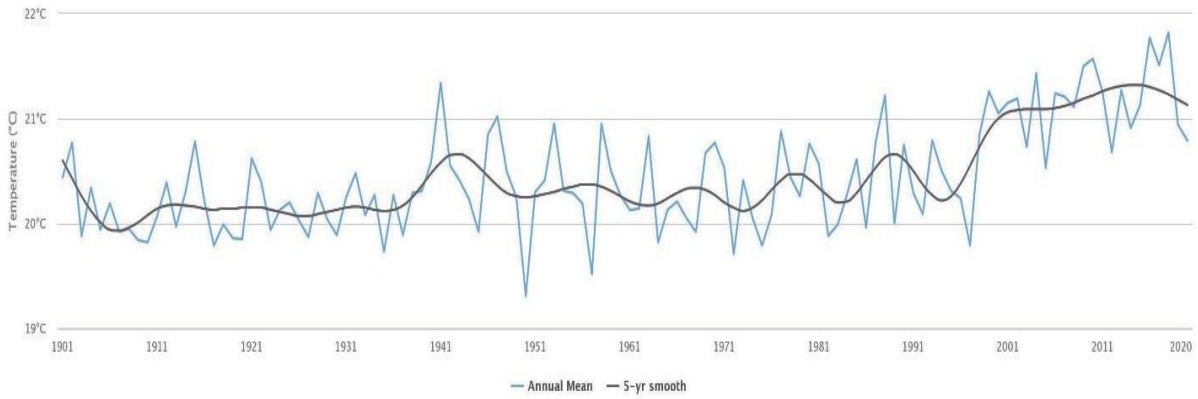


Figure 4.7: Observed Average Annual Mean- Temperature of Pakistan for 1901-2020

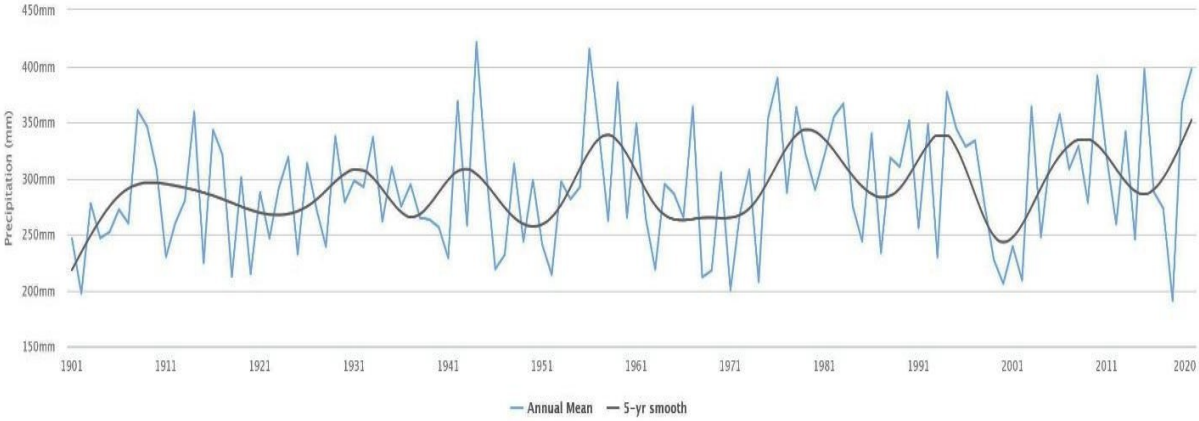


Figure 4.8: Observed Average Annual Rainfall of Pakistan for 1901-2020

Temperature

- Warming in Pakistan was estimated at 0.57°Cover the 20th century, but has accelerated more recently, with 0.47°C of warming measured between 1961–2007.
- Increases in temperature is strongly biased towards the winter and post-monsoon months (November–February). On a sub-national level, warming is also strongly biased towards the more southerly regions, with Punjab, Sind, and Baluchistan all experiencing winter warming in the region of 0.91°C–1.12°C between 1961–2007, and Khyber Pakhtunkhwa in the north experiencing only 0.52°C.
- The rise in average daily maximum temperatures (0.87°C between 1961–2007) has been slightly stronger than the rise in average temperatures. A concurrent increase in the frequency of heat wave days has been documented, particularly in Sindh Province.

Rainfall

- Mean rainfall in the arid plains of Pakistan and the coastal belt has decreased by 10-15% since 1960. Most other regions have experienced a slight increase, seen both in the monsoon and dry seasons.
- The number of heavy rainfall events has increased since 1960, and the nine heaviest rains recorded in 24 hours were recorded in 2010.
- Recent evidence suggests that glaciers in the headwaters of the Indus Basin may be expanding due to increased winter rainfall over the Himalayan region in the last 40 years.

4.2.3 Climate Change Risk Identification and Preliminary Assessment

At the framework level, identification of climate change risks and their preliminary assessment has been carried out (refer Table 4.2) considering the scope and available data on the existing climate change parameters. Global Facility for Disaster Reduction and Recovery (GFDRR) in collaboration with the World Bank Group (WBG) developed a tool which has been utilized to consider the climate change impacts of disasters on new and existing development project. The tool identifies and robustly 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 and planning phase accordingly.

The level of hazards can be described as:

- High: Potentially severe damage from this hazard for the project location. Without taking measures to mitigate the hazard and risk, high levels of damage can be expected to occur within the project
- Medium: Potentially damaging effects of this hazard for the project location. Potentially damaging events can be expected to occur within the project and measures to mitigate the hazard and risk should be considered.
- Low: Potentially damaging events are less likely to occur within the project but are still possible. Measures to mitigate the hazard and risk would be prudent at critical locations.
- Very Low: Potentially damaging effects are unlikely to occur, on average, in the project.
- No damaging effects.

The consultant will conduct the Section wise climate risk and vulnerability assessment during the ESIA stage and proposed the applicable mitigation and adaptation measures in consultation and close coordination with design team, NHA and Climate expert. The detailed climate change risk and vulnerability assessment will be carried out by the Consultants for the whole project. An international Climate Change Specialist will also be engaged for the support of the national Consultants through an international consultant via separate contract.

Table 4.16: Climate Change Risks Identification and Preliminary Assessment

Sr. No.	Section	River Flood	Urban Flood	Coastal Flood	Earthquake	Landslide	Cyclone	Water Scarcity	Extreme Heat	Wildfire	Tsunami	Volcano
1.	Hyderabad – Hala	High - Major water bodies crossing the alignment include Indus River and Canals.	Low – the proposed project passing through the semi urban areas which facing low level urban flooding impact.	No Impact	Medium – Fall in 2A Zone (Moderate) as per the seismic zoning of Pakistan under BCP 2007/2021.	No Impact	No Impact	Medium – there is no physical water scarcity issue in the project area, however, Pakistan is facing the economic water scarcity which will also be reported in proposed project area. The proposed project area falls under water stressed category.	High – During summer high temperature prevail during day time in the surrounding areas of the proposed project.	Low – Due to extreme heat and existence of forest areas (Miani Forest and Hatri Forest) wildfires may erupt.	No Impact	No Impact
2.	Ranipur – Rohri	High - Major water bodies crossing the alignment include Rohri, Mirwah and Nara Canals along with other distributaries and Nullahs.	Medium – the impact of urban flooding is only expected in Rohri (Sukkur District) where the proposed project passes through the urban area.	No Impact	Medium – Fall in 2A Zone (Moderate) as per the seismic zoning of Pakistan under BCP 2007/2021.	No Impact	No Impact	Medium – there is no physical water scarcity issue in the project area, however, Pakistan is facing the economic water scarcity which will also be reported in proposed project area. The proposed project area falls under water stressed category.	High – During summer high temperature prevail during day time in the surrounding areas of the proposed project.	No Impact	No Impact	No Impact
3.	Okara – Manga	High - Major water bodies crossing the alignment include Lower Bari Doab Canal and Baloki Sulaimanki Link canal along with other distributaries and Nullahs	Low - the impact of urban flooding is only expected in Okara and Lahore districts where the proposed project passes through the urban and semi urban areas.	No Impact	Medium – Fall in 2A Zone (Moderate) as per the seismic zoning of Pakistan under BCP 2007/2021.	No Impact	No Impact	Medium – there is no physical water scarcity issue in the project area, however, Pakistan is facing the economic water scarcity which will also be reported in proposed project area. The proposed project area falls under water stressed category.	High – During summer high temperature prevail during day time in the surrounding areas of the proposed project.	No Impact	No Impact	No Impact

Sr. No.	Section	River Flood	Urban Flood	Coastal Flood	Earthquake	Landslide	Cyclone	Water Scarcity	Extreme Heat	Wildfire	Tsunami	Volcano
4.	Lahore – Gujranwala	High - Major water bodies crossing include Shahdara Distributary, Upper Chenab Link Canal along with other distributaries and Nullahs (Sem Nullah, Degh Nullahs and Laila Nullah)	Low - the impact of urban flooding is only expected in Lahore and Gujranwala districts where the proposed project passes through the urban and semi urban areas.	No Impact	Medium – Fall in 2A Zone (Moderate) as per the seismic zoning of Pakistan under BCP 2007/2021.	No Impact	No Impact	Medium – there is no physical water scarcity issue in the project area, however, Pakistan is facing the economic water scarcity which will also be reported in proposed project area. The proposed project area falls under water stressed category.	High – During summer high temperature prevail during day time in the surrounding areas of the proposed project.	No Impact	No Impact	No Impact
5.	Kharian – Dina	High - Major water bodies crossing include Jhelum River, Upper Jhelum Canal, Teenpur Khas along with other distributaries and Nullahs	Low - the impact of urban flooding is only expected in Jhelum and Gujrat districts where the proposed project passes through the urban and semi urban areas.	No Impact	Medium – Fall in 2B Zone (Moderate) as per the seismic zoning of Pakistan under BCP 2007/2021.	No Impact	No Impact	Medium – there is no physical water scarcity issue in the project area, however, Pakistan is facing the economic water scarcity which will also be reported in proposed project area. The proposed project area falls under water stressed category.	High – During summer high temperature prevail during day time in the surrounding areas of the proposed project.	Low – Due to extreme heat and existence of forest areas (Pabbi Forest) wildfires may erupt.	No Impact	No Impact
6.	Dina – Rawat	High - Major water bodies crossing include Dab Kas and Kas Chhejjedo Streams (dried), Mangla Lake Tributary along with other distributaries and Nullahs	Low - the impact of urban flooding is only expected in Jhelum and Rawalpindi districts where the proposed project passes through the urban and semi urban areas.	No Impact	Medium – Fall in 2B Zone (Moderate) as per the seismic zoning of Pakistan under BCP 2007/2021.	Very Low	No Impact	Medium – there is no physical water scarcity issue in the project area, however, Pakistan is facing the economic water scarcity which will also be reported in proposed project area. The proposed project area falls under water stressed category.	High – During summer high temperature prevail during day time in the surrounding areas of the proposed project.	Low – Due to extreme heat and existence of forest areas (Lehri National Park) wildfires may erupt.	No Impact	No Impact
7.	Rawalpindi -	High - Major	Low - the	No Impact	Medium – Fall in 2B	Very Low	No Impact	Medium – there	High – During	Very Low –	No Impact	No Impact

Sr. No.	Section	River Flood	Urban Flood	Coastal Flood	Earthquake	Landslide	Cyclone	Water Scarcity	Extreme Heat	Wildfire	Tsunami	Volcano
	Hassanabdal	water bodies crossing include tributary of Haro River along with other Nullahs	impact of urban flooding is only expected in Okara and Lahore districts where the proposed project passes through the urban and semi urban areas.		Zone (Moderate) as per the seismic zoning of Pakistan under BCP 2007/2021.			is no physical water scarcity issue in the project area, however, Pakistan is facing the economic water scarcity which will also be reported in proposed project area. The proposed project area falls under water stressed category.	summer high temperature prevail during day time in the surrounding areas of the proposed project.	Due to extreme heat and existence of forest areas (Buffer of Margala Hill National Park) wildfires may erupt.		
8.	Nowshera - Peshawar	High - Major water bodies crossing includes Nullahs and flood channels. Tributary of Kabul River is also exist in nearby vicinity.	Low - the impact of urban flooding is only expected in Nowshera and Peshawar districts where the proposed project passes through the urban and semi urban areas.	No Impact	Medium – Fall in 2B Zone (Moderate) as per the seismic zoning of Pakistan under BCP 2007/2021.	Very Low -	No Impact	Medium – there is no physical water scarcity issue in the project area, however, Pakistan is facing the economic water scarcity which will also be reported in proposed project area. The proposed project area falls under water stressed category.	High – During summer high temperature prevail during day time in the surrounding areas of the proposed project.	No Impact	No Impact	No Impact

5 STAKEHOLDER ENGAGEMENT

This chapter describes the objective, identification of stakeholders, process of the stakeholder consultations and future program that will be carried out during ESIA/EIA of each Section under the proposed project.

5.1 REQUIREMENT OF STAKEHOLDER CONSULTATION

Stakeholder engagement is an inclusive process conducted throughout the Project life cycle for designing and implementation of the Project., it supports the development of strong, constructive, and responsive relationships that are important for successful management of a Project's environmental and social risks.

Stakeholder engagement is most effective when initiated at the project conception stage. It is an integral part of early decisions and the assessment, management, and monitoring of the Project's activities. A detailed Stakeholder Engagement Plan (SEP) has been prepared for the proposed Project as a standalone document. For detailed information regarding the stakeholder engagement process, please refer to the SEP.

5.2 OBJECTIVES

AIIB's ESF and national legislations require that borrowers engage with stakeholders throughout the project life cycle, commencing such engagement as early as possible in the project development process and in a timeframe that enables meaningful consultations with stakeholders on project design. The nature, scope and frequency of stakeholder engagement have to be proportionate to the nature and scale of the project and its potential risks and impacts.

The overall objective of the stakeholder engagement planning is to define a program for stakeholder engagement, including public information disclosure and consultation, throughout the entire project cycle. The SEP outlines the ways in which the project team will communicate with stakeholders and includes a mechanism by which people can raise concerns, provide feedback, or make complaints about the project and any activities related to the project. The involvement of the local population is essential to the success of the project in order to ensure smooth collaboration between project staff and local communities and to minimize and mitigate environmental and social risks related to the proposed project activities. See **Figure 5.1** below for the stakeholder engagement process.

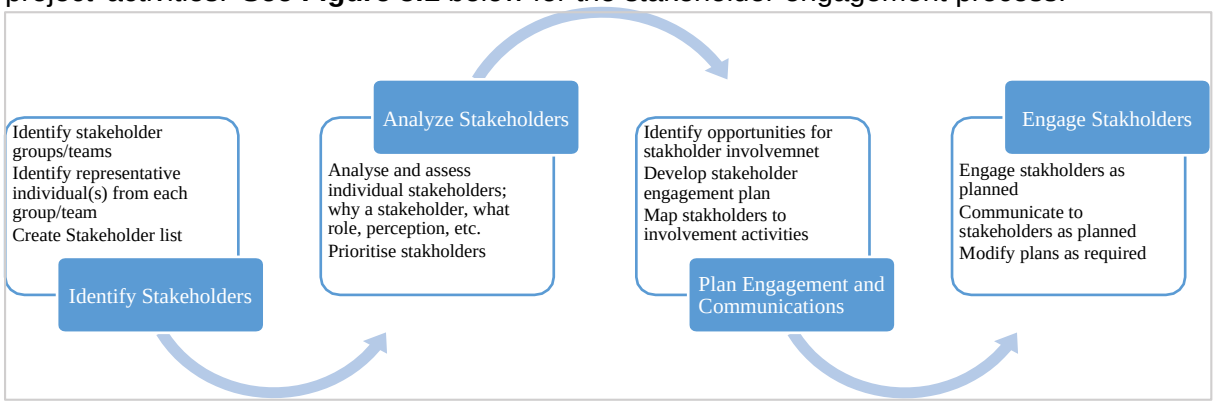


Figure 5.9: Process of Stakeholder Engagement

5.3 IDENTIFICATION, CATEGORIZATION AND ANALYSIS OF STAKEHOLDERS

Identification of stakeholder is an important step which ensures that all the concerned stakeholders are identified for the following.

- Sharing of information with stakeholders about the proposed project activities and potential impacts of proposed project on the physical, ecological and socio-economic conditions in the project area; and
- To address the most relevant concerns of the stakeholders on project and its activities including the upfront negative impacts.

The three categories of stakeholders as per the ESS1 are outlined below:

- **Project Affected Parties** –individuals/groups/entities within the Project Area of Influence (AoI)[1] that are directly influenced (actually or potentially) by the Project and/or have been identified as most susceptible to change associated with the Project, and who need to be closely engaged in identifying impacts and their significance, as well as in decision-making on mitigation and management measures. For this Project, residents, religious leaders/custodians, shopkeepers, kiosk owners, and various business operators along with their workers/tenants who have encroached on the NHA-owned Right of Way (ROW), as well as any workers for these businesses, will be directly affected by the project's implementation.
- **Other Interested Parties**– individuals/groups/entities that may not experience direct impacts from the Project but who consider or perceive their interests as being affected by the project and/or who could affect the project and the process of its implementation in some way. In this regard, various national and provincial departments, such as Environmental Protection Agency (EPA), district Revenue Departments, Forest Department, concerned authorities and organizations (formal and informal), the users of the bus services (particularly women), and local Civil Society Organizations (CSOs)/Non-Government Organizations (NGOs), will fall under this category of stakeholders.
- **Women and Vulnerable/Disadvantaged Groups** – individuals/groups/entities who may be disproportionately impacted or further disadvantaged by the project(s) as compared with any other groups due to their vulnerable status[2], and that may require special engagement efforts to ensure their equal representation in the consultation and decision-making process associated with the project. Vulnerable and disadvantaged groups relevant to the site context will be identified during the detailed social impact assessment and census surveys, and their details will be highlighted in the site-specific RAP document of each Section.

[1] *This refers to the overall project area which may have direct or indirect impacts due to project activities in these locations.*
[2] *Vulnerable status may stem from an individual's or group's race, national, ethnic or social origin, color, gender, language, religion, political or other opinion, property, age, culture, literacy, sickness, physical or mental disability, poverty or economic disadvantage, and dependence on unique natural resources.*

After the identification and categorization considering the gender equity, diversity and inclusion, stakeholders are analyzed and assess based on their roles and prioritized as primary and secondary stakeholders.

5.4 PROCESS OF STAKEHOLDER CONSULTATION

Consultants and NHA will undertake a process of meaningful consultation in a manner that provides stakeholders with opportunities to express their views on project risks, impacts, and mitigation measures, and allows the NHA to consider and respond to them. Meaningful consultation will be carried out on an ongoing basis as the nature of issues, impacts and opportunities evolves. Meaningful consultation is a two-way process, that:

- Begins early in the project planning process to gather initial views on the project proposal and inform project design;
- Encourages stakeholder feedback, particularly as a way of informing project design and engagement by stakeholders in the identification and mitigation of E&S risks and impacts; Continues on an ongoing basis, as risks and impacts arise;
- Is based on the prior disclosure and dissemination of relevant, transparent, objective, meaningful and easily accessible information in a timeframe that enables meaningful consultations with stakeholders in a culturally appropriate format, in relevant local language(s) and is understandable to stakeholders;
- Considers and responds to feedback;
- Supports active and inclusive engagement with project-affected parties;
- Is free of external manipulation, interference, coercion, discrimination, and intimidation; and
- Is documented and disclosed by NHA.

5.5 ESMPF CONSULTATION AND DISCLOSURE

A Stakeholder Engagement Plan (SEP) is essential for fostering effective communication and collaboration among the stakeholders throughout a project lifecycle. The objectives of aSEP include building mutually beneficial relationships, ensuring stakeholder input influences decisions, and enhancing transparency in the decision-making process. Key requirements of an SEP involve stakeholder identification, engagement strategies, a grievance mechanism, and monitoring and evaluation protocols. The process of developing an SEP typically entails identifying stakeholders, planning engagement activities, implementing those activities, collecting feedback, and evaluating the effectiveness of the engagement efforts. Fundamental principles guiding an SEP emphasize transparency, inclusivity, proactive engagement, and respectful dialogue to ensure all opinions are heard and considered in project development.

Consultation is required with the stakeholders regarding the potential E&S risks and impacts of the proposed project/Sections as part of the ESMPF preparation. The consultations were conducted by the E&S team of NHA from September to November 2024, in the project area. A total of 47 consultations were carried during the project preparatory stage by various E&S teams in which 454 male and female community members participated. Out of 47, gender consultations were carried out at 19 localities within the project area. In addition, a total of 37 institutional consultations were held during the E&S studies of N5 project.

The main concerns of the stakeholders were:

- Displacement of their temporary structures falling in the project area of the proposed Project which will cause livelihood impact due to temporary displacement and access restriction.

- The stakeholders also pointed out that due to number of accidents on this road on daily basis, many injuries and casualties take place on this road.
- Special provisions should be considered while designing, construction and operation stages.
- Crossings, pedestrian bridges, bus stops with partition for men and women should be built for the local community along the road at suitable locations.
- Locals also showed their concerns related to the poor road infrastructure which will turn into the worst condition due to excavation.
- They also recommended that the project should proceed on the fast track with minimum disturbance of the social amenities and ensure provision of job and labor opportunities for local people.

These concerns/suggestions of stakeholders have been addressed in consultation with NHA, and embedded into the design of the Project.

6 INSTITUTIONAL ARRANGEMENT AND MANAGEMENT FRAMEWORK

This chapter describes institutional arrangements for environmental management, screening methodology for the sub- projects/Sections, generic mitigation plan, monitoring framework, and capacity building of stakeholders involved in ESIA/ESMP, monitoring and management.

6.1 INSTITUTIONAL ARRANGEMENT

The institutional requirements for the pre-construction, construction and O&M phases of the proposed project are provided in the sections below.

6.1.1 Institutional Arrangement for E&S Instruments during Pre-Construction Phase

The proposed project will be administrated by the PIU-HQ NHA during the pre-construction/design phase. In the organizational hierarchy of PIU-HQ, General Manager (Engineer) NHA-HQ, will be overall responsible for the design and preconstruction aspects of the proposed project. The General Manager (EALS/ESHS) NHA-HQ will take the sole responsibility for the monitoring and compliance of pre-construction phase E&S instruments. The PIU-HQ staff will be responsible for the following:

- Coordinating to monitor environmental and social compliance during pre-construction;
- Reporting on the progress of environmental and social compliance to General Manager (Engineer) NHA-HQ, and AIIB;
- Assessing as well as mitigating the long-term environmental and social impacts of the proposed project;
- Sustaining a working partnership among the line agencies, and concerned departments as identified in SEP.
- Coordination and facilitating the NHA field staff and the E&S Consultants in preparation of the E&S studies and supervise the E&S Consultants in the field.
- Ensuring the ES requirements are included in the bidding documents in compliance with all the ES instruments.

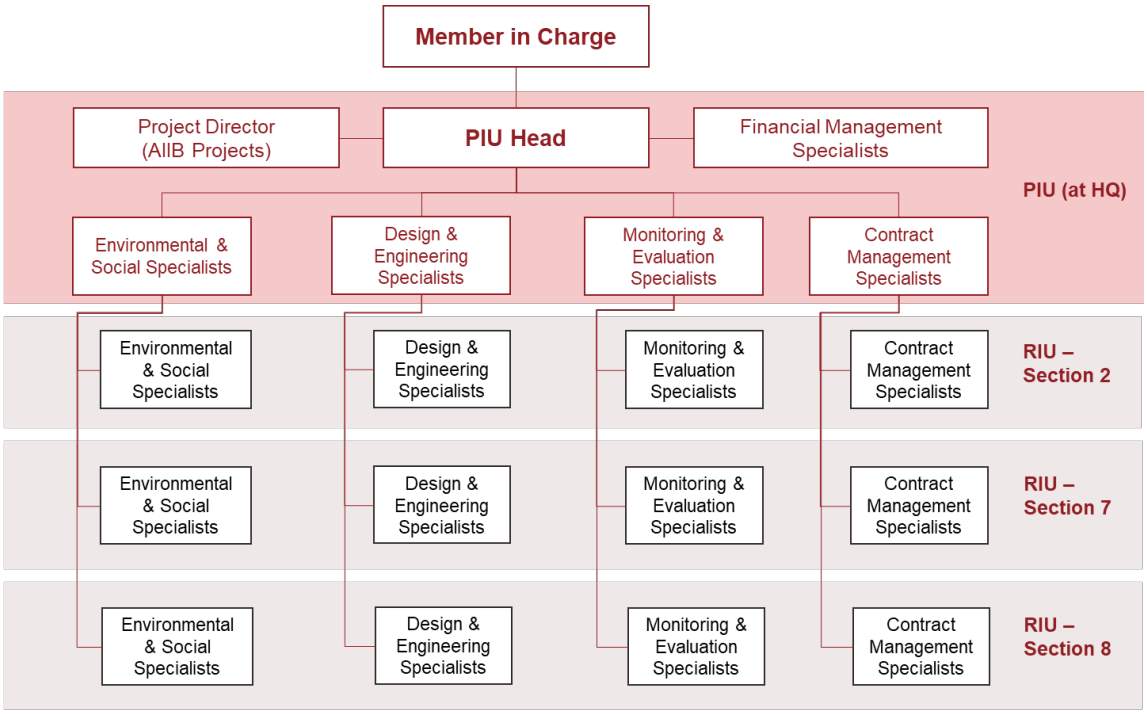
6.1.2 Institutional Arrangements for Implementation of E&S Instruments during Construction/Implementation Phase

The key players involved during construction phase of the proposed project are the PIU-HQ-NHA as employer / proponent and RIU(s) at each Section, concerned EPAs, the Construction Supervision Consultant (CSC), Third Party Validation Consultants (External Monitor) and the Contractor(s). The roles and responsibilities of these organizations are outlined below. The following staff will be involved in the implementation of E&S Instruments:

- PIU-HQ (General Manager (Engineer) NHA-HQ) / Proponent / Employer;
- PIU-HQ (EALS/ESHS);
- Design Consultants
- E&S Consultants
- RIU(s) at each Section (Project Director(s) and its E&S Staff);
- CSC;
- Third Party Validation Consultant; and

- Contractor's Staff.

The PIU-HQ NHA will included Employer's ESHS requirements in Contractors bidding documents to implement the E&S instruments and other terms and conditions of the relevant Permits including NOCs from Concerned EPAs. Construction camps will be established after necessary approvals and submission of Site-Specific E&S instruments (where required) to be developed in light of AIIB and the relevant agencies requirements, before commencement of new works. The organizational setup for implementation of E&S instruments during construction phase is provided in **Figure 6.1 (A&B).**



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

Figure 6.10 (A): Overall Organization Setup of NHA for N5 Project

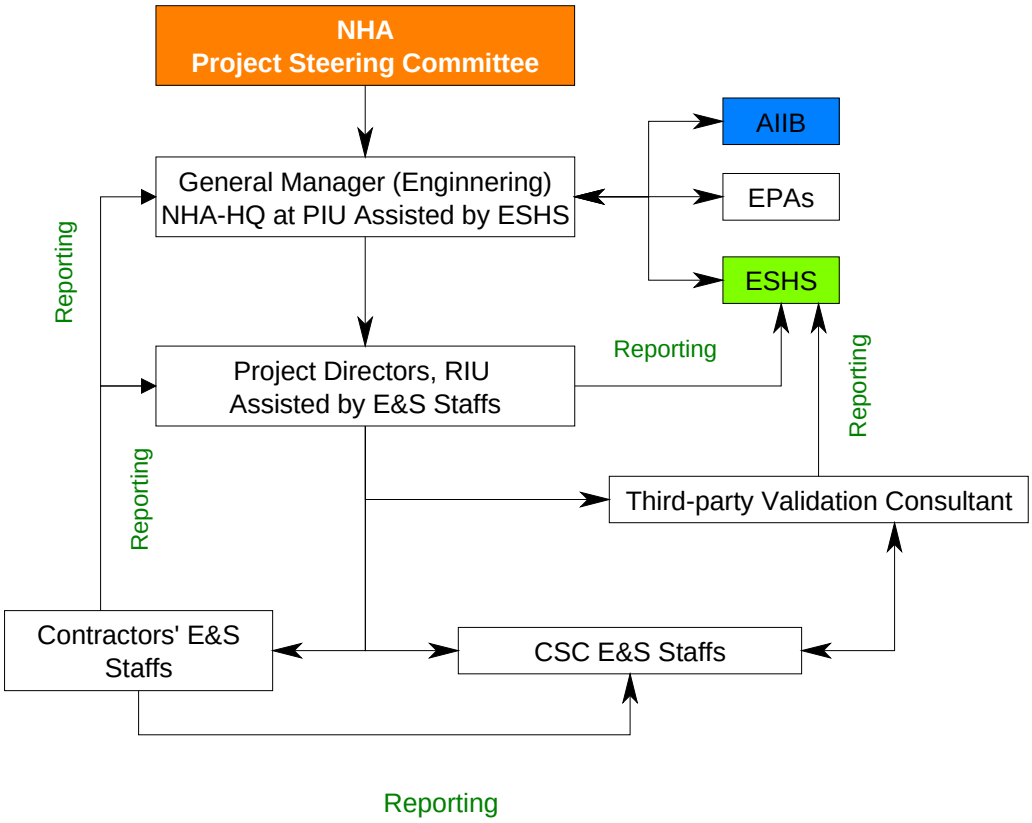


Figure 6.1 (B): Organizational Setup for Implementation of E&S Instruments During Implementation

6.1.3 Environment, Social, Health, and Safety Section

It is recommended to strengthened EALS Section with structural reforms and resource augmentation by covering environment, biodiversity, social, occupational and community health and safety. Therefore, it is proposed that EALS change the name to ESMS Section to make it broader, which will be headed by Member (ESHS), along with General Manager (Land and Social) and General Manager (Environment and Biodiversity). The Section will be responsible for the preparation of E&S instruments, design employer's ESHS requirements in bidding documents, technical specifications with ESHS BoQ, and implementation of RAP during the pre-construction phase and oversee the project implementation with regional project implementation units. Additional capacity building and institutional strengthening activities will be carried out at a later stage, during which the reforms and resource requirements for ESHS will be reviewed and assessed accordingly PIU-HQ will be responsible for the following:

- Coordinating to monitor environmental and social compliance during pre-construction;
- Ensuring the E&S requirements are included in the bidding documents in compliance with all the E&S instruments;
- Procurement of works and goods;
- Recruitment and monitoring of Construction Supervision Consultants (CSC);
- Recruitment of Third-party Validation Consultants;
- Ensuring that the required environmental and social training is provided to the concerned staff;
- Implementation of RAPs;

- Make sure that all the contractual obligations related to the environmental and social compliance are met;
- Review monitoring reports for the progress of environment, social, health and safety related activities;
- Document and disclose monitoring results and identify necessary corrective and preventive actions in the periodic monitoring reports, and make follow-up on these actions to ensure progress toward the desired outcomes;
- Oversee the compliance of all the monitoring programs as given in E&S instruments;
- Submit incident flash report within 24 hrs to AIIB when environmental and social incidents (Fatal and high potential) are occurred and full investigation report within 7 days of the incident, while record of other incident and report will be included in the E&S monitoring and compliance reports;
- Maintain interface with the other lined departments/stakeholders; and
- Submit quarterly monitoring and progress reports to the concerned EPA and relevant agencies on status of E&S Instruments implementation.

In order to conduct the tasks listed above, ESHS Section will be strengthened with E&S Staffs listed in

Table 6-17: E&S staffs of ESHS Section

Sl.	Position Name (Social)	Number	Position Name (Environment)	Number
1.	Deputy Director (LAR)	2	Deputy Director (Env.)	1
2.	Deputy Director (Social and Gender)	2	Deputy Director (Biodiversity)	1
3.	Assistant Director (LAR)	4	Deputy Director (OHS)	1
4.	Assistant Director (Soc. & Gen.)	2	Deputy Director (Afforest.)	1
5.	Land Acquisition Officer (LAO)	4	Deputy Director (Terr. & Aqua.)	1
6.	Social Officer (SO)	2	Assistant Director (Env.)	2
7.	Assistant LO	4	Assistant Director (OHS)	1
8.	Assistant SO	2	Assistant Director (CC)	1
9.			Assistant Director (Afforest.)	1
10.			Assistant Director (Ter.)	1
11.			Assistant Director (Aqu.)	1

6.1.4 Roles and Responsibilities

a) General Manager (Engineer) NHA-HQ – PIU

The General Manager (Engineer) NHA-HQ of PIU-HQ is the executive head of the entire N5 project. He is responsible for necessary policy, administrative and financial decisions and actions for effective and timely implementation of the project as per the approved framework and implementation schedules. He will be responsible for overall implementation of the project including environmental and social management aspects and hiring of contractors and consultants. The General Manager (Engineer) NHA-HQ PIU will be assisted by Project Director(s) of each project section for the onsite administration and other matters with close coordination with General Manager (Engineer) NHA-HQ PIU.

b) Project Director(s) - RIUs

The Project Director (PD) of RIUs is the executive head of the concerned Project Section. He is responsible for necessary administrative and financial decisions and actions for effective and timely implementation of the project as per the approved framework and implementation schedules. He will be responsible for overall implementation of the project including environmental and social management aspects at site. The PD-RIU will be assisted by Deputy Project Director(s) and its E&S Staff of the concerned project Section for the onsite administration and other matters with close coordination with PIU-HQ.

Each PD of concerned RIU will be assisted by E&S Staffs at site during project implementation stage which consist of the following positions:

- Resettlement & Social Safeguard Specialist
- Gender Specialist,
- Labour Specialist
- OHS Specialist
- Environment Specialist; and
- Climate Specialist

c) Consultants

PIU-HQ will engage Construction Supervision and Third-party Validation Consultants during the implementation of the subsequent phases. A draft TOR is presented in Annex 2.

d) Contractor

PIU-HQ will engage Contractors for the subsequent phases complying with AIIB requirements. A draft TOR is presented in Annex 2.

e) EPAs

As per relevant Environmental Protection Acts of each concerned EPAs, who are responsible for environmental protection and pollution control. The concerned EPAs are also responsible for the approval of the EIA/ESIA of all the developmental projects under their jurisdictions. Concerned EPAs will undertake audits (as and when required quarterly or biannually as defined in NOC obtained concerned EPA) of the proposed project activities with respect to the protocols as defined in ESMP/EMP and environmental approval.

6.1.5 Institutional Arrangement for Implementation of E&S Activities during O&M Phase

The proposed N5 will be managed by the NHA during the O&M phase. In the organizational hierarchy of NHA, Maintenance Section of NHA, will be overall responsible for the road. The regional General Manager of each region will be the sole responsible for such activities. The project operation will be under direct jurisdiction of regional staff of NHA. The monitoring and compliance of operational phase E&S activities will be the responsibilities of site staff of EALS/ESHS-NHA. These personnel will report to the concerned land, environment and afforestation officials of EALS/ESHS-NHA headquarters for the compliance and monitoring of E&S activities at O&M stage. The staff will be responsible for the following:

- Coordinating to monitor environmental and social compliance during operation;
- Advising on, and monitoring tree plantations along the road;
- Reporting on the O&M progress of environmental and social compliance to the concerned EPAs and relevant agencies;

- Assessing as well as mitigating the long-term environmental and social impacts of the proposed project operation; and
- Sustaining a working partnership among the concerned EPA, Agriculture, Irrigation, Forest and Wildlife departments, NGOs and other related public private sector organizations.

6.2 SCREENING AND CATEGORIZATION OF ROAD SECTIONS

The E&S consultants in coordination with NHA and design/technical team will identify the road sections as per the project prioritization criteria i.e. the most urgent section on the basis of economic & financial plan of AIIB, traffic conditions, road condition, environment, social and resettlement impacts. The screening and categorization of sections as per the local / national and AIIB requirements are described as follow:

6.2.1 Screening as Per Provincial EPA

According to the Review of IEE and EIA Regulations, 2000 in Pakistan, the Project falls under Schedule II (Category 'D' of "Transport – Provincial highways or major roads"), as per Khyber Pakhtunkhwa Environmental Assessment Rules, 2021, the Project falls under Schedule II (Category 'D' of "Transport – Federal or Provincial Highways (Except maintenance, re-building or re-construction of existing metaled road)"), according to Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations 2022, the Project falls under Schedule II (Category 'D' of "Transport – Highways, motorway, express ways or major roads"), while according to Sindh Environmental Protection Agency (Environmental Assessment) Regulations, 2021. the Project falls under Schedule III (Category 'E' "Transport – Construction of highway, motor ways, major roads (Intercity roads) more than one km and above"). NHA in collaboration with E&S consultants conduct the screening based on the location, size, nature and the overall project cost of each section as per the applicable regulations identified earlier[2]. The screening will be approved by the concerned EPA. Based on the initial level screening all of the said Agencies mandates a comprehensive EIA study to obtain a NOC from the respective EPAs. **Table 6.2** below illustrates the screening of the Sections.

[2] *The screening of Phase 1(A) i.e. Section 2, 7 and 8, has been completed as per criteria and guideline provided in the applicable core legislative guidelines (as mentioned in 3rd column of Table 6.1). These sections require a separate EIA study as the approval / clearance is required from an independent agency of each section. The screening of remaining sections under Phase 1B and so on will be carried out in the similar way on finalization of required design and technical data/information before the preparation and E&S instruments*

Table 6.18: Section Location, Rationale & E&S Instrument as per Provincial EPAs

Sr. No.	Applicable Regulatory Agency for each Section of N5	Applicable Core Legal Requirements	Rationale	E&S Instrument
Local Regulatory Requirements				
1	SEPA for Sindh Section (Section 1 & 2)	Sindh Environmental Protection Act - 2014 Review of Environmental Assessment (EA) Regulations, 2021	The proposed project falls in Schedule III of Regulations as it involves widening of N5 which trigger the Clause E (construction of highway, motorway and major road more than one kilometer).	Environmental Impact Assessment (EIA) study is required
2	Punjab EP&CCD for Punjab Section (Section 3 to 7)	Punjab Environmental Protection Act – 1997 (as amended 2017) Punjab Environmental Protection (Review of IEE and EIA) Regulations 2022	The proposed project falls in Schedule II of Regulations as it involves widening of N5 which trigger the Clause D (construction of highway, motorway, expressway, and major road).	Environmental Impact Assessment (EIA) study is required
3	KP EPA for Khyber Pakhtunkhwa Section (Section 8)	Khyber Pakhtunkhwa Environmental Protection Act – 2014 Khyber Pakhtunkhwa Environmental Assessment Rules, 2021.	The proposed project falls in Schedule II of Regulations as it involves widening of N5 which trigger the Clause D (construction of federal or provincial highways).	Environmental Impact Assessment (EIA) study is required
4	Islamabad Capital Territory (Portion of Section 7)	Pakistan Environmental Protection Act – 1997 Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations 2000	The proposed project falls in Schedule II of Regulations as it involves widening of N5 which trigger the Clause D	Environmental Impact Assessment (EIA) study is required

6.2.2 ENVIRONMENTAL AND SOCIAL SCREENING AS PER AIIB

The Bank (with the facilitation from NHA and E&S consultants) screens and categorizes each identified section as early as feasible at the outset of its due diligence assessment in order to determine the nature and level of the required E&S assessment study. During categorization, the Bank takes into consideration the type, nature, location, sensitivity and scale of each section. The Bank categorized all its section/sub-projects into the following three categories.

- The project is categorized as Category A if it is likely to have significant adverse environmental and social impacts that are irreversible, cumulative, diverse or unprecedented and requires the client to conduct an Environmental and Social Impact Assessment (ESIA) with Environmental and Social Management Plan (ESMP).
- A project is categorized as Category B when: it has a limited potentially adverse environmental and social impacts; the impacts are not unprecedented; few if

any of them are irreversible or cumulative; they are site-specific; and can be successfully managed using good practice in an operational setting and requires clients to conduct an initial review of the environmental and social implications of the Project.

- A Project is categorized C when it is likely to have minimal or no adverse environmental and social impacts and the client is required to prepare a review of the environmental and social aspects of the Project.

To categorize the section, E&S due diligence will be carried out based on the nature and scale of the Project, its E&S risks on physical, biological, socio-economic, and cultural resources and vulnerability of affected groups including indigenous peoples and vulnerable groups. Field-based reviews of each section will provide a refined understanding of the environmental and social risks and impacts. Based on the available data and information each section under this sub-project, initial level screening and categorized the proposed project with respect to the AIIB's ESF 2016 as amended 2024 is carried out and shown in **Table 6.3**.

Table 6.19: E&S Categorization of Proposed Project as per AIIB[3]

Sr. No.	Sub-Project	Applicable Requirements	Rational	E&S Instrument
1	Phase 1A – Section 2, 7 and 8	ESS-1: Environmental and Social Assessment and Management	The proposed project may cause significant impact due to physical interventions thus categorized as Category A based on the type, nature, location, sensitivity and scale.	An Environmental and Social Impact Assessment (ESIA) along with ESMP study is required
2	Phase 1B – Section 4 and Nai Baran Bridge	ESS-1: Environmental and Social Assessment and Management	The proposed project may cause significant impact due to physical interventions thus categorized as Category A based on the type, nature, location, sensitivity and scale.	An Environmental and Social Impact Assessment (ESIA) along with ESMP study is required

Considering the extensive involve tree cutting, disturbance to national park/forest areas, climate change vulnerability, risks to women and vulnerable groups, air, dust and noise pollution, impact on water bodies, the proposed project Phase 1A is categorized as Category "**A''** project (as per AIIB's ESF 2016 as amended 2024) which requires ESIA including ESMP studies. This screening will be updated for the Phase 1B based on the site specific data and information of the sections and due consultation among the E&S consultants with the PIU-HQ NHA, AIIB and concerned EPAs.

6.3 ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA)

After the screening process and classification of the category of the project, the type and extent of the ESIA required is decided and executed. NHA will prepare the Terms of References (TORs) for the ESIA and hire the Consultants and necessary experts. It is expected that all eligible Sections will require an ESIA (Phase wise) and its corresponding Environmental and Social Management Plan (ESMP) during the feasibility studies of the respective phase/Section.

[3] *E&S Screening Checklist for Phase 1 sections is attached as Annex-6*

The PIU-HQ will support the NHA to prepare the ESIA (as per indicative outline of ESIA provided in **Annex 3**) which will be disclosed as per the AIIB's and national regulatory requirements. Finally, the ESIA (including the ESMP) will be made part of the contractors' contract agreement through inclusion in the tender / bidding documents.

6.4 IMPLEMENTATION AND SUPERVISION

NHA through PIU-HQ and RIUs will implement measures to mitigate anticipated environmental and social impacts, to monitor programs, to correct unanticipated impacts, and to comply with any E&S conditionality. Procedures for startup and continuing operation of the project will normally specify these agreements, as well as measures to protect the health and safety of direct workers, contracted workers and primary suppliers as identified in LMP. Proper staffing, staff training, and procurement of spare parts and equipment to support preventive, predictive and corrective maintenance are also necessary elements of implementation.

Supervision is an essential aspect that ensures mitigating measures and other provisions will be fully implemented and will be effective in avoiding or controlling adverse. Supervision is carried out through a combination of the i) compliance reports from all tiers of institutional arrangements, ii) status of mitigating measures, results of monitoring programs and other environmental and social aspects of the project etc.

AIIB will also review implementation of E&S provisions, corrective actions taken to respond to impacts, and compliance with environmental and social conditionality, including institutional strengthening components; and site visits by Bank's environmental and social specialists or consultants as required to supervise complex environmental and social components or respond to environmental and social problems.

6.5 PREPARATION OF SITE-SPECIFIC E&S INSTRUMENTS

Site specific ESIAs including ESMPs, and RAPs including LRP will be prepared for various phase wise project Sections, as directed by this ESMPF and the RPF. These instruments will be submitted to the AIIB for clearance and approval before initiating any construction works. The ESIAs/ESMPs will also be shared with the concerned EPAs for environmental approval prior to initiation of construction works. Additionally, the proposed project will require various approvals from relevant government departments during implementation, summarized in **Table 6.4** below.

Table 6.20: Approvals and Permits Required during Project Implementation

Sr. No.	Approval Required	Issuing Authority	Requirements	Responsible Agency	Schedule
1.	Clearance of ESIAs/ESMPs, RAPs, and other required instruments as described in the ESMPF and RPF	AIIB	Submission of site-specific E&S instruments	PIU-HQ-NHA	Prior to initiation of subproject construction works
2.	Environmental approval for the construction works	Concerned EPAs	Submission of EIA(s)	PIU-HQ-NHA	Prior to initiation of subproject construction works

Sr. No.	Approval Required	Issuing Authority	Requirements	Responsible Agency	Schedule
3.	Approval for notified forest & wildlife areas, and clearing of trees	Concerned Forest and Wildlife Department of each province	Submission of request with detailed project layout/plans	PIU-HQ-NHA	During construction phase
4.	Approval for River, Stream, Nullah and Canal Crossings	Concerned Irrigation Department	Submission of request with detailed project layout/plans	PIU-HQ-NHA	During construction phase
5.	Approval for the use of quarry and excavated material	Concerned Mines and Minerals Department	Submission of request with location map of the quarry area	PIU-HQ-NHA	During construction phase
6.	Approval for disposal of solid and liquid waste	Concerned Municipal Authorities	Submission of request with detailed project layout, location map and Waste Management Plan	PIU-HQ-NHA	During construction phase
7.	Approval for crossing of public utilities	Concerned Agencies	Submission of request with detailed project layout, location map and site specific details of utilities	PIU-HQ-NHA	During construction phase
8.	Approval for crossing of notified archeological and cultural sites	Concerned Archeological Department	Submission of request with detailed project layout, location map and Chance Find Procedures	PIU-HQ-NHA	During construction phase

Note: Any other approval as identified during later stages (ESIA stage or implementation stage) will also be considered.

6.6 ENVIRONMENTAL AND SOCIAL REQUIREMENTS IN BIDDING DOCUMENTS

PIU-HQ-NHA will include the following Environmental, Social, Health and Safety (ESHS) conditions in the pre-qualifications and employer's requirements in the bidding documents to ensure all mitigation measures proposed in the ESIA and other E&S instruments are effectively implemented.

Table 6.21: E&S Requirements in Bidding Documents

Sr. No.	Condition	Rationale	Specifications to be Included in Bidding Documents
1.	Past performance of the Contractor on ESHS	The contractor's past performance on compliance with ESHS is an indicator of the contractor's commitment and capability for implementation of the ESMP	Record of past ESHS performance
2.	The Contractor shall propose E&S Specialists in its team as per the requirements defined in the site-specific E&S instruments	The Contractor's staff should include E&S specialists who will be responsible for the implementation of the mitigation measures in compliance with the C-ESMP and OCHSMP	The bidder will include CVs of the proposed, suitably qualified E&S Specialists
3.	Contractor shall obtain performance bond for compliance with E&S obligations	The Contractor should have a financial implication if it fails to comply with E&S requirements.	The Contractor will obtain a performance bond
4.	Contractor shall implement construction related mitigation measures provided in the E&S Instruments	Mitigation measures from site specific ESIAs and other E&S instruments will be included on the tender/bidding documents.	Tender documents will contain site specific construction related mitigation measures
5.	Code of Conduct for Contractors' site personnel	All workers hired by the Contractor should sign a Code of Conduct to ensure compliance with E&S requirements	The Contractor will submit a Code of Conduct with the bidding documents

6.7 ENVIRONMENTAL AND SOCIAL MONITORING FRAMEWORK

Environmental and Social monitoring provides timely and useful information to the project management and implementation agencies. It helps in timely identification / analysis and removal of the bottlenecks and expedites actions. Certain environmental parameters (physical, ecological and social) are selected and quantitative analysis is carried out. The results of analysis will be compared with the guidelines; standards and pre-project condition to investigate whether the ESIA/ESMP and its implementation are effective for the mitigation of impacts or not. The objectives of environmental and social monitoring plan during the pre-construction, construction and O&M phases will be as follows:

- Monitor the actual project impacts on physical, ecological and socio-economic receptors;
- Recommend mitigation measures for any unforeseen impact or where the impact level exceeds the anticipated level in the ESIA/ESMP;
- Ensure compliance with legal and community obligations including safety during construction and O&M phases;
- Ensure the safe disposal of excess construction materials, solid waste, water and wastewater and gaseous emissions;

- Appraise the adequacy of the ESIA/ESMP with respect to the project's predicted long-term impacts on the area's physical, ecological and socio-economic environment;
- Evaluate the effectiveness of the mitigation measures proposed in the ESIA/ESMP and recommend improvements in ESIA/ESMP, if required; and
- Compile periodic incidents / accidents data to support analyses that will help to minimize future risks.

PIU-HQ and RIU of NHA will be responsible for all the monitoring activities (compliance monitoring and effect monitoring). All the findings and results in the form of monitoring report will be finally shared with respective EPA as well as AIIB as per the reporting mechanism.

6.7.1 Compliance Monitoring

The compliance monitoring of the proposed project activities is principally a tool to ensure that the environmental and social control measures identified are strictly adhered to during the project execution. The compliance monitoring will be conducted by the E&S Staff of CSC. Various aspects of the ESIA/ESMP compliance monitoring will be to:

- Systematically observe the activities undertaken by the contractor(s) or any other persons associated with the proposed project;
- Verify that the activities are undertaken in compliance with the ESIA/ESMP;
- Document and communicate the observations to the ESC of PIU-HQ and E&S staff of RIUs, so that any corrective measures, if required, can be taken in a timely manner;
- Maintain a record of all incidents of environmental and social significance and related actions and corrective measures;
- Maintain contact with the communities, solicit their views and concerns, and discuss them during the monthly meetings; and
- Prepare periodic reports of the environmental and social performance of proposed project.

6.7.2 Effect Monitoring Strategy

The ESIA/ESMP anticipates the impacts of the proposed project on the basis of information available at the time of conducting the assessment and the natural processes that link various environmental and social parameters. Based on assessment, mitigation measures are introduced such that the predicted residual effects do not exceed acceptable levels. Consequently, it is possible that even if the mitigation measures are implemented fully, the negative impacts of the project could exceed predicted levels or acceptable limits. In order to address the above concerns, effects monitoring will be undertaken during the project activities, with the overall objective of proper management of environmental and social risks and uncertainties. Broadly, effects monitoring has the following objectives:

- To verify that the impacts of the proposed project are within acceptable limits, thus establishing credibility (public assurance);
- To immediately warn the PIU-HQ and RIU of unanticipated adverse impact or sudden changes in impact trends so that corrective actions can be undertaken, which may include modifications in the proposed activities, or the inclusion of modified or additional mitigation measures;
- To provide information to plan and control the timing, location, and level of certain project activities so that the effects are minimized; and

- To facilitate research and development by documenting the effects of the proposed project that can be used to validate impact-prediction techniques and provide a basis for more accurate predictions of future projects.

The contractor(s) is mainly responsible for effect monitoring, which is being supervises by the CSC and PIU-HQ/RIUs at each site, and for the entire project. The effect monitoring program has been designed carefully considering the identified impacts and some additions or deletions probably in frequency may be taken up in this program after learning lessons from one-year operation of the project through Change Record Register. Typical environmental and social effect monitoring schedule for pre-construction, construction and operations stages and relevant parameters are presented in Chapter 10 of the Phase 1A ESIA. **Table 6.6 also** provides summary of a typical environmental and social effect monitoring schedule.

Table 6.22: Generic Environmental and Social Monitoring Framework

Sr. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location[4]	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	Monitoring
1	Water Resources/ Water Quality	Monitoring of all parameters of effluent from construction sites as per stringent environmental quality standards.	Proposed project routes. - Major receptor i.e. residential areas etc. within the RoW/AoI. However, estimated sampling points will be verified at construction stage. Other proposed effluent discharge points are: - Contractors camps - Concrete preparation plants - Fuel (Petrol. Oil and Grease) products storages. - Vehicle and Machines repairing and servicing yards.	Visual checks of laboratory activities Discrete grab sampling and laboratory testing of water samples by Concerned EPA approved Laboratory for monitoring.	• Once before the start of construction by activity monitors and reported; and • On quarterly basis during the construction. • Bi annual during O&M Phase	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/ RIU during Construction Phase • NHA during O&M Phase
	Drinking Water	Monitoring of all parameters of	Proposed project routes. Major receptor i.e.	Visual checks and monitoring of	• Once before the start of construction	• Contractor during Pre-	• Compliance monitoring lies

[4] Locations will be refined during ESIA stage

Sr. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	**Monitoring**
		drinking water as per stringent environmental quality standards.	construction site, camps area and nearby residential areas within the RoW/ AoI. However, estimated sampling points will be verified at construction stage.	laboratory activities Discrete grab sampling and laboratory testing of drinking water samples by Concerned EPA approved Laboratory for monitoring.	by activity monitors and reported; and • On quarterly basis during the construction. Bi annual during O&M Phase	Construction and Construction Phase • NHA during O&M Phase	with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Soil Contamination	Soil contamination, uncontrolled solid waste disposal activities at sites.	Proposed project routes. - Sites with severe contamination. Other proposed sampling sites are: - Construction Camp. - Equipment washing yards. Spillage points of fuel, chemicals and lubricants.	Visual observations and checks of laboratory activities Sampling and laboratory testing for soil samples.	• Once before the start of construction by activity monitors and reported; and • On quarterly basis during the construction. • Bi annual during O&M Phase	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Land Resources	Land use change.	Proposed project routes. Sites with significant land use change.	Random visits and visual observations of land use change.	• Once before the start of construction by activity monitors and reported; and • On quarterly basis during the construction. • Bi annual during O&M Phase •	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Dust	Monitoring of PM_{10}	Proposed project routes.	Visual checks and	• Once before the	• Contractor	• Compliance

Sr. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	**Monitoring**
	Emissions	$PM_{2.5}$ as per stringent environmental quality standards	Sensitive receptors within the RoW/AoI, construction site, camps area. Estimated sampling points will be verified during construction stage.	monitoring of laboratory activities Onsite Ambient Air Monitoring equipment	start of construction by activity monitors and reported; and • On quarterly basis during the construction. • Bi annual during O&M Phase •	during Pre-Construction and Construction Phase • NHA during O&M Phase	monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Noise Pollution	Day and night time noise monitoring in dBA Leq. as per stringent environmental quality standards	Proposed project routes. - Sensitive receptors within the RoW/AoI. Estimated sampling points will be verified during construction stage. Other proposed sampling sites are: - Construction camps. Equipment yards.	Visual checks and monitoring of laboratory activities Monitoring of noise level at site.	• Once before the start of construction by activity monitors and reported; and • On Monthly basis during the construction (spot measurement regular daily basis keeping in view the day to day application of different heavy noise causing equipment by the contractor). • Bi annual during O&M Phase	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Fumes and gases	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} and compliance with stringent	Proposed project routes. - Major receptors within the RoW/AoI. Estimated sampling points will be	Visual checks and monitoring of laboratory activities Onsite monitoring	• Once before the start of construction by activity monitors and reported; and • On quarterly basis	• Contractor during Pre-Construction and Construction	• Compliance monitoring lies with CSC and PIU-HQ/RIU during

Sr. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	Monitoring
		environmental quality standards Vehicular emissions as per stringent environmental quality standards.	verified during construction stage. Emissions from the silencers of heavy machinery, trucks and other vehicles.	of ambient air quality will be preferred.	during the construction. Bi annual during O&M Phase	Phase • NHA during O&M Phase	Construction Phase • NHA during O&M Phase
	Ecological Resources	Disturbance to natural habitat and fauna, uncontrolled floral cutting which can be avoidable.	Proposed project routes along the RoW/ AoI.	Visual checks to ensure that only marked trees are cut within the project corridor. Monitoring of Wildlife / birds hunting. Inventory of existing trees, cut trees, and planted trees.	• Once before the start of construction by activity monitors and reported; and • On quarterly basis during the construction. • Bi annual during O&M Phase	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Public Infrastructure	Disturbance or damage to public infrastructure	Proposed project routes. Public infrastructures within the RoW/AoI. These structures will be verified prior to the start of construction.	Random visits and consultations with vulnerable.	Prior to the start of construction. • Reporting will be done on the basis of RAP recommendation.	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Community around the project	Use of common resources.	Communities within the RoW/AoI.	Community consultations.	Prior to the start of construction and during the construction stage.	• Contractor during Pre-Construction	• Compliance monitoring lies with CSC and

Sr. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	**Monitoring**
	corridor	Hindrance to mobility. CHS			• Reporting will be done on the basis of RAP recommendation.	and Construction Phase • NHA during O&M Phase	PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Waste Management	Inspection of waste and spoil disposal in accordance with Waste Management Plan	- Main project area (RoW) - Construction camps and Offices. - Equipment yards. Other project allied facilities	Visual Observations, Monitoring and Audits	• Review the waste management stream before start of the project; • Monitoring and reporting on monthly basis during the construction stage; • Bi annual during O&M Phase •	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Labor Management and Working Conditions	As per the LMP of which include but not limited to OHS, hygiene facilities, appropriate camps area, etc.	- Main project area (RoW) - Construction camps and Offices. - Equipment yards. - Other project allied facilities	Visual Observations, Incident/accident register Monitoring and Audits ,	• Monitoring and reporting on monthly basis during the construction stage; • Bi annual during O&M Phase •	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Traffic Safety and Management	As per the TMP of ESIA / ESMP which include but not limited to the	- Main project area (RoW and AoI) - Construction camps and Offices.	Visual Observations, Vehicle Log Books, Monitoring and	• Monitoring and reporting on monthly basis during the	• Contractor during Pre-Construction and	• Compliance monitoring lies with CSC and PIU-HQ/RIU

Sr. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	Monitoring
		observation of traffic congestion at bottleneck areas, provision of signs and signal, vehicular inspection, driving safety protocols, etc.	- Equipment yards. Other project allied facilities	Audits	construction stage. • Bi annual during O&M Phase	Construction Phase • NHA during O&M Phase	during Construction Phase • NHA during O&M Phase
	Social aspects including GBV and other Grievances	Social and cultural conflicts, SEA/SH complaints, grievances related to livelihood impacts, child abuse, etc.	- Main project area (RoW and AoI) - Construction camps and Offices. - Equipment yards. Other project allied facilities	Visual Observations and consultations, Grievance Redress/Social Complaint Register, Monitoring and Audits	• Monitoring and reporting on monthly basis during the construction stage; • Bi annual during O&M Phase	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	OHS; CHS; accidents and incidents	As per O&CHS sub-plan which include but not limited to the inspection of working proposed project, work permits,, provision and availability of mandatory PPEs, Community complaints on H&S	- Main project area (RoW and AoI) - Construction camps and Offices. - Equipment yards. Other project allied facilities	Visual Observations and consultations, Grievance Redress/Social Complaint Register, Incident/accident register, Monitoring and Audits	• Monitoring and reporting on monthly basis during the construction stage • Bi annual during O&M Phase	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
	Chemical Storage and	Safety Data Sheets, Leakage	- Main project area (RoW and AoI)	Visual Observations, Chemical Storage	• Monitoring and reporting on	• Contractor during Pre-	• Compliance monitoring lies

Sr. No.	Parameters / Receptor	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility	
						Implementation	**Monitoring**
	Handling	and spills, Segregated handling and storage of chemicals, availability of fire extinguishers,	- Construction camps - Equipment yards. Other project allied facilities	inventory, Incident/accident register, Monitoring and Audits	monthly basis during the construction stage • Bi annual during O&M Phase	Construction and Construction Phase • NHA during O&M Phase	with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase
16	Land Acquisition and Resettlement	As per Entitlement Matrix of RPF and RAP	- Within the proposed project construction limits	As per RPF and RAP	• As defined in RPF and RAP	• NHA	• TPV (External Monitor)
	Vulnerable Groups	Employment data, trainings provided, social programs implemented, inclusion in consultations	Communities along the RoW	RAP/GAP/SEP	Monitoring and reporting on monthly basis during the construction stage;	• Contractor during Pre-Construction and Construction Phase • NHA during O&M Phase	• Compliance monitoring lies with CSC and PIU-HQ/RIU during Construction Phase • NHA during O&M Phase

6.8 Institutional Capacity Assessment

NHA has its dedicated Environment, Afforestation and Land Section (EALS) headed by General Manager (GM). The overall capacity assessment of the NHA EALS is carried out on following aspects:

1. **No. of Staff:** Overall forty-three (43) employees with almost fifteen (15) numbers of technical staff. Under GM-EALS one director land, one director afforestation and environment, one deputy director environment and one deputy director afforestation are working directly for all the maintenance and O&M related activities of all the highways in Pakistan.
2. **Work Load:** There are numbers of local or international funded projects ongoing (in construction, and planning / preparation) phase all over the Pakistan which are also being handled by the environment and land staff of EALS.
3. **Expertise:** The staff is well experienced in their field but the capacity building is required on latest area of interest such as climate change, carbon footprint assessment, carbon financing, GHG emission estimation, air and noise modeling with latest software, biodiversity aspects, latest community and stakeholder engagement techniques, GRM handling and reporting procedures, Gender Aspects including GBV/SEA/SH/ Violence Against Children (VAC), labour management etc.

Based on the above capacity assessment of NHA, there is an overall need of capacity enhancement for the in-house staff in terms of training and an increase in staff for implantation of E&S instruments as per the latest funded agencies requirements. The detailed capacity assessment will be carried out later with the help of international environmental and social consultants hired by the NHA. Apart from this, the project specific staff is required in PIU-HQ and RIU as suggested in above section (institutional arrangement) along with the project specific training and capacity building as provided in upcoming section of this ESMPF.

6.9 TRAINING AND CAPACITY BUILDING

To enhance the capacity of the Project Proponent as well as the Contractor, training will be imparted related to the environmental and social issues of the proposed project.

In-house training for the project staff including contractor, consultant and the supervision staff will be ensured through the provision of basic training and site and contract specific advanced training, covering environmental, occupational and community health and safety and social aspects of the development projects. The training protocols will include the following aspects:

- Procedures for monitoring the air quality parameters and measures to be adopted for avoiding or minimizing air pollution, particularly from the concrete batching and asphalt plants, haul- trucks, etc.;
- Procedures for monitoring water quality parameters and measures to be adopted for avoiding or minimizing water pollution, particularly from the wastewater effluent generated from the workshops, machinery washing yards, and other obnoxious chemicals;
- Safe waste management and disposal practices;
- Baseline Noise Monitoring and Highway Noise Modeling;
- Safe noise levels from the construction machinery etc.;
- Traffic interface planning and man-machine interaction;
- Over and near water construction;

- Per Performance Indicators and estimation of TRIR and LTIFR;
- Incident investigation and root-cause analysis using 5 Whys and ICAM;
- Employer's EHSH Requirements in bidding documents;
- Business Results with Integrated EHS (by addressing direct and indirect costs of incidents);
- Leadership Styles and Theories;
- General housekeeping and cleanliness;
- Communicable diseases;
- Resettlement Related Issues and Grievance Redress
- Gender Aspects including GBV/SEA/SH/ Violence Against Children (VAC)
- Safety measures against hazards for workforce and the local communities arising from the construction activities;
- Use of safety gadgets by the workforce; and
- Any other environment and social topic which are required to properly implement the ESMP.

Tentative training plan based on the initial institutional capacity assessment along with the required trainer, trainee, schedule and content for the project staff at site during the construction phase of the proposed project is provided in **Table 6.7.** This training plan will be revised based on the findings of detailed ES capacity assessment (as suggested earlier) during a later stage. A comprehensive training manual will be developed and implemented by the Contractor with prior consent of CSC environmental staff

Table 6.23: Training Plan for the Project Staff during Construction Stage

Sr. No.	Training Activity	Participants	Trainer	Mode of Training	Content	Scheduling
1.	Overview of Project and its Sections and their Environmental and Social Instruments	PIU-HQ, RIUs Consultants, Contractors	PIU-HQ / E&S Staff of RIUs	Presentation / Lecture	Awareness on E&S Instruments	Once at the start of project or each Section
2.	Environmental Monitoring, Evaluation and Compliance Reporting Requirements	PIU-HQ, RIUs Consultants, Contractors	PIU-HQ / E&S Staff of RIUs	Presentation / Lecture	M&E procedures, Compliance Reporting Procedures	Annual Basis
3.	Environmental Monitoring, Sampling and Testing Requirements during Construction and Operational Phases	PIU-HQ, RIUs Consultants including labs, Contractors	PIU-HQ / E&S Staff of RIUs	Presentation / Lecture	Procedures of Monitoring, Sampling and Testing as per national and international requirements	Annual Basis
4.	Public Consultation, Disclosure and Grievance Redress Mechanism Requirements	PIU-HQ, RIUs Consultants, Contractors	PIU-HQ / E&S Staff of RIUs	Presentation / Lecture	Procedures of consultation, disclosure as per SEP and GRM procedures	Bi annual Basis
5.	Site Orientation and Induction	CC and CSC	PIU-HQ / RIUs	Presentation / Lecture	Awareness about Site, working protocols	Once for each individual
6.	ESMP and Environment Code of Practices	CC	CSC and PIU-HQ /RIUs	Presentation	Awareness and applicability of ESMP and environmental code of practices	Monthly
7.	Emergency Response and Use of Fire Extinguishers	CC	CSC and PIU-HQ /RIUs	Presentation	Potential natural and other hazard/emergencies and dealing with emergency and fire to minimize damage	Quarterly
8.	Resettlement Related Issues and Grievance Redress	CC	CSC and PIU-HQ /RIUs	Presentation	Awareness on ESS-5 (Involuntary Resettlement)	Quarterly
9.	Labor Management	CC	CSC and PIU-HQ /RIUs	Presentation	Awareness on AIIB's ESF (Labor and Working Conditions) and LMP	Quarterly
10.	Gender Aspects including GBV/ SEA/SH/ Violence Against Children (VAC)	CC	CSC and PIU-HQ /RIUs	Presentation	Awareness on GBV, gender equality, gender related issues and their redress; awareness regarding GAP	Quarterly
11.	Stakeholder Engagement	CC	CSC and PIU-HQ /RIUs	Presentation	Interaction with the PAPs and	Quarterly

Sr. No.	Training Activity	Participants	Trainer	Mode of Training	Content	Scheduling
					Other Interested Parties, Awareness on SEP	
12.	Awareness workshop regarding vector borne diseases	CC	CSC and PIU-HQ /RIUs	Presentation	Risk, Prevention and available treatment	Bi annual
13.	First Aid and Cardiopulmonary resuscitation (CPR)	CC	CSC and PIU-HQ /RIUs	Presentation	Onsite first aid procedures	Bi annual
14.	Compliance of Concerned EPA NOC (Environmental Approval) and AIIB's ESS	CC	CSC and PIU-HQ /RIUs	Presentation	Awareness on concerned EPA NOC, rules, guidelines, regulation and standards for satisfactory compliance	Bi annual
15.	Community Involvement for Ecological Sustainability	Community and CC	Park and Horticulture Department, Forest Department, CSC and PIU-HQ / RIUs	Seminar and Workshop	Awareness on Plantation of beneficiary trees, protection of flora and fauna, ecological sustainability	Annual

6.10 COMMUNICATION AND DOCUMENTATION

Communication and documentation is an essential feature of ESMP of each ESIA. The key features of such mechanism are:

6.10.1 Data Recording and Maintenance

All forms to be used for recording information during the environmental and social monitoring will follow a standard format which will correspond to the database into which all the gathered information will be placed. Check boxes will be used as much as possible to facilitate data entry. A tracking system will be developed for each form.

6.10.2 Meetings and Reporting

Monthly meetings will be held by E&S Staff of RIU(s) at site during the construction phase. The purpose of these meetings will be to discuss the routine activities, non-compliances and their remedial measures. The reporting will cover, such as, (i) the overall implementation of E&S risk management instruments and measures, (ii) E&S performance, and any E&S issues arising as a result of project activities and how these issues will be remedied or mitigated, including timelines, (iii) Occupational Health and Safety performance (including incidents and accidents reporting), (iv) community health and safety, (v) stakeholder engagement updates, in line with the SEP, (vi) public notification and communications, (vii) summary of grievances/beneficiary feedback received, actions taken, and complaints closed out, in line with the SEP; etc. These reports will also be produced at periodic time intervals, as provided in **Table 6.8** along with information regarding persons responsible for report preparation and review process. Additionally, minutes of meeting will also be submitted as part of routine environmental and social reports.

Table 6.24: Periodic Reporting Mechanism

Sr. No.	Report Category	Prepared by	Submitted to	Reviewed by
1	Monthly	Contractors' environmental and social staff	CSC and PIU-HQ / RIUs	CSC and PIU-HQ / RIUs
2	Quarterly	Contractors' environmental and social staff	CSC and PIU-HQ / RIUs	CSC and PIU-HQ / RIUs and Concerned EPA (as per the requirement define in NOC)
3	Quarterly Environmental and Social Monitoring Report (QESMR)	CSC	PIU-HQ / RIUs	PIU-HQ / RIUs and AIIB
4	Semi-Annual External Environmental and Social Monitoring Report	Third Party Validation Consultant	PIU-HQ / RIUs	PIU-HQ / RIUs and AIIB
5	Annual Report	Contractors' environmental and social staff	PIU-HQ / RIUs	PIU-HQ / RIUs and AIIB
6	Completion Report	Contractors' environmental and social staff	PIU-HQ / RIUs	PIU-HQ / RIUs and AIIB

6.10.3 Photographic Records

Contractors will maintain photographic records during the implementation of the proposed project. As a minimum, the photographic records will include the site photographs, all the roads, camp sites and monitoring activities, etc.

6.11 Guideline for Tree Plantation / Reforestation Plan

The basic purpose of afforestation/plantation of suitable species in the project area is to reduce the risk been made due to different construction activities for the proposed project. The expected risk made will be compensated by planting of saplings to enhance green cover and improve the overall environment of the area. Afforestation will not only reduce the risk been made but will also increase the green cover, carrying capacity and aesthetics of the area along with many positive aspects and impacts.

Plantation will be done after the construction work immediately. Plantation of indigenous trees species is highly important to maintain the biodiversity and ecological balance. It is also important to prevent global warming, soil erosion and pollution. Afforestation purifies the environment and helps in reducing the carbon dioxide level. Along with the importance of construction, the afforestation activity will further help in enhancing the socio-economic condition of the area and project sustainability. The detailed project specific tree plantation plan will be prepared considering the tree cutting due to the respective project Section in the ESIA/ESMP.

6.12 Biodiversity Friendly Cross-Drainage

To ensure safe passage for wildlife while maintaining effective drainage, the following biodiversity-friendly cross-drainage designs can be considered in the road design:

(a) Box Culvert with Dry Ledges

- Install **50 cm wide dry ledges** along the interior walls to facilitate the movement of small animals.
- Maintain a **natural bed** inside the culvert to mimic the existing habitat, allowing small mammals, amphibians, and reptiles to cross safely.
- Implement **animal-friendly access points**, such as sloped embankments, ramps, or gradual transitions from the surrounding habitat.
- **Guide fences** may be installed along the approach areas to direct wildlife towards the crossings, reducing road mortality.

(b) Effective Culvert Designs for Small Mammals

- **Double Culvert System:** One culvert remains at water level for aquatic passage, while a **raised culvert** provides a dry crossing for species such as otters.
- **Retrofitted Wooden Walkways:** Wooden planks attached along culvert walls, extending from dry embankments to ensure seamless movement for small mammals.
- **Prefabricated Concrete Culverts with Integrated Ledges:** Designed with built-in dry passageways to support wildlife movement without additional retrofitting.
- **Corrugated Steel Stormwater Culvert:** Modified by filling the ridges along the bottom with concrete to create a stable surface for insects, amphibians, and small mammals to traverse safely.

(c) Amphibian-Friendly Arch Culvert

- Utilize an **arch culvert design** to maintain a **natural streambed**, ensuring amphibians can move without encountering steep drops or artificial barriers.
- Ensure the underside of the arch culvert remains **moist and shaded**, creating an optimal microhabitat for amphibian species.
- Include **vegetation buffers** along entry and exit points to maintain connectivity with surrounding wetlands and breeding areas.
- Implement **amphibian guide fences** to direct species safely into the culvert, preventing road crossings and reducing mortality risks.

These measures will enhance safe movement of community with their livestock, habitat connectivity and minimize the ecological impact of infrastructure development, promoting biodiversity conservation in the project area.

6.13 Guidelines for Chance Find Procedure

The purpose of these guidelines is to address the possibility of archaeological deposits, finds and features becoming exposed during earth removing and ground altering activities associated with the construction and to provide procedures to follow in the event of a chance archaeological find. Detailed procedure is included in Annex 1. The following 'chance-find' principles will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

- Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.
- Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.
- If the site supervisor determines that the item is of potential significance, an officer from the concerned Department of Archaeology (DoA) will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.
- Work will not re-commence in this location until agreement has been reached between DoA and NHA as to any required mitigation measures, which may include excavation and recovery of the item.
- A precautionary approach will be adopted in the application of these procedures.

6.14 Guidance Note for Integrating/ Considering E&S Aspects During Design and Technical Planning

Following are the guidance note to be considered for E&S aspects:

- The E&S features of the areas such as area profile (Village, Union Council, Tehsil and District information), existing plantation, notified and non-notified structures including archaeological sites, forest areas, wildlife sanctuary, etc. will also be collected with the topographic survey. For this, an E&S checklist will be shared with survey team for such data collection. These aspects will be considered in layout planning
- The E&S team and design team will work together during project prioritization phase, design phase, selection of acceptable cross section which covers all the mandatory components of road with least environment, social and resettlement impacts.
- The E&S team leader will closely coordinate with the project manager on frequent basis for these aspects. The options considering to minimize the environment, social and resettlement impacts will be incorporated in ESIA and RAP documents as alternate analysis.

- The mitigation measures suggested for the significant impacts and efforts to minimize the resettlement and livelihood loss impacts will be finalized in close coordination with technical team.
- Design should consider notified protection and key biodiversity area, climate adaption and resilience, and pollution control aspect. Proper drainage systems should be incorporated to manage stormwater, prevent flooding, and reduce soil erosion. Design should prioritize community engagement, safety, and accessibility. Early consultation with local communities ensures that the project aligns with their needs, minimizing land acquisition disputes and displacement concerns. Incorporating pedestrian walkways and road safety features helps reduce accidents and ensures accessibility for all, including vulnerable groups such as children, elderly individuals, and persons with disabilities.

6.15 INFORMATION DISCLOSURE AND CONSULTATIONS

Stakeholder consultations will be carried out during all phases of the project in accordance with AIIB's ESF and the project specific SEP. These consultations are aimed at identifying additional opportunities and risks for the project, improving design and implementation, and increasing stakeholder ownership in the project. The SEP has identified stakeholders in three categories:

- Affected Parties: which are likely to be affected by the project because of its actual impacts, or potential risks to their physical environment, health, security, cultural practices, well-being, or livelihoods.
- Other Interested Parties: those stakeholders which are likely to have an interest in the project and may be able to assist informed decision making for the project, or otherwise influence the outcomes of the project.
- Disadvantaged/Vulnerable Individuals and Groups: who may be more likely to be adversely affected by project impacts and may be more limited than others in their ability to take advantage of the project's benefits.

Stakeholder consultations will be carried out during the preparation of the E&S instruments to obtain feedback and address concerns. The ESMPF and other associate documents at preparation stage (LMP, RPF, SEP) will be disclosed on the PIU-HQ-NHA website, and shall also be available in AIIB's repositories. ESIA's and other site-specific E&S instruments (such as RAPs) will also be disclosed through the same channels. Executive summaries of each E&S instrument will be translated into local language and will also be made available.

6.16 GRIEVANCE REDRESS MECHANISM

The NHA will establish a Grievance Redress Mechanism (GRM) to facilitate the resolution of community complaints and grievances. The formal GRM provided for this project has a three-tiered structure including, i) a Community / Local Level GRC; ii) RIU level GRC; and (iii) PIU-HQ-NHA Level GRC. Apart from these GRC, GBV committee(s) will also be established and notified within PIU-HQ/RIU to resolve the issues of Gender Based Violence (GBV), SEA&SH issues. This GBV Committee will be gender sensitive and it will ensure that women can register all types of grievances they may have related to the project. These grievances may relate to the payment of compensation, restrictions in their movement during construction, impact of the privacy, issues related to gender-based violence (GBV) or any other project related issues. To facilitate the aggrieved women (if any) to lodge their complaints and get their concerns resolved through this GBV Committee.

For the proposed Project, the PIU-HQ NHA, supervision consultants and its contractors will also establish a separate GRM (or make provisions in the overall GRM) for the project workers to address labor or workplace related concerns consistent with the applicable

national and provincial laws and AIIB's ESF requirements before the Project Effectiveness. The functions and responsibilities for each level of GRC under this GRM along with GBV committee and detailed worker GRM is provided in SEP of this project.

6.17 FUTURE CONSULTATION PROGRAM AND STAKEHOLDER WORKSHOP

The stakeholder consultation and engagement is an ongoing process and will be carried out during ESIA/EIA. The consultation process during ESIA/EIA stage will be scheduled with the project affected parties. A Stakeholder Workshop will also be conducted based on the draft SEP and ESMPF.

7 BUDGET

This chapter describes the tentative budget for the environmental and social assessment and compliance of management and mitigation plan during preconstruction, construction and operational phases of the project and its Sections.

7.1 BUDGET ESTIMATE

A rough estimate has been developed to give idea of the total cost the ESMP implementation may represent. These elements will be further explored and may evolve during the preparation of the ESIA. Total tentative budget for the compliance of environmental safeguard requirements is about **PKR 1.895 Billion**. The yearly tentative budget under different cost head is mentioned in **Table 7.1**.

Table 7.25: Tentative Budget for E&S Assessment and Compliance

Sr. No.	Cost Head	Unit Cost (PKR)	No. Of Units	Total Amount (PKR)
A: Site Specific ESIA / ESMP Preparation as per National and AIIB's Requirements (Lump Unit Cost)[5]				
1	ESIA of Phase 1 (A)	15,000,000	1	15,000,000
2	ESIA of Phase 2	15,000,000	2	30,000,000
Total A				**45,000,000**
B: RIU (E&S) Staffing Cost				
2	Five RIUs at site (One for Phase 1B and four for Phase 2) • Resettlement & Social Safeguard Specialist • Gender Specialist, • Labour Specialist • OHS Specialist • Environment Specialist; and • Climate Specialist •	900,000 Per month (Logistics will be covered under main project cost)	24 (2 year)	108,000,000 (21,600,000 for each section)[6]
Total B				**108,000,000**
C: ESMP Implementation Cost (Pre-Construction, Construction and O&M)				
1	Phase 1B (Refer **Annex-4**)	494,360,000	1	494,360,000
2	Phase 2 (Refer **Annex-5**)	1,075,950,000	1	1,075,950,000
Total C				**1,570,310,000**
Grand Total (A+B+C)				**1,723,310,000**
Grand Total (A+B+C) with 10% Contingencies				**1,895,641,000** ***(Say 1.895 Billion PKR)***

[5] *Except other E&S Instruments such as LMP, SEP, GAP, ESMPF, RPF, RAP including LRP documents etc*
[6] 21,600,000 PKR for Phase 1B and 86,400,000PKR for Phase 2.

ANNEXES

ANNEX 1: CHANCE FIND PROCEDURE

1. BACKGROUND

The purpose of this document is to address the possibility of archaeological deposits becoming exposed during ground altering activities within the project area and to provide protocols to follow in the case of a chance archaeological find to ensure that archaeological sites are documented and protected as required.

The Antiquities Act, 1975, protects archaeological sites, whether on Provincial Government owned or private land. They are non-renewable, very susceptible to disturbance and are finite in number. Archaeological sites are an important resource that is protected for their historical, cultural, scientific and educational value to the general public and local communities. Impacts to archaeological sites must be avoided or managed by development proponents. The objectives of this 'Archaeological Chance Find Procedure' are to promote preservation of archaeological data while minimizing disruption of construction scheduling It is recommended that due to the moderate to high archaeological potential of some areas within the project area, all on site personnel and contractors be informed of the Archaeological Chance Find Procedure and have access to a copy while on site.

2. POTENTIAL IMPACTS TO ARCHAEOLOGICAL SITES

Developments that involve excavation, movement, or disturbance of soils have the potential to impact archaeological materials, if present. Activities such as road construction, land clearing, and excavation are all examples of activities that may adversely affect archaeological deposits.

3. RELEVANT LEGISLATION

It ensures the protection, preservation, development and maintenance of antiquities in the provinces of Pakistan. The Act defines "antiquities" as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments, etc. The Act is designed to protect these antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the relevant provincial governments to prohibit excavation in any area that may contain articles of archaeological significance. Under the Act, the subproject proponents are obligated to ensure that no activity is undertaken in the proximity of a protected antiquity, report to the Department of Archaeology, any archaeological discovery made during the course of the project.

4. REMEDIES AND PENALTIES

The Antiquities Act, 1975 provides for heritage inspection or investigation orders, temporary protection orders, civil remedies and penalties to limit contraventions. These powers provide: ''A contravention of any provision of this Act or the rules shall, where no punishment has been specifically provided be punishable with rigorous imprisonment for a term which may extend to two years, or with fine up to rupees ten hundred thousand, or with both. ''

5. ARCHAEOLOGICAL 'CHANCE FIND' PROCEDURE

If you believe that you may have encountered any archaeological materials, stop work in the area and follow the procedure below:

The following 'chance-find' principles will be implemented by the contractor throughout the construction works to account for any undiscovered items identified during construction works:

i. Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.

ii. Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.

iii. If the site supervisor determines that the item is of potential significance, an officer from the concerned Department of Archaeology (DoA) will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.

iv. Work will not re-commence in this location until agreement has been reached between DoA and NHA as to any required mitigation measures, which may include excavation and recovery of the item.

v. A precautionary approach will be adopted in the application of these procedures.

6. DETAILED PROCEDURAL STEPS

vi. If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.

vii. Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.

viii. If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.

ix. Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.

x. If any person, who discovers or finds any movable antiquity contravenes the provisions of the Act, he shall be punishable with imprisonment for a term which may extend to five (05) years, or with fine not less than fifteen hundred thousand rupees or with both and the Court convicting such person shall direct that the antiquity in respect of which such contravention has taken place shall stand forfeited to Government.

xi. The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.

xii. The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.

xiii. No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.

xiv. Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.

xv. If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part under the Land Acquisition Act, 1894 (I of 1894), as for a public purpose.

ANNEX 2: DRAFT TOR FOR CONTRACTOR, SUPERVISION CONSULTANTS AND THIRD PARTY VALIDATION CONSULTANTS

For Project Implementation Unit (PIU), Supervision Consultants, Contractor, and Third-Party Validation for Environmental and Social (E&S) Implementation during Construction Phase of Road Project

1. Introduction

This draft Terms of Reference (TOR) defines the roles and responsibilities of the Project and Regional Implementation Units (PIU & RIU), Supervision Consultants, Contractors, and Third-Party Validators in ensuring effective Environmental and Social (E&S) implementation during the construction phase of the road project. The objective is to ensure compliance with national regulations, international best practices, and lender requirements.

2. Roles and Responsibilities

2.1 Project and Regional Implementation Unit (PIU & RIU)

The **Project Regional Implementation Unit (PIU & RIU)** plays role in overseeing and ensuring the successful implementation of the Environmental and Social Management Plan (ESMP) throughout the construction phase of the project. It is responsible for regulatory compliance, stakeholder coordination, monitoring and evaluation, grievance redress mechanisms, field visits, and implementing corrective actions.

- **Regulatory Compliance**: The PIU & RIU ensures that all project activities comply with national environmental and social regulations, international best practices, and funding agency requirements. This involves reviewing environmental impact assessments, securing necessary permits, and ensuring adherence to labor laws, health, and safety guidelines.

- **Stakeholder Coordination**: Effective communication among key stakeholders is critical to project success. The PIU & RIU serves as the central coordinating body, facilitating discussions between government agencies, contractors, supervision consultants, and affected communities. This ensures that all parties are aligned with project goals, addressing concerns proactively to avoid delays and conflicts.

- **Monitoring & Evaluation**: The PIU & RIU conducts regular assessments of the project's environmental and social performance. This includes analyzing reports from contractors and supervision consultants, identifying risks, and ensuring corrective actions are implemented in a timely manner. Continuous monitoring helps in minimizing adverse environmental and social impacts.

- **Grievance Redress Mechanism (GRM)**: To address concerns from local communities and workers, the PIU establishes a functional grievance redress mechanism. This system allows affected individuals to report complaints, ensuring transparency and responsiveness. The PIU & RIU ensures grievances are resolved promptly to maintain community trust and minimize disruptions.

- **Field Visits**: Periodic site inspections are conducted to verify compliance with ESMP guidelines. These visits help identify on-ground challenges, assess worker safety conditions, and confirm that mitigation measures are effectively implemented.

- **Corrective Actions**: In case of non-compliance, the PIU & RIU is responsible for ensuring swift corrective actions. This may involve issuing warnings, enforcing penalties, or requiring additional mitigation measures to maintain project integrity and sustainability.

2.2 Supervision Consultants

The Supervision Consultants ensures that the contractor adheres to the Environmental and Social (E&S) commitments outlined in the Environmental and Social Management Plan (ESMP) and contractual agreements. Their responsibilities encompass site inspections and audits, community engagement, occupational health and safety (OHS) assessments, capacity building, and non-compliance reporting.

- **Site Inspections & Audits**
  Supervision Consultants conduct regular site inspections and audits to ensure that the contractor follows the prescribed health, safety, and environmental (HSE) standards. These inspections help in identifying potential hazards, monitoring waste management practices, ensuring pollution control measures are in place, and verifying compliance with biodiversity protection guidelines. Any deviations from the ESMP are recorded, and immediate corrective measures are recommended to prevent environmental degradation or safety hazards.

- **Community Engagement**
  To foster a positive relationship between the project and local communities, Supervision Consultants ensure the implementation of community engagement plans. They facilitate meaningful consultations with stakeholders, ensuring that community concerns and expectations are integrated into the project execution strategy. They also ensure that the contractor follows agreed-upon grievance redress mechanisms (GRM) to address complaints in a timely and transparent manner.

- **Occupational Health & Safety (OHS)**
  The safety and well-being of workers is a key priority. Supervision Consultants assess working conditions, availability of personal protective equipment (PPE), emergency response mechanisms, and adherence to occupational safety standards. By enforcing these safety measures, they help minimize accidents, injuries, and health risks at the construction site.

- **Capacity Building**
  Supervision Consultants conduct training sessions for contractors and workers on environmental, social, and safety best practices. These sessions focus on waste management, pollution prevention, biodiversity conservation, labor rights, gender inclusion, and workplace safety protocols to build a responsible workforce.

- **Non-Compliance Reporting**
  Supervision Consultants play a crucial role in monitoring and reporting non-compliance issues. They document violations, recommend corrective actions, and ensure the contractor takes necessary steps to mitigate risks. Persistent violations are escalated to the PIU & RIU for enforcement actions, ensuring accountability and project integrity.

2.3 Contractor

The Contractor plays a critical role in ensuring that all construction activities comply with Environmental and Social (E&S) guidelines, contractual obligations, and the Environmental and Social Management Plan (ESMP). Their responsibilities encompass mitigation measures, documentation and reporting, worker training, community relations, legal compliance, and periodic reporting to relevant authorities.

- **Mitigation Measures**
  The Contractor is required to implement mitigation strategies as outlined in the ESMP to minimize environmental and social impacts. This includes erosion control, dust and noise suppression, waste management, pollution control, biodiversity protection, and ensuring sustainable resource use. The contractor must proactively identify potential risks and apply best practices to reduce adverse effects on the environment and local communities.

- **Documentation & Reporting**
  Maintaining comprehensive records of environmental and social compliance is essential. The Contractor must document waste disposal procedures, air and water pollution levels, accident reports, safety drills, and grievance redress actions. These records are crucial for transparency and are regularly reviewed by the Supervision Consultant and PIU to assess compliance with project standards.

- **Worker Training**
  Ensuring that workers are well-informed about E&S policies is a key responsibility. The Contractor must conduct regular training sessions covering occupational health and safety (OHS) practices, use of personal protective equipment (PPE), fire and hazard management, emergency response procedures, and social responsibility. Training helps in reducing workplace accidents and enhances workers' understanding of their roles in environmental conservation.

- **Community Relations**
  A strong relationship with local communities is vital for smooth project implementation. The Contractor must implement community engagement strategies, hold consultations, and address grievances promptly. This includes appointing community liaisons, ensuring fair hiring practices, and avoiding any activities that could disrupt local livelihoods.

- **Legal Compliance**
  Adhering to national labor laws, gender inclusion policies, and worker welfare regulations is mandatory. The Contractor must ensure equal employment opportunities, fair wages, safe working conditions, and compliance with international labor standards. Worker rights, non-discrimination policies, and grievance mechanisms should be effectively enforced.

- **Periodic Reporting**
  The Contractor is responsible for submitting weekly and monthly compliance reports to the Supervision Consultant and PIU & RIU. These reports include progress on mitigation measures, community engagement activities, worker safety records, and any non-compliance incidents. Regular reporting ensures accountability, transparency, and proactive resolution of E&S issues.

2.4 Third-Party Validation

The Third-Party Validator (TPV) plays a critical role in providing an independent, unbiased evaluation of the project's Environmental, social, health and safety (ESHS) compliance. Their assessments help ensure that the project meets national regulations, international best practices, and lender requirements, thereby improving overall transparency and accountability. The TPV's key responsibilities include conducting independent audits, regulatory compliance checks, effectiveness assessments, grievance redress analysis, and reporting recommendations.

- **Independent Audits**
  The Third-Party Validator conducts comprehensive audits to assess whether the project adheres to E&S guidelines and contractual obligations. These audits include site inspections, document reviews, interviews with stakeholders, and analysis of compliance records. The TPV ensures that the contractor are properly implementing the C-ESMP and and OCHSMP and CSC is supervising the implementation of C-ESMP and OCHSMP.

- **Regulatory Compliance Checks**
  One of the TPV's main functions is to verify adherence to national and international regulatory standards. They assess whether the project is in line with local environmental laws, labor rights regulations, occupational health and safety (OHS) standards, and funding agency guidelines. Any violations or non-compliance issues are documented, and corrective measures are recommended to the Project Implementation Unit (PIU) and other stakeholders.

- **Effectiveness Assessment**
  Beyond compliance, the TPV evaluates the effectiveness of mitigation measures outlined in the ESMP. This includes analyzing pollution control measures, biodiversity conservation efforts, waste management strategies, and safety protocols to determine their impact. If any mitigation strategies are found to be insufficient, the TPV provides recommendations for improvements.

- **Grievance Redress Analysis**
  An essential part of the TPV's role is to assess the efficiency of the project's grievance redress mechanisms (GRM) and community engagement practices. This includes reviewing how complaints from local communities and workers are handled, the response time, and whether grievances are resolved satisfactorily. The TPV also ensures that community engagement efforts are meaningful and inclusive.

- **Recommendations & Reporting**
  Finally, the TPV provides independent reports with actionable recommendations to NHA, which will report to AIIB, regulatory bodies, and PIU & RIU. These reports highlight best practices, areas of concern, and corrective measures to enhance overall E&S performance. By offering an objective perspective, the TPV helps improve project sustainability and stakeholder confidence.

ANNEX 3A: ESIA/ESMP TEMPLATE

a) Executive Summary: Introduction, Project Description, Baseline Environment, Anticipated Environmental Impacts and Mitigation Measures, Alternatives, Public Consultation and Information disclosure, Disclosure of documents, Environmental and Social Management Plan, Conclusion and Recommendations

b) Introduction: Background/Overview, Need of Preparation of ESIA, Purpose of the document/ESIA

c) Legal and Institutional Framework: Government Policy, AIIB ESP (ESF, ESSs, ESEL), International Treaties, Policies Applicable to the Project, Summary Gap analysis between Government and AIIB ESP, International Good Practices (WBG EHS Guidelines, etc)

d) Project Description: Location, Key Project Components, Description of RoW Alignment

/Location, Project Design, Key construction activities, Key O&M activities, Construction materials, Quarries and Borrow Sites, Construction Camps, Manpower requirements, Supplies and waste generation, Project Costs, Implementation Schedule etc as well as temporary facilities; ancillary facilities; associated facilities; existing facilities etc

e) Baseline Data (existing condition and trend): The Scoping exercise will provide site and subject specific guidance.

- Physical Resources: Hydrology and Hydrogeology/ surface & ground water/ drainage/floods; Climate, Noise, Air, temperature; Topography and Landscape; Geomorphology/ Geological hazards i n the project area etc.
- Ecological Resources: Flora, Fauna, terrestrial and aquatic species, critical & endangered species, habitat & movement routes, Protected Areas, etc.
- Environment Quality
- Social and socioeconomic aspects: Population and demography; Vulnerable groups, migrants, refugees and poverty profile; Gender aspects; Pattern of land use and natural resources including agriculture; Land tenure system; Land use patterns , Industry, Occupational structure; Formal and informal occupations and structures; to access the level of encroachment within ROW if any, Income and expenditure; Economic activities e.g. labor (industrial, daily-wage etc.); business; services; fisheries; trade; quarrying, tourism, transport etc.; Water supply; Sanitation and wastes, Access to social services; Transport facilities; accidents, traffic congestions/ vehicular traffic; Community organizations and institutions (including for service delivery related complaints resolution); Recreational areas and public spaces, potential; Cultural heritage; archaeology; objects and places of special interest (e.g. graveyards and monuments; and others).

f) Environmental and Social Risks and Impacts

Identification of impacts, approach to Screening of Environmental and social Impacts.
Impact magnitude, receptor sensitivity, and significance of impacts

- Preconstruction
- Construction
- Operation

Preliminary assessment of climate change (CC) impact (CC impact on the highway, and project impact on CC. Link with separate CC Impact Assessment.

Induced and cumulative impacts (assess if cumulative impact assessment is needed in this project. If necessary, suggests Valued-Environmental Component (VES), tentative geographical boundary for such assessment, and methodology to follow based on good international practice).

g) Mitigation Measures:
Follow Mitigation hierarchy.
Mitigation measures for each impact assessed. Residual impacts and their significance.
Contingency Plan, if necessary Road Safety Measures, if necessary

h) Analysis of alternatives (No-project Scenario; compare alternatives from E&S aspects as well; avoid adverse impacts to sensitive receptors)
Overview
Without Project Alternatives
Alternative Analysis in Feasibility Study Alternative Analysis during Detailed Design

- Improvement of Project Route of Feasibility Study Stage
- Study of Alternative Alignment
- Selection of Design and Construction Standards

i) Grievance Redress Mechanism (tiers GR Mechanism, GRM for Labor),
j) Stakeholder Consultation and Information Disclosure (summary)
k) Environmental and Social Management Plan (see f and g – build on from there)

- Objective of ESMP
- Institutional arrangements and roles and responsibilities
- Environmental and social risk and impacts (see f)
- Mitigation Plan
- Cost Estimate
- Monitoring Plan with timing and performance indicator
- Institutional and Capacity Assessment and Capacity Strengthening Plan
- Implementation Schedules
- Integration of ESMP with Project
- Emergency Response Plans
- Reporting responsibility
- Special Clause for the BoQ/Bid Document

m) Key Appendices
n) Maps of Project area and photographs documenting existing conditions on site.
Project design documents and drawings

- List of the professionals and organizations having contributed to the preparation of the ESIA.
- A copy of the Final Terms of Reference of the Study
- List of consulted documents, including project-related reports
- Baseline data referred to in the Report (including instrument monitoring reports) Record of consultation meetings with primary and secondary stakeholders
- Any other information.

ANNEX 3B: FORMAT OF E&S MONITORING REPORT

1 **Introduction**
1.1 Preamble
1.2 Monitoring Period
2 **Project Description and Current Activities**
2.1 Project Description
2.2 Project Contracts and Management
2.3 Project Activities during the Reporting Period
2.3.1 Establishment of Offices and Staff Mobilization
2.3.2 Meetings with the Consultants, PIU-HQ/RIU, and Other Stakeholders
2.4 Contractor's Obligation and Pre-Requsits
2.4.1 Necessary Permits from Local Government and Other Line Departments
2.5 Description of Any Changes to Project Design
2.6 Description of Any Changes to Agreed Construction Methods
3 **Environmental and Social Activities**
3.1 General Description of E&S Safeguard Activities
3.2 Site Audits
3.3 Stakeholder Consultations
3.4 Issues Tracking (Based on Non-Conformance Notices)
3.5 Trends
3.6 Unanticipated E&S Impacts or Risks
4 **Results of OnSite Environmental Monitoring**
4.1 Overview of Monitoring Conducted During Current Period
4.2 Trends
4.3 Summary of Monitoring Outcomes
4.4 Material Resources Utilisation
4.5 Waste Generation and Management
4.6 Occupational and Community Health and Safety
4.6 Gender-Based Violence, SEA/SH
4.7 Training and Capacity Building
4.8 Instrumental Monitoring of Air, Noise Water and Wastewater as per Monitoing Plan
5 Implementation of the CESMP
6 Implementation of Grievance Redress Mechanism and Record
7 Good Practices and Opportunity for Improvement
8 Summary and Recommendation

ANNEX 4: PHASE 1(B) ESMP COST

Sr. No.	Parameter	Mechanism	Frequency	Unit Rate (PKR)	Quantity	Cost (PKRs)	Remarks
A	**PRE- CONSTRUCTION PHASE (at Start of Project)**						
A-1	**Environmental Monitoring Cost**						
1	Water Resources/ Water Quality	Discrete grab sampling and laboratory testing of water samples (Surface and Ground) by Concerned EPA approved Laboratory for monitoring as per stringent environmental quality standards.	Once	70,000	9 7 for P#4, 2 for NBB	630,000	One-time monitoring shall be carried out before the mobilization of Contractor.
2	Noise Levels	dBA Leq. as per stringent environmental quality standards	Once	5,000	9 7 for P#4, 2 for NBB	45,000	
3	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by Concerned EPA approved Laboratory as per stringent environmental quality standards	Once	40,000	9 7 for P#4, 2 for NBB	360,000	
	Sub-Total (A-1)					**1,035,000**	
A-2	**Tree Plantation Cost**						
1	Tree Plantation Cost	250 numbers of trees per avenue km	87,500,000			87,500,000	
Sub-Total (A-2)						**87,500,000**	
Sub-Total A ((A-1)+(A-2))						**88,535,000**	
B	**CONSTRUCTION PHASE**						
B-1	**Environmental Monitoring Cost**						
1	Water Resources/ Water Quality	Discrete grab sampling and laboratory testing of water samples (Surface and Ground) by Concerned EPA approved Laboratory for monitoring as per stringent environmental quality standards	Quarterly	70,000	9 7 for P#4, 2 for NBB	2,520,000	Quarterly monitoring cost for the one-year construction period and will be updated each year based on latest rates during construction timeline of the proposed Project.
2	Noise Levels	dBA Leq. as per stringent environmental quality standards	Quarterly	5,000	9 7 for P#4, 2 for NBB	180,000	
3	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by Concerned EPA approved Laboratory as per stringent environmental quality standards	Quarterly	40,000	9 7 for P#4, 2 for NBB	1,440,000	
Sub-Total (B-1)						**4,140,000**	
B-2	**Environmental and Social Management Cost**						
1	Environment, Social, Medical and OHS specialist of contractor	E&S Personnel will monitor / conduct all environment, social and OHS related activities e.g. TBTs, PPEs, housekeeping, safety signage, emergency preparedness, etc.	Monthly	1,600,000		38,400,000	This is the tentative monthly cost for one-year period for one E&S Team leader, 01 environment specialists, 01 social specialists, one medical officer and 01 OHS specialists along with their monthly logistics for each Package.
2	HSE Management	HSE related activities e.g. TBTs, PPEs, housekeeping, safety signage, emergency preparedness, etc.	Lump sum (3,000,000 for Each Package)			6,000,000	Cost for PPEs, extinguishers, emergency lights, housekeeping equipment, safety signage and barricade, emergency preparedness kit, first aid kit, etc.
3	Ecological and Biodiversity Monitoring & Management	Monitoring of disturbance of habitats through encroachment, noise and other construction activities.	Quarterly	150,000		1,200,000	This is the tentative quarterly cost for one-year period for one senior expert along with their monthly logistics for each Project.
4	Solid and liquid Waste Management	Collection, segregation, transportation, disposal and management of domestic, commercial, construction wastes (solid and liquid)	Lump Sum (1,000,000 for Each Package)			2,000,000	Cost for Collection, segregation, transportation, disposal and management of domestic, commercial, construction wastes (solid and liquid)
5	Social Development Cost	Based on the regular consultations with stakeholders including affectees and nearby community, through basic need assessment by the contractor and verified by PIU/PMU	Lump sum (5,000,000 for Each Package)			10,000,000	Social Development of local community especially PAPs..

Sr. No.	Parameter	Mechanism	Frequency	Unit Rate (PKR)	Quantity	Cost (PKRs)	Remarks
		coordinating the district social welfare department.					
6	Training Cost	Literature preparation, printed material such as posters & pamphlets trainer(s), and venue, etc.	Monthly	400,000		9,600,000	This is the tentative cost for one-year period for one trainers along with logistics at site for each package.
7	Third Party Environmental Consultant	Auditor's checklists & proformas	Bi-annual	1,000,000		4,000,000	This is the tentative cost for one-year period for at least two auditors (E&S specialist) along with logistics, travels and accommodation charges for each package.
8	Communicable Diseases	Tests should be performed by approved laboratory	Biannually	2,000,000		8,000,000	This is the tentative cost for one-year period for medical tests of kitchen staff at each camp site at each package.
9	Environment, Social and OHS specialists of supervisory consultant	E&S Personnel will monitor / supervise all environment, social and OHS related activities	Monthly	1,800,000		43,200,000	This is the tentative monthly cost for one-year period for one E&S Team leader, one environment specialist, one social specialist, one OHS specialist along with their monthly logistics for each package.
Sub-Total (B-2)						**122,400,000**	
Sub-Total B ((B-1)+(B-2))						**126,540,000**	**Tentative for one year. The cost shall be updated based on the current market prices during construction phase.**
Sub-Total B ((B-1)+(B-2))						**253,080,000**	**Tentative for 24 months Project construction period. The cost shall be updated based on the current market prices during construction phase.**
C	**OPERATION & MAINTENANCE PHASE (Five Year Cost)**						
C-1	**Environmental Monitoring Cost**						
1	Water Resources/ Water Quality	Discrete grab sampling and laboratory testing of water samples (Surface and Ground) by Concerned EPA approved Laboratory for monitoring as per stringent environmental quality standards	Biannually	70,000	9 7 for P#4, 2 for NBB	6,300,000	Biannually monitoring cost for the five year O&M Phase and will be reproduced for next years of O&M based on updated rates.
2	Noise Levels	dBA Leq. as per stringent environmental quality standards	Biannually	5,000	9 7 for P#4, 2 for NBB	450,000	
3	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by SEPA approved Laboratory as per stringent environmental quality standards	Biannually	40,000	9 7 for P#4, 2 for NBB	3,600,000	
Sub-Total (C-1)						**10,350,000**	
C-2	**Environmental and Social Management Cost**						
1	E&S Activities	PMU / PIU	Monthly	1,000,000		60,000,000	This is the tentative monthly cost for five-year period for one E&S staff along with site visit cost and logistics arrangements.
	Sub-Total (C-2)					**60,000,000**	
	Sub-Total C ((C-1)+(C-2))					**70,350,000**	**Tentative for five (05) year Project O&M phase. The cost shall be reproduced for next years of O&M Phase and updated based on the current market prices during O&M phase.**
	Grand Total (A+B+C)					**411,965,000**	
	Contingency Charges		20% of Grand Total			**82,393,000**	
	Grand Total with Contingencies					**494,358,000**	**Say 494.36 Million PKR**

ANNEX 5: PHASE 2 ESMP COST

Sr. No.	Parameter	Mechanism	Frequency	Unit Rate (PKR)	Quantity	Cost (PKRs)	Remarks
A	**PRE- CONSTRUCTION PHASE (at Start of Project)**						
A-1	**Environmental Monitoring Cost**						
1	Water Resources/ Water Quality	Discrete grab sampling and laboratory testing of water samples (Surface and Ground) by Concerned EPA approved Laboratory for monitoring as per stringent environmental quality standards.	Once	70,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	1,750,000	One-time monitoring shall be carried out before the mobilization of Contractor.
2	Noise Levels	dBA Leq. as per stringent environmental quality standards	Once	5,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	125,000	
3	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by Concerned EPA approved Laboratory as per stringent environmental quality standards	Once	40,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	1,000,000	
	Sub-Total (A-1)					**2,875,000**	
A-2	**Tree Plantation Cost**						
1	Tree Plantation Cost	250 numbers of trees per avenue km		326,250,000		326,250,000	
	Sub-Total (A-2)					**326,250,000**	
	Sub-Total A ((A-1)+(A-2))					**329,125,000**	
B	**CONSTRUCTION PHASE**						
B-1	**Environmental Monitoring Cost**						
1	Water Resources/ Water Quality	Discrete grab sampling and laboratory testing of water samples (Surface and Ground) by Concerned EPA approved Laboratory for monitoring as per stringent environmental quality standards	Quarterly	70,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	7,000,000	Quarterly monitoring cost for the one-year construction period and will be updated each year based on latest rates during construction timeline of the proposed Project.
2	Noise Levels	dBA Leq. as per stringent environmental quality standards	Quarterly	5,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	500,000	
3	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by Concerned EPA approved Laboratory as per stringent environmental quality standards	Quarterly	40,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	4,000,000	
	Sub-Total (B-1)					**11,500,000**	
B-2	**Environmental and Social Management Cost**						
1	Environment, Social, Medical and OHS specialist of contractor	E&S Personnel will monitor / conduct all environment, social and OHS related activities e.g. TBTs, PPEs, housekeeping, safety signage, emergency preparedness, etc.	Monthly	1,600,000		76,800,000	This is the tentative monthly cost for one-year period for one E&S Team leader, 01 environment specialists, 01 social specialists, one medical officer, one gender and 01 OHS specialists along with their monthly logistics for each Section.
2	HSE Management	HSE related activities e.g. TBTs, PPEs, housekeeping, safety signage, emergency preparedness, etc.	Lump sum (3,000,000 for Each Section)			12,000,000	Cost for PPEs, extinguishers, emergency lights, housekeeping equipment, safety signage and barricade, emergency preparedness kit, first aid kit, etc.
3	Ecological and Biodiversity Monitoring & Management	Monitoring of disturbance of habitats through encroachment, noise and other construction activities.	Quarterly	150,000		2,400,000	This is the tentative quarterly cost for one-year period for one senior expert along with their monthly logistics for each Project.
4	Solid and liquid Waste Management	Collection, segregation, transportation, disposal and management of domestic, commercial, construction wastes (solid and liquid)	Lump Sum (1,000,000 for Each Section)			4,000,000	Cost for Collection, segregation, transportation, disposal and management of domestic, commercial, construction wastes (solid and liquid)

Sr. No.	Parameter	Mechanism	Frequency	Unit Rate (PKR)	Quantity	Cost (PKRs)	Remarks
5	Social Development Cost	Based on the regular consultations with stakeholders including affectees and nearby community, through basic need assessment by the contractor and verified by PIU/PMU coordinating the district social welfare department.	Lump sum (5,000,000 for Each Section)			20,000,000	Social Development of local community especially PAPs..
6	Training Cost	Literature preparation, printed material such as posters & pamphlets trainer(s), and venue, etc.	Monthly	400,000		19,200,000	This is the tentative cost for one-year period for one trainers along with logistics at site for each Section.
7	Third Party Environmental Consultant	Auditor's checklists & proformas	Bi-annual	1,000,000		8,000,000	This is the tentative cost for one-year period for at least two auditors (E&S specialist) along with logistics, travels and accommodation charges for each Section.
8	Communicable Diseases	Tests should be performed by approved laboratory	Biannually	2,000,000		16,000,000	This is the tentative cost for one-year period for medical tests of kitchen staff at each camp site at each Section.
9	Environment, Social and OHS specialists of supervisory consultant	E&S Personnel will monitor / supervise all environment, social and OHS related activities	Monthly	1,800,000		21,600,000	This is the tentative monthly cost for one-year period for one E&S Team leader, one environment specialist, one social specialist, one gender, one OHS specialist along with their monthly logistics for each Section.
Sub-Total (B-2)						**180,000,000**	
Sub-Total B ((B-1)+(B-2))						**191,500,000**	**Tentative for one year. The cost shall be updated based on the current market prices during construction phase.**
Sub-Total B ((B-1)+(B-2))						**478,750,000**	**Tentative for 30 months Project construction period. The cost shall be updated based on the current market prices during construction phase.**
C	**OPERATION & MAINTENANCE PHASE (Five Year Cost)**						
C-1	**Environmental Monitoring Cost**						
1	Water Resources/ Water Quality	Discrete grab sampling and laboratory testing of water samples (Surface and Ground) by Concerned EPA approved Laboratory for monitoring as per stringent environmental quality standards	Biannually	70,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	17,500,000	Biannually monitoring cost for the five year O&M Phase and will be reproduced for next years of O&M based on updated rates.
2	Noise Levels	dBA Leq. as per stringent environmental quality standards	Biannually	5,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	1,250,000	
3	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by SEPA approved Laboratory as per stringent environmental quality standards	Biannually	40,000	25 6 for P#1, 8 for P#3, 4 for P#5, 7for P#6	10,000,000	
Sub-Total (C-1)						**28,750,000**	
C-2	**Environmental and Social Management Cost**						
1	E&S Activities	PMU / PIU	Monthly	1,000,000		60,000,000	This is the tentative monthly cost for five-year period for one E&S staff along with site visit cost and logistics arrangements.
	Sub-Total (C-2)					**60,000,000**	
	Sub-Total C ((C-1)+(C-2)) -					**88,750,000**	**Tentative for five (05) year Project O&M phase. The cost shall be reproduced for next years of O&M Phase and updated based on the**

Sr. No.	Parameter	Mechanism	Frequency	Unit Rate (PKR)	Quantity	Cost (PKRs)	Remarks
							current market prices during O&M phase.
	Grand Total (A+B+C)					**896,625,000**	
	Contingency Charges		20% of Grand Total			**179,325,000**	
	Grand Total with Contingencies					**1,075,950,000**	**Say 1,075.95 Million PKR**

ANNEX 6: E&S SCREENING CHECKLISTS FOR PHASE 1 SECTIONS

Environmental and Social Screening Checklist

Project Title:	**Widening and Improvement of National Highway N5 Priority Sections (487 km**
Section Name:	Section- 2: Ranipur to Rohri (70km)
Section Brief	The proposed Project is mainly divided into two Sections (i.e. South and North Section). These two Sections are further divided into eight sub Sections. The proposed Section 2 is a part of South Section which involve widening and rehabilitation of N-5 road in District Khairpur and Sukkur. The total length of the proposed Section is around 70 km starting from Rohri Toll Plaza (Lat 27°15'22.77" - Long 68°29'4.11") to near NHA Kanta Sukkur (Lat 27°41'1.25- Long 68°56'15.13). An initial site reconnaissance was conducted by NESPAK team along with Assistant Director (Afforestation) from NHA on this Section from October 1st, 2024 to October 4th, 2024.

Screening questions	Yes	No	Remarks
A. PROJECT SITING **Is the project area adjacent to or within any of the following environmentally sensitive areas?**			
▪ **Cultural heritage site**		√	Will be verified after consultation with archeology department
▪ **Protected area**		√	
▪ **Wetland**		√	
▪ **Mangrove**		√	
▪ **Estuarine**		√	
▪ **Buffer zone of protected area**		√	
▪ **Special area for protecting biodiversity**	√		The project road passing near the Lab-e Mehran (View Point of Indus Dolphin) that needs to be considered during construction phase. Construction activities may cause adverse impact on aquatic life.
B. **POTENTIAL ENVIRONMENTAL IMPACTS** **Will the Project cause…**			

Screening questions	Yes	No	Remarks
▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	
▪ Encroachment on precious ecology (e.g. Sensitive or protected areas)?		√	
▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	√		Various water bodies (major canals, nullahs) are being crossed by the existing N-5 road. This may cause minor impact.
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	√		Adequate sanitary facilities and drainage in the workers' camps will help to avoid/minimize this possibility. Moreover, the location of the camps will be proposed away from the surface water bodies and the criteria for the selection of construction camps sites will be provided in the ESIA report.
▪ Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	√		Air pollution level is likely to be increased for short duration during construction period. Appropriate distance from settlements may be taken into account to locate batching plants and other facilities likely to cause air pollution. Use of environment friendly equipment's / machineries will help to reduce air pollution.
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?	√		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for a short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects.
▪ Noise and vibration due to blasting and other civil works?	√		Blasting may not be involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site-specific. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level.
▪ Dislocation or involuntary resettlement of people?		√	

Screening questions	Yes	No	Remarks
▪ Dislocation and compulsory resettlement of people living in right-of-way?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed during detailed study stage.
▪ Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?	√		Various encroachments and parties on lease are found within the RoW. That will cause adverse impacts on livelihood of poor people. Extent of impact will be assessed during detailed study stage.
▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	√		Deterioration in ambient air quality, traffic congestion due to construction activities will cause HSE related issues to both workers and community.
▪ Hazardous driving conditions where construction interferes with pre-existing roads?	√		The proposed construction activities will cause interference to the existing road traffic. A traffic management plan will be designed and implemented by the contractor to prevent any hazardous driving condition in above situations.
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/aids) from workers to local populations?	√		Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents and the ESIA/EIA to avoid such possibility. Workers will be made aware about communicable diseases.
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	√		Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents and the ESIA/EIA to avoid such possibility. Workers will be made aware about communicable diseases.
▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	√		Accident risks associated with increased vehicular traffic are anticipated. Emergency response plan will be provided in ESIA/EIA which cover adequate safety measures to avoid such conditions.

Screening questions	Yes	No	Remarks
▪ Increased noise and air pollution resulting from traffic volume?	√		Increase in noise and air pollution is expected during construction phase. Adequate mitigation measures will be suggested in ESIA/EIA to minimize them. During operation phase, the main source of noise and air will be traffic. Improved road conditions will help to reduce the noise and air impact due to less idling of vehicles.
▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	√		This is expected from accidental spillage. Adequate safety provisions will be proposed to avoid such situation.
▪ Social conflicts if workers from other regions or countries are hired?	√		No such conflict is anticipated as the major work force will be hired locally.
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?	√		Workers will be mostly from local areas. Worker from remote places will be provided with adequate facility. The ratio of local and outside workers will be balanced that there is minimum or almost no additional burden on existing social infrastructures and services.
▪ Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		Such risks are anticipated. EIA/ESIA will outline such anticipated risks and recommend necessary mitigation measures to avoid them.
▪ Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.	√		Adequate measures will be recommended to mitigate such risks. Awareness will be created amongst people and workers through information disclosure, safety signage and public consultation about safety aspect.

Note: Hazards are potentially damaging physical events.

Conclusion:

The proposed Section is a part of South Section which involve widening and rehabilitation of N-5 road in District Khairpur and Sukkur. Considering the above mentioned minimal physical, ecological, social and climate vulnerability impacts the proposed Section is categorized as A and requires ESIA.

Environmental and Social Screening Checklist

Project Title:	**Widening and Improvement of National Highway N5 Priority Sections – 487 km**
Package Name:	Package-4: Lahore to Gujranwala (68 km)
Package Brief	The proposed package is mainly divided into two packages (i.e. South and North package). These two packages are further divided into eight sub packages. The proposed Package 4 is a part of North Package which involve widening and rehabilitation of N-5 road in District Lahore, Sheikhupura and Gujranwala. The total length of the proposed package is around 68 km starting from Punjab Employees Social Security Institution, Shahdara (Lat 31.627761-Long 74.28829) to Gujranwala (Lat 32.20225-Long 74.171176). An initial site reconnaissance was conducted by NESPAK team along with Assistant Director Afforestation from NHA on this package from September 24 2024 to September 25, 2024. All works are confined within existing Right of Way (ROW) of National Highway Authority, therefore no land acquisition will be required. There is no protected and notified cultural site within or near the vicinity of the project area. There is no protected/ reserve forest present in the project area. Industries are present throughout the route. Resettlement issues are anticipated as the proposed package is encroached. Apart from above, few environmental and social impacts are anticipated which are temporary, short-term and localized limited to the construction phase and are primarily related to soil erosion, noise, and air (dust) emissions, solid waste generation and disposal of wastewater, occupational and community health and safety, loss of livelihood, cutting of trees and traffic congestion/jam.

Screening questions	Yes	No	Remarks
A. PROJECT SITING **Is the project area adjacent to or within any of the following environmentally sensitive areas?**			
▪ **Cultural heritage site**	√		No cultural heritage site is noted or reported within the project area.
▪ **Protected area**	√		No protected area is present within or near the vicinity of the project area.
▪ **Wetland**		√	There is no notified wetland near the project area.
▪ **Mangrove**		√	There are no mangrove trees or forests located near to or in the vicinity of the project area.
▪ **Estuarine**		√	There is no estuarine environment or an estuary located along the project area

Screening questions	Yes	No	Remarks
▪ **Buffer zone of protected area**	√		There is no notified buffer zone of the protected area present near the project area.
▪ **Special area for protecting biodiversity**		√	There is no notified special area for protecting biodiversity near the project area
C. **POTENTIAL ENVIRONMENTAL IMPACTS** **Will the Project cause…**			
▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	No encroachment of historical places.
▪ Encroachment on precious ecology (e.g. Sensitive or protected areas)?		√	No encroachment on precious ecology.
▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	√		Major water bodies crossing include Shahdara Distributary, Upper Chenab Link Canal, Sem Nullah, Degh Nullahs and Laila Nullah. This may cause minor impact.
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	√		Adequate sanitary facilities and drainage in the workers' camps will help to avoid/minimize this possibility. Moreover, the location of the camps will be proposed away from the surface water bodies and the criteria for the selection of construction camps sites will be provided in the ESIA/EIA report.
▪ Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	√		Air pollution level is likely to be increased for short duration during construction period. Appropriate distance from settlement area may be taken into account to locate air polluting facility like batching plants, etc. Use of environment friendly equipment's / machineries will help to reduce air pollution.
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?	√		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for a short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects.

Screening questions	Yes	No	Remarks
▪ Noise and vibration due to blasting and other civil works?	√		Blasting may not be involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site-specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level.
▪ Dislocation or involuntary resettlement of people?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Dislocation and compulsory resettlement of people living in right-of-way?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	√		Deterioration in ambient air quality will be localized and temporarily during construction activity. Traffic congestion due to construction activities will cause HSE related issues to both workers and community. Improved road conditions will improve the air quality of the area.
▪ Hazardous driving conditions where construction interferes with pre-existing roads?	√		The proposed construction activities will cause interference to the existing road traffic. A traffic management plan will be designed and implemented by the contractor to prevent any hazardous driving condition in above situations.
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/aids) from workers to local populations?	√		Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents and the ESIA/EIA to avoid such possibility. Workers will be made aware about communicable diseases.

Screening questions	Yes	No	Remarks
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	√		Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents and the ESIA/EIA to avoid such possibility. Workers will be made aware about communicable diseases.
▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	√		Accident risks associated with increased vehicular traffic are anticipated. Emergency response plan will be provided in ESIA/EIA which cover adequate safety measures to avoid such conditions.
▪ Increased noise and air pollution resulting from traffic volume?	√		Increase in noise and air pollution is expected during construction phase. Adequate mitigation measures will be suggested in ESIA/EIA to minimize them. During operation phase, the main source of noise and air will be traffic. Improved road conditions will help to reduce the noise and air impact due to less idling of vehicles.
▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	√		This is expected from accidental spillage. Adequate safety provisions will be proposed to avoid such situation.
▪ Social conflicts if workers from other regions or countries are hired?		√	No such conflict is anticipated as the Pakistani workers (mostly from local areas) will be hired. However, the conflict may arise if the international contractor is hired or Labour is recruited from other areas
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Workers will be mostly from local areas. Worker from remote places will be provided with adequate facility. The ratio of local and outside workers will be such balanced that there is minimum or almost no additional burden on existing social infrastructures and services.
▪ Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		Such risks are anticipated. EIA/ESIA will outline such anticipated risks and recommend necessary mitigation measures to avoid them.

Screening questions	Yes	No	Remarks
▪ Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.	√		Adequate measures will be recommended to mitigate such risks. Awareness will be created amongst people and workers through information disclosure, safety signage and public consultation about safety aspect.

Note: Hazards are potentially damaging physical events.

Conclusion:

The proposed package is a part of North Package which involve widening and rehabilitation of N-5 road in District Lahore, Gujranwala and Sheikhupura. Considering the above mentioned physical, ecological, social and climate vulnerability impacts the proposed package is categorized as a priority package and therefore included in Phase-1(B) projects.

Environmental and Social Screening Checklist

Project Title:	**Widening and Improvement of National Highway N5 Priority Sections– 487 km**
Section Name:	Section-7: Rawalpindi to Hassanabdal (48 km)
Section Brief	The proposed Section is mainly divided into two Sections (i.e. South and North Section). These two Sections are further divided into eight sub Sections. The proposed Section 7 is a part of North Section which involve widening and rehabilitation of N-5 road in District Rawalpindi, Attock and Islamabad Capital Territory. The total length of the proposed Section is around 48 km starting from IJP-N-5 road junction Rawalpindi (Lat 33.634168 Long72.933062) to Burhan Police Station Hassan Abdal (Lat 33.819594 Long 72.607532). An initial site reconnaissance was conducted by NESPAK team along with Assistant Director (Afforestation) from NHA on this Section from September 30, 2024 to October 01, 2024. All works are confined within existing Right of Way (ROW) of National Highway Authority, therefore no land acquisition will be required. A notified cultural site namely Nicholson Column is found near the road in Taxila. The Margalla National Park also exist near the vicinity of the Section 7. Resettlement issues are anticipated as the proposed Section is encroached and land is given on lease by NHA. Apart from above, few environmental and social impacts are anticipated which are temporary, short-term and localized limited to the construction phase and are primarily related to soil erosion, noise, and air (dust) emissions, solid waste generation and disposal of wastewater, occupational and community health and safety, loss of livelihood, cutting of trees, traffic congestion/jam.

Screening questions	Yes	No	Remarks
A. PROJECT SITING **Is the project area adjacent to or within any of the following environmentally sensitive areas?**			
▪ **Cultural heritage site**	√		A notified cultural site (Nicholson Column) is located near the vicinity of the Section in Taxila.
▪ **Protected area**	√		A notified protected area (Margalla National Park) may exist near the vicinity of the Section. It will be confirmed on later stages through demarcation of national park boundary.
▪ **Wetland**		√	There is no notified wetland near the project area.
▪ **Mangrove**		√	There are no mangrove trees or forests located near to or in the vicinity of the project area.

Screening questions	Yes	No	Remarks
▪ **Estuarine**		√	There is no estuarine environment or an estuary located along the project area
▪ **Buffer zone of protected area**	√		A notified buffer zone of Margalla National Park may exist near the vicinity of the Section. It will be confirmed on later stages through demarcation of national park buffer zone.
▪ **Special area for protecting biodiversity**		√	There is no notified special area for protecting biodiversity near the project area
D. **POTENTIAL ENVIRONMENTAL IMPACTS** **Will the Project cause…**			
▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	No encroachment of historical places.
▪ Encroachment on precious ecology (e.g. Sensitive or protected areas)?		√	No encroachment on precious ecology.
▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	√		Various water bodies (nullahs) and tributary of Haro River are being crossed by the existing N-5 road. This may cause minor impact.
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	√		Adequate sanitary facilities and drainage in the workers' camps will help to avoid/minimize this possibility. Moreover, the location of the camps will be proposed away from the surface water bodies and the criteria for the selection of construction camps sites will be provided in the ESIA report.
▪ Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	√		Air pollution level is likely to be increased for short duration during construction period. Appropriate distance from settlement area may be taken into account to locate air polluting facility like batching plants, etc. Use of environment friendly equipment's / machineries will help to reduce air pollution.
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?	√		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for a short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects.

Screening questions	Yes	No	Remarks
▪ Noise and vibration due to blasting and other civil works?	√		Blasting may not be involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site-specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level.
▪ Dislocation or involuntary resettlement of people?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Dislocation and compulsory resettlement of people living in right-of-way?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	√		Deterioration in ambient air quality will be localized and temporarily during construction activity. Traffic congestion due to construction activities will cause HSE related issues to both workers and community. Improved road conditions will improve the air quality of the area.
▪ Hazardous driving conditions where construction interferes with pre-existing roads?	√		The proposed construction activities will cause interference to the existing road traffic. A traffic management plan will be designed and implemented by the contractor to prevent any hazardous driving condition in above situations.
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/aids) from workers to local populations?	√		Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents and the ESIA/EIA to avoid such possibility. Workers will be made aware about communicable diseases.

Screening questions	Yes	No	Remarks
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	√		Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents and the ESIA/EIA to avoid such possibility. Workers will be made aware about communicable diseases.
▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	√		Accident risks associated with increased vehicular traffic are anticipated. Emergency response plan will be provided in ESIA/EIA which cover adequate safety measures to avoid such conditions.
▪ Increased noise and air pollution resulting from traffic volume?	√		Increase in noise and air pollution is expected during construction phase. Adequate mitigation measures will be suggested in ESIA/EIA to minimize them. During operation phase, the main source of noise and air will be traffic. Improved road conditions will help to reduce the noise and air impact due to less idling of vehicles.
▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	√		This is expected from accidental spillage. Adequate safety provisions will be proposed to avoid such situation.
▪ Social conflicts if workers from other regions or countries are hired?		√	No such conflict is anticipated as the Pakistani workers (mostly from local areas) will be hired. However, the conflict may arise if the international contractor is hired or Labour is recruited from other areas
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Workers will be mostly from local areas. Worker from remote places will be provided with adequate facility. The ratio of local and outside workers will be such balanced that there is minimum or almost no additional burden on existing social infrastructures and services.
▪ Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		Such risks are anticipated. EIA/ESIA will outline such anticipated risks and recommend necessary mitigation measures to avoid them.

Screening questions	Yes	No	Remarks
▪ Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.	√		Adequate measures will be recommended to mitigate such risks. Awareness will be created amongst people and workers through information disclosure, safety signage and public consultation about safety aspect.

Note: Hazards are potentially damaging physical events.

Conclusion:

The proposed Section is a part of North Section which involve widening and rehabilitation of N-5 road in District Rawalpindi & Attock of Punjab Province and Islamabad Capital Territory. Considering the above mentioned physical, ecological, social and climate vulnerability impacts the proposed Section is categorized as A and requires ESIA.

Environmental and Social Screening Checklist

Project Title:	**Widening and Improvement of National Highway N5 Priority Sections – 487 km**
Section Name:	Section-8: Nowshera to Peshawar (40 km)
Section Brief	The proposed Section is mainly divided into two Sections (i.e. South and North Section). These two Sections are further divided into eight sub Sections. The proposed Section 8 is a part of North Section which involve widening and rehabilitation of N-5 road in District Nowshera and Peshawar. The total length of the proposed Section is around 40 km starting from Chamkani Police Station (Lat 34.019343- Long 71.652726) to Ummah Welfare Trust Nowshera (Lat 34.005907- Long 72.086899). An initial site reconnaissance was conducted by NESPAK team along with Assistant Director (Afforestation) from NHA on this Section from September 30, 2024 to October 01, 2024. All works are confined within existing Right of Way (ROW) of National Highway Authority, therefore no land acquisition will be required. There is no protected and notified cultural site and environmental sensitive areas present within or near the vicinity of the project area. Resettlement issues are anticipated as the proposed Section is encroached. Apart from above, few environmental and social impacts are anticipated which are temporary, short-term and localized limited to the construction phase and are primarily related to soil erosion, noise, and air (dust) emissions, solid waste generation and disposal of wastewater, occupational and community health and safety, loss of livelihood, cutting of trees and traffic congestion/jam.

Screening questions	Yes	No	Remarks
A. PROJECT SITING **Is the project area adjacent to or within any of the following environmentally sensitive areas?**			
▪ **Cultural heritage site**	√		No cultural heritage site is noted or reported within the project area.
▪ **Protected area**	√		No notified protected area falls adjacent to or within the project area.
▪ **Wetland**		√	There is no notified wetland near the project area.
▪ **Mangrove**		√	There are no mangrove trees or forests located near to or in the vicinity of the project area.
▪ **Estuarine**		√	There is no estuarine environment or an estuary located along the project area
▪ **Buffer zone of protected area**	√		There is no notified buffer zone of the protected area falls inside or near vicinity of project area.
▪ **Special area for protecting biodiversity**		√	There is no notified special area for protecting biodiversity near the project area

Screening questions	Yes	No	Remarks
E. **POTENTIAL ENVIRONMENTAL IMPACTS** **Will the Project cause…**			
▪ Encroachment on historical/cultural areas; disfiguration of landscape by road embankments, cuts, fills, and quarries?		√	No encroachment of historical places.
▪ Encroachment on precious ecology (e.g. Sensitive or protected areas)?		√	No encroachment on precious ecology.
▪ Alteration of surface water hydrology of waterways crossed by roads, resulting in increased sediment in streams affected by increased soil erosion at construction site?	√		Various water bodies (nullahs, Kabul river) are being crossed by the existing N-5 road. This may cause minor impact.
▪ Deterioration of surface water quality due to silt runoff and sanitary wastes from worker-based camps and chemicals used in construction?	√		Adequate sanitary facilities and drainage in the workers' camps will help to avoid/minimize this possibility. Moreover, the location of the camps will be proposed away from the surface water bodies and the criteria for the selection of construction camps sites will be provided in the ESIA report.
▪ Increased local air pollution due to rock crushing, cutting and filling works, and chemicals from asphalt processing?	√		Air pollution level is likely to be increased for short duration during construction period. Appropriate distance from settlement area may be taken into account to locate air polluting facility like batching plants, etc. Use of environment friendly equipment's / machineries will help to reduce air pollution.
▪ Risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation during project construction and operation?	√		Workers may get exposed to dust and noise during construction activities. However, the exposure levels are likely for a short time. Workers will be provided requisite PPEs to minimize such exposure and associated harmful occupational health effects.
▪ Noise and vibration due to blasting and other civil works?	√		Blasting may not be involved which is the major source of vibration. However, vibration produced from construction machinery will be limited and site-specific. Ambient noise level is expected to increase in the range of 80-90 dB(A) due to various construction activities, maintenance workshops, and earthmoving equipment to be used for civil works. All stationary noise making equipment will be installed with acoustic enclosures. Timings of noise construction activities will be regulated near sensitive receptors. Plantation will be proposed along the road which acts as a barrier to reduce the noise level.

Screening questions	Yes	No	Remarks
▪ Dislocation or involuntary resettlement of people?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Dislocation and compulsory resettlement of people living in right-of-way?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Disproportionate impacts on the poor, women and children, indigenous peoples or other vulnerable groups?	√		Various encroachments and parties on lease are found within the RoW. Extent of impact will be assessed as part of the RAP.
▪ Other social concerns relating to inconveniences in living conditions in the project areas that may trigger cases of upper respiratory problems and stress?	√		Deterioration in ambient air quality will be localized and temporarily during construction activity. Traffic congestion due to construction activities will cause HSE related issues to both workers and community. Improved road conditions will improve the air quality of the area.
▪ Hazardous driving conditions where construction interferes with pre-existing roads?	√		The proposed construction activities will cause interference to the existing road traffic. A traffic management plan will be designed and implemented by the contractor to prevent any hazardous driving condition in above situations.
▪ Poor sanitation and solid waste disposal in construction camps and work sites, and possible transmission of communicable diseases (such as STI's and HIV/aids) from workers to local populations?	√		Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents and the ESIA/EIA to avoid such possibility. Workers will be made aware about communicable diseases.
▪ Creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?	√		Temporary excavated areas and used tyres in the warehouse/yards during the construction phase may provide breeding grounds for mosquitoes including dengue. Proper provisions for sanitation, health care and solid waste disposal facilities will be available in the contract documents and the ESIA/EIA to avoid such possibility. Workers will be made aware about communicable diseases.
▪ Accident risks associated with increased vehicular traffic, leading to accidental spills of toxic materials?	√		Accident risks associated with increased vehicular traffic are anticipated. Emergency response plan will be provided in ESIA/EIA which cover adequate safety measures to avoid such conditions.

Screening questions	Yes	No	Remarks
▪ Increased noise and air pollution resulting from traffic volume?	√		Increase in noise and air pollution is expected during construction phase. Adequate mitigation measures will be suggested in ESIA/EIA to minimize them. During operation phase, the main source of noise and air will be traffic. Improved road conditions will help to reduce the noise and air impact due to less idling of vehicles.
▪ Increased risk of water pollution from oil, grease and fuel spills, and other materials from vehicles using the road?	√		This is expected from accidental spillage. Adequate safety provisions will be proposed to avoid such situation.
▪ Social conflicts if workers from other regions or countries are hired?		√	No such conflict is anticipated as the Pakistani workers (mostly from local areas) will be hired. However, the conflict may arise if the international contractor is hired or Labour is recruited from other areas
▪ Large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?		√	Workers will be mostly from local areas. Worker from remote places will be provided with adequate facility. The ratio of local and outside workers will be such balanced that there is minimum or almost no additional burden on existing social infrastructures and services.
▪ Risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?	√		Such risks are anticipated. EIA/ESIA will outline such anticipated risks and recommend necessary mitigation measures to avoid them.
▪ Community safety risks due to both accidental and natural causes, especially where the structural elements or components of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning.	√		Adequate measures will be recommended to mitigate such risks. Awareness will be created amongst people and workers through information disclosure, safety signage and public consultation about safety aspect.

Note: Hazards are potentially damaging physical events.

Conclusion:

The proposed Section is a part of North Section which involve widening and rehabilitation of N-5 road in District Nowshera and Peshawar. Considering the above mentioned physical, ecological, social and climate vulnerability impacts the proposed Section is Categorized as A and requires ESIA.

ANNEX 7: INCIDENT FLASH REPORT

Contractor:		**Contract:**	
Location of incident	**Date of incident:** (dd/mm/yy)	**Time:**	☐ a.m. ☐ p.m.
	Date reported: (dd/mm/yy)	**Time:**	☐ a.m. ☐ p.m.

Describe Incident:

NOTE: This is not an investigation report. This is a preliminary Flash Report to alert other business unit about the incident and to take precautions to avoid similar type of incidents by reviewing their work processes/procedures and put adequate corrective measures in place.

Type of Incident (*multiple selections possible)*

Is this incident a reoccurrence of a similar incident **Yes ☐** **No ☐**

Details if it is a similar incident from past:

INCIDENT CATEGORY

Injury ☐ Fire/Explosion ☐MVC ☐ Property Damage ☐
Environment ☐ Reputation ☐

Actual Severity	**Potential Severity**
0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ First Aid ☐ Medical Treatment Case ☐ Restricted Work Injury ☐ Loss Time Injury ☐ Fatality ☐ **(For MVC) Light ☐ Serious ☐ Major ☐ Catastrophic ☐**	0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ First Aid ☐ Medical Treatment Case ☐ Restricted Work Injury ☐ Loss Time Injury ☐ Fatality ☐ **(For MVC) Light ☐ Serious ☐ Major ☐ Catastrophic ☐**

Attach Pictures here (if available):

Immediate corrective actions:

Report prepared by:	Date: