COMMUNICATION AND WORKS DEPARTMENT
KHYBER PAKHTUNKHWA

Khyber Pakhtunkhwa Integrated Tourism Development (KITE) Project

DRAFT ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

PACKAGE: REHABILITATION AND REMODELING OF THANDIANI ROAD

LOT-I: ABBOTTABAD-THANDIANI ROAD (KM 00+000 TO KM 13+000)

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Khyber Pakhtunkhwa Integrated Tourism Development (KITE) Project

ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN (ESMP)

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LIST OF ABBREVIATONS

AADT	Average Annual Daily Traffic
ACS	Additional Chief Secretary
ADT	Average Daily Traffic
ASTM	American Standards for Testing Materials
BOD	Biological Oxygen Demand
BP	Bank Procedure
OC	Degree Centigrade
CCMP	Construction Camp Management Plan
CO_2	Carbon Dioxide
COD	Chemical Oxygen Demand
COP	Conference of Parties
COI	Corridor of Impact
C&W	Communication & Work Department
dB (A)	Decibel
DCR	District Census Report
DC	Design Consultant
DFO	Divisional Forest Officer
EHS	Environmental, Health & Safety
EIA	Environmental Impact Assessment
ERP	Emergency Response Plan
ESMP	Environmental & Social Management Plan
ESSU	Environmental and Social Safeguard Unit
EPA	Environment Protection Agency
FI	Financial Intermediary
Ft	Feet
GDA	Galiyat Development Authority
GHG	Green House Gas
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GoP	Government of Pakistan
GOKP	Government of Khyber Pakhtunkhwa
IDA	International Development Association
ILO	International Labour Organization
ITZ	Integrated Tourism Zone
IUCN	International Union for Conservation of Nature
Km	Kilometer
KP	Khyber Pakhtunkhwa
KITE	Khyber Pakhtunkhwa Integrated Tourism Enterprise Project
LAA	Land Acquisition Act
MEC	Monitoring and Evaluation Consultant
MASL	Meter Above Sea Level
NCS	National Conservation Strategy
NEQS	National Environmental Quality Standards
NESPAK	National Engineering Services Pakistan (Pvt.) Ltd.
NEP	National Environmental Policy
NGO	Non-governmental Organization
NOC	No Objection Certificate

NPO	No Project Option
OPs	Operation Policies
PAPs	Project Affected Persons
PCU	Passenger Car Unit
PEPA	Pakistan Environmental Protection Act
PMU	Project Management Unit
PSC	Project Steering Committee
RAP	Resettlement Action Plan
ROW	Right of Way
SC	Supervision Consultant
SDG	Sustainable Development Goals
SOP	Standards Operating Procedures
TOR	Terms of Reference
UNFCCC	United Nation Framework Convention on Climate Change
WB	World Bank

GLOSSARY

Air Quality Sensitive Receptors	People, property, species or designated sites for nature conservation that may be at risk from exposure to air pollutants potentially arising as a result of a proposed development.
Air Quality Standard	Levels of air pollutants prescribed by regulations that may not be exceeded during a specified time in a defined area.
Average Rainfall	Average amount of rainfall falling at any catchment area over a specific number of years.
Baseline	Existing environmental conditions present on, or near a site, against which future changes can be measured or predicted.
Biodiversity	The variety of life in the world or in a particular habitat or ecosystem.
Black Top	A bituminous substance used to pave roads
Climate	The climate can be described simply as the 'average weather', typically looked at over a period of 30 years. It can include temperature, rainfall, snow cover, or any other weather characteristic.
Climate Change	A change in the state of the climate, which can be identified by changes in average climate characteristics that persist for an extended period - typically over a period of 30 years.
Decibel(s)	A unit used to express relative differences in sound power or intensity. There is a million to one ratio in sound pressure (measured in Pascal (Pa)) between the quietest audible sound and the loudest tolerable sound. The decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement because of this wide range. Audibility of sound covers a range of approximately 0-140dB.
Dust	All airborne particulate matter.
Earthworks	The removal or placement of soils and rocks such as in cuttings, embankments including the in-situ improvement of soils/rocks to achieve desired properties.
Ecosystem	A biological community of interacting organisms (e.g. plants and animals) and their environment.
Effect	Used throughout this ESMP Report to refer to the consequence of an impact to the receiving environment (see also: 'impact').
Effluent	Liquid waste flowing out of a factory, farm, commercial establishment, or a household into a water body.
Environment Agency	Government agency (KP - Environmental Protection Agency) established to protect and improve the environment and contribute to sustainable development (Responsibility include: water quality and resources, flooding and coastal risk management and contaminated land)
Environmental Impact Assessment	A process of systematically assessing the likely environmental effects of proposed development projects. EIA is a legal requirement for certain public and private projects under PEPA Act 1997.
Environmental and Social Management Plan	A process of systematically assessing the likely environmental effects of proposed development projects.
Excavated Material	Soil, rock and other material that has been removed from the ground during construction.

Greenhouse Gas	A gas such as carbon dioxide, methane, chlorofluorocarbons, nitrous oxide, ozone, and water vapor that contributes to the greenhouse effect by absorbing infrared radiation.
Groundwater	All water that is below the surface of the ground and within the permanently saturated zone.
Initial Environmental Examination	A process of systematically assessing the likely environmental effects of proposed development projects. IEE is a legal requirement for certain public and private projects under PEPA Act 1997.
Mitigation	The measures put forward to prevent, reduce and where possible, offset any adverse effects on the environment.
Right of Way	To make a way over a piece of land for transportation purposes
Soil Erosion	The detachment and movement of soil by the action of water and/or wind.
Soil Profile	A vertical cross-section through a soil.
Surface Water	Water on the surface of planet such as in a river, lake, ocean, canal, stream, wet land and estuaries.
Topography	Shape and feature of the surface of the earth.
Topsoil	Surface soil usually including the organic layer in which plants have most of their roots and which the farmer turns over in plowing.

EXECUTIVE SUMMARY

ES-1 Introduction

This Environment and Social Management Plan (ESMP) has been prepared for the Communication & Works (C&W) Department, Government of Khyber Pakhtunkhwa (GoKP). This study covers the impacts from the Lot-I: Abbottabad-Thandiani Road (KM 00+000 to KM 12+760)[1] under the Khyber Pakhtunkhwa Integrated Tourism Development Project (KITE) financed by the World Bank. This report has been prepared to meet compliance with environmental regulations and requirements under Khyber Pakhtunkhwa Environmental Protection Act, 2014 and the World Bank's Safeguard policies applicable to the project.

This document presents Environmental and Social Management Plan (ESMP) of Lot-I.

ES-2 Legal and Administrative Framework

The Government of Pakistan (GoP) has promulgated laws/acts, regulations and standards for the protection, conservation, rehabilitation and improvement of the environment. Relevant National laws and regulations include Pakistan Environment Protection Act 1997, Guidelines for Environmental Assessment, Pakistan EPA. National Environmental Quality Standards; National Conservation Strategy,1992; Land Acquisition Act, 1894 including later amendments; Hazardous Occupations Rules, 1963 Protection of Trees and Brushwood Act, 1949, The Forest Act (1927) including later amendment; Employment of Child Act, 1991, Draft Solid Waste Management Guidelines (2005). Applicable provincial laws and policies include KP Environmental Protection Act, 2014; KP wildlife and biodiversity act, 2015; Climate change policy, KP, 2016; Tourism Policy, 2015; Culture Policy, KP, 2018. Applicable international conventions and treaties referred in this report include Convention on Biological Diversity, 1997, The Convention on Conservation of Migratory Species of Wild Animals, (1981), Convention on International Trade in Endangered Species of Wild Fauna and Flora, (1973), United Nations Framework Convention on Climate Change, (1994), Sustainable Development Goals (SDGs). Applicable World Bank Policies include, Environmental Assessment (OP/BP 4.01), Natural Habitats (OP/BO 4.04), Physical Cultural Resource (OP/BP 4.11), Involuntary Resettlement (OP/BP 4.12), Forests (OP/BP 4.36) and Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labor Influx, and Environmental, Health & Safety Guidelines.

C&W Department will be responsible for the implementation of project through Project Management Unit (PMU) whereas, Khyber Pakhtunkhwa Environmental Protection Agency (KP-EPA) will be responsible for issuing environmental approval.

[1] Subproject.

ES-3 Project Description

The project/ Thandiani Road[2] is located in District Abbottabad in Khyber Pakhtunkhwa (KP) Province. The subproject[3] is basically the rehabilitation and remodeling of Lot-I of Thandiani Road. The length of project is 13 km including Lot-I (13 km). Presently existing Thandiani Road is 5m to 7m wide bituminous road, which is not in good condition. The project is basically the construction of two-lane standard road as per C&W Department standards from Thandiani Chowk on Abbottabad ~ Murree road to Thandiani Top. Project passes through various population centers i.e. Kund, Ochar, Ghumawan, Kalay Pani, Crali, Rawalkot, Khatwal, Chatree, Bandi Mansoor, Thandiani and Daharan. The whole project alignment passes through hilly / mountainous terrain. The scope of project is to construct two lane standard road as per C&W Department standards. Project also involves replacement of existing slab / pipe culverts with new culverts. Details of the technical inputs/parameters include: project: Design Speed 25 to 40 Kmphroad Width 7.5 m. Total proposed project ROW varies from 09 to 41 meters and Design Life of Structures: 25 years.

The project cost (Lot-I & Lot-II) as per PC-1 is PKRs. 2,584.52 million. However, annual operating and maintenance cost is calculated as PKRs. 2.58 Million. Construction period for the project is 24 months. Project is proposed to be implemented from July 2021 to June 2023.

ES-4 Description of the Environment

Physical Environment

The existing environment in and around the project area has been studied with respect to the physical, ecological and socio-economic conditions. The project area lies in district Abbottabad which is dominated by mountains and hills. The mountains of Abbottabad are part of lesser Himalayas. Elevation of project route varies from 1,113 meters Above Sea Level (AMSL) near Thandiani Chowk to 2,700 AMSL near Thandiani Top.

Only some 10.5% of the cultivated area is irrigated by canals (Government owned), while wells (groundwater) for irrigation are used for only around 1% of the cultivated area. The important streams of the District are Haro and Dor.

In the project area near Abbottabad, the mountains rich in various minerals exist. The major minerals present in the entire stretch of the project area are iron, lead-zinc, manganese, tungsten, bentonite, graphite etc. The project area is located in Seismic Zone 3, where 3 represents peak horizontal ground acceleration from 0.24g to 0.32g.

The mean maximum and mean minimum temperatures from 1991 – 2015 are 26.12 ^{0}C and 7.36 ^{0}C respectively while the mean annual rainfall is 96.80 mm.

[2] *The word **Thandiani Road/Project/Project area/study area** in this document means an entire Project including Lot-I & Lot-II.*

[3] *Subproject means Lot-I.*

Two (02) points for surface water/ wastewater monitoring, two for drinking water/ groundwater monitoring and two points for air and noise level monitoring were selected. Sample size was selected on the basis of road length, traffic congestion points and number of settlements.

Environmental monitoring was carried in project area by an EPA Certified lab. All parameters tested for noise level, water, wastewater, and air quality were found to be within the permissible limit of NEQS except PM_{10} which was higher than the permissible limits of NEQS.

In the project area, no conventional solid waste management system exists. Most of the solid waste is found to be stored in the form of heaps at various locations near the villages and drains and open burning of waste is a common practice. Similarly, no proper sewerage system exists in the project area. The sewage through open drains is discharged into the nearby surface water bodies.

The proposed project route passes through the mountainous region with hilly, uncultivated, cultivated, forest area, vegetal, stream / nullahs, roads, tracks, residential & commercial land, graveyards, mosques, shrine etc. A comprehensive map showing sensitive receptors of the project area such as schools, mosques, shrines, graveyard, basic health units etc. is also provided as baseline of Project Area.

Ecological Environment

Study area of the proposed 24 km Thandiani road (Lot-I & Lot-II) is dominated and represented by Blue Pine Moist Temperate Zone and Sub-Tropical Chir Pine Zone.

The forest areas along the road are falling under different categories of forests. In the project area chatri reserve forests, and location forests were reported. Reserve forests were declared under the forest act 1927. Prior to the execution of any sort of work in these areas / Reserve Forests NOC from the Forest department (competent authority) is mandatory as per law of land. Administratively the project area lies within the jurisdiction of Abbottabad and technically (Forestry & Wildlife Departments) in Abbottabad Forest and wildlife Division. The scope of work includes widening of the existing road.

The proposed Thandiani Road is a pre-established metaled road, hence no major fragmentation is expected which can disintegrate the habitat areas into smaller and more isolated units. The prevalence of floral diversity along the existing alignment varies with elevation. In the upper reaches of the Galiyat region, the main tree species include deodar (*Cedrus deodara*), biar (*Pinus wallichiana*), paludar (*Abies smithiana*), and barangi (*Quercus lassiflora*). Chir pine (*Pinus roxburghii*) covers the lower hills, along with kao, or wild olive, (*Cedrala toona*). Currently, small oasis of plant life (small scrubby bushes belonging to different taxonomic groups), flourishing at the different patches along the ROW strip.

Significant faunal species in the sub-project area are; Flying Squirrel ((*Halopetesfimbriatus EN*), striped hyena (*Hyaena hyaena-NT*), Porcupine (*Hystris indica-LC*), Yellow throated martin (*Martes flavigula-LC*), Rhesus Macaque (*Macaca mullata-LC*), Common Leopard (*Panthera pardus-EN* Found in the ecosystem, but the habitat of same is away from sub-project site due to heavy human interventions and habitat destruction in past) Fox (*Vulpes vulpes griffithi-LC)*.

In the galiyat ecosystem (near the study area) the IUCN Red List specifies some birds occurring solely in the study area need be considered important, and may be designated as flagship species. These include the kalij pheasant (*Lophura leucomelanos-LC)*, koklass pheasant (*Pucrasia macrolopha-LC)*, peregrine or shaheen falcon (Falco peregrinus-LC) red-capped falcon (Falco pelegrinoides-LC), fairy pitta (Pitta nympha-VU) or Indian pitta or blue-winged, and the tytler's or slender-billed leaf warbler (*Phylloscopus tytleri-NT)*.

Socio-economic Environment

This Section provides a socioeconomic assessment pertaining to the demographic and socio-economic conditions of the PAPs and local community settled along the Thandiani Road from Abbottabad to Thandiani Top. Census and Socioeconomic survey was carried out 100% of the affected HHs affected due to the widening of road from Abbottabad to Thandiani, in which physical survey of each affected HHs was carried out. There are 83 households being affected due to widening of the road and socioeconomic survey of these PAPs was carried out. During the socio-economic surveys, people were also informed about the project objective, its location and basic design features etc. Administratively the project area falls in Tehsil Abbottabad of District Abbottabad.

According to the census survey, there are total 83 Households (HHs) consisting of 524 persons, which are being affected due to rehabilitation and remodeling of Thandiani Road. Out of total population affected (524), 270 are males and 254 are females and average HHs size is 6.3.

The census and socio-economic survey results reveal that majority (41%) of the HHs/respondents were aged above 50 years, 34.9% were aged between 41 – 50 years, 13.3% were aged between 31 – 40 years and 8.4 were aged between 21-30 years of age. Out of the total 51.8% of the respondents/HHs Heads were matric, 8.4% were educated upto primary level, and only 6% were Illiterate. Based on the field survey, major occupations in the villages along the road are doing jobs in private sector and business, Labour, agriculture and livestock rearing. Out of total (83) respondents/HHs Heads, 98% were married and only 02% were unmarried. 96.4% of the respondents were living in joint family system, whereas 3.6% were living in the Nuclear family system. As per socio-economic survey main language spoken in the study area was Hindko and Pashto. Out of total, 06% of the respondents fall in the very low income group below Rupees 17,500, majority of the respondents (43.4%) fall in the range of Rupees 17,500 to 30,000, 26.5% between 30,001 –50,000 and 19.3% of the respondents were earning their monthly income between the ranges of 50,001-75,000 rupees per month and only 4.8% were earning more than 75,000 per month. Sampled respondents were asked about the ownership status of the houses. All the respondents/

PAPs were owners of the houses. Health facilities are generally inadequate in the villages along the road route. No Non-Governmental Organization (NGO) or Community Based Organization (CBO) is identified working in the villages along the road.

To assess the socio-economic situation of women and their role in different decision making activities at the household level, socio-economic survey of the women was carried out along the road. For this purpose, structured interviews were conducted randomly with 30 women.

ES-5 Project Alternatives

No route alternative to the project was considered as proposed sub-project involves rehabilitation and remodeling of existing Thandiani Road. However, a comparison was made by taking Alternative 1 as No Project Option and Alternative II as rehabilitation and remodeling of Thandiani Road. Considering the environmental and socio-economic benefits of the proposed project including lesser wear & tear of vehicles, lesser air emissions, reduced probability of accidents, improved access to local markets, educational and health facilities, increased tourism and business opportunities, Alternative-II was selected.

ES-6 Public Consultation and Information Disclosure

The consultation and information disclosure to the Project Affected Persons (PAPs) and other stakeholders including KP-EPA, EPA, Abbottabad (regional office of KP-EPA), Forest Department, Irrigation Department, C&W Department, Galiyat Development Authority, Agriculture Department and Wildlife Department, were involved from the early stages of the planning and design of the project. Major concerns of the people in the project area were about the satisfactory compensation in case of acquisition of their assets, enhancement of tourism activities (resulting in increasing the commercial activities like parking requirements for the vehicles, hotels for night stays, tuck shops, roadside restaurants etc. in the project area), early completion of road, lack of trust on local government, special provision of jobs to poor people etc. People were also eager to have jobs during construction phase of the project.

ES-7 Potential Environmental and Social Impacts and their Mitigations

The proposed project twill have both positive and negative impacts during the construction and operational phases. Major impacts identified during construction are maintaining slope stability, shifting of public utilities such as electric poles, telephone lines, water supply pipelines, generation of 23.5kg of municipal solid waste and hazardous waste, disturbance of drainage, soil erosion, surface and groundwater contamination, construction camps/camp sites, deterioration of air quality, noise and vibrations, waste and hazardous waste, traffic management, cutting of trees, habitat disturbance of fauna, social conflicts due to labor influx, land acquisition and resettlement.

Negative impacts anticipated during operational phase include increase in air pollution in the long run (although improved road condition will improve the air quality but in the long run traffic will increase due to improved accessibility, hence resulting in increase in air pollution)

and noise level due to increase of traffic, generation of solid waste due to increase in number of tourists and road safety issues due to increase in traffic and speed of vehicles due to improved road condition.

Mitigation measures include maintaining natural angle of cut slopes and embankments during design to avoid land sliding, avoid use of heavy machinery on wet soil to prevent damage to soil structure, provision of temporary runoff collection system to contain the construction runoff, safe storage of oil, lubricants, chemical and other hazardous substances removal of left-over material from site, use of Personal Protective Equipment (PPEs) like masks, goggles and gloves, regular water sprinkling, restrict construction vehicles movement during night time; prohibition of hunting, poaching and harassing of animals and birds, provision of pedestrian bridge/underpasses for crossing of pedestrian and domestic animals, provision of special corridors for movement of wild animals, signs or warning notices of the presence of animals, adoption of work safety measures and good workmanship practices.

Positive impacts during construction and operation are employment opportunity, increase in land value, increase in trade, business and access to educational and health facilities.

ES-8 Environmental and Social Management Plan

Environmental and Social Management Plan (ESMP) is to provide institutional arrangement for the implementation of the proposed mitigation measures during the construction and operational phases of the proposed project. The ESMP defines roles and responsibilities, reporting mechanism, training needs and schedules and budget to implement the ESMP. The impacts, mitigation measures, monitoring indicators, frequency and responsibility has been documented in Environmental and Social Management Plan (ESMP).

Project Steering Committee will be responsible for overall project implementation while PMU Communication & Works Department will be responsible for overall implementation of ESMP of the project. Environmental and Social Safeguard Unit (ESSU) consisting of environment, social and occupation health and safety specialist will be established in PMU to ensure compliance of ESMP by the contractor. Monitoring and Evaluation consultant will carry out third party monitoring on yearly basis for implementation of ESMP. The Contractor will be responsible for the implementation of ESMP for the proposed project.

Environmental Monitoring will be undertaken during pre-construction, construction and operational phases to ensure the effectiveness of the proposed mitigation measures. Certain environmental parameters will be selected and quantitative analysis will be carried out.

A total of around 12,720 plants will be planted for total alignment on both sides of the subproject. The total cost required to effectively implement the mitigation measures is Rs. 45.8 Million.

1 INTRODUCTION

1.1 GENERAL

Communication & Works (C&W) Department, GoKP intends to rehabilitate and remodel Thandiani Road[4] (Length 24.4 km) under KITE comprising of two (02) lots:

Lot-I: Abbottabad-Thandiani Road (Km 00+000 to Km 13+000); and
Lot-II: Abbottabad-Thandiani Road (KM 13+000 to KM 24+377).

1.2 PROJECT BACKGROUND

Tourism is an important contributor to KP's economy and job creation, and the number of domestic tourists traveling to KP keeps growing rapidly. KP is blessed with diverse tourism attractions, catering to all interest types.

KP's rising value in the tourism sector is also evident from the fact that its expenditure in tourism sector rose from Rs. 86.23 million in the financial year 2012-13 to Rs. 791 million in financial year 2018-19. The increased tourism promotion has led to an unprecedented rise in tourist traffic in the province, resulting in growth in economic activity in the province and the creation of new employment opportunities for the local population.

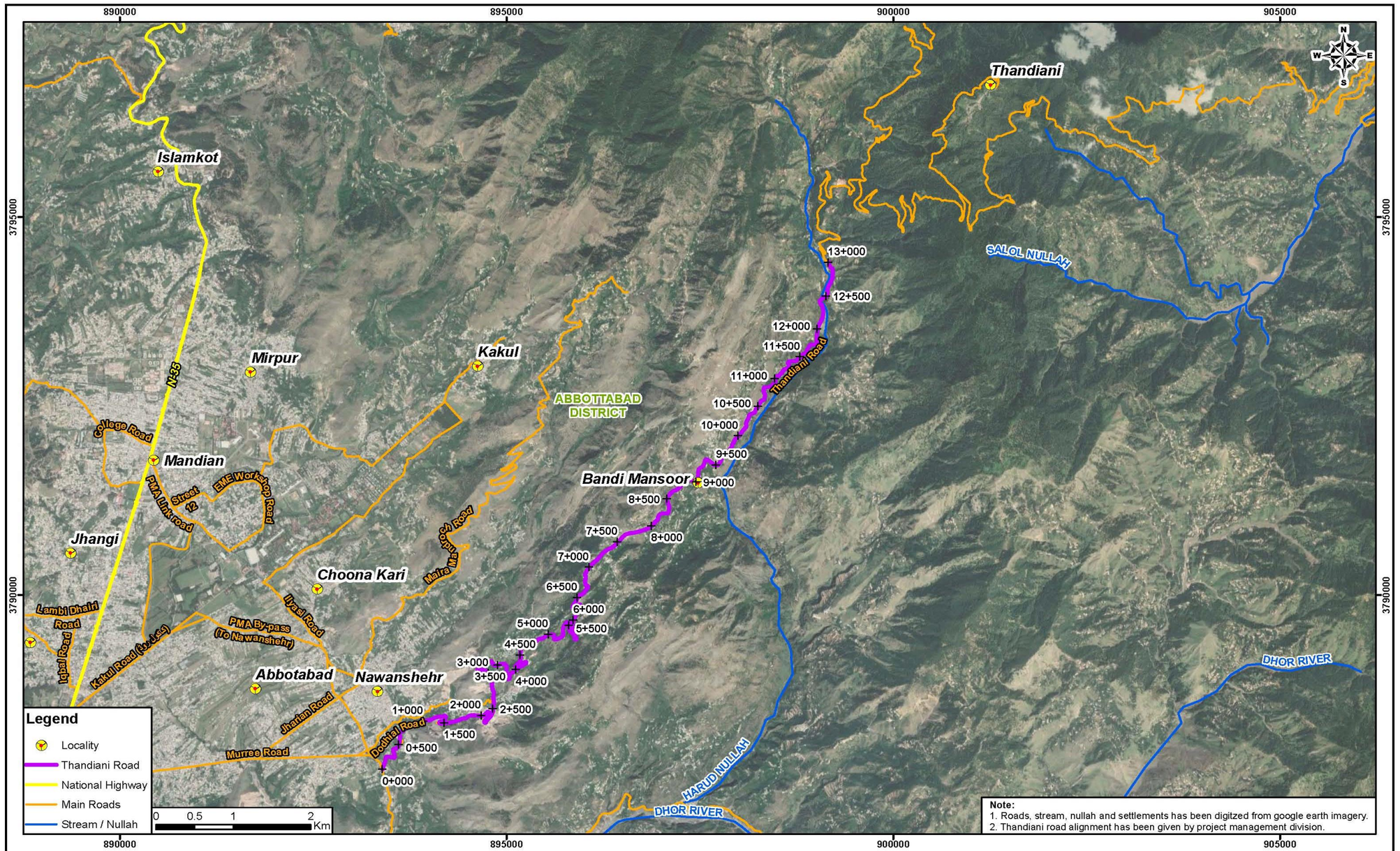
The GoKP has received loan from International Development Association (administered by the World Bank) towards the KITE. The KITE project aims to enhance under-utilized potential of KP's tourism sector for generating income and revenues, by providing an enhanced tourism experience to domestic and international tourists, while focusing on preservation of environment, wildlife, culture and heritage.

The GoKP intends to utilize part of the IDA funding for KITE Project to explore sites which have access from main road and can be termed as Integrated Tourism Zone (ITZs). In this connection, four roads including Supat Valley Road in District Mansehra, Thandiani Road in District Abbottabad, Mankial Road in District Swat and Shishikoh Madaklast Road in district Chitral has been selected for improvement and up-gradation.

This document presents Environment and Social Management Plan (ESMP) of Lot-I: Abbottabad-Thandiani Road (Km 00+000 To Km 13+000)[5] in District Abbottabad, KP. Location map is attached as **Figure 1.1**. This ESMP remains a live document, subject to modifications as the project design and technical specifications are finalized or modified prior to the implementation stage.

[4] *The word **Thandiani Road/Project/Project area/study area** in this document means an entire Project including Lot-I & Lot-II.*

[5] *Subproject*



CLIENT: WORKS & SERVICES DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				PREPARED	BILAL S.	PROJECT: REHABILITATION AND REMODELING OF THANDIANI ROAD LOT-1: ABBOTTABAD-THANDIANI ROAD (KM 00+000 TO KM 13+000)	LOCATION MAP OF ABBOTTABAD-THANDIANI ROAD
		03				SUBMITTED	BADAR H.		SCALE: 1:45,000
		02				RECOMMENDED	YAWAR S.		DATE: AUGUST, 2020 / DRAWING No.: P38472/043/M/001 / REV.: 0
		01				CHD/VER.	ABID S.		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	SHARIQ A.		

Figure 1.1: Subproject Location Map

This report has been prepared to meet compliance with environmental regulations and requirements under Khyber Pakhtunkhwa Environmental Protection Act, 2014 and the World Bank's Safeguard policies applicable to the project.

According to the World Bank Operational Policy OP 4.01 'Environmental Assessment' the proposed Project falls under Category 'B' as potential adverse environmental impacts of the proposed project on human populations or environmentally important areas are less adverse than those of Category A projects. These impacts are site-specific; few if any of them are irreversible; and mitigation measures can be designed more readily than for Category A.

1.3 OBJECTIVES OF ESMP

The main objective of this ESMP study is the identification of the possible and induced impacts of the proposed Project on both short and long-term basis. The impact identification process focuses particularly on physical, ecological, socio-economic and cultural aspects of the environment. Based on the level and nature of these observations the ESMP then delineates proper mitigation measures. As a planning tool, the ESMP aims to ensure that environmental, socio-economic and cultural issues throughout the entire project lifecycle are anticipated and considered by the project proponent. It also serves as a framework for establishing project controls to reduce or prevent adverse environmental or socio-economic impacts. A separate Resettlement Action Plan (RAP) has been prepared to deal with the land acquisition, resettlement and rehabilitation issues.

The specific objectives of this ESMP are:

- To assess the existing environmental and socioeconomic conditions of the project area;
- To identify potential impacts of the proposed subproject on the physical, ecological and social aspects of the Project Area, to predict and evaluate these impacts and determine their significance;
- To propose appropriate generic mitigation measures that should be incorporated in the design of the subproject to avoid or minimize if not eliminate the potentially adverse impacts;
- To assess the compliance status of the proposed activities with respect to the national/provincial environmental legislation and WB's OPs;
- To provide institutional, monitoring, reporting and documentation measures for environmental safeguards compliance; and
- To aid decision makers to take informed decisions.

1.4 THE PROPONENT

The Government of KP through Project Management Unit (PMU) KITE-C&W is the executing agency for the project, headed by the Project Director.

1.5 CONSULTANT ESMP TEAM

The NESPAK's ESMP team has been involved in the preparation of this ESMP for the proposed project. Detail of ESMP team is given in **Annex-I**

1.6 APPROACH & METHODOLOGY TO WORK

1.6.1 Approach

The study has been conducted in accordance with Environmental Protection Agency (EPA), Government of Pakistan (GoP) Guidelines, 1997, and the World Bank Safeguards policies (OP4.01, OP4.04, OP4.36, OP4.11 and OP4.12) applicable to this project. The study is based on both primary and secondary data and information. The primary data includes data collected from field. The secondary data includes a review of relevant information from literature. Discussions were held with stakeholders including government officials, community representatives and a wide range of road users and roadside dwellers. The main purpose of this approach was to obtain an impartial impression of the people's perceptions about the project and its environmental and social impacts.

1.6.2 Methodology

The following methodology was adopted for carrying out the ESMP study of the proposed project activity:

a) Field Survey

A site visit was conducted in the month of August, 2020 for the preparation of screening report for Lot-I. For this purpose, a checklist (attached as **Annex- II**) was developed in accordance with the Environmental and Social Standards of the World Bank's operational policies and applicable national and provincial legislations. Afterwards a detailed site visit for collection of data was conducted during the month of December, 2020. The data collected from field include:

- Identification of environmental sensitive receptors including air sensitive receivers, noise sensitive receivers and water bodies expected to receive pollutant load;
- Identification of ambient air and noise monitoring points, surface/wastewater and drinking water sampling locations;
- Ecological survey;
- Socioeconomic survey including public consultation; and
- Stakeholders consultations,

b) Review of Secondary Data

Previous environmental and social soundness assessment for KP region and other published and unpublished information was collected in order to gain a complete understanding of existing environmental conditions of the area including:

- Physical environment: topography, geology, soils, surface and groundwater resources and climate;
- Biological environment: habitat types, flora and fauna (particularly rare or endangered species), critical habitats /zones and vegetation communities within the project area;

- Socio-economic environment: settlements, socio-economic conditions, infrastructure and land use.
- Heritage aspects: sites of cultural, archaeological or historical significance.

c) Environmental Monitoring, Sampling and Testing

M/s Green Crescent Environmental Consultants (Pvt.) Ltd., an EPA certified laboratory was hired for Environmental Monitoring of air, water & noise quality. Two (02) surface water / wastewater and two (02) drinking water / groundwater samples have been collected. Similarly, two (02) points have been selected for ambient air and background noise monitoring at site. Sampling size was selected on the basis of road length. Two points were selected at traffic congestion location and more populated area/high number of settlements.

d) Corridor of Impact (CoI) and Right of Way (RoW)

CoI include the actual Project Right of Way (RoW) as well as the area in the surroundings in which positive and adverse impacts may be foreseen due to the implementation of the proposed Project.

Based on the available route alignment, ROW of Thandiani Road varies from 09 meters to 41 meters. However, CoI is taken 10 meters from the edge of RoW of the road on either side for the baseline survey.

e) Stakeholder Consultations

For this ESMP study, stakeholder consultation was carried out. The ESMP team met with the government functionaries, affected persons and local communities along the proposed route. The objective of the consultation was to disseminate information on the project and its expected impact, long-term as well as short-term, among primary and secondary stakeholders and to gather information on relevant issues so that the feedback received could be used to address these issues at an early stage.

f) Environmental and Social Impact Assessment

The data collected from the field was analyzed and the impacts of the proposed project on the physical, ecological and socio-economic environment prevalent in the project area were identified and characterized with respect to significance and probability of occurrence at the design, construction, operation and decommissioning phases. Possible mitigation measures and implementation mechanisms are proposed so that the impacts can be mitigated / controlled and the project implementation remains sustainable.

g) Development of Environmental and Social Management Plan (ESMP)

An ESMP for the proposed project activities was prepared. The ESMP provides a plan for implementing and managing the mitigation and monitoring measures. The ESMP includes the following:

- Mitigation and monitoring plan;
- Definition of roles and responsibilities of the proponent, contractors and monitoring teams;
- Requirements for communication, documentation and training during the project.
- Restrictions on design, timing and conduct of the project; and
- Change Management Plan to cover unforeseen events / environmental conditions during the project.

1.7 STRUCTURE OF REPORT

This document is a part of environmental and social safeguard documents prepared in the light of TORs for KITE Project. The structure of this report is listed below:

Section 1: Introduction presents the project background, objectives, methodology and need of the ESMP study.

Section 2: Legal and Administrative Framework Lists national as well as provincial laws, regulations and procedures and applicable World Bank Operational Policies (OPs).

Section 3: Project Description provides an overall description of the project including proposed alignment, design considerations and concepts, manpower requirement, waste generation, machinery and material requirements.

Section 4: Description of Environment gives a description of baseline physical, ecological and socio-economic conditions of the project area**.**

Section 5: Project Alternatives enlists possible design alternatives for the proposed project and their influence on environment and social situation.

Section 6: Public Consultation and Information Disclosure identifies the main stakeholders and their concerns raised during scoping sessions and deals with the measures to mitigate the social impacts.

Section 7: Potential Environmental and Social Impacts and their Mitigations Measures identifies, predicts and evaluates impacts of the project activities during the construction and operation stages and deals with the measures proposed to mitigate potential environmental impacts of the proposed project.

Section 8: Environmental and Social Management Plan This section outlines organizational framework, mitigation and monitoring plans training requirements, defines roles and responsibilities, estimates budgets requirements for satisfactory implementation.

Section 9: References presents the references consulted for the preparation of ESMP study.

1.8 INCLUSION OF SAFEGUARDS DOCUMENTS IN THE BIDDING DOCUMENTS

This ESMP will be a part of the Request for Proposals package/ Bid Documents and its compliance is mandatory. The contractor will be required to prepare site-specific plans as stipulated in ESMP. These site-specific plans will then be embedded into the civil

works contracts and therefore will be legally binding on the contractor. The site-specific plans must be submitted to the PMU / Project Director for review and clearance within 30 days of the signing of the contract or before mobilization on site, which ever date is earlier.

2 LEGAL AND ADMINISTRATIVE FRAMEWORK

2.1 GENERAL

This section deals with the current environmental policy as well as legal and administrative framework required to carry out the ESMP of the Lot-I. All relevant provisions of Environmental Policies laid out by the Government of Pakistan, along with applicable World Bank Safeguards have been duly discussed and the Project Proponent will be required to adhere to these regulations throughout the course of the project.

2.2 KEY NATIONAL AND PROVINCIAL LAWS, REGULATIONS AND POLICIES

Government of Pakistan has promulgated laws and regulations to safeguard the environment. At national level Ministry of Climate Change is the responsible authority & at provincial level KP-EPA is responsible for promulgation & implementation of environment related laws. Besides environmental statutes, a number of laws governing the social performance of the project also exist, e.g. Land Acquisition Act. The following description presents a brief overview of the relevance of various existing national policies, legislation and guidelines:

2.2.1 National Laws, Regulations and Policies

a) Pakistan Environmental Protection Act (PEPA), 1997

The Act was enacted on December 06, 1997 by repealing the Pakistan Environmental Protection Ordinance, 1983. It provides the framework for implementation of the PNCS, 1992, establishment of provincial sustainable development funds, protection and conservation of species, conservation of renewable resources, and establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examinations (IEE) and Environmental Impact Assessments (EIA). Section 12 of the Act stresses the need to carry out EIA/IEE study prior to construction or operation of a project. PEPA will play its role in relation to enforcement of other environmental laws in project's execution.

b) Sectorial Guidelines Applicable to the Project

PEPA published sectoral guidelines for environmental studies for different sectors in 1997. The sectoral guidelines for road sector are taken as reference for the preparation of this ESMP. These guidelines categorize Major Roads as motorways, major rural roads and major urban arterial roads Ancillary facilities such as all works within the right of way, restoration of access to surrounding property, traffic control devices, administration buildings, tollbooths, truck weighing facilities, rest and service areas, borrow pits, maintenance depots and construction compounds are also included within the scope of the guideline. The guideline aims to assist proponents in identifying the key environmental issues as well as mitigation measures and alternatives that should be considered during the

construction of a Road Project. This guideline categorizes Major Roads as motor ways, major rural roads and major urban arterial roads.

c) National Conservation Strategy, 1992

Pakistan National Conservation Strategy (NCS) approved by the federal cabinet in March 1992 is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992). The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment. Part 3 of NCS provides action agenda & implementation strategy of 14 program areas for priority implementation. These are mainly, maintaining soils in croplands, increasing irrigation efficiency, protecting watersheds, supporting forestry and plantations, restoring rangelands and improving livestock, protecting water bodies and sustaining fisheries, conserving biodiversity, increasing energy efficiency, developing and deploying renewable, preventing/abating pollution, managing urban wastes, supporting institutions for common resources, integrating population and environment programs and preserving the cultural heritage.

For each program the long-term goals and expected outputs and physical investment, required within the first 10 years of implementation have been identified. The NCS purposes a seven-level strategy for implementation. The seven levels of federal and provincial leadership, departmental responsibilities, district coordination, community participation, individual action, corporate tasks & government and NGO support.

A midterm review of NCS was prepared by IUCN in Nov 2000 about the achievements, impacts & prospects of Pakistan’s NCS since the beginning of its implementation in 1992. The main conclusion of midterm review are;

1. Achievements under NCS have been primarily awareness raising & institution building rather than actual improvements in quality& productivity of environment and natural resources;
2. NCS was not designed as national sustainable development strategy;
3. NCS process has strengthened civil society institution and enhanced the capacity of public institution;
4. NCS implementation capacity requires much improvement; and
5. NCS continues to have a major catalyst role in furthering Pakistan’s sustainable development agenda.

This strategy will safeguard and conserve natural environment by ensuring sustainable development in relation to project activities.

d) National Environmental Policy (NEP), 2005

NEP is the primary policy of Government of Pakistan addressing environmental issues. The broad Goal of NEP is, “to protect, conserve and restore Pakistan’s environment in order to

improve the quality of life of the citizens through sustainable development". The NEP identifies a set of sectoral and cross-sectoral guidelines to achieve its goal of sustainable development. It also suggests various policy instruments to overcome the environmental problems throughout the country. The sectoral guidelines include water supply and management, Air quality and noise, waste management, forestry, biodiversity and protected areas, climate change and ozone depletion, energy efficiency and renewable, agriculture and livestock and multi-lateral agreements were as; cross sectoral guidelines include; poverty and environment, population and environment, gender and environment, health and environment, trade and environment, environment and local governance and natural disaster management. NEP will protect the environment by ensuring sustainable development.

e) Guidelines for Environmental Assessment, Pakistan EPA

The Pak-EPA has published a set of environmental guidelines for conducting environmental assessments and the environmental management of different types of development projects. The guidelines that are relevant to the proposed project are listed below:

1. The Pakistan Environmental Protection Ordinance 1997
2. Policy and procedures for filing, review and approval of environmental assessments
3. Guidelines for the Preparation and Review of Environmental Reports, Pakistan, EPA 1997;
4. Guidelines for Public Consultations; Pakistan EPA May 1997;
5. Guidelines for Sensitive and Critical Areas, October 1997; and
6. Pakistan Environmental Legislation and the National Environmental Quality Standards.

These guidelines will be used as reference in preparation of EIA reports (if required), in later stages of the project.

f) National Environmental Quality Standards (NEQS), 2010

In pursuance of the statutory requirement under clause (e) of sub-section (1) of section (6) of the Pakistan Environmental Protection Act, 1997(XXXIV of 1997), Pakistan Environmental Protection Agency with prior approval of the Pakistan Environmental Protection Council, has published the NEQS in 2010.

The NEQS 2000 specify the following standards:

Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment facilities, and the sea (three separate sets of numbers);

- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources;
- Maximum allowable concentration of pollutants (two parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles; and
- Maximum allowable noise levels.

NEQS ensures that air, water and noise levels do not exceed their allowable limits, during project's implementation.

g) Land Acquisition Act, 1894 Including Later Amendments

The Land Acquisition Act, 1894, is a "law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition". The exercise of the power of acquisition has been limited to public purposes. This law is applicable in resettlement of the community and will ensure provision of adequate compensation of land to the affectees. This law is applicable in resettlement of the community and will ensure provision of adequate compensation of land to the affectees.

h) Protection of Trees and Brushwood Act, 1949

This Act prohibits cutting or lopping of trees and brushwood without permission of the Forest Department. The Forest Department will be approached for permission to cut trees (if required) in or around the proposed project site. This law controls greater number of trees cutting for the sake of development.

i) Antiquities Act 1975

The protection of cultural resources in Pakistan is ensured by the Antiquities Act of 1975. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments etc. The act is designed to protect 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 Government of Pakistan to prohibit excavation in any area, which may contain articles of archaeological significance. NOC would be requested from DG Archeological Department for construction within 200 feet of cultural heritage sites. The law protects antiquities and heritage sites during the implementation of the project.

j) Guideline for Solid Waste Management, 2005

Guidelines for Solid Waste Management have been issued as a draft by the Pakistan Environmental Protection Agency. These guidelines explain the waste generation, discharge and composition. These guidelines should strictly be followed for safe handling and disposal of waste generated during construction and operational stages of the project. These guidelines will be followed in collection, transportation and disposal of solid waste during projects implementation.

k) Building Code of Pakistan, 1986

The provision of Building Code of Pakistan shall apply for engineering design of building like structure and related components. The construction in violation of the Building code shall be deemed as violation of professional engineering work. Moreover, a certificate for the

proposed action will be obtained from Provincial Building Control Authority. Seismic provisions were later added in 2007.

l) National Forest Policy 2015

Historically, Forestry remained a provincial subject even after independence of Pakistan. In the Constitution of Islamic Republic of Pakistan 1973, Forestry is purely a provincial subject and not impacted by the eighteenth amendments in the Constitution (2010). However the federal support to federating units for meeting international obligations and filling their financial gaps is widely acknowledged. Climate mitigation and adaptation measures are the focus of National Forest Policy in view of Pakistan's high vulnerability to adverse impacts of climate change, in particular to extreme events.

m) The Forest Act (1927)/Addendum

The Forest Act 1927 is designed to protect forest areas. The law prohibits grazing hunting, quarrying, clearing for the purpose of cultivation, removing forest produce, and felling or looping trees in forest or protected areas. Section 26 of the act prohibits the clearing of land, felling trees, cultivation, grazing livestock, trespassing, mining and collecting forest reserves along with setting traps or snares and poisoning of water. Any person who contravene shall be liable with punishment set by the law. However, after Forest Ordinance Amendment (2016) in sec 27 and 34-A of the Forest Act 1927 a subsection (3) is inserted according to which the government after approval from the provincial cabinet declares reserved forest as no more reserved and can acquire the forest land for purpose of projects of national importance. The forest act also allows the concerned authorities to regulate privately owned forests and land under certain conditions such as protection from floods or landslides, safeguarding roads, bridges and railways and preservation of public health (Sec 55). This law avoids cutting of trees in development of tourist's facilities.

n) International Labour Organization (ILO)

The ILO aims to ensure that it serves the needs of working women and men by bringing together governments, employers and workers to set labor standards develop policies and devise programs.

The ILO has the following four strategic objectives:

- Promote and realize standards and fundamental principles and rights at work;
- Create greater opportunities for women and men to decent employment and income; and
- Enhance the coverage and effectiveness of social protection for all Strengthen social dialogue.

The ILO aims to ensure the needs of working women and men by bringing together governments, employers and workers to set labor standards develop policies and devise programs.

o) Employment of Child Act, 1991

This act prohibits the employment of children in certain occupations and regulates the conditions of work of children. According to the definition in the act, a child is one who has not completed his 14th year of education. According to Section 3 of the Act, 'No child shall be employed or permitted to work in any of the occupations set forth in Part I of the Schedule or in any workshop wherein any of the processes set forth in Part II of that Schedule is carried on: Provided that nothing in this section shall apply to any establishment wherein such process is carried on by the occupier with the help of his family or to any school establishment, assisted or recognized by Government'. This Act prohibits the employment of children in any of the proposed project activities.

p) Occupational Health & Safety Laws

In Pakistan, the OHS in different sectors is covered in various laws. There is no single comprehensive law covering OHS. The following pieces of legislation could be relevant to the project in terms of OHS aspects:

- Factories Act 1934;
- North-West Frontier Province Factories Rules 1975;
- West Pakistan Hazardous Occupations Rules 1963;
- Provincial Employees Social Security (Occupational Diseases) Regulation 1967; and
- Workmen Compensation Act 1923 and Rules 1961.

However, the exact applicability of the above laws to the proposed project is subject to discussion and legal opinion.

2.3 PROVINCIAL LAWS, REGULATIONS AND POLICIES

2.3.1 KP Environmental Protection Act, 2014

Post the adoption of the 18th Constitutional Amendment in 2011, the subject of environment was devolved, and the provinces have been empowered for environmental protection and conservation. Subsequently, the KP Government amended PEPA 1997 as KP Environmental Protection Act 2014, and KP EPA is responsible for ensuring the implementation of provisions of the Act in KP's territorial jurisdiction. KP EPA is also required to ensure compliance with the NEQS and establish monitoring and evaluation systems. In case any project falls under Schedule I or II of this Act, the relevant IEE (or EIA where required) will be developed and submitted to EPA KP for issuing NOC before commencing any physical work. This law will enforce the implementation of environmental legislations at provincial level and will be responsible for issuing No Objection Certificates (NOCs), if required.

2.3.2 KP Tourism Policy, 2015

This policy identifies key priorities of provincial government for the next few years to develop the tourism sector as the priority sector and transform it into an engine of economic growth by making KP a preferred tourist destination. KP tourism sector vision aims to develop an internationally competitive tourism sector to fully realize its diverse potential; making tourism a leading economic sector for the province through public-private partnership. The policy focuses on sustainable tourism development. The objectives of policy includes; to establish KP as a preferred tourist destination, nationally in the short to medium term and globally in the long term, increase tourist traffic in the province by at least 10% every year over the next five years, Increase private sector investment in the provincial tourism sector in the provincial tourism sector over the next five years, increase workforce quality in the sector provide quality services in the short to medium terms and position KP as a source of world class tourism workforce in the long run. Establish a tourism quality assurance system in the province and ensure compliance in the short to medium term and achieve global service standards in the long term. This policy will provide guidance in planning and implementation of the project activities.

2.3.3 KP Tourism Act, 2019

Khyber Pakhtunkhwa Tourism Act, 2019 which will provide a framework for the Integrated Tourism Zones (ITZs), Provincial Tourism Authority (PTA), tourist police and private sector entities in the tourism and hospitality sectors of KP. The aims of this act includes but not limited to: promote, preserve and revive cultural heritage, cultural traditions, values, festivals and dialects; measures for sustainable development; promote and preserve tangible and intangible cultural assets, values and traditions of province, develop, publish and implement regulations in respect of forests, mountains, water features, lakes, waterfalls, flora and fauna. The authority will have the powers to acquire land for the purpose of promoting tourism and developing resorts, skiing facilities, hotels and other tourism related activities. This policy will provide guidance in planning and implementation of the project activities.

2.3.4 KP Wildlife & Biodiversity Act, 2015

KP Wildlife Act is expedient to provide for the protection, preservation, conservation and management of wildlife in KP. The aims and objects of this Act are the:

1. Strengthening the administration of the organization to effectively manage wild animals and their habitats;
2. To holistically manage Protected Areas in sustainable manners for the best interest of the indigenous communities and local stakeholders;
3. Securing appropriately the goods and services produced from wild animals and their habitats at the level of local communities;
4. Fulfilling the obligations envisaged under the biodiversity related multilateral environmental agreements ratified by the Government of Pakistan;
5. Promotion of public awareness and capacity building for proper appreciation of the environmental significance and socio-economic values of wildlife; and

6. Conservation of biological diversity and realization of its intrinsic and extrinsic values through sustainable use and community participation.

To provide for the protection, preservation, conservation and management of wildlife.

2.3.5 KP Forest Ordinance 2002

This Ordinance is relevant because the proposed projects are located in or around forested areas. Especially, during construction, the contractors will need to strictly abide by its provisions. This Ordinance prohibits construction of any building or shed, road or enclosure, or any infrastructure, or altering or enlarging any existing road or infrastructure in a reserved forest. It also ban any cutting, felling or uprooting any tree or brushwood listed in Schedule – I. Furthermore, it also disallows to quarry stone from reserved forests. Due to the close proximity with a number of reserved forests, the mentioned provisions of this law will need to be taken into account.

2.3.6 Khyber Pakhtunkhwa Antiquities Act, 2016

This act pertains to protect, preserve, develop and maintain antiquities in the Province the KP. It extends to the whole of the Province of the KP. This act contains VII Chapters. Clause 55& 56 of Chapter IV, Development Schemes, New Construction and use of Movable Antiquities is applicable and require NOC from Directorate in case of vicinity of any protected immovable antiquity.

2.3.7 KP Climate Change Policy 2016

Pakistan has drafted its National Climate Change Policy in 2012. However, after the 18th amendment in the constitution of Pakistan, the Govt. of KP decided to formulate a Provincial Climate Change Policy to be more specific, target oriented and also in line with National Climate Change Policy of Pakistan 2012 - thus a Provincial Climate Change Policy was formulated for the first time in June, 2016, to the specific needs of the Province.

The Policy highlights sectors that need mitigation measures such as energy, transport, wastes, industries, urban planning etc. It also gives emphasis, to streamline Climate Change in different sectors of the economy and developmental projects in the Province to make a sustainable development and create resilience to natural disasters. Successful implementation of the Policy in relevant sectors like agriculture, water resources, forestry, wildlife etc. will help in achieving targets pertaining to Climate Change resilience. This law will enforce the implementation of mitigation measures such as energy, transport, wastes, industries, urban planning etc.

2.3.8 Culture Policy, Khyber Pakhtunkhwa, 2018

The KP culture policy goals are to create an enabling environment in which Cultural Heritage Sector can flourish and play a significant and defining role in nation building, safeguarding of identity and socioeconomic development. The primary objective of KP cultural policy is to

achieve the economic and social development and moderate the problems faced by existing cultural sector. KP culture policy aims to provide an environment conducive to the protection, growth and promotion of indigenous culture heritage. This policy will protect the cultural integrity of the province throughout the project area.

2.3.9 KP Commission on Status of Women

The KP Commission on the Status of Women is a statutory advisory body established under the Khyber Pakhtunkhwa Act XIX of 2009 which was amended by the Khyber Pakhtunkhwa Assembly under the new Act XXVIII of 2016. The Commission in KP is the first ever Provincial Level Commission in the country, established with functions to oversee implementation of laws, policies and programs related to women and propose new measures where gaps exist. The third term of the Provincial Commission on the Status of Women was notified in January 2017.

2.4 APPLICABLE INTERNATIONAL CONVENTIONS

Pakistan is signatory to a number of international conventions and agreements on biodiversity conservation, environmental protection, and sustainable development. The major conventions and agreements that are relevant to the project are the following:

2.4.1 Convention on Biological Diversity, 1997

Also known informally as the Biodiversity Convention, it is a multilateral treaty. The Convention has three main goals including: the conservation of biological diversity (or biodiversity); the sustainable use of its components; and the fair and equitable sharing of benefits arising from genetic resources.

The Convention requires parties to develop national plans for the conservation and sustainable use of biodiversity, and to integrate these plans into national development programmes and policies. Parties are also required to identify components of biodiversity that are important for conservation, and to develop systems to monitor the use of such components with a view to promoting their sustainable use.

Relevance: This convention is relevant because the project interventions will be undertaken in areas of rich diversity of flora and fauna.

2.4.2 The Convention on Conservation of Migratory Species of Wild Animals, (1981)

The Convention requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or cooperate with other countries in matters of research on migratory species.

Relevance: The project interventions will be undertaken in areas of rich wildlife and is the habitat of a number of migratory species.

2.4.3 Convention on International Trade in Endangered Species of Wild Fauna and Flora, (1973)

The convention requires Pakistan to impose strict regulation (including penalization, confiscation of the specimen) regarding trade of all species threatened with extinction or that may become so, in order not to endanger their survival further.
Relevance: The project interventions will be undertaken in areas where number of endangered species are present.

2.4.4 United Nations Framework Convention on Climate Change, (1994)

The UN Framework Convention on Climate Change (UNFCCC) is a multilateral agreement to address the issue of climate change. The Convention, was set out and opened for signature at the June 1992 UN Conference on Environment and Development (UNCED), also known as the Rio Earth Summit. The UNFCCC entered into force on 21 March 1994. Pakistan being signatory of this treaty is bound to control the GHG emissions and climate change. Recent conference of parties (COP) for UNFCCC was held from 6 to 17 November, 2017 in Bon Germany.

Relevance: Being a signatory to UNFCCC, the activities under the project must avoid GHG emissions.

2.4.5 Sustainable Development Goals (SDGs)

Sustainable Development Goals (SDGs) are a collection of 17 global goals set by the United Nations General Assembly in 2015, and adopted by Pakistan as its national goals. The goals are broad and interdependent, yet each has a separate list of targets to achieve. The SDGs cover social and economic development issues including poverty, hunger, gender equality, water, sanitation, energy, health, education, global warming, urbanization, environment and social justice.

Relevance: The project has direct relevance with SDG 6 (Clean Water & Sanitation), SDG 8 (Decent Work & Economic Growth), SDG 11 (Sustainable Cities & Communities), SDG 13 (Climate Action), SDG 14 (Life below Water) and SDG 15 (Life on Land).

2.5 APPLICABILITY OF WORLD BANK SAFEGUARD POLICIES

The development objectives of the World Bank safeguard policies are based on sustainability, transparency, fairness, accountability, governance, informed decision making, rights, participation and meaningful consultation for investment projects financed by the World Bank. Among total twelve safeguard policies, there are six environmental, two social, and two legal policies with their detailed Bank procedures can be found on the World Bank website. The disclosure and access to information policy is applicable to all investment

projects and programs funded by the World Bank. Based on available information the applicability of World Bank policies is summarized below:

Table 2.1: Applicability of World Bank Policies

WB Safeguard Policies Triggered by the Project	Triggered		Explanation
	Yes	No	
Environmental Assessment (OP/BP 4.01)	[√]	[ ]	The ESMP in hand is fully committed to the requirements determined in the WB Safeguard Policy. The environmental works carried out by the consultants on behalf of project proponents have been essentially guided by these rules as enunciated in the OP 4.01.
Natural Habitats (OP/BP 4.04)	[√]	[]	This OP is triggered to support the protection, maintenance and rehabilitation of natural habitats and their functions. The proposed Thandiani Road passes through the ecologically sensitive zones
Physical Cultural Resources (OP/BP 4.11)	[√]	[]	The possible discovery of archaeological sites or random findings during the excavation and earthworks may occur. In such case, this OP will trigger
Involuntary Resettlement (OP/BP 4.12)	[√]	[ ]	Land will be acquired from public/ private landholders. Hence this OP will trigger
Forests (OP/BP 4.36)	[√]	[]	This OP is triggered as the proposed Thanadiani Road already passes through ecological sensitive area. If this road is widened, then it will result into cutting down of trees in the Chatri Reserve Forest and Location Forest Thandiani.

2.6 OTHER RELEVANT WORLD BANK GUIDELINES AND POLICIES

2.6.1 Guidance Note on Labor Influx

A Guidance Note for “Managing the Risks of Adverse Impacts on Communities from Temporary Project Induced Labour Influx” was issued by World Bank in 2016. This Note provide guidance on identifying, assessing and managing the risks of adverse social and environmental impacts that are associated with the temporary influx of labor resulting from Bank supported projects. It contains guiding principles and recommendations to be considered as part of the design and implementation of projects with civil works that require labor from outside the project’s area of influence. It does not introduce new requirements, but rather seeks to provide concrete guidance on how to approach temporary labor influx within the environmental and social assessment process.

2.6.2 Environmental, Health & Safety Guidelines

In addition to operational policies (OP), the WBG has also established its EHS guidelines for all the interventions that are financed by the group. These EHS Guidelines are technical reference documents with general and sector-specific examples of Good International Industry Practice (GIIP). Following EHS guidelines are relevant to the proposed project during the construction and operation phase:

General EHS Guidelines: Issues associated with the construction and operation of maintenance facilities are addressed in the General EHS Guidelines with other key element like Environment and OHS at workplace as well as for community.

EHS Guidelines for Construction Materials Extraction: Issues associated with sourcing of construction materials are presented in the EHS Guidelines for Construction Materials Extraction.

Environmental, Health and Safety Guidelines for Toll Roads: EHS issues associated with road projects, which occur during the construction and operation phase, along with recommendations for their management are included in the guidelines.

Mitigations and preventive measures, based on the above guidelines, have been incorporated in the ESMP. The mentioned EHS guidelines will be adhered to during the construction and operation of the project.

2.6.3 World Bank Group Gender Strategy (2016-2023)

The 2015 Gender Strategy recognizes that stronger and better-resourced efforts are needed to address gender inequalities in access to jobs as well as control over and ownership of productive assets are key levers of change for women, their communities and economies and fundamental drivers of economic growth and poverty reduction. Gender equality is central to the World Bank Group's own goals of ending extreme poverty and boosting shared prosperity in sustainable manner.

2.7 ADMINISTRATIVE FRAMEWORK OF ROAD CONSTRUCTION

The C&W PMU will be established within the head office of C&W in Peshawar. It will monitor and coordinate all project implementation activities including financial management, procurement, recruitment of staff, consultants and contractors, and overseeing the implementation of ESMP.

3 PROJECT DESCRIPTION

3.1 GENERAL

The proposed project comprises of rehabilitation and remodeling of Thandiani Road, district Abbottabad.

3.2 NEED AND PURPOSE OF PROJECT

Objective of the project is to enhance the mobility from Thandiani Chowk on Abbottabad ~ Murree road to Thandiani Top. Project is aimed to promote the tourism in the area as Thandiani is characterized by excellent weather and lush greenery in the summer months, and snow-covered vistas and hills in the winter. Many tourists from KP and all over Pakistan visit Thandiani top especially in the summer season. Being at a high altitude, with attractive scenery and several hiking trails into the forests and other nearby locations, it is a very attractive prospect.

To promote the tourism, rehabilitation and remodeling of Thandiani is utmost need as existing road has limited road cross-section, which needs upgradation for smooth traffic operations. Project will ultimately increase the business / employment opportunities for the locals leading to a decrease in Poverty. The project aims to enhance under-utilized potential of KP's tourism sector for generating income and revenues, by providing an enhanced tourism experience to domestic and international tourists, while focusing on preservation of environment, wildlife, culture and heritage.

Construction of these roads is the utmost requirement to accommodate the smooth flow of traffic and facilitate the road users of the area. This project will extend its benefits to the area of the adjoining area by increasing their mobility and accessibility to a good quality road. This project by increasing the living standard of the people in the surrounding will also help in reducing vehicle operating cost and journey time thus boosting the economic condition of the surrounding people and the country.

The project provides major tangible and intangible benefits which include:

- Vehicle Operating Cost will be at its minimum;
- It will provide an efficient and time saving route; and
- Massive impact of the project on Land use will surely help in the progress of area and local people, as employment and business will be generated in vicinity by the implementation of the project.

3.3 PROJECT LOCATION AND ACCESSIBILITY

The project is located in District Abbottabad in KP Province. The project is basically the rehabilitation and remodeling of existing Thandiani Road. The project length is 24.4Km including Lot-I (13 km). The scope of project is construction of two lane road as per C & W

Department Standards. The location map of the project area is shown in **Figure 1.1**. The project site is accessible through Murree Road Abbottabad.

3.4 PROJECT DESCRIPTION

Projectstarts from Thandiani Chowk on Abbottabad to Murree road and terminates at Thandiani Top near PTV station. Presently existing road is 5m to 7m wide bituminous road, which is not in good condition.

The project is basically the construction of two lane standard road as per C & W Department standards from Thandiani Chowk on Abbottabad ~ Murree road to Thandiani Top. Project passes through various population centers i.e. Nawan Shehr, Ghumanwan, Rawalkot, Kala Pani and Thandiani. The whole project alignment passes through hilly / mountainous terrain. The scope of project is to construct two lane standard road as per C&W Department standards. Project also involves replacement of existing slab / pipe culverts with new culverts.

3.4.1 Salient Features of the Project

Salient features of the proposed project are given as under:

Design Speed:

- Design speed 25 ~ 40 Kph

Road Width : 7.3 m

Road Cross Section

- No of Lanes 02 Lanes
- Total Carriageway width 5.5 m
- TST / PCC Shoulder:
- Outer 1 m (Cut side)
  2 m (Fill side)

Cross Slope

- Carriageway 2%
- Shoulders 4%

Embankment:

- Side Slope : 2H : 1V (Common) in Fill
- Cut Slope : 1H : 1V in Common Cut
  : 1H : 2V in Soft Rock Cut
  : 1H : 3V in Medium Rock Cut
  : 1H : 4V in Hard Rock Cut

Right of Way

- Existing : 6 m
- Additional : 14 m
- Total Proposed ROW : 20 m

Maximum Super Elevation : 6%

Gradient:

- Maximum (Existing) : 20%
- Maximum (Provided) : Followed Existing

Design Life of Structures

Design Return Period:

- Culverts : 25 Years

Structures (Culverts)
Loading : Class A / AA
(Whichever is severer)

Pavement Lane Markings:

- Yellow line - Edge of pavement
- White line - Center line
- Studs - as required

Codes and Standards:

Following codes and standards have been considered/ adopted for design of the project:

Geometric Design	:	AASHTO Policy on Geometric Design of Highways & Streets- 2011
Material & Testing		AASHTO – ASTM
Pavement Design		AASHTO Guide for Pavement Structures 1993.

The proposed typical cross section are shown in **Figure 3.1 and Figure 3.2.**

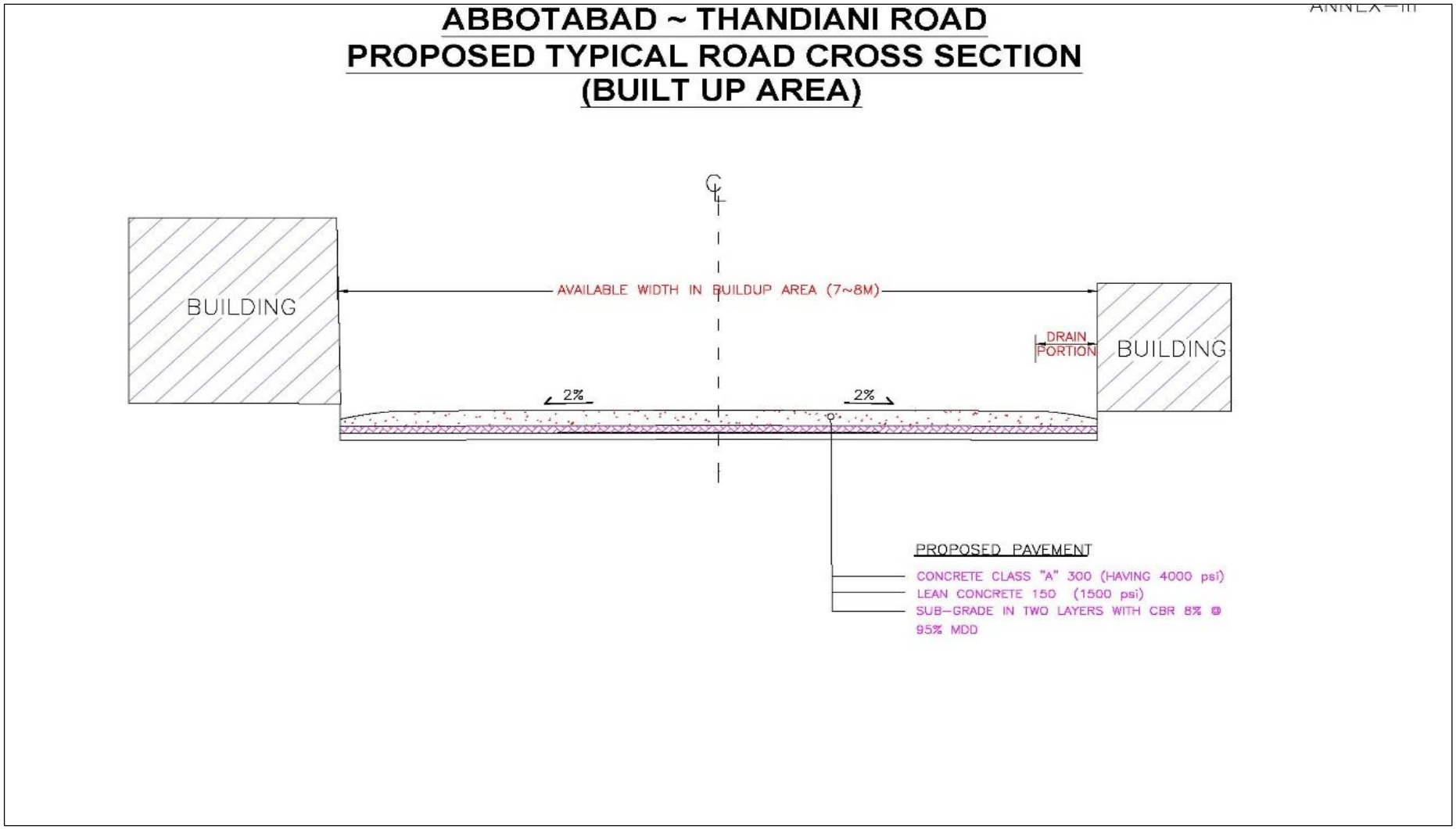


Figure 3.1: Typical Cross Section 1

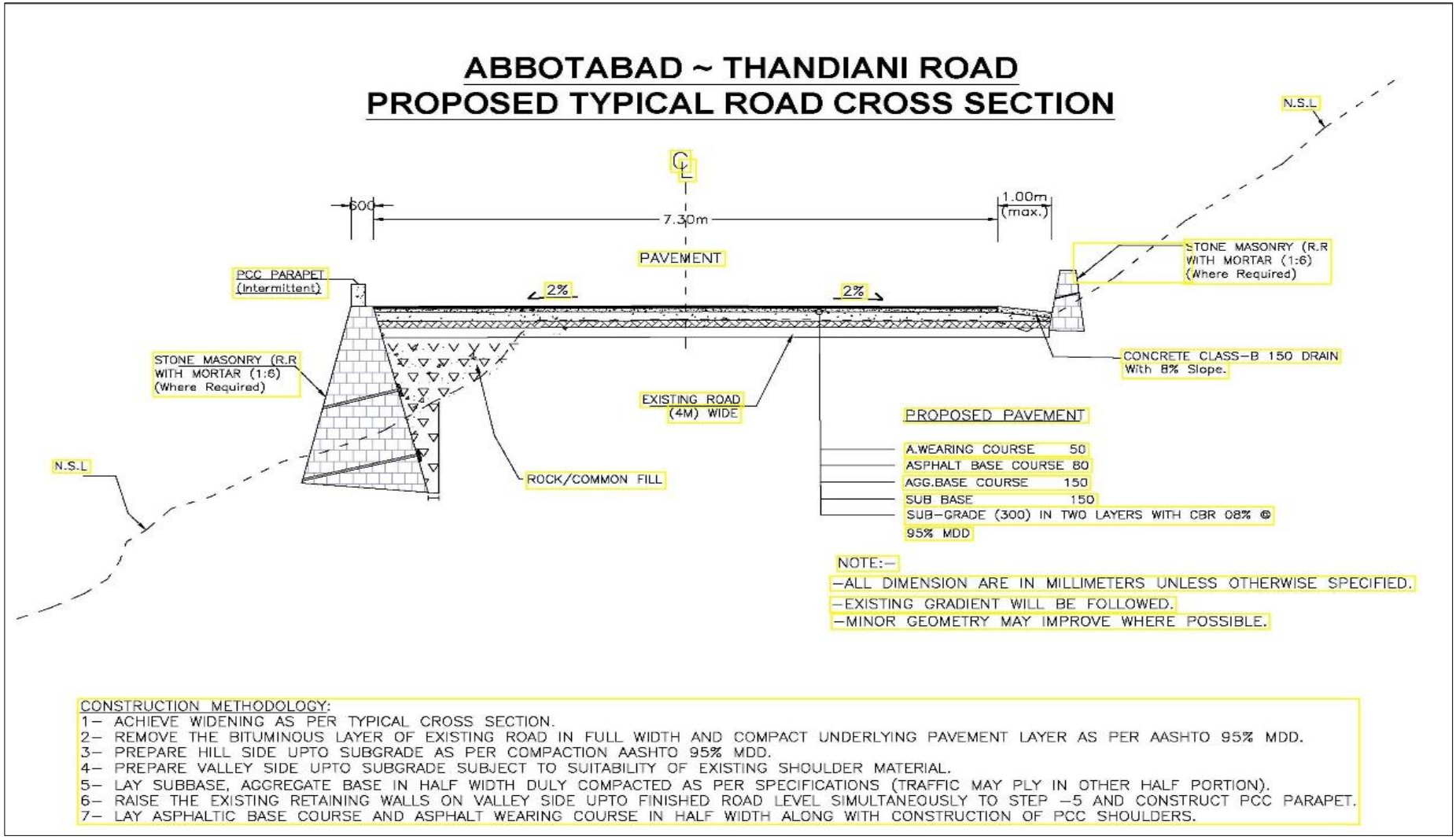


Figure 3.2 : Typical Cross Section 2

3.5 PROJECT COST

The project cost (Lot-I & Lot-II) as per PC-1 is PKRs. 2,584.52 million. However, annual operating and maintenance cost is calculated as PKRs. 2.58 Million.

3.6 PROJECT IMPLEMENTATION SCHEDULE

Construction period for the project is 24 months. Project is proposed to be implemented from July 2021 to June 2023.

3.7 PROJECT ADMINISTRATIVE JURISDICTION

The proposed project falls under the jurisdiction of Deputy Commissioners of Abbottabad districts.

3.8 CONSTRUCTION MATERIALS

For material specifications, the "Technical Specifications Book-1 (Engineering Materials)" issued by C&W Department GoKP in the year 2020 were used. Special provisions cover any deviation from these specifications. The following major materials will be used during the construction phase.

3.8.1 Concrete

Minimum compressive cylinder strength of concrete at 28 days for various structural works shall be as follows:

Substructure of culvert/underpass	=	280 Kg/cm^2 (4000 psi)
Superstructure of culvert/underpass	=	280 Kg/cm^2 (4000 psi)
Lean/blinding concrete	=	100 Kg/cm^2 (1500 psi)

3.8.2 Reinforcement

All reinforcing steel to be used in reinforced concrete works shall conform to ASTM A615 Grade 60 with minimum yield strength of 4250 kg/cm^2 (60,000 psi) or AASHTO M-31 Grade 60.

3.9 CONSTRUCTION ACTIVITIES AND REQUIRED MACHINERY

Construction activities involve following:

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

Table 3.1 shows the list of expected machinery required for construction:

Table 3.1: List of expected Machinery/Equipment

Sr. No.	Type of Machinery and Equipment
1	Dump Truck
2	Front End Loader
3	Dozer
4	Grader
5	Vibratory Roller
6	Water Tankers
7	AGG. Spreader
8	Three Wheel Rollers
9	Tandem Roller
10	Asphalt Plant
11	Paver
12	Self-Propelled Pneumatic Roller
13	Asphalt Distributor
14	Batching Plant
15	Concrete Transit Truck
16	Concrete Pump
17	Excavator
18	Water Pumps
19	Cranes
20	Vibrators
21	Generators

3.10 CONSTRUCTION WORK FORCE

The project involves professional, administrative, skilled and unskilled labour which will be deployed for the construction activities. About 47 numbers (estimated for Lot-I) of crew, skilled and unskilled labour to be employed during the construction stage by the Contractor. The Contractor will be advised to hire unskilled labour from the local communities. A training programme will be conducted for unskilled workers.

3.11 WASTE GENERATION AND DISPOSAL

Due to construction activities waste will be generated at construction and contractors camp site. The construction waste will include wastewater, oil spillage from machinery, domestic waste and waste construction materials. Solid waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites.

3.12 CONSTRUCTION CAMPS

Camp sites will be selected based on following considerations:

- Number of workforces deployed;
- Type and quantity of machinery mobilized;

- Availability of adequate area for establishing camp sites including parking areas for machinery, stores and workshops; and
- Access to communication and local markets, and away from the local population settlement and appropriate distance from sensitive areas including settlements and religious and/or cultural facilities.

Final locations will be selected by the contractor with the assistance of Supervision Consultant, which will be finalized after the approval from Project Director of C&W Department, KP. Care will be taken to safeguard the existing environment of the area and location shall be selected away from settlements. It will not be possible to locate camp sites within the ROW. The contractors may acquire land on lease from private landowners.

4 DESCRIPTION OF ENVIRONMENT

4.1 GENERAL

This chapter provides the description of the baseline conditions along the proposed project within the CoI and RoW.

Considering the potential impacts of the Proposed Project, existing baseline environmental conditions of the proposed project's CoI has to be used as a benchmark for comparison of the physical, ecological and socio-economic conditions before and after construction phases of the Project. This baseline will also provide the datum for assessing the impacts and suggesting the mitigation measures, which will be implemented effectively at various phases of the project activities.

4.2 PHYSICAL ENVIRONMENT

The major parameters covered include Topography, Geology, Seismicity, Soil, Climate, Water Resources, Ambient Air Quality & Noise, Solid Waste and Land-use along the Proposed Project.

4.2.1 Topography

The proposed project lies in district Abbottabad which is dominated by mountains and hills. The mountains of Abbottabad are part of lesser Himalayas. Elevation of project route varies from 1,113 meter AMSL near Thandiani Chowk to 2,700 meter AMSL near Thandiani Top. **Figure 4.1** shows the topographical map.

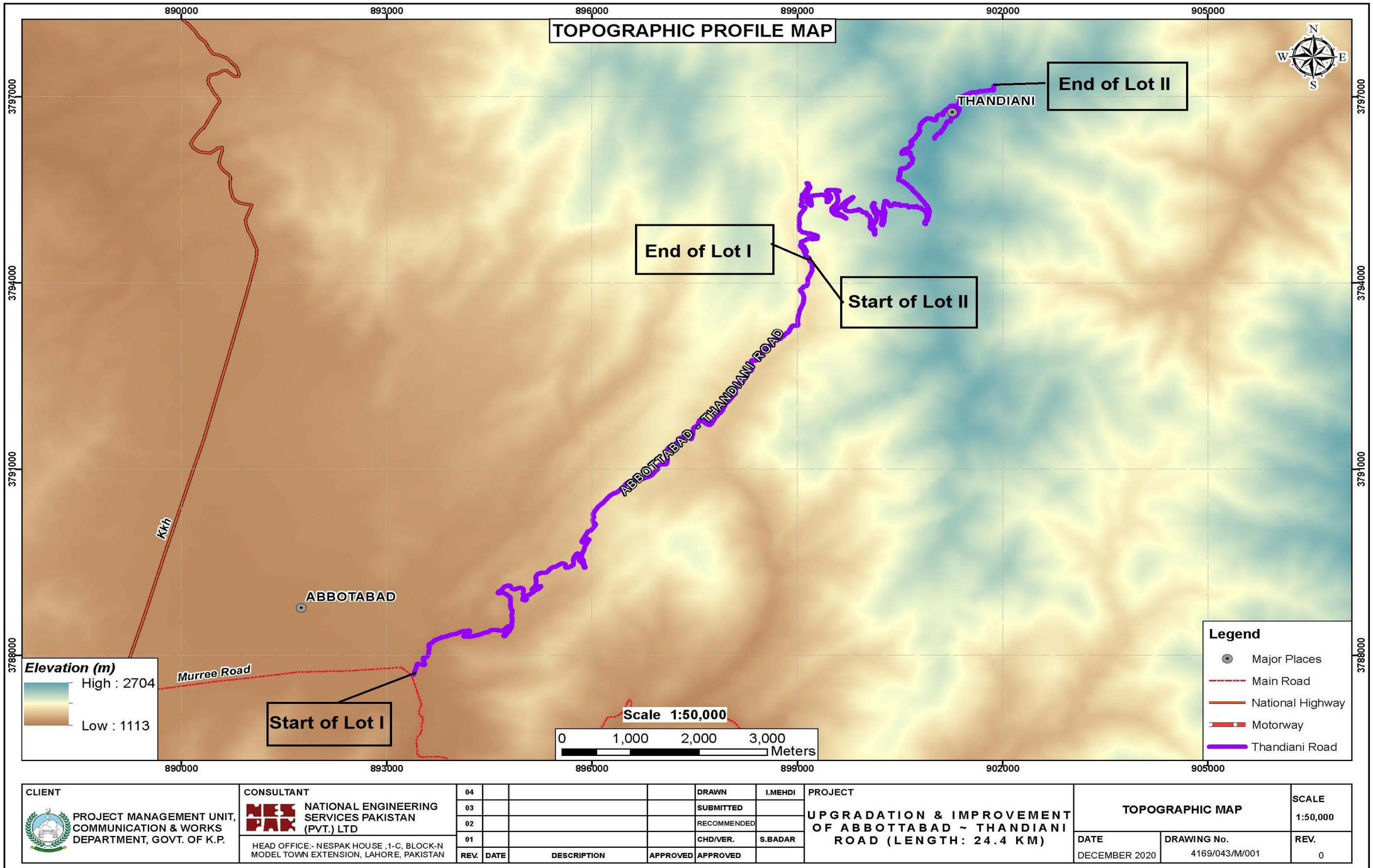


Figure 4.1 : Topographical Map of Project Area

4.2.2 Water Resources

4.2.2.1 Surface water

Irrigation Water

Approximately 10.5% of the cultivated area is irrigated by canals (Government owned), while wells (groundwater) for irrigation are used for only around 1% of the cultivated area.

Rivers and Streams

The important streams of the District are Haro and Dor. **Figure 4.2** shows the rivers and tributaries of the project area. Beside these Kunhar river flows along the north eastern boundary of the district and joins the Jhelum in the east. The Jhelum River flows along the eastern boundary of the project area for about 50 kilometers. The Haro originates at the southern end of Dunga Gali range and flows through the District as two separate streams towards southwest. The Dor River rises at the northern end of Dunga Gali range and flows in the center of the District in a south western direction. These rivers have numerous tributaries, some with permanent flow and other with scanty flow. These tributaries (nullahs) are also used as access road to the hilly terrain where the earthen tracks are not available.

The Dor contains much less water and has a shorter and more rapid course and originates at the northern end of Daunga Gali ranges flows through the plains of district and joins the Siran near the north-eastern of Gandger range 8 kilometers above Tarbela.

The Haro River emanates from the southern end of Dunga Gali range where it has two main branches. The eastern known as Dhund and the western is known as Karral Haro. The two streams unite at the head of Khanpur tract and the river after flowing for some distances debauches on the Khanpur Panjkatha.

4.2.2.2 Groundwater

In COI due to higher elevation, locals utilize readily available spring water which is supplied through pipeline network.

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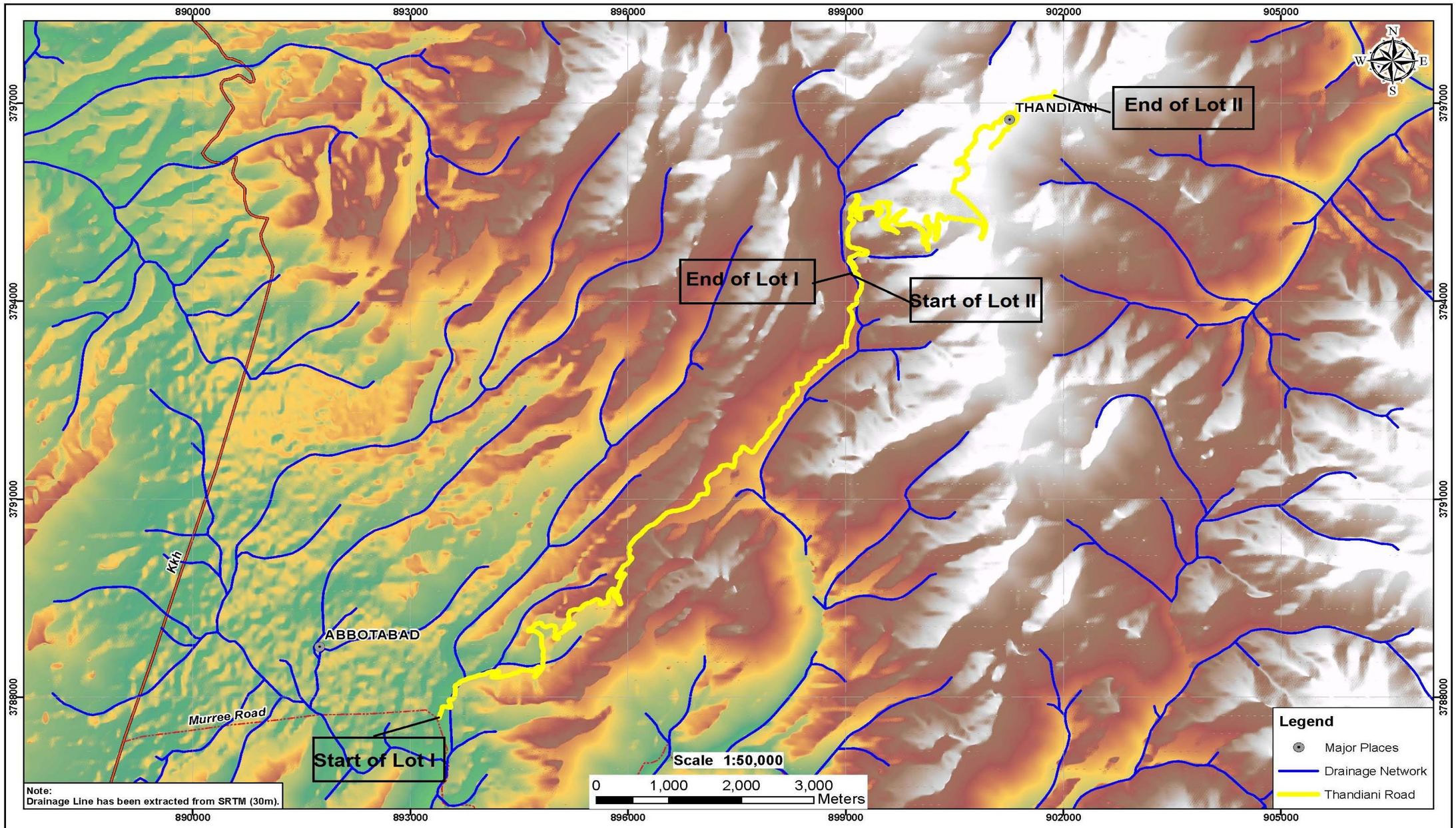


CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)
		03				SUBMITTED		
		02				RECOMMENDED		
		01				CHD/VER.	S.BADAR	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED		

SURFACE WATER RESOURCES MAP		SCALE
		1:50,000
DATE	DRAWING No.	REV.
DECEMBER 2020	4169/043/M/001	0

Figure 4.2: Surface Water Resources Map

4.2.3 Geology and Soil

In the project area near Abbottabad, the mountains rich in various minerals exist. The major minerals present in the entire stretch of the project area are iron, lead-zinc, manganese, tungsten, bentonite, graphite etc. Geological map is shown in **Figure 4.3**. Due to substantial rainfall in the project area, soil erosion has been observed as a major problem along the alignment of the proposed project. The water percolates inside the land and erodes the soil significantly. The soil in the project area is mostly of alluvial character and consists of agglomerate of stone fragments, gravel, sand and silty loams. The soil at project area is predominantly of silt.

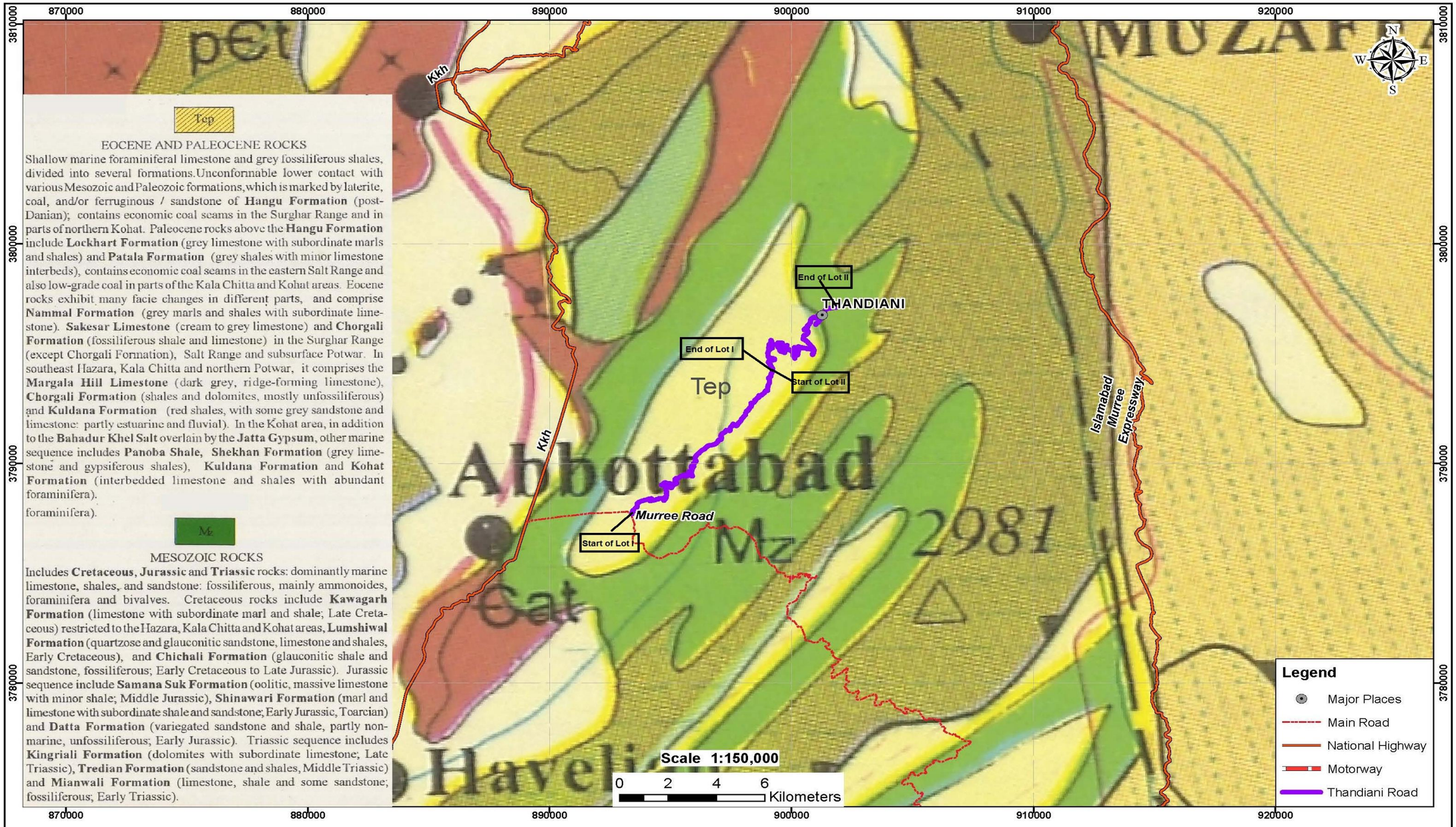
4.2.4 Seismicity

On the basis of Peak Ground Acceleration (PGA) values obtained through Probabilistic Seismic Hazard Assessment (PSHA), Pakistan is divided into five (05) seismic zones in line with the Uniform Building Code (UBC), 1997 of the Pakistan. The boundaries of these zones are defined on the basis as shown in **Table 4.1**.

Table 4.1: Values of Seismic Zones of Pakistan

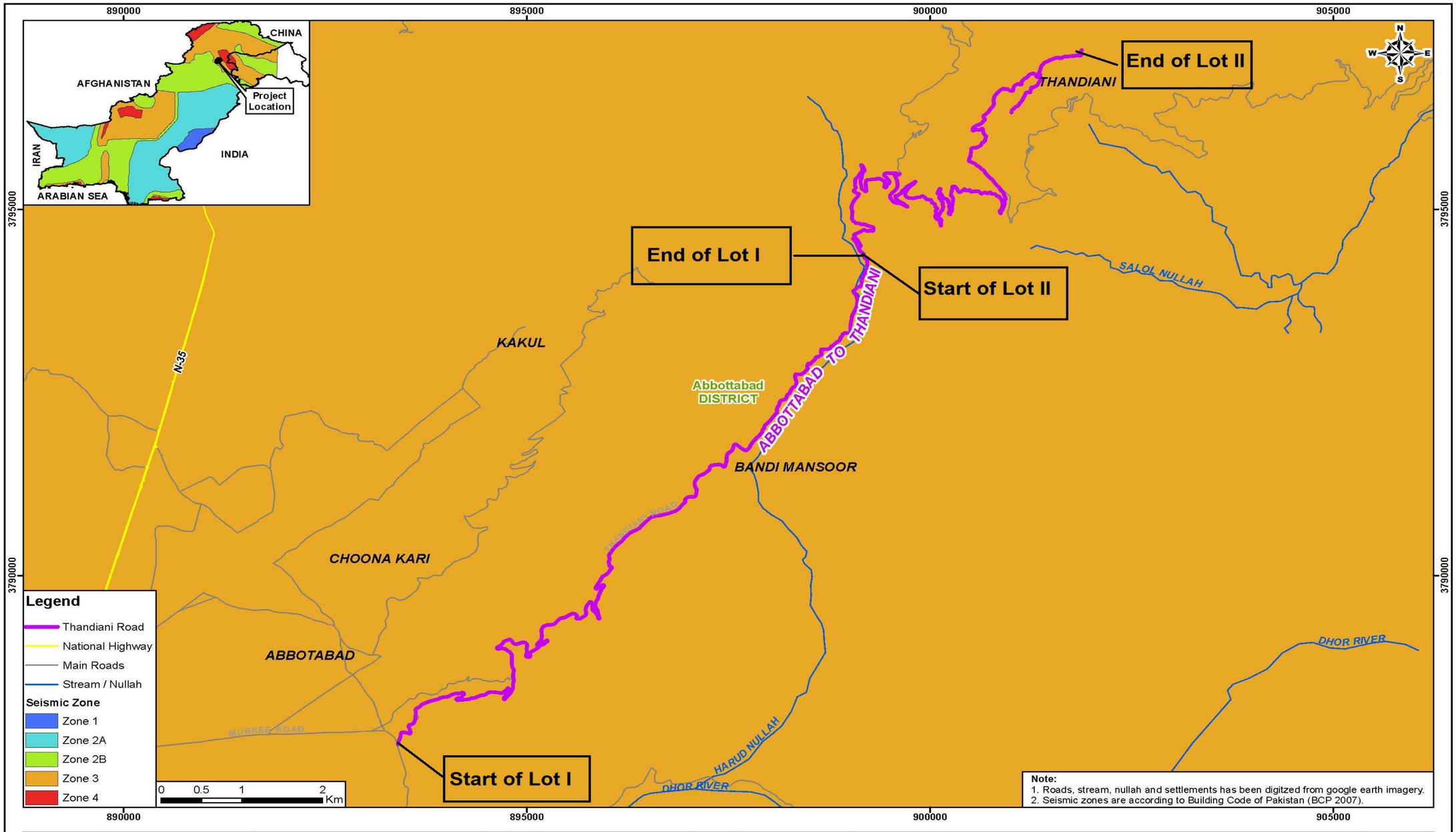
Sr. No.	Zone	PGA (g)
1	1	0.05 to 0.08
2	2A	0.08 to 0.16
3	2B	0.16 to 0.24
4	3	0.24 to 0.32
5	4	> 0.32 g

Horizontal and vertical seismic forces transmitted to the support structures by the ground during earthquake may cause extremely high mechanical stress to engineering structures as well as roads, seismic adaptation which is primarily related to the appropriate design of support structures and connections between the units. The project area is located in Seismic Zone 3, where 3 represents peak horizontal ground acceleration from 0.24g to 0.32g. **Figure 4.4** shown the seismic map of our road alignment of Thandiani road.



CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	GEOLOGY MAP
		03				SUBMITTED			
		02				RECOMMENDED			DATE: DECEMBER 2020
		01				CHD/VER.	S.BADAR		DRAWING No.: 4169/043/M/001
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED			REV.: 0
									SCALE: 1:150,000

Figure 4.3: Geological Map of Proposed Project



CLIENT: WORKS & SERVICES DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				PREPARED	BILAL S.	PROJECT: KP INTEGRATED TORUISM DEVELOPMENT (KITE) PROJECT
		03				SUBMITTED	BADAR H.	
		02				RECOMMENDED	YAWAR S.	
		01				CHD/VER.	ABID S.	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	SHARIQ A.	

SEISMIC ZONE MAP OF ABBOTTABAD-THANDIANI ROAD		SCALE: 1:45,000
DATE: AUGUST, 2020	DRAWING No.: P38472/043/M/002	REV.: 0

Figure 4.4: Seismic Zoning Map of Proposed Project

4.2.5 Climate

The mean maximum and mean minimum temperatures from 1991 – 2015 are 26.12 ^{0}C and 7.36 ^{0}C respectively while the mean annual rainfall is 96.80 mm[6].

Kakul Weather Station is the nearest weather station of Pakistan Meteorological Department for collection and recording of meteorological data for the proposed Project. The average data for the various climatic parameters such as temperature, rainfall, relative humidity, wind speed and direction has been acquired for the year 1981 to 2010 (recent 30-year average normal meteorological data) which is being discussed as below:

4.2.6 Temperature

Mean monthly temperature data of the region for the past 30 years (1981-2010) is presented in **Table 4.2**. Based on this data, the coldest month is January in which the mean minimum temperature is 0.7°C and the mean maximum temperature is 13.0°C. June is the hottest month with the mean minimum temperature of 18.2°C and the mean maximum temperature as 32.0°C.

Table 4.2: Monthly Mean of Daily Temperatures

Sr. No.	Month	Minimum Temperature °C	Maximum Temperature °C	Mean Temperature °C
1	January	0.7	13.0	6.8
2	February	2.3	13.9	2.1
3	March	6.2	18.2	12.2
4	April	10.5	23.7	17.2
5	May	14.7	28.8	21.7
6	June	18.2	32.0	25.1
7	July	19.4	29.7	24.5
8	August	18.9	28.5	23.7
9	September	15.9	27.9	21.9
10	October	10.4	25.1	17.7
11	November	5.8	20.8	13.3
12	December	2.3	15.6	9.0
Annual		**10.3**	**22.7**	**16.5**

Source: Pakistan Meteorological Department

4.2.7 Rainfall

The maximum rainfall occurs during the monsoon season in the month of July with mean rainfall of about 257.5 mm. The variation of monthly rainfall for the past 30 years (1981-2010) is given in **Table 4.3.**

[6]http://sdwebx.worldbank.org/climateportal/index.cfm?page=country_historical_climate&ThisCcode=PAK

Table 4.3: Mean Monthly Rainfall

Sr. No.	Month	Mean Monthly Rainfall (mm)
1.	January	69.8
2.	February	104.4
3.	March	143.6
4.	April	111.9
5.	May	70.2
6.	June	88.9
7.	July	257.5
8.	August	235.6
9.	September	100.6
10.	October	50.6
11.	November	31.1
12.	December	60.4
	Annual	**1324.7**

Source: Pakistan *Meteorological Department*

4.2.8 Relative Humidity

The data for relative humidity is being recorded on daily basis for 00 UTC, 03 UTC and 12 UTC. The monthly mean, which is calculated for these timings for the past 30 years (1981-2010) is presented in **Table 4.4.**

Table 4.4: Relative Humidity

Sr. No.	Month	Mean Monthly Relative Humidity (%)			
		00 UTC	03 UTC	12 UTC	Mean
1.	January	72.2	69.4	51.7	64.4
2.	February	74.9	70.2	52.3	65.8
3.	March	75.2	67.1	51.0	64.4
4.	April	72.0	62.6	44.7	59.8
5.	May	65.5	55.1	37.6	52.7
6.	June	65.7	55.0	37.0	52.6
7.	July	84.8	78.2	61.5	74.8
8.	August	89.0	83.9	69.7	80.9
9.	September	82.7	75.4	58.3	72.1
10.	October	72.7	63.9	46.9	61.2
11.	November	67.3	60.1	45.6	57.7
12.	December	68.3	63.3	50.1	60.6
	Annual	**72.8**	**65.2**	**51.2**	**63.1**

Source: Pakistan Meteorological Department

4.2.9 Wind Speed

The wind data is being recorded on daily basis for 00 UTC, 03 UTC and 12 UTC. The monthly mean for the wind speed is calculated and mentioned in **Table 4.5** below for the past 30 years (1981-2010) in knots. It is observed that at 12 UTC, the wind speed is low in winter season, while in summer season, winds are blowing at a relatively higher speed than winter. However, at 00 UTC and 03 UTC very low velocity winds are blowing during November to January annually.

Table 4.5: Mean Wind at Synoptic Hours (Knots)

Sr. No.	Months	Mean Monthly Wind Speed		
		00 UTC	03 UTC	12 UTC
1.	January	0.1	0.1	1.1
2.	February	0.1	0.1	1.3
3.	March	0.2	0.2	1.6
4.	April	0.2	0.2	1.4
5.	May	0.3	0.3	1.5
6.	June	0.2	0.2	1.6
7.	July	0.2	0.1	1.6
8.	August	0.1	0.1	1.3
9.	September	0.2	0.1	1.3
10.	October	0.2	0.1	1.0
11.	November	0.1	0.1	0.6
12.	December	0.1	0.1	0.6
	Annual	**0.2**	**0.1**	**1.1**

Source: Pakistan Meteorological Department

4.2.10 Environmental Monitoring, Sampling and Testing for Proposed Project

In order to determine the ambient air, background noise levels, water and wastewater quality of the study area different locations were selected in the COI. The sampling locations for the environmental monitoring of ambient air, noise and water for proposed project is shown in **Figure 4.5**.

Two (02) surface water / wastewater and two (02) drinking water / groundwater samples have been collected. Similarly, two (02) points have been selected for ambient air and background noise monitoring at site. The work for external monitoring and testing was awarded to EPA approved environmental laboratory i.e. M/S Green Crescent Environmental Consultants (Pvt.) Ltd. The work was awarded as per Public Procurement Regulatory Authority (PPRA) regulations through a competitive bidding. Monitoring was carried out from January 02 to 04, 2021. The summary of ambient air, noise, surface and ground water analysis are shown in below tables. The details are attached in environmental monitoring report as **Annex-III**.

Ambient Air

Ambient air quality data for SO2, NO, NO2, CO2, VOC, PM10 and PM2.5 was monitored at two (02) points. The results were compared with the NEQS for ambient air. The summary of ambient air monitoring points along with averaging periods are provided in **Table 4.6.** The results reveal that the PM2.5 are exceeding the NEQS limits.

Table 4.6: Ambient Air Monitoring Results

Parameter	Unit	Monitoring Duration	Average Concentration of Pollutants		Limits as Per NEQS, 2010
			Ghumanwa (Abbotabad)	Kund	
Nitrogen Dioxide (NO_2)	µg/m³	24 Hours	25.53	21.78	80 µg/m³
Nitrogen Oxide (NO)	µg/m³	24 Hours	17.16	14.54	40 µg/m³
Sulfur Dioxide (SO_2)	µg/m³	24 Hours	16.17	15.57	120 µg/m³
Carbon Monoxide (CO)	mg/m³	08 Hours	1.06	0.94	5.0 µg/m³
Ozone (O_3)	µg/m³	01 Hours	15.77	14.94	130 µg/m³
Particulate Matter ($PM_{2.5}$)	µg/m³	24 Hours	26.96	20.38	35 µg/m³
Particulate Matter (PM_{10})	µg/m³	24 Hours	132.46	**163.29**	150 µg/m³
Suspended Particulates Matter (SPM)	µg/m³	24 Hours	190.42	216.67	500 µg/m³
Lead (Pb) Airborne Particles	µg/m³	24 Hours	0.049	0.054	1.5 µg/m³

µg/m³: micrograms per cubic meter

NEQS: National Environmental Quality Standards

Background Noise Levels

The background noise level monitoring was carried out at two (02) locations as shown in **Figure 4.5.** The results were compared with the NEQS for noise Commercial area (B) with limiting value of 65 dB(A) - day time, 55 dB(A) - night time. The summary of background noise monitoring points along with averaging period are provided in **Table 4.7**

Table 4.7: Average Concentration of Noise Level

Sr. No.	Averaging Time	NEQS, 2010	Unit	Average Value in dB (A)	
				Ghumanwa (Abbotabad)	Kund (Abbotabad)
	Day-time	**65**	dB(A) Leq	52.30	45.67
	Night-time	**55**		38.18	35.69

Day Time hour: 06:00am to 10:00pm Night Time hour: 10:00pm to 06:00am

NOISE LEVEL MONITORING REPORT

Surface Water / Wastewater

In order to document the existing quality of surface water, two samples of surface water/wastewater were collected. All the samples were collected as grab samples and after being labeled and preserved, they were transported to the laboratory for testing. Location of

all the sampling points is given in **Figure 4.5**. The results were compared with the NEQS for surface water / wastewater which are shown in **Table 4.8**

Table 4.8: Surface Water/Wastewater Sampling Results

Sr. No.	Parameter	Units	Harud nullah/ kallapani	Thandiani chowk	NEQS
1	Temperature	◦C	24.1	24.1	40 + ≤ 03
2	pH	pH	7.96	7.68	6 to 9
3	Biological Oxygen Demand	(mg/L)	<1.0	3.0	80
4	Chemical Oxygen Demand	(mg/L)	5.0	28.0	150
5	Total Suspended Solids	(mg/L)	10.0	96.0	200
6	Chloride (Cl)	(mg/L)	25.80	<0.24	1000
7	Total Dissolved Solid (TDS)	(mg/L)	211.0	390.0	3500
8	Sulphate	(mg/L)	67.91	96.72	600
9	Oil and Grease	(mg/L)	<0.1	<0.1	10
10	Phenolic Compound	(mg/L)	<0.01	<0.01	.1
11	Fluoride (F)	(mg/L)	<0.01	<0.01	10
12	Cyanide (CN)	(mg/L)	<0.01	<0.01	1
13	Detergent	(mg/L)	ND	ND	20
14	Sulphide	(mg/L)	<0.4	<0.4	1
15	Ammonia	(mg/L)	<0.002	0.8	40
16	Cadmium	(mg/L)	0.0057	0.0042	0.1
17	Chromium	(mg/L)	<0.0054	<0.0054	1
18	Copper	(mg/L)	<0.0045	<0.0045	1
19	Lead	(mg/L)	<0.013	<0.013	0.5
20	Nickel	(mg/L)	<0.008	<0.008	1.0
21	Iron	(mg/L)	0.2	1.3	8
22	Manganese	(mg/L)	<0.0016	<0.0016	1.5
23	Mercury	(mg/L)	<0.0008	<0.0008	.1
24	Zinc	mg/L)	<0.0033	<0.0033	5
25	Arsenic	(mg/L)	<0.01	0.01	1
26	Silver	(mg/L)	<0.0032	<0.0032	1
27	Barium	(mg/L)	<0.031	<0.031	1.5
28	Boron	(mg/L)	<0.1	<0.1	6
29	Total Chlorine	(mg/L)	<0.1	<0.1	6.0
30	Selenium	(mg/L)	ND	ND	0.5
31	Total Toxic Metals	(mg/L)	<0.01	0.01	2

NS: Not Specified ND: Not Detected

Drinking Water/ Groundwater

In order to document the existing drinking water / groundwater quality, two (02) samples were collected. All the samples were collected as grab samples and after being labeled and preserved, they were transported to the laboratory for testing. These samples were tested against all parameters. Location of all the sampling points is given in **Figure 4.5.** Results of these samples along with the respective NEQS values are shown in **Table 4.9**

Table 4.9: Groundwater / Drinking Water Sampling Results

Sr. No.	Parameter	Units	Kund	Safeda gali	NEQS
1	pH	pH	7.50	7.45	6.5-8.5
2	Odor	(mg/L)	Odorless	Odorless	Non-Objectionable
3	Taste	(mg/L)	Sweet	Sweet	Non-Objectionable
4	Color	(mg/L)	<1.0	<1.0	<15TCU
5	Turbidity	(mg/L)	ND	ND	<5NTU
6	Total Hardness	(mg/L)	180.32	188.16	<500
7	Total Dissolved Solid (TDS)	(mg/L)	255.0	268.0	<1000
8	Chloride	(mg/L)	7.94	7.94	<250
9	Cyanide (CN)	(mg/L)	<0.01	<0.01	≤0.05
10	Fluoride (F)	…..	<0.01	<0.01	≤1.5
11	Nitrite	…..	<0.01	<0.01	≤3
12	Nitrate	(mg/L)	0.8	0.9	≤50
13	Phenolic Compound	(mg/L)	<0.01	<0.01	-
14	Residual Chlorine	(mg/L)	<0.1	<0.1	0.2-0.5
15	Aluminum (Al)	(mg/L)	<0.028	<0.028	≤0.2
16	Cadmium	(mg/L)	<0.0028	<0.0028	0.01
17	Copper	(mg/L)	<0.0045	<0.0045	2
18	Chromium	(mg/L)	<0.0054	<0.0054	≤0.05
19	Mercury	(mg/L)	<0.0008	<0.0008	≤0.01
20	Antimony (Sb)	(mg/L)	ND	ND	≤0.005
21	Nickel	(mg/L)	<0.008	<0.008	≤0.02
22	Zinc	(mg/L)	<0.0033	<0.0033	5.0

Sr. No.	Parameter	Units	Kund	Safeda gali	NEQS
23	Arsenic	(mg/L)	<0.01	<0.01	≤0.05
24	Barium	(mg/L)	<0.031	<0.031	0.7
25	Manganese	(mg/L)	<0.0016	<0.0016	≤0.05
26	Boron	(mg/L)	<0.1	<0.1	0.3
27	Lead	TCU	<0.013	<0.013	≤0.05
28	Selenium	NTU	ND	ND	0.01
MICROBIOLOGICAL ANALYSIS					
29	Total Coliforms	CFU/100ml	Absent	07	0/100ml
30	Faecal Coliforms (Ecoli)	CFU/100ml	Absent	Absent	0/100ml

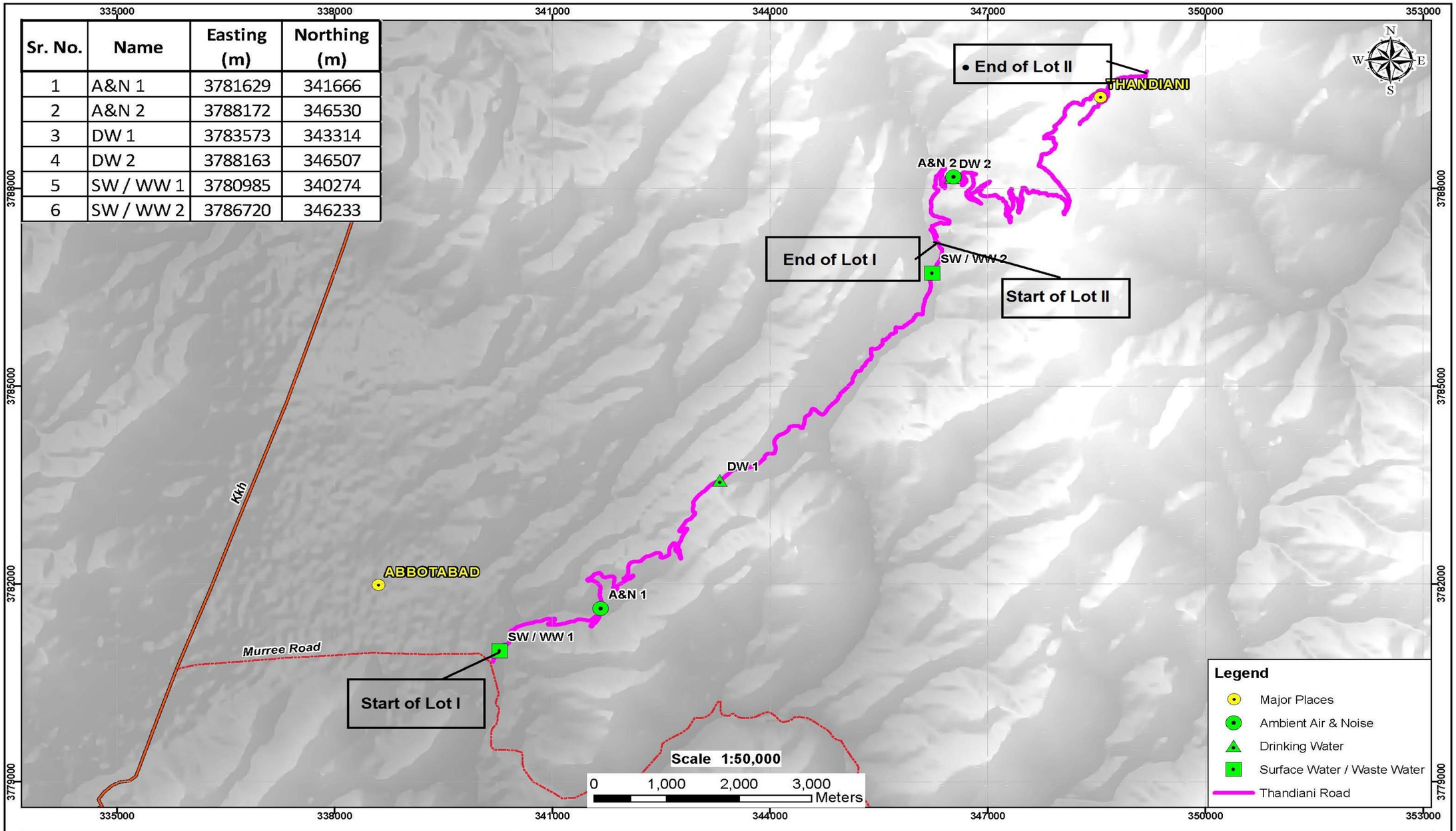
4.2.11 Solid Waste and Wastewater Situation

In the CoI, no conventional solid waste management system exists. Most of the solid waste is found to be stored in the form of heaps at various locations near the villages and drains and open burning of waste is a common practice. The remaining organic and livestock waste is collected in the designated area which is used to prepare compost utilized by local farmers in their agriculture fields as a fertilizer. The major constituents of solid waste in the area are paper, plastic, and organic waste (food waste and animal waste) and waste from the existing nearby houses. Similarly, no proper sewerage system exists in the CoI. The sewage through open drains is discharged into the nearby surface water bodies.

4.2.12 Land use

The proposed project route passes through the mountainous region with hilly, uncultivated, cultivated, vegetal, stream / nullahs, roads, tracks, residential & commercial land. The major settlement along the Thandiani road are Kund, Ochar, Ghumawan, Kalay Pani, Crali, Rawalkot, Khatwal, Chatree, Bandi Mansoor, Thandiani and Daharan. The main commercial areas fall along the alignment of proposed project Thandiani Chowk, Kala Pani, Gali Banya, Kund, Thandiani Top etc., some poultry farms and stone crushing plants were also observed along the alignment. During field survey, community level mosques, graveyards and shrines were identified in various settlements along the existing Thandiani Road. Forest area land constitutes a major portion whereas few patches of Agriculture land were also observed along the alignment. **Table 4.10** shows the land utilization of the study area. Details landuse map of the project is given in **Annex - IV**

Sr. No.	Name	Easting (m)	Northing (m)
1	A&N 1	3781629	341666
2	A&N 2	3788172	346530
3	DW 1	3783573	343314
4	DW 2	3788163	346507
5	SW / WW 1	3780985	340274
6	SW / WW 2	3786720	346233



CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	ENVIRONMENTAL MONITORING SITES / SCALE 1:50,000
		03				SUBMITTED			
		02				RECOMMENDED			
		01				CHD/VER.	S.BADAR		
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED			DATE: DECEMBER 2020 / DRAWING No.: 4169/043/M/001 / REV.: 0

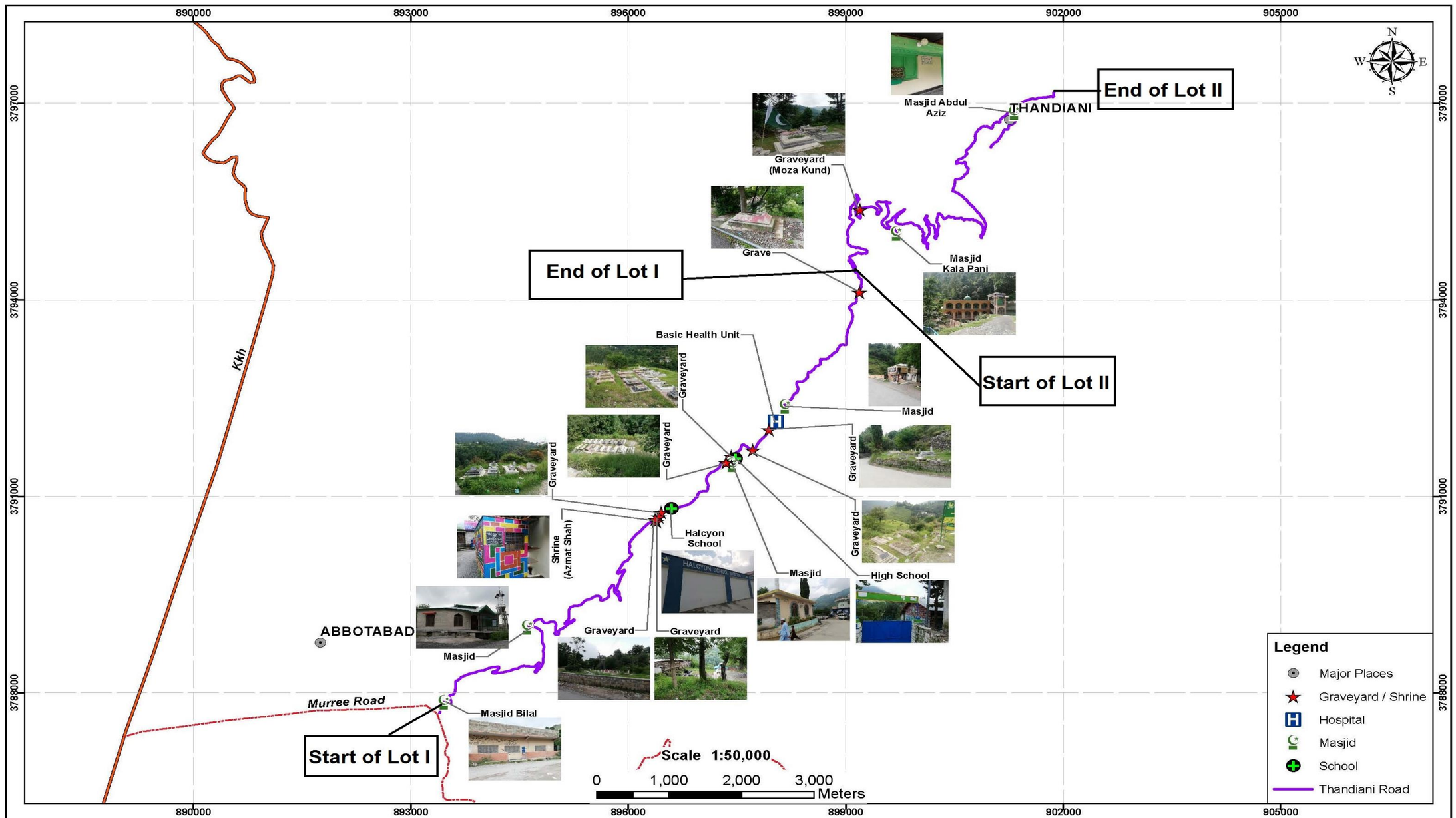
Figure 4.5: Environmental Monitoring Map

Table 4.10: Land utilization of Study Area

Sr. No.	Landuse Type	Area (Acre)	
		ROW	COI
1	Barren Land	7.28	19.85
2	Builtup Area	0.80	6.95
3	Cultivated Land	7.09	33.30
4	Forest	43.19	97.95
5	Graveyard	0.11	0.43
6	Road	31.78	39.13
7	Stream / Nullah	0.70	1.20
8	Track	0.08	0.45
9	Trees / Bushes	5.85	18.17
Total		**96.89**	**217.44**

4.3 ENVIRONMENTAL SENSITIVE RECEPTORS

A comprehensive map showing sensitive receptors of the project area such as schools, mosques, shrines, graveyard, basic health units etc. is given in **Figure 4.6.**



CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)
		03				SUBMITTED		SENSITIVE RECEPTOR MAP
		02				RECOMMENDED		SCALE: 1:50,000
		01				CHD/VER.	S.BADAR	DATE: DECEMBER 2020
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED		DRAWING No.: 4169/043/M/001
								REV.: 0

Figure 4.6: Sensitive Receptors of Project Area

4.4 ECOLOGICAL ENVIRONMENT

The ecological survey of the proposed project has been carried out to assess the existing biodiversity of the area, as well as assess impacts of construction activities on flora and fauna particularly the number and type of trees to be cut/uprooted. Information regarding the ecological profile of study area was gathered through desk study, consultation with concerned field formations of provincial departments of forestry, wildlife sectors and field visit was conducted to obtain the information regarding flora and fauna. For baseline data collection, an ecological checklist was developed which is attached as **Annex-V**.

4.4.1 Introduction

Study area of the proposed 24 KM Thandiani Road is dominated and represented by Blue Pine Moist Temperate Zone and Sub-Tropical Chir Pine Zone. Administratively the project area lies within the jurisdiction of Abbottabad and technically (Forestry & Wildlife Departments) in Abbottabad Forest Division. The scope of work includes widening of the existing road.

The proposed construction of road will not major cause habitat fragmentation, change hydrological dynamics, and disrupts natural processes because of its already operational status Road maintenance and traffic contaminate the surrounding environment with a range of chemical pollutants and noise. Moreover, the infrastructure and traffic cause dispersal barriers to terrestrial animals, and vehicle traffic causes the death of crossing animals.

The proposed Thandiani Road already exits so, no major fragmentation is expected which can disintegrate the habitat areas into smaller and more isolated units.

The ecological survey of the proposed project has been carried out to assess the existing biodiversity of the area, as well as assess impacts of construction activities on flora and fauna particularly the number and type of trees to be cut/uprooted.

4.4.2 Floristic Composition of the Area

In the upper reaches of the Galiyat region, the main tree species include deodar (*Cedrus deodara*), biar (*Pinus wallichiana*), paludar (*Abies smithiana*), and barangi (*Quercus lassiflora*). Chir pine (*Pinus roxburghii*) covers the lower hills, along with kao, or wild olive, phulai (*Acacia modesta*); indian mahogany/toona (*Cedrala toona*); drek (*Melia sempervirans*); and sinetta (*Dodona burmanniawa*). Vegetation grows for the most part in scattered clumps.

At lower elevations and in the plains, the most common trees are toot (*Morus alba*), drek (*Melia azedarach*), phulai, (*Acacia modesta*), ber (*Zizyphus jujaba*), Non-timber forest products include floral buds of the pomegranate, blackberries, raspberries, cranberries, and wild pears. The vegetation was studied based on the forest zones existing in the project area. The description of floristic composition in the forest zones is described as follows:

Blue Pine Moist Temperate Zone: The top portion of project area lies in Blue Pine Moist Temperate Zone. The main characteristic of this type of habitat is establishment of coniferous forests. These forests extend to dry temperate region at one side and to some extent in to alpine forests. The number of dominant species in this type of forest is small and in fact pure crop stands or mixture of two species are commonly found. The existing forest consists almost exclusively of *Pinus wallichiana* (Blue pine) with a small admixture of *Cedrus deodara* (Deodar) and *Picea smithiana* (Spruce).

The shrubby undergrowth is present with *Vibernum* and *Lonicera* as characteristic genera. Some evergreen shrubs such as *Sarcococa saligna, Daphne mucronata, Skimmia laureola* and *Strobilanthes wallichii* are also found with. Other shrubs include *Indigofera, Lonicera, Rosa, Desmodium, Rubus and Viburnum.* The herbaceous flora includes *Impatiens, Plectranthus, Senecio, Dipsacus* and Heracleum. Climbers such as *Rosa brunonii, Clematis spp.* and *Hedera* nepalensis are frequent. Mosses and ferns grow fairly. These forests are "reserve Forests" and have been protected from grazing resulting in prominent regeneration.

The soil under these forests shows wide range but loam predominate. Fires are liable to sweep up in to these forests from the inflammable chir pine forests below them and do great damages.

Subtropical Pine Forests Zone: The starting of road alignment runs through pine forest zone. *Pinus roxburghaii* is the characteristic species of this zone that forms hole of the top canopy. In the center of its distribution there is usually little or no middle canopy except in depressions where the evergreen oaks and some of other deciduous associates may extend down from the temperate forest, and trees of the tropical or semi-tropical deciduous forests spread up from below. There is heavy needle fall in these forests that is prone to fire unless special protective measures are taken.

A major part of the chir zone has been cleared for cultivation and there is evidence of former clearing in many of the existing forests. Fire is a natural factor of the site occurring periodically from lightening. The dead material accumulated in the forests enhance fire spreading in the forest. Some portions of these forests are protected that exhibit good regeneration of pine trees. The unprotected parts of the forests are under heavy grazing.

The floristic composition of this zone include *Pinus roxburghii* as dominant species. *Quercus incana,* with occasional *Lyonia ovalifolia* and *Rhododendron arboreum*, occurs widely on the moister sites. *Pistacia integerrima, Syzygium cumini, Mallotus philippinensis, Xylosma longifolium, Quercus glauca, Ficus* spp. and other broadleaved trees spread up from lower down; *Pyrus pashia* may occur throughout the altitudinal range. The common shrubs at higher altitudes include *Myrsine africana, Daphne, Lonicera, Rosa etc.* and *Carissa, Dodonaea, Woodfordia,* etc. at lower elevations. *Berberis* and *Indigofera, Reinwardtia* and *Rubus* spp. occur throughout. C*lematis, Smilax* and *Rosa* are the only common climbing genera present. Typical herbaceous species include *Viola, Valeriana* and *Senicio.* The grasses include *Heteropogan contortus, Chrysopogon, Bothriochloa, Themeda,* and *Arundinella.*

The soils under this zone tend to be light and sandy loam and of moderate fertility. Much erosion of top soil has taken place through burning.

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4.4.3 Reserve and Protected Forests & National Parks

The forest areas along the road are falling under different categories of forests. In the project area chatri reserve forests, and location forests were reported. Reserve forests were declared under the forest act 1927. Prior to the execution of any sort of work in these areas/Reserve Forests NOC from the Forest department (competent authority) is mandatory as per law of land. Forest lands notification is attached as **Annex- VI.**

The Ayubia National Park is part of gilliyat but away from the project area so, no impact or disturbance is anticipated due to the proposed activities of project.

4.4.4 Agriculture

Agricultural land has not extensively been utilised in the immediate (along the road) surrounding landscape of subproject area at various locations for the last several decades due to the terrain difficulties and small land holdings. Anecdotal information suggests that the main crop produced in the agricultural land are wheat, maize, and millets. Local people strongly involved in agricultural practices, due to which local forests under immense threat and want shift their livelihoods depend on the agricultural produced at small patches. So, due to non-availability of agriculture land/small land holding, harsh climatic conditions so, no adverse impacts are anticipated due to the activities of construction.

4.4.5 Fauna of the Project Area

The Western Himalayan Ecoregion is the catchment area of Indus River. It is responsible for the streamflow of 70-80 per cent of water to the river. The freshwater streams and springs at the park are a significant source of water supply for the residents of the area. Over the decades, unsustainable land management practices such as fuel wood harvesting, overgrazing and urbanization have led to deforestation, water shortage, landslides and flash floods the livelihoods of the locals were threatened along with the biodiversity of the region. The main mammalian species found in Galiyat region are *Canis aureus, Canus lupus, Herpestes auropunctatus, Lepus capensis, Lutra prespcillata, Manus crassicaudata, Mus musculus, Pipi strellusspps, Rattus rattus, Rousettus leschnauln, Suncus murinus, Sus scrofa, Viverri culaindica* and *Vulpes vulpes*. A variety of rare animal species can be found in Murree, including the leopard, which inhabits the neighboring Galiyat region. Common animals include the rhesus monkey, wild boar, foxes and various species of birds, including the cheer pheasant and kalij pheasant.

Mammals: The mammalian species reported from and vicinity of project area are given in the following **Table 4.11.**

Table 4.11: Mammals Reported from the Study Area

Sr. No.	Scientific Names	Common Names	Local Names
1.	*Canis aureus*	Asiatic jackal	Gidar
2.	*Canis lupus*	Indian wolf	Bughiar
3.	*Sus scrofa*	Wild boar	Soor
4.	*Felis chaus*	Jungle cat	Jungli billi
5	*Felis lupus*	Jungle cat	Jungli billi
6	*Hylopetes fimbriatus*	Small Kashmir flying Squirrel	Choti uran gulehri
7	*Martes flavigula*	Yellow-throated Martin	Kharza
8	*Hystrix indica*	Indian crested porcupine	Seh
9	*Lepus nigricolis*	Indian hare	Khargoash
10	*Lepus capensis*	Cape here	Sahrai Khargoash
11	*Macaca mulatta*	monkey	Booja, bundar
14	*Paguma larvata*	Himalayan masked palm Civet	Mushki billi
15	*Panthera pardus*	Panther or leopard	Seehn, guldar
16	*Vulpes*	Common red fox	Langarhi or loomri
18	*Vivericula indica*	Small Indian civet	Guldari billi
19	*Bandicota bengalensis*	Indian Mole Rat or Rice Rat	Fusli chooha
20	*Eptesicus serotinus*	Common Serotine	Chumgadar
21	*Funambulus Pennantii*	Palm Squirrel	Gulehri
22	*Herpestes edwardsi*	Common India Mongoose	Neola
23	*Herpestes auropunetatus*	India Grey Mongoose	Neola
24	*Hyaena*	Striped Hyaena	Lagr bager
27	*Mus musculus*	Common house mouse	Choohi
28	*Mus booduga*	Field Mouse	Jangli Choha
29	*Tatera indica*	Antelope Rat	Indian Gerbal
30	*Golunda ellioti*	Bush Rat	Jangli Chuha
31	*Myotis muricola*	Dark whiskered bat	Chumgadar
32	*Eptesicus serotinus*	Common serotine	Chumgadar
33	*Rousettus Leschenaultia*	Fulvous fruit bat	Chamgadar
34	*Pteropus giganteus*	Indian flying fox	Chamgadar
35	*Megaderma lyra*	Vampire bat	Chamgadar
36	*Scotophilus heathii*	Greater yellow bat	Chumgadar
37	*Rattus*	Common rat	Chooha
38	*Tatera indica*	Indian gerbil	Chooha
40	*Suncus murinus*	House shrew	Chchundar

Reptiles and Amphibian: As per the field reporting, departmental consultations and the secondary data given in Table depicts the presence of amphibians and reptiles in the vicinity of the project area:

The complete list of reptiles and amphibian found in the area is tabulated in **Table 4.12.**

Table 4.12: Reported Amphibians and Reptilian Fauna of the Study Area

Sr. No.	Species	Common Name
1.	*Euphlyctis cyanophlyctis*	Skittering frog
2.	*Tomopterna breviceps*	Indian burrowing frog
3.	*Hoplobatrachus tigerinus*	Tiger frog
4.	*Microhyla ornata*	Short ant frog
5.	*Bufo stomaticus*	Marbelled toad
6.	*Bufo melanostictus*	Asian garden toad

Sr. No.	Species	Common Name
7.	*Eublepharis macularius*	Fat-tailed leopard gecko
8.	*Hemidactylus brooki*	Brook's house gecko
9.	*Hemidactylus flaviviridis*	Yellow-green house Gecko
10.	*Calotes versicolor*	Garden lizard
11.	*Mabuya dissimilis*	Mabua
12.	*Varanus bengalensis*	Monitor lizard
13.	*Ptyas mucosa*	Rat snake
14.	*Xenochrophis piscator*	Checkered-keelback water snake
15.	*Naja oxiana*	Central Asian Cobra
16.	*Bunganus caeruleus*	Indian krait
17.	*Vipera russelii*	Russel's viper

Birds: The study area is the home of variety of birds. However, currently the project area does not support migratory birds habitats and having no large water bodies and other attraction for subject species. The birds list reported from the study area is based on field observations, departmental consultations andliterature review. The common bird species are given in **Table 4.13**.

Table 4.13: Conservation Status of Birds Reported from the Project Area

Sr. No.	*Species*	Common Name	IUCN/Conservation Status
1	*Actitis hypoleucos*	Common Sandpiper	LC
2	*Acridotheres ginginianus*	Bank Myna	LC
3	*Acridotheres tristis*	Common or Indian Myna	LC
4	*Acrocephalus stentoreus.*	Southern Great Leaf Warbler	LC
5	*Alauda gulgula*	Oriental Small Sky Lark	LC
6	*Alcedo atthis*	Common Eurasian Kingfisher	LC
7	*Anas acuta*	Northern Pintai	LC
7	*Anas clypeata*	Shovelar	LC
9	*Amaurornis phoenicurus*	Mallard	LC
10	*Apus affinis*	Indian house Swif	LC
11	*Ardea cinerea*	Grey Heron	LC
12	*Ardeola grayii*	Indian Pond Heron	LC
13	*Athene brama*	Spotted Little Owl	LC
14	*Bubulcus Ibis*	Cattle Egret	LC
15	*Cacomantis merulinus*	Plaintive cuckoo	LC
16	*Catreus wallichii*	Cheer pheasant	vulnerable
17	*Centropus sinensis*	Common Crown Pheasant	LC
18	*Ceryle lugubris*	Crested Kingfisher	LC
19	*Ceryle rudis*	Small Pied Kingfisher	LC
20	*Circus aeruginosus*	western marsh harrier	LC
21	*Cisticola juncidis*	Fantailed Warbler	LC
22	*Columba livia*	Common Pigeon	LC
23	*Copsychus saularis*	Magpie Robin	LC

24	*Coracias benghalensis*	Indian Roller Blue Jay	LC
25	*Corvus splendens*	Common Crow	LC
26	*Coturnix*	Common Quail	LC
27	*Dendrocitta vagabunda*	Tree Pie	LC
28	*Dicrurus adsimilis*	Black Drongo	LC
29	*Dicrurus leucophaeus*	Ashy Drongo	LC
30	*Egretta garzetta*	Little Egret	LC
31	*Egretta intermedia*	Intermediate Egret	LC
32	*Emberiza Spp.*	Buntings	LC
33	*Eudynamys scolopacea*	Common Koel	LC
34	*Falco tinnunculus*	Eurasian Kestral	LC
35	*Falco jugger*	Laggar falcon	Near Threatened
36	*Francolinus pondicerianus*	Indian Grey Patridge	LC
37	*Galerida cristata*	Crested Lark	LC
38	*Halcyon smyrnensis*	White Throated Kingfisher	LC
39	*Hierococcyx varius*	Common Hawk Cuckoo	LC

4.5 SOCIO-ECONOMIC ENVIRONMENT

4.5.1 General

This Section provides a socioeconomic assessment pertaining to the demographic and socio-economic conditions of the PAPs and local community settled along the road from Abbottabad to Thandiani Top. To assess the socioeconomic conditions of the PAPs, a social survey was carried out with the following objectives:

- Observe and document the existing socio-economic conditions of the PAPs;
- Gain information about the demographic characteristics of the PAPS;
- Identify the economic resource dependency of the PAPs;
- Explore the situation of civic amenities, possession of household items, drinking water conditions, education and health facilities etc.;
- Get feedback from the community about existing and potential social issues; and
- Evaluate the possibilities of addressing their concern through relevant authorities.

4.5.2 Methodology Adopted for Data Collection

Four types of surveys were carried out at site for impacts identification; assess the socio-economic conditions of the affected population and gender situation analysis of the population settled along the road:

- Census survey of the Households (HHs);
- Socioeconomic survey;
- Structures and shop keepers assessment survey; and
- Gender Survey.

Census and Socioeconomic survey was carried out 100% of the affected HHs affected due to the widening of road from Abbottabad to Thandiani, in which physical survey of each affected HHs was carried out. There are 83 households being affected due to widening of

the road and socioeconomic survey of these PAPs was carried out. During the socio-economic surveys, people were also informed about the project objective, its location and basic design features etc. Questionnaires developed for socio-economic baseline, gender survey and stakeholder consultation are attached herewith as **Annex VII**.

4.5.3 Administrative Setup

Administratively the project area falls in Tehsil Abbottabad of District Abbottabad. There are various settlements along the road from Abbottabad to Thandiani top and the main settlements include Kund, Ochar, Ghumawan, Kalay Pani, Crali, Rawalkot, Khatwal, Chatree, Bandi Mansoor, Thandiani and Daharan.

4.5.4 Findings of the Census and Socio-economic Survey

4.5.4.1 Estimated Affected Households and Population (HHS)

A census and socio-economic survey of the affected HHs (PAPs) along the road was carried out in December 2020. According to the census survey, there are total 83 HHs consisting of 524 persons, which are being affected due to rehabilitation and remodeling of Thandiani Road. **Table 4.14** below shows the detailed population of the PAPs.

Table 4.14: Affected Estimated Population

No. of HHs	Total Population	Male	Female	Avg. HHs Size
83	524	270	254	6.3
83	**524**	**270**	**254**	**6.3**

Out of total population affected (524), 270 are males and 254 are females and average HHs size is 6.3. The male population is higher as compared to female population.

4.5.4.2 Gender Distribution of the Respondents

From the total 83 respondents, all the respondents are male. Due to local cultural constraints female are not allowed to give any information to the male persons. Therefore, gender survey for this study was conducted through female enumerator.

4.5.4.3 Demographic Characteristics of the Population

The census and socio-economic survey results reveal that majority (41%) of the HHs/respondents were aged above 50 years, 34.9% were aged between 41 – 50 years, 13.3% were aged between 31 – 40 years and 8.4 were aged between 21-30 years of age. Out of the total 51.8% of the respondents/HHs Heads were matric, 8.4% were educated upto primary level, and only 6% were Illiterate.

Based on the field survey, major occupations in the villages along the road are doing jobs in private sector and business (small shop keeper, hotels and restaurants) Labour (Unskilled

workers), agriculture and livestock rearing (sale and purchase of livestock and dairy products). As per socio-economic survey, it was noticed that private service and business is the main source of income for the locals. As per survey results, majority part of the road passes through rural areas and majority of people are involved in private service.

The dominant source of income in the whole study area is labour/farmer which is 41%, who were doing labour jobs either in the form of mechanic, painter, welder, masonry worker etc. The second major source of income identified in the study area was business i.e. 33.7% of the total. Only few people were found who use to work in other occupations. However, majority of the respondents are small landholder, therefore they are forced to adopt other source of income such as labour, livestock, small level general stores etc. Details occupational distribution of the respondents is given in below **Table 4.15.**

Table 4.15: Demographic Characteristics of the Population

Demographic Characteristics		Total Respondents	
		Count	%
Age Composition			
All Respondents/HHs Heads		**83**	**100**
1	Upto 20 years	02	2.4
2	21 – 30 years	07	8.4
3	31 – 40 years	11	13.3
4	41 – 50 years	29	34.9
5	Above 50 years	34	41.0
Education			
All Respondents/HHs Heads		**83**	**100**
1	Illiterate	05	6.0
2	Upto Primary	07	8.4
3	Primary to Middle	10	12.0
4	Matric	43	51.8
5	Intermediate	04	4.8
6	Graduation and Above	14	16.9
Occupation			
All Respondents/HHs Heads		**83**	**100**
1	Business	28	33.7
2	Labour/Farmer	34	41.0
3	Private Job	04	4.8
4	Govt. Job	13	15.7
5	Retired	04	4.8

4.5.4.4 Marital Status and Family System

Out of total (83) respondents/HHs Heads, 98% were married and only 02% were unmarried. 96.4% of the respondents were living in joint family system, whereas 3.6% were living in the Nuclear family system as reflected in **Table 4.16** given below:

Table 4.16: Marital Status and Family System

Description		Total Respondents	
		Count	Percentage
All Respondents/HHs Heads		83	100
Marital Status	Married	81	98
	Un-married	02	02
All Respondents/HHs Heads		83	100
Family System	Joint	80	96.4
	Nuclear	03	03.6

4.5.4.5 Religion and Caste System

Out of the 83 respondents, only 01 respondent is non-Muslim. The main caste along the road is Pathan i.e 42.2% followed by Awan (36.1%) and 08 % are Sardar. Remaining details are given in **Table 4.17**.

Table 4.17: Religion and Caste System

Description		Total Respondents	
		Count	Percentage
All Respondents/HHs Heads		**83**	**100%**
Religion	Muslim	82	99
	Christian	01	01
All Respondents/HHs Heads		**83**	
Caste	Pathan	35	42.2
	Abbasi	03	3.6
	Gujjar	03	3.6
	Qazi	02	2.4
	Awan	30	36.1
	Sardar	07	8.4
	Syed	01	1.2
	Tanoli	02	2.4

4.5.4.6 Sex Ratio

The sex ratio is an important demographic indicator, which is defined as the “number of males per hundred females”. As per social survey, sex ratio based on the household was 106 males per 100 females. The sex ratio depends on the factors such as the sex ratio at birth, differential mortality rates between the sexes at different ages, and losses and gains through migration.

4.5.4.7 Languages Spoken

As per socio-economic survey main language spoken in the study area was Hindko and Pashto. However, Urdu was also understood and was spoken by the male members of the families.

4.5.5 Socio- Economic Characteristics

4.5.5.1 Monthly Income of the Respondents

From the **Table 4.18**, it is clear that 06% of the respondents fall in the very low income group below Rupees 17,500, majority of the respondents (43.4%) fall in the range of Rupees 17,500 to 30,000, 26.5% between 30,001 –50,000 and 19.3% of the respondents were earning their monthly income between the ranges of 50,001-75,000 rupees per month and only 4.8% were earning more than 75,000 per month.

Table 4.18: Average Monthly Income of the Respondents

Sr. No.	Average Monthly Income	Number of Respondent	Percentage
1	Below 17,500	05	6.0
2	17,500– 30,000	36	43.4
3	30,001 –50,000	22	26.5
4	50,001-75,000	16	19.3
5	Above 75,000	04	4.8
Total		**83**	**100**

4.5.5.2 Expenditure of the Respondents

Household expenditure depends on the earning, about 6% respondents reported their monthly expenditure below 17,500 and 49.4% respondents found within the range of 17,500– 30,000 per month. While, 24.1% fall between the expenditure range of 30,001 – 50,000 and 18.1% recorded their monthly expenditures between the range of 50,001-75,000 per month. A very few number of respondents only 2.4% were having their expenses more than 75,000 per month, refer **Table 4.19**.

Table 4.19: Range of Monthly Expenditures of the Respondents

Sr. No.	Average Monthly Expenditures	Number of Respondent	Percentage
1	Below 17,500	05	6.0
2	17,500– 30,000	41	49.4
3	30,001 –50,000	20	24.1
4	50,001-75,000	15	18.1
5	Above 75,000	02	2.4
Total		**83**	**100**

4.5.5.3 Ownership Status of the Houses

Sampled respondents were asked about the ownership status of the houses. All the respondents/PAPs were owners of the houses.

4.5.5.4 Housing Construction Pattern

Results show that along the road study area villages, 100% PAPs living in Pacca houses.

4.5.5.5 Mode of Transport

The people normally use their own motorcycles and private vehicles. While remaining respondents use public transport. **Table 4.20** describes mode of transport being used by the respondents during social impact assessment survey. About 30.1% of respondents were using their own personal transport (motor cycles & car) and 44.6% reported public transport like Bolan, rickshaw and suzuki pickups. While, 25.3% respondents were enjoying both mode of transport including public & private for traveling purpose.

Table 4.20: Mode of Transport

Sr. No.	Mode of Transport	Number of Respondents	Percentage
1	Personal	25	30.1
2	Public	37	44.6
3	Public & Private (both)	21	25.3
	Total	83	100.0

4.5.5.6 Health Facilities

Health facilities are generally inadequate in the villages along the road route. However, in Abbottabad city there are many health institutions exist such as:

- Ayub Teaching Hospital. Main Mansehra Road, Mandian, Abbottabad;
- Home Visits Hospital, Abbottabad;
- Shafiq Medical Centre;
- Allied Specialist Clinics;
- Chinar Hospital & Dialysis Center; and
- LIMS Clinic of Physiotherapy & Rehabilitation.

In case of any emergency locals have to move Abbottabad for better health facility. As per household survey, although health facilities exist in few villages along the ROW, but they are not in good condition. In some villages, dispensaries/Basic Health Units (BHUs) are working up to some extent. Along the road villages, private clinics exists which are run by dispensers with limited services.

4.5.6 Civic Amenities

4.5.6.1 Basic Amenities in the Project Area

During the field visit, it was observed that most of the villages have drainage facilities. However, during rains, due to hilly terrain water flows with the natural slope pattern of the project area. Electricity is available in all the villages while gas is available only Thandiani Chock and Ghumawan villages. Small level commercial/grocery shops are available in the community along the road, which are being used by the residents for their daily needs.

The result of the survey revealed that 100% of the households had electricity facility, water supply was available for all the sampled households while the health care facilities in shape of hospital/dispensaries were available to residents at limited level.

4.5.6.2 Source of Drinking Water in the Project Area

Drinking water meeting NEQS/ WHO Standards is not only a basic need and a precondition for healthy life, but is also a basic human right. The quality of water is directly linked to the quality of health. Drinking water is available through pipline in all the PAPs households. Due to hilly terrain spring water is being used for drinking purpose and as per locals water quality is very good.

4.5.7 Religious, Historical, Archaeological and Recreational Sites

Religious sites include mosques, shrines and graveyards are socially sensitive areas to deal with. Mosque and graveyard is available in every village along the road. Significant efforts were made to identify the archeological / historical sites falling within the proposed RoW of the project area, but no notified archeological / historical site was found.

4.5.7.1 Mosques

Jamia Mosque Umer Farooq is located in the Ghumawan Village where people of the community offer their prayers. This mosque is partially affected due to the widening of the existing road. The mosque is also being utilized for the religious and community activities. In the same building a Madrassa with the same name has been established to provide the religious education to children of the local communities. Jamia Masjid and Madrissa in Kala Pani area is also located along the road but this will not be affected due to the widening of the road. But during construction these mosques will face noise and dust issues which require special mitigation measures.

4.5.7.2 Graveyard

People are very sensitive about the graveyard because they are emotionally attached to the religious sites. In the project area, graveyards are located along the road but none of them is affected due to widening of the road. There is no adverse impact on the graveyard due to construction activities of the project and the local communities shown no concern.

4.5.8 Mechanism of Conflict Resolution

During the field survey, discussions were held with the local communities about the disputes prevailing in the communities along the road. Small level/petty disputes were reported. It was observed that most of activities are carried out under the instruction of the head of a caste. The decisions about conflicts, right to vote, marriage settlement and other matters are usually resolved by the heads of the castes. Most of the conflicts in the project area are insignificant, i.e. quarrels among youngsters which are mutually resolved within the caste at local level.

4.5.9 Presence of NGOs/ CBOs

No Non-Governmental Organization (NGO) or Community Based Organization (CBO) is identified working in the villages along the road.

4.5.10 Women's Status

To assess the socio-economic situation of women and their role in different decision making activities at the household level, socio-economic survey of the women was carried out along the road. For this purpose, structured interviews were conducted randomly with 30 women. A brief socio-economic profile of the women interviewed is presented in following:

- 55% of the women surveyed were illiterate, while 30% were primary pass. On the other hand 10% & 5% were middle and matric pass respectively;
- All the women surveyed were married; the average age at the time of marriage was only 20 years;
- The mean size of children in the family was 03;
- All the women surveyed were housewives;
- 47% of women are desirous to learn new skills to meet their household needs; majority wanted to learn embroidery & stitching etc.; and
- Apart from their role in deciding household chores, women were not identified playing a significant role in decision-making.

4.5.10.1 Role of Women in Decision Making at the Household Level

Table 4.21 depicts that women are playing significant role in carrying out daily household chores. 100% respondents were found involved in the household chores. Detailed involvement of women at the household level in different activities is given below:

Table 4.21: Role of Women in Decision Making at the Household Level

Household Chores	Role	Total	
All Respondents		**30**	**100%**
Daily Household Chores	Yes	30	100%
	No	00	0%
Upbringing, Education and Marriage of Children	Yes	30	100%
	No	00	0%
Expenditures of Household Items	Yes	17	56.7

Household Chores	Role	Total	
	No	13	43.3
Contribution to Household Income	Yes	00	0%
	No	30	100%
Full Power to Spend Money the way you Like	Yes	05	16.7
	No	25	83.3
Purchase and Disposal of Household Property	Yes	00	0%
	No	30	100%
Dispute Resolution Regarding their Family Matters	Yes	00	0%
	No	30	100%
Discussion on Household Problems with Neighbours / Local Community	Yes	00	0%
	No	30	100%
Matters Related to Outdoor Activities of Male Family Members	Yes	00	0%
	No	30	100%

4.5.10.2 Major Issues Faced by Women

Information which is collected through primary and secondary sources along group discussion with locals shows that major problems faced by women in the area are lack of primary health care, the lack of education opportunities and the lack of access to clean water.

5 PROJECT ALTERNATIVES

5.1 GENERAL

This section outlines different project options considered and compares the environmental and social impacts associated with these options. The following alternatives have been identified and are discussed in further detail below:

5.2 ALTERNATIVE I: NO PROJECT OPTION

Project starts from Thandiani Chowk on Abbottabad ~ Murree road and terminates at Thandiani Top near PTV station. Length of project is 24.4 Km. Presently existing road is 5m ~ 7m wide bituminous road, which is not in good condition.

To promote the tourism, rehabilitation and remodeling of project is utmost need as existing road has limited road cross-section, which needs upgradation for smooth traffic operations. Project will ultimately increase the business / employment opportunities for the locals leading to a decrease in poverty. The project aims to enhance under-utilized potential of KP's tourism sector for generating income and revenues, by providing an enhanced tourism experience to domestic and international tourists, while focusing on preservation of environment, wildlife, culture and heritage. It will provide the commuters of the area with fast access to the markets. Besides that, it will also reduce the travel times and hence will improve the overall socio-economic development of country.

The no project option (NPO) considers continuation of utilizing existing road and no further development would be done. It reflects no apparent change to the physical, cultural and social environment. No project option may result in continued degradation of air, dust and noise pollution due to unpaved shoulders and deteriorated road conditions etc. The continuation of existing conditions of road will result in longer travel times. The deplorable conditions of road will result in wear and tear of vehicle and increased probability of accidents.

Due to the hilly terrain, approach to the main city by nearby villages will remain difficult and access to better educational and health facilities will also remain limited. In case of emergencies, rescue services will also not reach easily to the affected areas or safe areas if needs evacuation. Improvement in tourism, trade and development will also remain slow.

Therefore, NPO conditions will result in further worsening of the present environmental and socio-economic conditions and increased disturbance to residents of the area and the road users.

5.3 ALTERNATIVE II: WIDENING OF EXISTING THANDIANI ROAD

Road alignment starts from Murree Road near Abbottabad. This section of roadway is under administrative control of C&W Department KP. The existing carriageway is fair quality with

some patches of katcha track with last 4 KM having Asphaltic road of good quality. Various pot holes were seen while traversing the road. Marginal alligator cracking was also seen in the existing road. The existing road shoulder is of poor quality katcha shoulders with some reaches having PCC shoulders. At initial stretch, the existing geometry is smooth but as moving further, the geometry gets sharp. Various sharp horizontal curves were negotiated as moving towards Thandiani top. Steep vertical geometry also posed problems to smooth operation of vehicles. No proper road side safety is ensured at this project which is potentially hazardous as errant vehicles may run off the carriageway towards valley. To promote the tourism, rehabilitation and remodeling of Thandiani Road is utmost need as existing road has limited road cross-section, which needs upgradation for smooth traffic operations.

Overall road drainage is poor on the project. Majority of the culverts were pipe culverts with some culverts of stone masonry and are in poor condition. A lot of the culverts are choked. There exists one bridge on the project. Structural adequacy of these culverts and bridge will be assessed during detailed design process and a mitigation measure will be proposed in case these culverts are structurally inadequate. Some side drains were seen in cut section of this stretch.

Rehabilitation and remodeling of Thandiani Road is the utmost requirement to accommodate the smooth flow of traffic and facilitate the road users of the area. This project will extend its benefits to the area by increasing their mobility and accessibility to a good quality road. This project by increasing the living standard of the people in the surrounding will also help in reducing vehicle operating cost and journey time thus boosting the economic condition of the surrounding people and the country.

The proposed project is aimed to promote the tourism in the area as Thandiani is characterized by excellent weather and lush greenery in the summer months, and snow-covered vistas and hills in the winter. Many tourists from KP and all over Pakistan visit Thandiani top especially in the summer season. Being at a high altitude, with attractive scenery and several hiking trails into the forests and other nearby locations, it is a very attractive tourist spott.

Moreover, the widening of this Thandiani Road will resolve the issue of traffic problem. Therefore, this option is feasible in terms of environmental and social economic aspects.

Comparison of both the alternatives has been given in **Table 5.1**. Considering the benefits associated with the proposed project, construction of the Thandiani Roadhas been planned to promote tourism in the project area.

Table 5.1: Comparison Analysis of Alternatives

Impacts	No Project Option	Rehabilitation and Remodeling of Thandiani Road
Environment, Health and Safety	• Air pollution and dust will increase with passage of time due to deterioration of road. • Longer travel times due to steep and damaged road. • More wear and tear of vehicles. • Higher probability of accidents. • Land sliding and erosion triggered by cutting of rocks will not occur. • The ecological status of the area will remain similar.	• The construction activities will result in noise, vibration, dust and air pollution during construction phase. • Probability of accidents will reduce in operational phase due to construction of road with proper safety measures. • Lesser wear and tear of vehicles. • Cutting of trees in construction phase is involved, which will be compensated through plantation plan, however access to the market for local fruit and vegetable supply will be facilitated in operational phase. • Land sliding and erosion triggered by cutting of rocks may also occur.
Socio-economic	• Improvement in tourism, trade and development will remain slow. • Nearby villages will remain difficult to access. • Access to better educational and health facilities will also remain limited. • Limited access for rescue in case of emergency/disasters.	• Land acquisition and resettlement will be moderate as there is an existing track at most of the places. • Generation of employment opportunities. • This option will allow the tourists to explore a new area and provide the communication links to the inhabitants of the area. • Improved access to main city will help elevate the educational and health facilities available to the locals and will also provide better business opportunities improving tourism, trade and development. • Better access to educational and health facilities • Ease in access for rescue in case of emergencies/ disaster.

6 PUBLIC CONSULTATION AND INFORMATION DISCLOSURE

6.1 GENERAL

The consultation and information disclosure to the Project Affected Persons (PAPs) and other stakeholders during project planning, designing and implementation stages is a key to sustainable development. Likewise, participation of stakeholders at all stages of project preparation is essential to meet the objectives of meaningful consultation under resettlement policy. During preparation of the ESMP, project affected persons and other stakeholders from different fields of life were consulted to learn their concerns and adopt appropriate measure in project design, resettlement planning and implementation and disseminate requisite information about project impacts, bank policy guidelines and land acquisition parameters.

6.2 OBJECTIVES AND PRINCIPLES OF CONSULTATION

Consultations are key processes through which stakeholders influence project decision making and outcomes. It is the starting point for all resettlement activities. Experiences have shown that many resettlement-related problems are avoidable provided consultation activities are undertaken ahead to engage the community in local decision making. In many ways, stakeholders' consultations are "problem-solving" opportunities and help find meaningful options to various problems. It is always a two-way process where the executing agency, policy makers, beneficiaries and affected persons discuss and share their concerns in a project process.

The stakeholder's communication policy is based on the principles of transparency, timeliness, participation, meaningful engagement, and inclusiveness. Means of communication and consultation are to promote participation of those who may otherwise tend to be marginalized such as women, elderly, disabled and the poor. Stakeholder's communication will encompass institutional stakeholders, communities within the project area, and persons directly affected by the project.

In order to meet the criteria of meaningful consultation process, consultations were held with PAPs from early stages of the project. At the start of the project, during the preparation of environmental and social screening reports during the month of August, 2020 and later on for during the month of December, 2020 for the preparation of ESMP, a series of consultation sessions were held with the PAPs and institutional stakeholders. These consultation meetings proved very useful for information sharing and consensus building. Concerns raised during the meetings were incorporated in the ESMP.

The consultation process will be continued to share the latest development interventions in the project and solicit responses from the PAPs. Consultation sessions were held in different settlements along the project route.

At this stage, specific objectives of the public consultation were as follows:

- To share fully the information with the affected people about Rehabilitation and Remodeling of Thandiani Road, its components and activities, latest interventions in the project development;
- To share the views of local people and PAPs about the land acquisition and compensation process;
- To disseminate the impacts of the project in terms of land acquisition, relocation of infrastructure, displacement and measures proposed to minimize the resettlement related impacts;
- To identify possible social impacts during the construction and operational phase of the project;
- To obtain the co-operation and participation of the PAPs in the resettlement planning and implementation process;
- To ensure transparency in all the project activities through sharing the information;
- Increase public confidence about the proponent, reviewers and decision makers; and
- The guiding principle underlying consultations is that social safeguard planning and implementation must follow a consultative and participatory process to ensure success of the project. This was further reinforced by the requirements of the World Bank OP 4.12.

The policies which give high priority to public consultation and participation during designing and implementation process are provided in **Table 6.1**.

Table 6.1: Frameworks for Consultation

Legal/ Policy Source	Regulations/Safeguard Policy Requirements
Government of Pakistan	• Land Acquisition Act (LAA) 1894 requires disclosures i.e. Under/4publication of preliminary notification; under Section/5A public purpose and hearing of objections • Environmental Protection Agency (EPA) 1997 Guidelines for Public Consultation requires public consultation and involvement in project planning and implementation. The policy and procedures require proponents to consult with affected community and relevant NGO during preparation reports. The guidelines contain a number of references to the need for Public Involvement.
World Bank	• OP.4.01, Clause 14 described that for all Categories A and B projects proposed for IBRD or IDA financing, during the EA process, the borrower consults project-affected groups and local non-governmental organizations (NGOs) about the project's Environmental aspects and takes their views into account. The borrower initiates such consultations as early as possible. For Category A projects, the borrower consults these groups at least twice: (a) shortly after environmental screening and before the terms of reference for the EA are finalized; and (b) once a draft EA report is prepared. In addition, the borrower consults with such groups throughout project implementation as necessary to address EA-related issues that affect them. • OP 4.12/Involuntary Resettlement: (i) Displaced persons should be meaningfully consulted and should have opportunities to participate in planning and implementing resettlement plans; (ii) Affected persons should be informed about their options and rights pertaining to resettlement; (iii) APs may be involved in the planning, implementation, and monitoring of the resettlement program, especially in the process of developing and implementing the procedures for determining eligibility for compensation benefits and development assistance; (iv) Establish appropriate and accessible grievance mechanisms; and (v) Particular attention be paid to the needs of vulnerable groups among those displaced, especially those below

Legal/ Policy Source	Regulations/Safeguard Policy Requirements
	poverty line, the landless, the elderly, women and children or other displaced persons who may not be protected through national land compensation legislation.

6.3 PROJECT STAKEHOLDERS

Project stakeholders were engaged in the review and discussions on various project aspects social and environmental issues at the early stage of impact assessments for feedback. There are two categories of stakeholders in project as shown in **Table 6.2** below:

Table 6.2: Categories of Project Stakeholders

Primary stakeholders	All project affected persons, households, communities, Project beneficiaries - for instance, residents of the project area, including the resettled community's users of the road vulnerable and gender.
Secondary Stakeholders	C&W and other related government departments/agencies, responsible for the design, management and implementation of the project, the financing institutions like the World Bank, mass media/civil society members, consultants and project advisors.

Public Disclosure of Information, which give high priority to public consultation and participation in designing and implementation of a socially and environmentally responsible project, is derived from various policy / legislative tools, as summarized in **Table 6.1**.

6.4 FORUMS CONSULTED

The following forums were used to carry out the public consultation process.

- Consultative meetings held with the local residents, shop keepers and Project Affected Persons (PAPs) along the road
- Scoping sessions held with the representatives of local communities
- Focus group discussions held with main road users such as drivers, daily travelers, etc.

The concerns raised by the stakeholders were considered in developing the entitlement matrix and resettlement plan, in order to enhance project acceptability among the general public on social considerations.

Table 6.3 provides a summary of the public consultations and Table 6.4 provides the Summary of Consultation Meeting with the Institutional Stakeholders.

Table 6.3: Summary of Consultation Meetings with the Primary and Secondary Stakeholders

Sr. No.	Village / Mouza	Venue	Date	No. of Participations

Sr. No.	Village / Mouza	Venue	Date	No. of Participations
01	Murree Road	Bazar Murree Road-Start Point of Project	09-08-2020	08
02	Kund	Kund Bazar	10-08-2020	10
03	Kalay Pani	Kalay Pani Bazar	10-08-2020	12
04	Gali Bania	Gali Bania Bazar	10-08-2020	10
05	Thandiani Bazar	Hotel in the Thandiani Bazar	21-12-2020	10
06	Kalay Pani	Kalay Pani Bazar	22-12-2020	25
07	Kund	Hotel in the Kund Bazar	22-12-2020	20
08	Ochar	Bazar	22-12-2020	05
09	Crali	Main Road	23-12-2020	07
10	Ghumawan	Bazar	23-12-2020	10
11	Khatwal	Thandiani Road	23-12-2020	08
12	Chatree	Thandiani Road	24-12-2020	05
13	Thandiani Top	Lake View Hotel	24-12-2020	04

Table 6.4: Summary of Consultation Meeting with the Institutional Stakeholders

Sr. No.	District/City	Department/Venue	Name/Designation	Date
01	Abbottabad	EPA	EPA (Mr. Muhammad Ali, Director-EPA, DD-EPA and AD-EPA, +923219009857	09-08-2020
02		Office of the Divisional Forest Officer (DFO) Wildlife Division	Mr. Salah-ud-Din Ayubi Divisional Forest Officer (DFO)Wildlife, Abbottabad +92301880228	09-08-2020
03		Office of the Gallies Forest Division	Mr. Taimor, Divisional Forest Officer Gallies and Mr. Sardar Riaasat, SDFO. +923145003030	09-08-2020
04		Office of SDO-Irrigation Subdivision Abbottabad	Eng. Gul Shahzad SDO, Subdivision Abbottabad +923459552018	23-12-2020
05		Galliat Development Authority	Mr. Syed Asad Shah, Assistant Director-Technical +923005624672	23-12-2020

Sr. No.	District/City	Department/Venue	Name/Designation	Date
06		Office of the SWO-Building Division C&WD-Abbottabad	Mr. Eng Zahid Amin SDO +923465004100 Mr. Tariq Surveyor	24-12-2020
07		Gallies Forest Division Abbottabad	Mr. Taimur Ilyas, DFO Gallies, +923318002000	24-12-2020
08	Peshawar	Environmental Protection Agency, Peshawar-Khyber Pakhtunkhwa	Mr. Waheed Khan, Deputy Director +923115420615	11-08-2020

6.5 APPROACH ADOPTED FOR THE CONSULTATION

To hold the meetings, PAPs were gathered at one place before the meeting in each bazar area and the villages. During the meetings, PAPs were asked to discuss the social, resettlement and project related issues. The meetings were held in an open encouraging atmosphere where PAPs expressed their concerns and views freely. For meetings with the institutional stakeholders, they were contacted thorough cell phone calls to confirm their availability and meetings were held in their offices at the given times.

6.6 INFORMATION DISSEMINATED

Following issues were discussed and disclosed to the stakeholders during the consultation meetings:

- Introduction of the project;
- Description of various project components, its activities and impacts;
- Description of land acquisition process;
- Description of criteria of evaluation of buildings and other infrastructure;
- Description of criteria of evaluation of land and trees;
- Description of criteria of evaluation of business losses;
- Basis for determining the rates of land, trees and other infrastructure;
- Discuss social and environmental impacts;
- Discuss overall land acquisition and resettlement related impacts of the project; and
- Needs, priorities and reactions of the affected people regarding the proposed Project.

6.7 STAKEHOLDERS CONCERNS TOWARDS THE PROJECT

As per stakeholders, the Rehabilitation and Remodeling of Thandiani Road will have several impacts of varying significance. Despite the impacts, the affected communities have a friendly attitude towards the project although there was some opposition, particularly arising

due to lack of information regarding compensation assistance and resettlement, at the beginning of the social assessment.

The interest of the PAPs of the Project was in evidence during the consultation meetings held in August and December, 2020 at different locations. The meetings were attended by a large number of residents and shopkeepers of the bazars. The consultant team encouraged the participants to express themselves and engaged in detailed discussion on project impacts, community consultation, compensation, awareness about the project, resettlement policies and mode of community support for the project. Some concerns were raised by the participants, particularly with regard to replacement costs for land acquired by the project. There was active participation at the meetings and participants expressed their willingness to support the Project. **Table 6.5** shows concerns from the consultation meetings with the affected households and communities along with responses.

Table 6.5: Concerns raised During the Consultation Meetings and their Responses

Sr. No.	Key Topic	Concerns Raised	Responses
During the consultation process, NESPAK team briefed the proposed KITE Project and Thandiani Road Rehabilitation and Remodeling as being part of KITE in Abbottabad District. Local residents and the shopkeepers considered the project very positive for the facilitation of tourists flow upto Thandiani Top and emphasized that the upgradation work of the road should be completed as early as possible. The improvement works in the road condition project will provide additional employment opportunities for the locals. The participants of the meetings raised concern that the land acquisition and demolition of shops in the bazar areas should be avoided for the rehabilitation and remodeling of Thandiani Road, however, If it is necessary, then compensation should be paid to the affected land and shop owners. The affectees losing their businesses should be paid compensation for the loss of their incomes and locals should be given priority for the hiring of local labour during the construction of road. Disturbance to the graveyards and mosques in different communities along the road should be avoided. The various concerns raised related to compensation and procedures for rate assessment and income restoration with their responses during the consultation sessions are given below:			
01	Compensation for Lost Assets	Participants emphasized that all the affected assets such as houses, shops and trees should be fairly compensated before the start of the construction.	All the affected assets will be compensated on the market rates as per law and payment will be made before taking possession of land, and before the start of construction.
02	Principles and Procedures of Rate Assessment	The affected community expressed their desire to adopt the market rates for compensation purpose and disclose the same top them. Rates will be shared and disclosed with local peoples and finalized with the consideration of affected people according to the market rate.	The compensation rates will be based on negotiations with the local communities to reflect the replacement value of the assets acquired as per local law and World Bank Policy. It will be in coordination of C&W and Revenue Department.
03	Inconvenience to Local people	During the construction phase of the project, this will result in causing inconvenience to the nearby residents and affecting their daily life activities. They feared that their lives and routine will be highly disturbed as a result of resettlement and dislocation. The road construction should avoid the schools,	The contractor will ensure that construction work does not hinder local people's access to the local route and their ability to cross it safely. The graves will not be affected.

Sr. No.	Key Topic	Concerns Raised	Responses
		settlements as well as sensitive location (i.e. shrine, mosques, graveyard etc.).	Dismantling of mosques will be avoided to the extent possible. If avoidance is not possible, cash compensation will be provided for restoring affected cultural/community structures (i.e. mosques, shrine, roads, schools, graves etc.), to the recognized patron/custodian.
04	Control over dust and noise	Minimize the effects of noise, dust, vibration, traffic and lightening associated with construction activities on the communities living along the project route that can cause disturbances and stress.	Sprinkling of water will be ensured to avoid dust problem and contractor will be bound for sprinkling of water. Noise barriers shall be provided in sensitive area in form of boundary wall.
05	Lack of trust in local government	Some PAPs indicated that they could not rely on the local government for proper compensation of land acquisition and resettlement.	Local people will be included in various project committees to increase their confidence in the process. Monitoring will be carried during implementation.
06	New civic Amenities	The participants demanded for the improved educational and health facilities in the areas along the road.	It was indicated that the construction of this road would increase and improve their accessibility to high schools, health outlets, banks, and fuel stations and enhance business and employment opportunities in the area.
07	Income/ Employment	Local people raised concerns related to income restoration/ rehabilitation such as employment opportunities. Poor people should be given special	The contractor will provide jobs to the locals on priority basis.

Sr. No.	Key Topic	Concerns Raised	Responses
		attention for employment during construction stage and establish vocational training centre for local people.	Effort will be made to engage poor & vulnerable during the construction stage of the project.
08	Monitoring and Implementation of project	World Bank should ensure strict monitoring during compensation payment to the PAPs. Implementation of the project should be in time without any delays.	Internal and external monitoring of the project implementation provisions are part of the ESMP and RAP.
09	Fears and Concerns of Women	The presence of outside labor may restrict the movement of local women. Elderly women with less exposure and the illiterate shared that they have no idea about the procedures regarding compensation. They feared that even if they are affected and compensated they will not be able to properly utilize the money. They shared that there is no platform or forum at the village level through which women can voice their problems.	Labour movement will be restricted to construction camps to avoid any inconvience to local population and to ensure women's privacy and houses. The representation of women is ensured at different levels of GRM by inducting female members in the GRCs. The PMU will have a social specialist with gender expertise who will ensure women's issues are handled sensitively and expediently.

6.8 CONSULTATION WITH INSTITUTIONAL STAKEHOLDERS

Table 6.6 shows the concerns of institutional stakeholders.

Table 6.6: Concerns of Relevant Departments/Institutional Stakeholders

Sr. No.	Department	Name, Designation & Contact No.	Stakeholder Views/Concerns	Response on Concerns
During the meetings with institutional stakeholders, NESPAK team briefed the proposed KITE Project and Thandiani Road rehabilitation and remodeling as being part of KITE in Abbottabad District. The institutional stakeholders appreciated the project and considered it of vital importance for the facilitation of tourists upto Thandiani Top and ensured their full cooperation for the execution of the project. The detailed concerns raised by different government				

Sr. No.	Department	Name, Designation & Contact No.	Stakeholder Views/Concerns	Response on Concerns
departments and their responses are given below;				
01	Environmental Protection Agency (EPA), Abbottabad	Mr. Muhammad Ali, Director-EPA, DD-EPA and AD-EPA, Abbottabad +923219009857	Tree cutting should be avoided at the maximum, however where unavoidable, C&WD needs prior permission (NOC) from Forest Department to cut the trees; Detail of reserve forests along the Thandiani Road can be obtained from the Forest Department (DFO) Abbottabad; Thandiani Road is passing through ecologically sensitive sites; tree cutting from the ecologically designated reserve sites should be avoided; Relocation of commercial shops in the bazar areas such as Kund, Kalay Pani, Gali Banya etc along the Thandiani Road should be avoided; Disturbance to the graveyards in various settlements along the road should be avoided; Upon inquiry from EPA-Abbottabad regarding requirement of environmental study for the rehabilitation and remodeling of project, it was advised by the EPA that C&WD should write a letter to Director-EPA Abbottabad about the decision on environmental study (whether EIA/IEE) for the proposed Rehabilitation and Remodeling of Thandiani Road .	Entire concerns of the officials were recorded and it was briefed that all concerns will be addressed during the design, construction and operation stage of the proposed project. The concerns related to land acquisition and resettlement are being addressed in the ESMP and RAP of the Project.
02	Office of the Divisional Forest Officer (DFO) Wildlife Division, Abbottabad	Mr. Salah-ud-Din Ayubi Divisional Forest Officer (DFO) Wildlife, Abbottabad +92301880228	The forest along the Thandiani Road is a habitat of precious wildlife, therefore it should be preserved; Wildlife habitat is disturbed with the cutting of trees and development of permanent structures along the road, therefore, both should be avoided; It was appreciated that consultation meetings with stakeholders may be very much fruitful to preserve the	Efforts have been made to avoid the tree cutting at maximum and for every tree cut, 10 new trees will be planted, for which a tree plantation plan is proposed suggesting indigenous species for re-plantation. Mitigation measures have been proposed in the

Sr. No.	Department	Name, Designation & Contact No.	Stakeholder Views/Concerns	Response on Concerns
			ecological sensitive areas at initial planning phase of the project.	environmental study for minimizing impacts on wildlife.
03	Office of the Gallies Forest Division Abbottabad	Mr. Taimor, Divisional Forest Officer Galies and Mr. Sardar Riaasat, SDFO. +923145003030	NESPAK team briefed the proposed KITE Project and Thandiani Road rehabilitation and remodeling in Abbottabad District, to DFO via telephone due to his non-availability; Due to non-availability of DFO, meeting was carried out with SDFO in his office at Abbottabad and cooperation from the Forest Department was ensured for any information and guidance regarding the proposed Project; The officer concerned made discourse on importance of the biodiversity of areas falling along the road; Reserve Forests are playing important role in stability of the watershed areas and catchments of the region; and Protection of the forest is the responsibility of the Forest Department, it is suggested that the proposed project must avoid the Reserve Forest areas.	The cooperation of the Govt. officials was appreciated and it was made sure that their concerns regarding reserve forest will be shared with the stakeholders to minimize the impacts of the proposed project.
04	Environmental Protection Agency, Peshawar-KP	Mr. Waheed Khan, Deputy Director +923115420615	NESPAK team briefed the proposed KITE Project and its sub-projects in various districts such as Abbottabad, Mansehra, Swat and Chitral of KP Province; EPA-Peshawar emphasized that ecologically sensitive sites should be avoided as far as possible and ensures the minimum tree cutting along the proposed project.	All the concerns of the official were recorded and it was briefed that all the concerns will be incorporated in design
05	Office of SDO-Irrigation Subdivision Abbottabad	Eng. Gul Shahzad SDO, Subdivision Abbottabad +923459552018	Culvert should be designed according to discharge flow of nullahs/small tributaries; Drain should be provided along the road; and Haro and Daur are the main rivers in District Abbottabad.	It was responded that all concerns are being addressed in the design of the project. Culverts has been given in the design keeping in view discharge flows. All other parameters has been taken into account according to design standards.

Sr. No.	Department	Name, Designation & Contact No.	Stakeholder Views/Concerns	Response on Concerns
06	Galliat Development Authority	Mr. Syed Asad Shah, Assistant Director-Technical +923005624672	Rest areas should be provided along the road; and Sitting areas after every 5-10 kilometers for travellers should be provided.	It was responded that all concerns are being addressed in the design of the project. In the design, there is provision for rest areas and siting areas for tourists after every 5-10 km along the road
07	Office of the SWO-Building Division C&WD-Abbottabad	Mr. Eng Zahid Amin SDO +923465004100	Provided rates of buildings for cost estimation of structures through his quantity surveyor	Provided rates will be adopted for estimation of cost of affected structures.
08	Gallies Forest Division Abbottabad	Mr. Taimur Ilyas, DFO Gallies, +923318002000	There are two reserve forests along the Thandiani road namely; i) Chatri Reserve Forest, ii) Location Forest Thandiani; More than 6inch dia trees are useful; Plantations should be carried out to control of erosions Plantation should be done with the consultation of forest department; Debris/ construction waste should not be disposed in the forest areas; and Proper vegetation should be done along the road.	All the trees to be cut will compensated on the market rates; Tree plantation plan is being proposed in the environmental studies of the project which will be prepared and implemented in consultation with the forest department along with its monitoring plan Debris/construction waste will be disposed at the approved sites by local municipal administration; and Vegetation is proposed along the ROW? to control soil erosion in the ESMP of the project.

7 POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND THEIR MITIGATIONS

7.1 GENERAL

This chapter identifies the beneficial as well as the potentially significant adverse environmental and social impacts during design/pre-construction, construction and operation phases of the proposed project on the physical, ecological and socio-economic domains of the environment. The appropriate mitigation and remedial measures are proposed in this chapter. A project impact evaluation matrix has been developed to evaluate the potential impacts of the proposed subproject. A brief qualitative description of each aspect and the affected environment in both RoW and the project's corridor of impact is presented below:

7.2 NOTION OF SIGNIFICANCE

Impact significance depends on both the nature of the impact and on the sensitivity of the receptor. The more sensitive the receptor the greater will be the significance of impact from that proposed activity. For this ESMP, activities and nature of impact are combined with the sensitivity of the receptor to evaluate the significance of the impact. The significance of impact is characterized as very low, low, moderate, high and very high. Environmental issues having "moderate", "high" and "very high" significance are provided with mitigation measures.

Following the assessment of magnitude, the quality and sensitivity of the receiving environment or potential receptor has been determined and the significance of each potential impact established using the impact significance criteria matrix as shown below. Most of the potential impacts can be mitigated by implementation of various types of mitigation measures; however some residual environmental impacts may remain after mitigation.

Notion of Significance

	Sensitivity of Receptors			
Magnitude of Impact	**High (4)**	**Medium (3)**	**Low (2)**	**Negligible (1)**
Major (4)	16	12	8	4
Moderate (3)	12	9	6	3
Minor (2)	8	6	4	2
Negligible (1)	4	3	2	1

Score	**Impact Significance**
1	Negligible
2 – 4	Low
5 – 8	Medium
9 – 12	High
> 12	Very High

7.3 METHODOLOGY FOR IMPACT EVALUATION

The methodology adopted for the evaluation of the impacts included the following assessment tools, (i) project impact evaluation matrix and (ii) overlays. These tools were used to identify the significance and magnitude of the impact as well as the nature, reversibility, extent etc.

7.3.1 Project Impact Evaluation Matrix

The Impact Evaluation Matrix was developed by placing project activities along one axis (i.e. Y-axis), and on the other axis (i.e. X-axis) the different environmental parameters likely to be affected by the proposed subproject actions grouped into categories i.e. physical, ecological and socio-economic environment. For the impact assessment, project impact evaluation matrix was used by dividing the project action into different phases (design/pre-construction, construction and operational phases). A Project Impact Evaluation Matrix is given as **Table 7.1**.

7.3.2 Overlays

In order to identify spatial based impacts, overlays were used. An overlay is based on a set of transparent maps, each of which represents the spatial distribution of an environmental characteristic (for example, land acquisition). Information for an array of variables such as land use, infrastructure, vegetation etc. was collected for the standard geographical units within the project's CoI, recorded on a series of maps, typically one for each variable. These maps were overlaid to produce a composite map. The resulting composite maps characterize the Project area's land use, physical, social, ecological and other relevant parameters related to proposed intervention. The overlays maps used in this ESMP for the quantification of the landuse categories referred in Chapter 4: Description of Environment.

Table 7.1: Project Impact Evaluation Matrix

Environmental Component / Project Component	Physical Environment						Ecological Environment						Socio Economic Environment																	
	Soil (Erosion/Stability/ Contamination)	Seismic Hazard	Air Quality	Noise Level	Surface & Ground Water Quality	Solid Waste Generation	Aquatic Ecosystem	Migratory birds	Wildlife	Beneficial Plants	Loss of trees	Loss of Crops/Orchards	Conflict over Resources	Mobility of Locals	Public Infrastructure	Accessibility	Housing Infrastructure	Cultural Properties (Mosque, Shrine, Graveyard	Community Stability	Tourism And Recreation	Grazing Area	Gender Issues	Cultural & Social Issues	Health& Safety	Aesthetic	Security Situation	Living Standards	Employment Opportunities	Restoration of Livelihood	Economic Uplift
A. Planning & Design Phase	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Geotechnical Investigation	NA	NA	NA	2	3	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	4	NA	NA	NA	NA	NA	NA
Temporary Acquisition of Land	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	NA	NA	NA	NA	NA	NA	NA	3	NA	NA	NA	3	NA	NA	NA	NA	NA	NA	NA
Parmanent Acquisition of Land	NA	NA	NA	NA	NA	NA	NA	NA	6	9	9	2	6	NA	6	NA	9	6	9	NA	NA	NA	9	NA	NA	6	6	NA	NA	NA
B. Construction Phase																														
RoW / Site Clearance	9	NA	9	9	8	8	NA	NA	7	4	9	2	NA	6	4	3	6	6	NA	NA	6	NA	8	9	4	4	NA	6	NA	4
Earthwork in Filling and Excavation	9	NA	9	9	8	8	NA	NA	4	NA	NA	NA	NA	6	2	3	NA	NA	2	NA	NA	NA	6	9	4	4	NA	6	NA	4
Establishment of Construction Camps & Workshop	2	NA	2	4	NA	NA	NA	NA	4	NA	NA	NA	8	NA	NA	NA	NA	4	4	NA	NA	4	4	8	4	NA	NA	6	6	6
Transportation & Storage of Construction Materials	4	NA	6	6	2	4	NA	NA	3	NA	NA	4	NA	4	NA	NA	NA	NA	4	NA	NA	NA	4	6	4	NA	NA	4	NA	NA
Use of Construction Material and Heavy Machinery	3	NA	8	9	5	4	8	NA	3	NA	NA	NA	NA	2	2	2	NA	NA	NA	NA	NA	NA	2	8	NA	4	NA	4	NA	NA
Installation and operation of Batching and Asphalt Plants	4	NA	8	8	2	4	NA	NA	3	NA	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	6	4	NA	4	4	NA	NA
Spoil Disposal	3	NA	3	NA	6	6	NA	NA	3	NA	4	6	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	4	4	6	NA	NA	NA	NA	NA
Structural & Civil Work	8	NA	8	8	7	7	NA	NA	3	NA	NA	4	NA	NA	2	NA	NA	NA	2	NA	NA	4	6	9	4	4	NA	8	NA	8
Drainage Work	6	NA	6	6	7	6	NA	NA	2	NA	NA	NA	NA	NA	2	NA	NA	NA	2	NA	NA	4	4	9	4	4	NA	8	NA	8
Miscellaneous Work (Road Ancillaries, Traffic Signs and Signals etc.)	NA	NA	4	6	4	4	NA	NA	NA	NA	NA	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	6	NA	NA	NA	6	NA	6
Pavement Work	2	NA	4	6	2	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	2	8	NA	NA	NA	6	NA	6
Finishing and Comissioning	NA	NA	2	4	NA	4	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	4	NA	NA	NA	4	NA	4
C. Operational Phase																														
Operation of Road	NA	7	2	2	NA	NA	NA	NA	NA	NA	6	NA	NA	6	4	8	NA	NA	6	4	NA	NA	8	6	8	4	8	6	6	6
Inspection & Monitoring	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	3	NA	NA	NA	NA	NA	NA	2	4	NA	4	NA	4	NA	NA
Road Maintenance	NA	NA	4	4	2	NA	NA	NA	NA	NA	NA	4	NA	4	4	4	NA	NA	NA	NA	NA	NA	NA	6	2	NA	NA	4	NA	NA
Maintenance of Miscellaneous Work	NA	NA	NA	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	2	2	2	NA	NA	NA	NA	NA	NA	NA	4	NA	NA	NA	4	NA	4

Positive Impact Score
0
2 to 4
5 to 8
9 to 12
>12

Impact Significance
Negligible
Low
Medium
High
Very High

Adverse Impact Score
0
2 to 4
5 to 8
9 to 12
>12

NA: Not Applicable

7.4 DELINEATION OF PROJECT CORRIDORS

Before proceeding to the environmental analysis of the Project, it is imperative to delineate the CoI. There are two (02) types of project corridors which have been used for the environmental baseline information, impacts assessment and mitigation purposes and is described briefly below.

7.4.1 Corridor of Impact (CoI)/ Area of Influence

For a linear Project, CoI is a limit that identifies the area where direct and indirect impacts of the project activities are envisaged. CoI also includes the RoW. This is limited to 10 m from the RoW each side for collection of baseline information, impacts assessment and mitigation measures of physical, ecological as well as social resources.

Apart from the CoI, which is along the centerline, some components are non-linear such as the Construction/Contractor camps, vehicle, equipment yard, material quarry areas, while access tracks are also considered part of the CoI for the study and termed as Project Area or Area of Influence. Therefore, in this report CoI the Study Area and Area of Influence are used accordingly.

The location of Construction/Contractor camps, vehicle, equipment yard, material quarry areas and access tracks are usually finalized by the Contractor. Some of the project components which are not finalized yet, the assessment for those components is generic in nature and will be updated accordingly as the more information is made available. CoI of the proposed project is shown in **Figure 5.1**.

7.4.2 Right of Way (RoW) / Project Area

RoW is the corridor where direct impacts of the proposed Thandiani Road are anticipated. In the RoW there will be direct impact on the environment like relocation of the physical infrastructure, clearing of vegetation, cutting of trees, loss of crops due to the proposed project are also envisaged. RoW varies from 9 to 41 m. RoW of the proposed project is shown in **Figure 5.1.**

7.5 POTENTIAL POSITIVE IMPACTS

The positive impacts due to the proposed project are mentioned below:

- Construction of the proposed project will provide accessibility to Thandiani Road which is currently inaccessible to most of the tourist due to dangerous road conditions;
- The project will provide an opportunity to the tourist to explore new areas to visit and to enhance tourism experience;
- The project will provide socio-economic benefits to the inhabitants of the area associated with increase in tourism and services along the roadside which create micro economic benefits to local people. There is a possibility of increased

economic opportunities and significant growth and extension of the local markets along the road alignment;

- The proposed project will greatly benefit the road users by reduction in the vehicle operating cost, better pavement surface, better communication and enhanced socio-economic benefits which will ultimately contribute to poverty reduction, and economic development of the country;
- During the operation of the proposed project, lesser wear and tear of the vehicles will occur and it will also result in lesser fuel consumption, reduced air emissions and decrease in operating cost;
- Improved communication infrastructure will promote new business opportunities. In addition, such an activity will also increase the land value that will benefit the local residents; and
- The proposed project is expected to increase the land values, especially in nearby villages. Land owners will have an opportunity to sell their land at increased prices and start new businesses.

7.6 POTENTIAL ENVIORNEMNTAL IMPACTS AND MITIGATION MEASURES

Apart from positive impacts, there are some potential significant adverse environmental impacts on the local environment. The proposed Project is divided into three (03) stages i.e. Pre-construction / Planning and Design Stage, Construction Stage and Operation and Maintenance (O&M) Stage. The Pre-Construction Stage includes all stages before the construction Stage (i.e. site investigation work i.e. topographical, seismic studies etc.); Construction Stage includes all stages from mobilization of Contractor to the completion of Project; and Operation Stage starts after the Construction Stage which includes the inspection and repair works.

Adverse impacts envisaged at these three (03) stages of the proposed project along with their proposed remedial or mitigation measures are detailed below:

7.7 POTENTIAL ENVIRONEMNTAL IMPACTS DURING PRE-CONSTRUCTION PHASE

Following is the brief description of impacts envisaged and the recommended mitigation measures during pre-construction phase.

7.7.1 Technical Design and Layout Planning

Potential Impacts

Incompatible layout plan and engineering design of the project's structures can undermine the overall aesthetic beauty and ambience of the project area. Also low utilization of the available spaces and designing the structures without considering the prospective and futuristic needs can result in structures with low social acceptability and functionality. This future traffic factor if not considered in the design properly, will also affect the project and public safety of the proposed Project. Similarly, the locals may also face access problems for their land. This impact is temporary and minor negative in nature.

Mitigation Measures

- The technical design of the proposed project must consider all the above mentioned factors for the final design and should meet all the local and international standards; and
- The proponent must review and validate all the design considering the possible impacts (as mentioned) before the start of construction of proposed Project.

7.7.2 Topography

Potential Impacts

The topography in the project area will change due to the construction of project. Construction of existing track will result in considerable earthworks and excavation including cutting of rocks, cutting of hill slopes, land clearing and leveling resulting in significant change in topography. This impact is permanent in nature.

Mitigation Measures

- Best engineering design measures should be adopted keeping in view the aesthetics of the project area;
- The project design should avoid excessive cutting of rocks/hill slopes where cutting is unavoidable make maximum efforts to ensure minimum changes in the topography; and
- Ground disturbances should be limited to only the areas necessary for project related construction activities.

7.7.3 Drainage

Potential Impact

The project area has high frequency of rainfall especially during monsoon, and water flows through the hills passing through the road which may deteriorate the road surface decreasing the life of road. Improper storm water drainage design of the proposed Project may result in stagnant water due to which following impacts are expected to arise:

- Deterioration of road surface and reduction of its bearing capacity;
- Inconvenience for commuters/pedestrians;
- Stagnant water may provide the breeding ground for disease vector; and
- Foul odour may be generated.

This impact temporary and minor negative in nature.

Mitigation Measures

Mitigation measures will include provision of appropriate drainage structures with appropriate design capacity to avoid flooding especially during the rains. Proper slopes shall be incorporated in design to avoid the stagnant water on At-grade road surface.

7.7.4 Seismic Hazard

Potential Impacts

The location of the project area varies from Seismic 3 as per Earthquake Zones Classification of the Building Code of Pakistan, 2007, where 3 (high) represents peak horizontal ground acceleration from 0.24 to 0.32 g. In this Zone, designing of various types of structures should be done on the basis of Peak Ground Acceleration (PGA). A high intensity earthquake impacting the project site can adversely impact the development in the following ways:

- Soil liquefaction caused by earthquake may result in massive land sliding resulting in damage of property, lives and infrastructure.
- Lateral spreading may result in opening large cracks or fissures in the ground, and can cause significant damage to buildings, bridges, roads, trees and public utilities;
- In addition to sudden collapse, structures may experience cracks in walls, cracking of foundations leaving the structure unserviceable, even without structural damage; and
- Electrical power lines may also break by tipping of poles making sparks resulting in fires.

This factor requires special consideration of the designers keeping in view of the recent earthquake of October 08, 2005. This will be a major negative impact.

Mitigation Measures

- The proposed project should be designed and constructed to withstand earthquake hazards considering the peak ground acceleration of the area;
- Retaining walls should be constructed along the road and also included in project design; and
- For seismic hazard analysis, updated structural and seismic evaluations should be carried out.

7.7.5 Slope Stability

Potential Impacts

Slope stability may be affected by construction of road cuts or embankments. Excessive slope of steep cuts, changes in drainage capacity and pattern can result in landslides as the project area is prone to land sliding. Land sliding may cause blockage of roads and serious accidents and can affect the nearby structures. The damages may vary from loss of life to injuries and loss of property. The impact will be in the range of minor to moderate for upgrading / rehabilitation of existing routes. This will be major negative impact.

Mitigation Measures

- Design should consider maintaining natural angle of cut slopes and embankments to avoid land sliding;

- Minimum clearance of vegetation especially tall trees shall be considered in design; and
- Engineering measures should be incorporated in design to control runoff and increase slope stability e.g. Rip Rap and Retaining wall etc.

7.7.6 Ecological Impacts

During the pre-construction phase, activities such as installation of construction camps, construction of temporary roads and mobility of construction staff may damage the local vegetation/trees. As the heavy machinery and camps will be moved and installed, which require significant space due to which available vegetation is expected to be removed. This impact is Site-specific, Permanent, Irreversible, Possible, Medium Significant and needs to be encountered prior to the start of construction stage.

7.7.7 Flora

Potential Impacts

Most common impacts due to a road project are habitat damage and fragmentation, exotic species incursion, pollution, over hunting and genetic obstacles. The proposed subproject already exits so no major fragmentation is expected which can disintegrate the habitat areas into smaller and more isolated units.

During the pre-construction phase, activities such as installation of construction camp, construction of temporary roads & mobility of construction staff may damage the local vegetation/trees. As the heavy machinery and camp will be moved and installed, which require significant space due to which available vegetation is expected to be removed. This impact is site-specific, permanent, irreversible, possible, medium significant and needs to be addressed prior to the start of construction stage.

Establishment of contractor camps and warehouses for storage of equipment, material etc., shall also involve, clearing of vegetation from the area, resulting in another minor negative impact.

A large number of trees of various species, approximately 848[7] (Counting based on aerial imaginaries from Google Earth and Ground truthing for species identification), in the ROW, will be affected due to implementation of the proposed project. This will have an adverse effect on the natural environment of the project area. This impact will be permanent and negative in nature.

[7] for subproject/Lot-I

Mitigation Measures

- As linear tree plantation on both sides of road is already exits along existing Thandiani road. Therefore, efforts should be done to avoid at least tree on either side during the process of widening.;
- NOC from KP, Forest Department is mandatory prior to start any intervention is reserve forests as per law of land.
- The mobility of machinery and construction of temporary road should be proper planned (to avoid tree cover and prefer barren land) and well designed to avoid any loss to local green cover.
- A tentative location for construction camp is recommended where no or minimum vegetation loss will occur.
- Similarly, the alternate routes for roads are recommended where no loss of vegetation is expected.
- Incorporate technical design measures to minimize removal of these trees, if possible
- Plan for compensatory planting of 12,720 trees of similar floral function on both sides of the proposed Alignment are recommended that will help in rehabilitating the floral and faunal activities of the project area.(refer Tree Plantation Plan as Annex-VIII;
- Provision of compensation in the Project Budget for the loss of trees to the affected people;
- During tree plantation exotic species introduction should be avoided and encourage plantation of native species/most suited to the tract like kail, deodar, walnut may be considered as recommended in the Tree Plantation Plan;
- Provision of animal corridors (for the free movement of faunal species, especially, near the attractive sites such as grazing lands, and water bodies.
- While working in or close to Reserve Forests, their management plans (Approved Forest working Plans of Gallies Forest div.) will be strictly followed.
- KP Forest Ordinance 2002, Khyber Pakhtunkhwa Wildlife and Biodiversity (Protection, Preservation, Conservation and Management) Act, 2015, Protection of Trees and Brushwood Act, 1949, WB OP on Natural Habitats (OP/BP 4.04) and Forests (OP/BP 4.36) should be strictly followed.

7.7.8 Disturbance to Wildlife

Potential Impacts

As movement and installations of machinery and vehicles will take place so noise and habitat loss is expected. The routes of the available wildlife and other habitats may be affected due to camps set-up and machinery movements and installations. Temporary road may also affect the habitat of locally available fauna. This impact is Site-specific, Temporary, Irreversible, Possible and Low Significant.

The project implementation will lead to the disturbance of wildlife and may create hurdles/barriers to the wildlife movements for food, water, grazing and overall habitats of different available species may alter as details are already provided in Ecological Baseline of

the same EIA report. The potential traffic noise, vehicles movement pressure and burden of tourists will also have negative impacts on the wildlife.

Wildlife crossings are areas of concentrated animal movement intercepted by roadways. The potential impacts are assessed because animals will be inadvertently hit by drivers as they will attempt to cross the road surface, leading to mortality of animals ("road-kill") and safety concerns to the motoring public.

Collisions with animals can have many negative consequences:

- Death and suffering of animals struck by vehicles;
- Injury to, or death of, vehicle occupants;
- Loss of valuable livestock or pets;
- Harm to endangered species;
- Vehicle damage;
- Economic losses (cleanup, repairs to vehicles, etc.); and
- Road kill is a distasteful sight, particularly costly to locations economically reliant on tourism.

So, by assessing the above impacts serious mitigation measures should be considered in design phase of the proposed project.

Mitigation Measures

- 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 should be given in this regard;
- Proponent must take NOC from the relevant department prior to construction phase; and
- After assessing the impacts on site and consultation with the Wildlife Department following are the recommendations for wildlife safety:

    - Safety fencing and signage will be provided at wildlife hotspots.
    - Safe speed limit will be strictly implemented, to ensure fatal accidents involving wildlife or humans could be avoided.
    - Structure for wildlife movement (underpasses, culverts) will be provided.
    - Caution boards would be erected at crossing areas of wild animals. The exact location for boards would be determined through a survey of crossing animals.
    - Awareness material regarding wildlife will be developed and displayed prominently at the sites frequented by tourists.
    - Roadside reflectors may be used to scare animals away from the road when vehicles approach at night.
    - Fencing or plant barriers can reduce the risk of collisions between animals and vehicles.
    - The engineering design to integrate the principles of green infrastructure including habitat conservation, animal trespasses etc.
    - Noise produced by blasting and other construction activities may be kept to acceptable level.

Wildlife Bridges/Overpasses

Wildlife bridges and vegetated structures should be designed for the passage wildlife to avoid wildlife/vehicle collisions and minimize injuries or fatalities,

The overpasses:

- May serve as intermediate habitat for local fauna;
- Maintain habitat connectivity;
- Reduce collisions and facilitate crossing, especially when used in conjunction with vegetation and fencing to guide animals to over-crossing;
- Substrate and vegetation on the overpass should match that of surrounding landscapes;
- Vegetation is often used to provide a sight and sound barriers to encourage use by disturbance-shy animals; and
- Fencing and vegetation are used to direct animals to the overpass.

The overhead pass may be provided between Kala Pani and End point in dense forest areas.

Wildlife Underpasses

Wildlife underpasses are also recommended to allow safe passage of large-bodied animals. As with wildlife bridges, these large structures may be primarily intended to benefit large-bodied animals, but simultaneously provide safe passage to a wide variety of small and medium-bodied animals, too, and are in most cases constructed with fencing to direct animals to and through the structure.

Culverts

Culverts are used in both upland and riparian settings and come in a variety of sizes, from small pipes to large, pre-cast concrete boxes, but are typically galvanized steel, aluminum, PVC, or concrete pipes of various diameters.

The culverts are in most cases originally designed and installed to enhance drainage and thus typically benefit mostly smaller-bodied vertebrates, including both aquatic (amphibians) and terrestrial (small mammals, snakes, lizards, tortoises) species, although they have been demonstrated to benefit a variety of vertebrate species. Larger culverts may benefit a larger number of species including even large-bodies mammals like leopard and bear.

Signs

Signs are used extensively to inform motorists of regions where the danger of wildlife collisions is high. However, despite their widespread use, the effectiveness of signs in reducing collisions has been incompletely studied and is not well known.

Some work has suggested that signs may be generally ineffective at reducing vehicle collisions with ungulates except in specific cases, such as during well-defined seasonal migrations

- Sign effectiveness has been shown to decrease with time, and most studies suggest that to remain effective at reducing motorist speeds and reducing animal-vehicle collisions, signs ought to be used seasonally and/or temporarily;
- Signs with additional warning mechanisms such as flashing lights, or words deployed seasonally, may be relatively more effective, as many signs are ignored by motorists;
- Signs may be especially appropriate in situations where other crossing measures are impractical, such as in marshy areas or where traffic volumes are low. In such situations, signs designed to reduce vehicular speed through known wildlife crossing areas may help to reduce rates of collision; and
- The Contractor will arrange sign boards for erection in reaches.

Wildlife overpasses will be primarily designed to provide connectivity for wildlife species, often in combination with wildlife fencing. However, overpasses are sometimes also deployed as standalone mitigation measures, with no or limited fencing. When used in combination with wildlife fencing, they help to reduce intrusions into the road corridor as animals are provided with a safe crossing opportunity. When used as a stand-alone mitigation measure, the reduction.

Habitat on Overpasses

The habitat on top of overpasses should reflect that of the surroundings and the habitat requirements of the target species. Often, this requires the presence of multiple habitat types, which can also influence the width of the crossing structure, as it takes space to create multiple habitat types. The habitat on top of wildlife overpasses may include:

- Open habitat (grasses, herbs); Cover (shrubs, trees, tree stumps, logs, branches, rocks);
- Ditches or depressions, and berms (on the sides); and
- Wet areas or (artificial) streams.

The different habitat types should span the entire structure, should continue in the approaches to the crossing structure, and should be integrated with the adjacent habitat.

- Consider planting higher shrubs and trees on the north or east side of an overpass to avoid shading out the overpass entirely;
- Tree species that grow tall and that have large and deep root systems should be avoided on an overpass because of concerns for the integrity of the structure and the potential for the trees to fall on the traffic below. Limit tree height to about 2.5–4 m (8–12 ft);

- Many overpasses have artificially created ponds and attractive vegetation (e.g., berry producing shrubs) on at least one side of wildlife overpasses to encourage animals to visit the location and use the crossing structure;
- Preferably, use only native plant species, and if possible use only seeds or plants from the immediate surroundings;
- KP Wildlife & Biodiversity Act 2015, WB OP 4.04 Natural Habitats will be followed for compliance; and
- Similarly, wastes of the camps shall be properly disposed of to prevent it being eaten by animals, as it may be hazardous to them.

7.8 POTENTIAL ENVIRONEMNTAL IMPACTS DURING CONSTRUCTION PHASE

Following is the brief description of impacts envisaged and the recommended mitigation measures during construction phase.

7.8.1 Soil Erosion and Contamination

Potential Impacts

The clearing of vegetation can also loosen the soil and make it more susceptible to erosion due to wind and rain. There is also a possibility of silt runoff during rainy season causing soil erosion. During the rain, the eroded soil mix with stagnant water to transform into slush, which can affect movement of vehicles and machinery and construction work as well as limit the movements of local people. Soil may be affected by erosion, compaction and contamination. Soil erosion may occur on roadside, at contractors' camps and at embankment works, as a result of uncontrolled run-off from equipment washing yards, excavation of earth/cutting operations and clearing of vegetation. Soil may also be impacted due to unauthorized use of borrow areas and quarries, resulting in degradation of landscape. Whereas, contamination of soil may be caused by solid waste generated at campsites and by oil and chemical spills at asphalt plant sites, workshop areas and equipment washing yards. This may limit the future use of land for agriculture land. This impact is high adverse negative in nature.

Mitigation Measure

- 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 by asphalt will be minimized by placing all containers in a bounded area away from water courses;
- Provision of impervious platform with oil and grease trap for collection of spillage during equipment and vehicle maintenance;
- All spoils shall be disposed of safely and the site shall be restored back to its original conditions;

- Non-bituminous wastes from construction activities shall be dumped in approved sites, in line with the legal prescriptions for dumpsites;
- In areas with strong sheet flow, high embankments will be provided with chutes and drains/culverts to minimize soil erosion. Stone pitching and retaining walls will be made at high embankments in critical areas;
- As applicable and needed, plantation of grasses and shrubs will be done for slope protection;
- Soil erosion control measures such as the formation of sediment basins, slope drains, etc, shall be adopted;
- Productive land or land adjacent to agricultural / irrigated land may not be preferred for excavation;
- Non-productive, barren lands in broken terrain, nullahs and publicly recognized waste lands should be given preference for borrowing materials; and
- Aggregate required for construction procured from quarries and river beds will need approval from authorities.
- Solid waste generated at the camp sites will be properly treated and safely disposed only in the demarcated waste disposal sites/areas;
- If any contaminated soils are found, they shall be removed and deposited in a sealed pit in an area agreed with the concerned;
- Use of modern, well-maintained machinery and vehicles by the contractor to avoid leakages; and
- Soils removed during construction would be stockpiled for reuse where possible

7.8.2 Excavation of Earth

During construction, there is a chance of finding archeological remains. Mismanagement of the archeological remains may result loss of a valuable asset. Further, excavation of earth from borrow areas and for clearance of ROW may result in erosion of soil. Erosion results in change of edaphic characteristics of soil. Loss of fertile top soil may affect adversely on the productivity of the project area. The impact is high adverse in nature.

Mitigation Measures

- In case of finding archeological remains during excavation, the contractor shall immediately report through Supervision Consultant to Directorate of Archaeology and Museums, KP to take further suitable action to preserve those antiques or sensitive remains. Chance finds procedure is given in **Annex- IX.**
- Avoid agriculture land for borrow materials; and
- Contractor needs to obtain approval for excavation and submit the plan of rehabilitation of the site after excavation.
- Time scheduling to avoid excavation during rain
- Proper site staging to ensure that the maximum amount of existing vegetation is left in place during the excavation phase
- Cover all exposed soil as soon as soils are exposed
- Leave a continuous buffer of vegetation around the site perimeter to intercept any sediment that might be transferred off site via surface water flow

7.8.3 Surface and Groundwater

Potential Impact

The surface water may get contaminated due to the surface runoff during construction phase. Construction activities may result in debris entering water body resulting in sedimentation. Storage and transport of construction material may also result in spills of chemical and contamination of water bodies.

Groundwater may also get contaminated from the wastewater generation from the construction camps, leachate from improper dumping of solid waste. Consumption of water for construction activities may also affect other designated uses of water especially drinking water due to less availability of drinking water in the area. The impact is high adverse in nature.

Mitigation Measures

As a mandatory step, all the effluents will be disposed as per the requirements of NEQS. 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. These measures are described below:

- Construction camps will be established in areas with adequate natural drainage channels in order to facilitate the flow of the treated effluents after ensuring that NEQS are met;
- The proponent will ensure that the construction work is confined within the RoW and water bodies are prevented from pollution during construction;
- The solid waste will be disposed of in designated landfill sites to sustain the water quality for domestic requirements;
- Regular water quality monitoring according to determined sampling schedule;
- Water required for construction shall be obtained in such a way that the water availability and supply to nearby communities remain unaffected;
- The contractor will ensure that construction debris do not find their way into the drainage or nullah which may get clogged;
- To maintain the surface water flow/drainage, proper mitigation measures will be taken along the road, like drainage structures;
- Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond;
- Construction work close to the streams or other water bodies will be avoided, especially during monsoon period;
- Wastes will be collected, stored and taken to approve disposal site;
- Wastewater effluent from the Contractors' workshops and equipment washing-yards will be passed through gravel/sand beds to remove oil/grease contaminants before discharging into the natural streams. According to the NEQS, the BOD concentration in sewage must be brought down to less or equal to 80 mg/l before being discharged into a natural stream having capacity to dilute the effluent. For wastewater apart from BOD, COD of 150 mg/l will also be checked; and
- Similarly, if the sewage after treatment is to be discharged on to the land it will meet the requirements of the NEQS for disposal of wastewater.

7.8.4 Traffic Issues

Potential Impact

Due to the proposed construction activities and movement of heavy project vehicles for construction material supply, traffic problems may arise for the commuters and transporters travelling to the proposed areas. The problems will include traffic jams and inconvenience to the public passing through the Project Area. It will also increase traffic load on the existing road network or access roads ultimately deteriorating the existing condition of the roads. The movement of vehicles along the haulage routes will cause soil erosion, debris flow, dust emissions, vibrational impacts, etc. Considering these consequences, this impact can be categorized as direct, moderate, site-specific, medium term, temporary, medium probability and irreversible.

Mitigation Measures

To minimize traffic problems in the proposed project area, following measures will be considered:

- Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the daytime to reduce traffic load and inconvenience to the local population;
- Construction vehicles, machinery and equipment will be parked at designated areas (at construction camps site) to avoid un-necessary congestions along the major roads;
- The speed of the vehicles will be controlled (at 15 to 25 km/hr) to reduce the probability of severe accidents, soil erosion, debris flows due to vibrations and dust emission;
- Damages of roads due to construction vehicles will be instantly repaired and/or compensated after the completion of work;
- Proper sign boards will be provided for smooth flow of traffic;
- Period of construction and area / location of construction site shall be informed to public in general and specifically to local residents; and
- Any closure of the roads (especially main roads) and deviations / diversions proposed should be informed to the riders through standard signs and displays.

Traffic Management Plan will be prepared by the contractor and implemented to avoid traffic accidents, jams/public inconvenience.

7.8.5 Air Quality

Potential Impact

Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. Besides, multifarious construction activities and increased vehicular traffic (construction vehicles) would also contribute to the localized airborne dust. Once in

the air, the larger sized particles, under influence of gravity, tend to settle down in the immediate vicinity of the source. The Suspended Particulate Matter (SPM) of the size smaller than 10 micrometre (PM_{10}) tends to remain suspended in the environment for much longer and persistent time and is an environmental hazard. The objectionable impacts of settling of the suspended dust would be its dry deposition on vegetation, motor vehicles, structures, and other exposed surfaces. Exhausts from fossil fuel burning in the construction machinery will also deteriorate local air quality. Similarly, exhausts from generators can also have impacts on air quality in the vicinity.

The overall impact on the quality of air during the construction phase will be high adverse, however, it will be temporary and limited to the project's implementation phase only.

Mitigation Measures

The impacts construction phase of the proposed project could be effectively mitigated by the implementation of simple procedures by the Contractor including but not limited to the following:

- All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;
- Open burning of solid waste from the Contractor's camps and at construction site should be strictly banned;
- Preventive measures against dust should be adopted for on-site mixing and unloading operations;
- Construction materials (sand, gravel, and rocks) and spoil materials will be transported through trucks covered with tarpaulins and all vehicles (e.g., trucks, equipment, and other vehicles that support construction works) will comply with the NEQS for carbon emissions and noise;
- Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s);
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions;
- Emissions from batching / asphalt plants can be controlled efficiently by the installation of cyclone / scrubbers. Diesel operated equipment should be equipped with well-maintained fuel filter and may be replaced timely (if required). In addition to that, regular maintenance activities comprising changing of lubricating oil, changing the air and fuel filter, cleaning the fuel system, draining the water separators and proper tuning may also help in reducing the emissions from diesel generators;
- Construction equipment is generally left idling while the operators are on break or waiting for the completion of another task. Emissions from idling equipment tend to be high. Existing idling control technologies, which automatically shut the engine off after a preset time can reduce emissions, without intervention of the operators;
- NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works;
- Service roads (used for earthmoving equipment and general transport) should be regularly sprayed with water during dry weather;
- All excavation work should be sprinkled with water;

- Construction workers should be provided with surgical masks for protection against the inhalation of dust;
- Vehicles used for construction should be tuned properly and regularly to control emission of exhaust gases;
- Ensure precautions to reduce the level of dust emissions from hot mix plants, crushers and batching plants should be taken up; e.g. providing them as applicable, with protection canvasses and dust extraction units. Mixing equipment should be well sealed and equipped as per existing standards; and
- Regular monitoring of air quality in accordance with NEQS.

7.8.6 Noise/Vibration

Potential Impact

The noise and vibration will be produced due to the operation of construction machinery, equipment and blasting activities. Sources of noise and vibration during construction are heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers, asphalt plants and other equipment's. Noise and vibration are perceived as one of the most undesirable consequences of construction activity. The above machinery is expected to generate noise levels that would be severe in the project area.

The cumulative effects from several machines can be significant and may cause significant nuisances. However, these increased noise levels will prevail only for a short duration during the preconstruction and construction stage.

The likely impacts due to noise are:

- Psychological effects of distraction of attention, irritation and short temperedness in the exposed persons due to persistently higher noise levels;
- Noisy settings and higher background levels can cause temporary threshold shift and the consequent habit of speaking loud, which may cause damage to vocal cords in the persons exposed;
- Potential impact from vibration during the construction period consists of damage to buildings from heavy earthmoving equipment and blasting; and
- Moreover, vibrations from machinery and equipment such as hand held compactors and concrete vibrators can produce easy fatigability and generalized aches in the persons operating these machines.

Though the construction method has not been determined yet, however it is believed that the adopted method of construction shall produce less noise and vibration if the suggested mitigation measures are adopted.

Mitigation Measures

- Selection of up-to-date and well-maintained plant or equipment with reduced noise levels ensured by suitable in-built damping techniques or appropriate muffling devices;

- Confining excessively noisy work to normal working hours in the day, as far as possible;
- Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use;
- Preferably, restricting construction vehicles movement during night time;
- Heavy machinery like percussion hammers and pneumatic drills shall not be used during the night without prior approval of the client;
- Vehicles and equipment used shall be fitted, as applicable, with silencers and properly maintained;
- Use of low noise machinery, or machinery with noise shielding and absorption;
- Contractors shall comply with submitted work schedule, keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures;
- Blasting shall be carried out according to relevant safety standards;
- Blasting schedules shall be publicly disseminated in areas where residences will be impacted by the blasting noise and vibration; and
- Potential structures which may be adversely affected by blasting vibration will be identified prior to blasting and monitored during blasting. Appropriate safety measures will be implemented. Following safety considerations shall be ensured during blasting activities;

    - Blast monitoring stations are operational.
    - No fly rock is emitted beyond zone of exclusion.
    - No visible emissions of dust/fumes from site.
    - Interruptions to road are minimized.
    - A safe area is evacuated around all blasts.
    - All blasts are monitored.
    - No damage occurs to people, property, livestock or power lines.
    - Personal Protective Equipment shall be provided and worn by the personnel involved in blasting operations.
    - First aid kit shall be available at easily accessible location.
    - The team shall be able to handle emergency situations and the possible emergency services shall be notified in advance.
    - All complaints are recorded and responded to in a timely and professional manner.
    - The Blast Record shall be maintained containing all the information required to re-create the blast site, locate blast holes and shot/loading details

7.8.7 Borrow Areas / Open Pits

Potential Impacts

Borrow / open pits and its excavation activities may result in land disputes, soil erosion, loss of potential cropland, loss of vegetation, landscape degradation, and damage to road embankments.

Borrow / Open pits may also result in 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. This impact is permanent and high adverse in nature.

Mitigation Measures:

- Necessary permits will be obtained for any borrow pits from the competent authorities;
- Conversion of borrow pits into fish farms and care in selection of borrow areas;
- Necessary permits shall be obtained for any borrow pits from the competent authorities;
- No excavations are allowed within distance of 500 m to ROW;
- In borrow pits, the depth of the pit shall be restricted upto 5' and the sides of the excavation will have a slope not steeper than 1:4;
- Soil erosion along the borrow pit shall be regularly checked to prevent/mitigate impacts on adjacent lands; In case borrow pits fill with water, measures have to be taken to prevent the creation of mosquito-breeding sites; and
- Other measures for soil erosion already given under para 7.8.1 should be adopted.

7.8.8 Construction Camps / Camp Sites

Potential Impact

Improper construction camp location and mismanagement of construction camp activities can lead to various social and environmental impacts which include health and safety, traffic problems, soil degradation, loss of vegetation and assets on the selected land, solid waste and water pollution. Furthermore, cultural differences, behavior of construction workers, potential disregard for local cultural norms can lead to increased tension between local communities and workers residing in the construction camps. This impact is temporary and moderate negative in nature.

Mitigation Measures

- WB EHS Guidelines (2007) will be followed (available at https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines);
- The project will seek to avoid sitting camps where their presence might contribute to any conflicts with locals;
- Employment policies which aim to maximize job opportunities for local people will help to minimize tensions caused by different socio-cultural values;
- Camps will be designed to be self-contained to reduce demand on infrastructure and services of nearby communities
- A comprehensive safety and security plan for the camps will be prepared which will comprise of a training manual, use of safety equipment and emergency preparedness.
- Training will be provided to all staff on camp management rules and overall discipline and cultural awareness.

- Waste Management Plan will be implemented to ensure safe handling, storage, collection and disposal of construction wastes and the training of employees who handle waste;
- Domestic and chemical effluents from the construction camp will be disposed by the development of on-site sanitation systems i.e. septic tanks (as shown in Figure 7.1).
- Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit.
- The Contractor(s) will be responsible to submit details of site-specific wastewater management plan along with details of wastewater collection, transportation and its disposal.
- Individual trees and shrubs of high conservation value to be marked and preserved wherever possible or transplanted if the root conditions are suitable for such an operation;
- Site for construction camp will be selected to minimize the removal of existing macro-plants at camp sites;
- Photographical and botanical inventory of vegetation before clearing the site;
- Compensatory plantation to be done when construction work near ends; and
- The contractor(s) shall ensure removal & rehabilitation of site upon completion.

7.8.9 Wastewater Generation at Construction Camps

Potential Impact

Wastewater will be generated at the construction camps by the workers. If the generated wastewater is not properly treated or disposed of, this may contaminate the surface water sources such as nullahs, drains, water channels etc. apart from soil contamination. The **Table 7.2** below shows anticipated composition and estimate of the wastewater to be generated from construction camps project assuming that on average the water demand per person is 40 liters per day and that 80% of the water demand will become wastewater.

Table 7.2: Estimated Wastewater Generated by Workers in Construction Camps

Sr. No.	No. of Workers*	Estimated Total Water Demand** (liters/day)	Estimated Wastewater Generated (liters/day)***
1	47[8]	1,880	1,504

* "Tentative Work Force Requirements Including Client and Contractor Staff"
** = (47) x (40) = 1,880 liters/day
*** = (1,880) x (80%) =1,504 liters/day

This impact can be categorized as direct, moderate, site-specific, short term, temporary, high probability and reversible.

[8] Estimated no. of staff for Lot-I.

Mitigation Measures

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 (as shown in **Figure 7.1**).
- Proper monitoring to check the compliance of NEQS will be carried out;
- Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit; and
- The Contractor(s) will be responsible to submit details of site-specific wastewater management plan along with details of wastewater collection, transportation and its disposal.

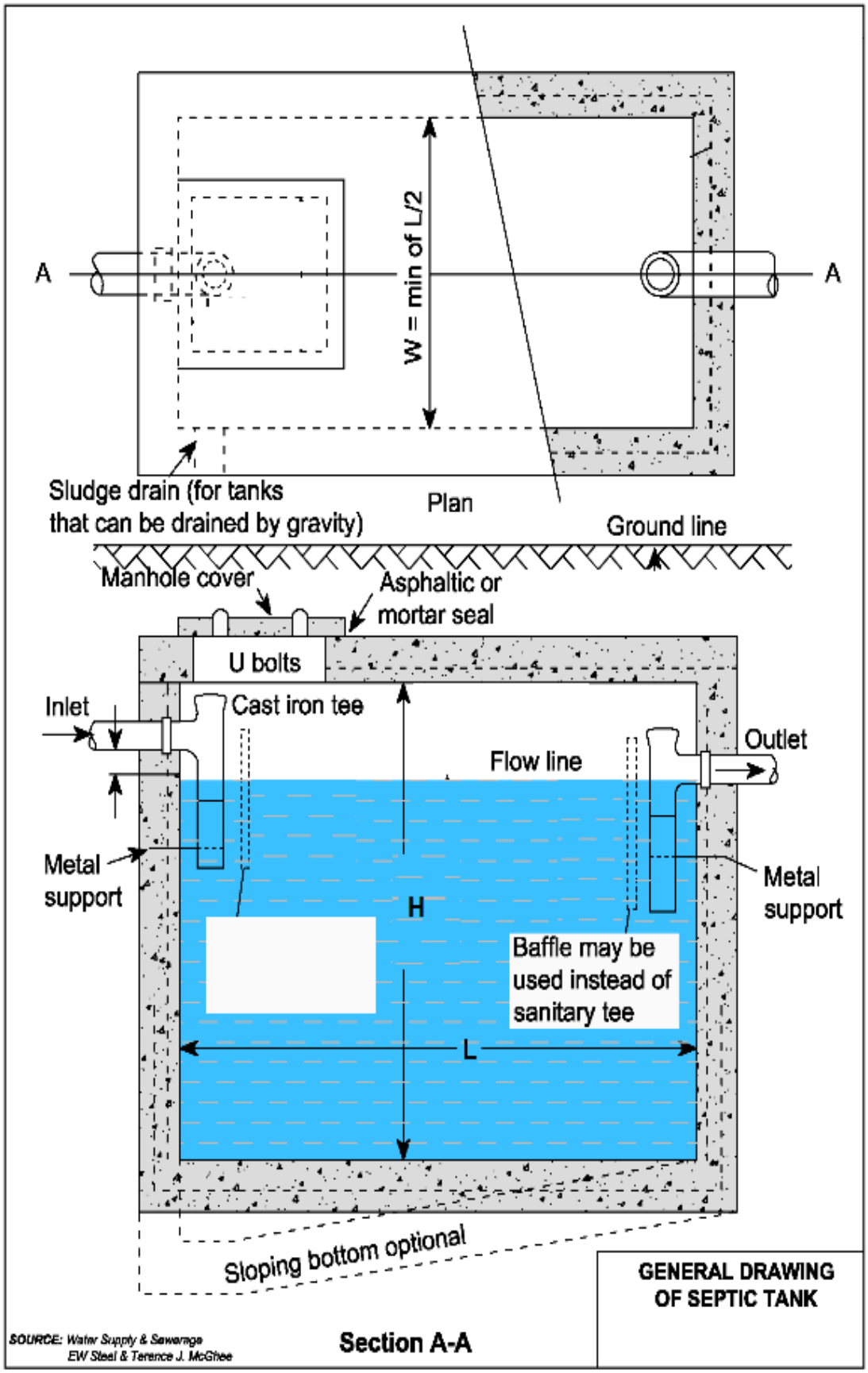

Figure 7.1 : General Drawing of Septic Tank

7.8.10 Solid Waste (Construction, Municipal and Hazardous Waste)

Potential Impact

Considering the labour (about 47[9] in numbers) residing in the construction camp and the locally available labour, an average solid waste generation rate of 0.5 kg/capita/day[10] is adopted for the estimation of solid waste generation. Based on this assumption, a total of about 23.5 kg of solid waste will be generated from construction camps on daily basis. Different type of waste is likely to be generated during the construction phase of the project. The municipal waste will be in the form of food, cans, paper and wastewater from construction camps toilets and washing yards. Construction waste will include excavated soil, sand, gravel, rocks, asphalt, pieces of concrete, bricks, wood, metal pieces and electrical wires. Whereas, hazardous waste can be comprised of paints and construction chemicals. All these, if left unattended, can become a source of nuisance and environmental pollution in the project area.

Insecure and unhygienic disposal of the solid wastes particularly garbage and trash may cause degradation of soil and land. Insecurely disposed off heaps of wastes containing kitchen garbage and food waste can serve as breeding grounds for the disease spreading vectors and rodents. Throwing away of solid wastes into water channels and the wastewater network can result into choking of the latter.

These impacts are temporary and major minor negative in nature.

Mitigation Measures

- WB Environment Health and Safety Guidelines (available at https://www.ifc.org/wps/wcm/connect/topics_ext_content/ifc_external_corporate_site/sustainability-at-ifc/policies-standards/ehs-guidelines) will be followed for management of solid waste including hazardous, municipal and construction waste;
- Solid Waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan;
- Training of work force in the storage and handling of hazardous materials and chemicals Construction workers and supervisory staff should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste;
- Proper labeling of containers, including the identification and quantity of the contents, hazard contact information etc.;
- Waste disposal plan must be reviewed during the entire construction phase in the light of changing weather conditions

[9] Estimated no. of staff for Lot-I.

Source: The World Bank Report 2012 – What a Waste: A global review of solid waste management. Based on UNEP estimates for waste generation in the Asia Pacific. Average is 0.45 kg/capita/day.

- Emergency Response plan shall be prepared to address the accidental spillage of fuels and hazardous goods;
- Immediate collection of spilled oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies;
- Reusing bitumen spillage; and Disposing non-usable bitumen spills in a deep trench providing clay linings at bottom and filled with soil at the top (for at-least 0.5 m);
- Used oil shall be collected in separate containers stored on impervious platform with restricted access and shall be sold to licensed contractor and the burning of waste oil shall be strictly restricted; and
- Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub grade/shoulders;
- camp site or at site, for the receipt of wash waters from construction machinery.

7.8.11 Green House Gas (GHG) Abatement

Potential Impact

The main sources of greenhouse gases (CO_2, CH_4, NO_x etc.) during the construction activities of the proposed project will include both mobile and stationary sources. The mobile source will be the construction and transportation vehicles while the stationary source will be the batching and asphalt plants. Emission of greenhouse gases cause global warming and other climatic changes on regional and global scale. The climate change due to global warming, may result in following impacts over a period of time:

- Extended summer season and absence of snow falls;
- Higher temperatures may result in more precipitation falling as rain rather than snow, hence earlier and greater runoffs, increased runoff may pose greater challenges for water management
- Increased natural hazards such as landslides and debris flows, extreme/unpredictable rainfall events, wind storms, droughts and wildfire.
- Due to shift in temperatures and precipitation patterns runoff, stream/lake temperatures, suitable habitats may move upland, thereby declining in size, ecosystems become fragmented, number and composition of species will change with particular threats to sensitive species; and
- Increased damages to transportation infrastructure from extreme events, causing difficulties for access and emergency evacuation, and involves higher maintenance costs.

Mitigation Measures

- Regular motioning of the vehicles for engine efficiency;
- Avoid idling of construction vehicles;
- Alternative energy resources shall be considered where possible;
- NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery shall be enforced during construction works.

7.8.12 Resource Conservation

Potential Impact

Resources involved in the construction of proposed project would include water, fuel and construction materials.
Excessive water consumption by the construction staff may stress water resources in the project area and in certain cases may disturb the existing water supplies in the project area.

Construction material to be used for construction includes coarse aggregates, fine aggregates, asphalt, cement, lining material, earthworks, reinforced and structural steel etc. Almost all the materials to be used in the construction of proposed project are non-renewable and therefore their efficient use is necessary for the future use.

Use of electricity will be insignificant. Diesel and residual fuel oils will be used to operate construction machinery and asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use, but it will also help to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes is very important. Electricity shortage is not expected but the sustainable use of diesel and residual fuel is necessary.

Fuel will be used to operate construction machinery. Efficient use of energy resources is important to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes is important. The impact is minor negative.

Mitigation Measures

Following practices shall be adopted to conserve these natural resources:

- Use potable water bowsers for construction works and mineral water bottles/ ground water for drinking purpose;
- Plan for the provision/purchase of adequate insulation to reduce heat loss through batching plants;
- Reduction of wastage of water through training of workers involved in water use;
- Source of water shall be carefully selected. Water use shall not disturb the existing community water supplies;
- Reuse of construction waste materials may be adopted wherever possible;
- Diesel and fuels with low sulphur content should be used to operate construction machinery and equipment;
- Efficient and well maintained equipment and machinery should be used;
- The equipment and machinery should be turned off when not in use;
- Unnecessary equipment washings shall be avoided;
- Use optimum amount of bitumen for road surfacing.
- Use of solar panels at construction camps may be considered;
- A good camp design and an efficient worksite management plan can help the contractor to reduce the water demand, wastewater and solid waste volumes to the lowest level;

- Ensure adequate insulation to reduce heat loss through batching plants;
- Regularly monitor CO and CO_2 content of the flue gases to verify that combustion systems are using practical excess air volumes;
- Maintain clean heat transfer surfaces in asphalt batching plant;
- Regular service of the vehicles and batching plants will reduce the mechanical losses of energy.

7.8.13 Disposal of Mucking Material

Potential Impacts

Inevitable cut and fill earthwork operations will open up scars on the land around the project area. This impact is permanent temporary and minor negative in nature.

Mitigation Measures

Mitigation measurewill include proper landscaping, which should be given due consideration along with re-establishment of the local/indigenous vegetation (refer tree plantation plan is attached as Annex-VIII). The excavated materials that are unsuitable for use will need to be stored, transported and reused and the residual material shall be disposed of appropriately at designated sites.

7.8.14 Natural and Man-Made Disasters

Potential Impact

Natural disasters (earthquakes) and accidents such as fire, falls, slips and trips may result in injuries, financial losses and may even lead to deaths. The workers shall be trained and facilitated to cope with such disasters.

Mitigation Measures

Mitigation measures include the following:

- An Emergency Response Plan (ERP) for earthquakes and manmade disasters should be developed by contractor in coordination with SC and C&W Department should be implemented in close consultation with the RESCUE Services and other concerned departments;
- Training of the Contractor and C&W Department staff and employees regarding the emergency procedures and plans should be regularly conducted;
- Emergency numbers should be clearly posted at all disposal stations; and
  Minor incidents and near misses should be reported, and preventive measures should be formulated accordingly by the C&W Department.

7.8.15 Flora

Potential Impact

The subproject will involve destruction of vegetation cover on construction areas particularly along existing alignment. It is initially examined that approximately 848 (for Lot-I) mature, sub-mature, and pole crop and saplings of different tree/plants species will be disturbed during the construction phase of the project. The provided number of trees is approximate and tentative which needs proper detailed field surveys by KP Forest Department. The number of possibly impacted trees is provided by GIS and tree identification was carried in field. Moreover, trees of small and medium sizes will be removed due to the layout of the project for which compensation will be made to concerned parties (Local community, forest and other relevant departments.)

The subproject interventions will be undertaken in subtropical chir pine and moist temperate Kail forests zones. The proposed sub project may pass through Chatri Reserve Forests and Location Forest Thandiani along the road. The proposed Thandiani Road is already exits so, no major fragmentation is expected which can disintegrate the habitat areas into smaller and more isolated units.

Project construction activities might create disturbance to local flora and fauna but limited and temporary. However, the extent of subproject activities is low in terms of physical intervention as the proposed subproject involves the rehabilitation and remodeling of existing Abbottabad-Thandiani Road/Lot-I. Therefore, the impact of disturbance to flora and fauna will be moderate.

Exhaust of noxious gases from movement of heavy machinery and dust will pollute air which will adversely affect health and vigor of plants. During construction activities, the Contractor's workers may damage the vegetation and trees (for use as fire-wood to fulfill the camp's requirements).

Overall, it can be stated that the large number of wood trees will be damaged and expecting low impact on agriculture crops and fruit trees in the proposed alignment of the project.

This impact is direct, permanent, irreversible, possible and high significant for wood trees raised for forest department.

Mitigation Measures

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 that route should be considered, in which minimum ecological and environmental losses are expected.

To overcome the expected losses of trees 12,720 number of trees are recommended for plantation including cost in plantation plan.

- As tree plantation on both sides of road is already exits along existing alignment till, therefore, efforts should be done to avoid at least trees on either side during the process of widening.
- NOC from KP, Forest department is mandatory prior to start any interventions in reserve or any designated forest, as per law of land/forest act 2002. Compensation of damaged trees, soil and other assists should be paid to forest department.
- A tree plantation plan/ program has been prepared (attached as Annex-VIII) with the recommendations and technical support of concerned Forest Department.
- As a principal, ten trees are planted in place of felling of one tree in consideration of mortality but here 24,000 are recommended for plantation along the road to compensate the losses in mountainous biodiversity in lieu of 848 trees.
- The client shall implement the program with the help of Forest Department and with the consultation of concerned consultant ecologist.
- The Forest Department shall involve the communities (if required) for carrying out plantation.
- Open fires should be banned in the area to avoid hazards of fire in the area.
- Clearing of vegetation cannot be avoided at the areas specified for project structures, but damage to the natural vegetation may be minimized by establishing camp sites, workshops and batching plants on waste/barren land rather than on forested or agriculturally productive land.
- However, if such type of land is not available, it shall be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth.
- The Contractor's staff and labor shall be strictly directed not to damage any vegetation such as trees or bushes. They shall use the paths and roads for movement and shall not be allowed to trespass through farmlands or forested areas.
- Contractor shall provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel shall not be allowed.
- Land holders should be paid reasonable compensation for the loss of their standing trees, in accordance with the prevailing market rates. This will mitigate the financial losses of the land holders
- Campsites and asphalt plants will be established on waste/barren land rather than on land with vegetation or agriculturally productive land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to crops, trees and undergrowth.
- Existing access tracks to the proposed alignment of the Thandiani road should be utilized and new paths should be constructed only in case, no existing path is available. While making paths for carriage of equipment and material to the site new tracks, care should be taken that minimum land is utilized and minimum area of crop is disturbed. Cutting of trees should be avoided by making diversions. Construction vehicles, equipment and machinery will remain confined within their designated areas of movement
- Prior formal approval from the Forest department will be obtained if removal of vegetation/ tree cutting is required.
- KP Forest Ordinance 2002, Khyber Pakhtunkhwa Wildlife and Biodiversity (Protection, Preservation, Conservation and Management) Act, 2015, Protection of Trees and Brushwood Act, 1949, WB OP on Natural Habitats (OP/BP 4.04) and Forests (OP/BP 4.36) should be strictly followed.

7.8.16 Fauna

Potential Impact

Alterations in land uses will impact the physical and biological environment and will cause dislocation of faunal species. However, deep burrowing in the project area would result in emergence of water catching ponds. The impact of the construction activities on local fauna is assessed to be moderate. However, for sustaining the status of existing terrestrial environment and caring for possible future improvement the following mitigation measures are proposed.

If any interventions planned in Wildlife department areas and assets advance NOC is mandatory from KP-Wildlife department as per Biodiversity act 2015.

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, blasting, movement of machinery and vehicular traffic, movement of labor, camping, etc. The existing animals will leave the directly affected areas due to construction activities and human intervention. Some animals particularly reptiles may get killed during the earthworks operations. Moreover, the movements of the mammals and reptiles will be restricted during the construction phase.

Birds as well will tend to move away from the construction areas and find shelter and food elsewhere due to the activities mentioned above for fear of being hunted / trapped.

As movement and installations of machinery and vehicles will take place so noise and habitat loss is expected. The routes of the available wildlife and other habitats may be affected due to camp set-up and machinery movements and installations. The temporary roads may also affect the habitat of locally available fauna. This impact is site-specific, temporary, irreversible, and low significant.

Noise generated from blasting and machinery particularly during the night hours will even scare the wildlife residing in habitats located at some distance from the construction areas. Uncontrolled blasting may even disturb the wildlife of the Project Areas. Food and refuse at the Contractor's camps may attract animals that might in turn be hunted by the workers. This impact is indirect, site-specific, temporary, reversible, possible and medium significant.

This road may alter the landscape and can impact biodiversity. In addition to destruction of habitat, the construction of roads would cause mortality, shift population demographics and be a source of pollution into the environment. The proposed work will not cause major impact or change to the habitat as the road already exits and the wildlife of the project area is already shifted to safer places from the decades. The potential impacts of widening of Thandiani Road and the mitigation measures are given.

Mitigation Measures

- Degraded micro habitat of the project site needs landscape restoration plan including fencing of both sides of the proposed project and planting of native plant species. Such closures will help in restoration of natural vegetation and micro habitats.
- Across the road, wildlife corridors, culverts and underpasses (Total Crossing/ drainage structures = 46, these structure will have provision for wildlife crossing and water drainage as well) .shall be provided for safe movement of reptiles and mammals in between both sides of the road. This will reduce the incidences of road kills.
- Establishment of rain water catchment bands for bringing improvement in natural landscape shall be considered by contactor during construction phase of the project and should be the part of planning in design phase as well. .
- Wildlife overpasses should be provided (especially for monkeys & others) starting from RD-5 (5th km, considering the habitat) after each 3rd km same structure must be provided (as mentioned in design phase) and same should be considered for signage and boards as well.
- For sustaining existing avifauna in the project area, small size water points shall be constructed along the road with provision of water on regular basis.
- Dumping of wastes along the road sides shall be avoided.
- Care shall be taken during construction activities for avoiding purposely or chance killing of animals.
- If any wild species and habitat is encountered during construction, that must dealt carefully and local wildlife department officials should be called to rescue the subject animal and may be shifted to nearby facility(if required) and should be released in the original/native habitat.
- 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 should be given in this regard. KP, Biodiversity act 2015 should be part of code of conduct.
- The Contractor must be held responsible for instructing his work force accordingly and for enforcing this restriction. In addition, this shall have to be controlled by the Wildlife Department.
- Special measures shall be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding.
- Blasting and other noise generating activities shall not be carried out during the night (especially at Dawn and Dusk timings) by the work force, clear orders should be given.
- Similarly, wastes of the camps shall be properly disposed of to prevent it from being eaten by animals.
- Noise produced by blasting and other construction activities will kept to acceptable level.
- The local people shared their views regarding the habitat improvement and recommended that strict law enforcement in the area is imperatively required to safeguard the natural resource of the region. Tree plantation drive should practical and provision of proper funds (timely payments) is key to success. They also shared that local people of the area need to be involved in forest and wildlife conservation activities.
- The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly, wastes of the camps will be properly disposed

of to prevent the chances of eating by wild animals, which may become hazardous to them.

- The underpasses for movement of wild animals may be provided for crossing of monkeys. For other animals
- Caution boards would be erected at crossing areas of wild animals. The exact location for boards would be determined through a survey of crossing animals.
- Stabilize road side slopes with plantation of appropriate indigenous grasses and shrubs etc. in addition to engineering techniques. Proper maintenance of road sides is also required.
- Speed bumps may be used to reduce vehicle speed and potential for vehicle/animal conflict in Populated towns/commercial areas, especially where the existing speed limits are relatively low, visibility is limited by a curve in the road or adjacent concealing vegetation, and where surrounding habitat increases the risk of collision (Carr et al. 2003). It may be used in some regions with high rates of animal-vehicle collisions as mentioned above, to get drivers' attention by creating noise and help to get drivers to slow down.
- Lighting, especially when used in conjunction with fencing and signage, to be effective in reducing collisions with large mammals by increasing driver visibility and reaction time, especially at night when many large animals are most active, and by reducing animal crossing by those animals that avoid lighted areas. Conversely, lighting components of a project may be evaluated to reduce glare in areas important for wildlife crossing where safe passage is ensured. The erection of lights could only be possible where electric supply will be available.
- The use of lighting is, however, often limited to areas with a nearby power source, but has generally been found to be a cost effective solution to vehicle-animal collisions,
- The activities water points must be provided (if disturbed any) to minimize the impact and movement of available wild and domesticated animals for water to conserve local ecosystems and biodiversity.
  By adopting the above and structures recommended in design phase mitigation, following results are expected:

The avoidance, minimization or compensatory mitigation actions leads to

- Reduction in animal-vehicle related mortality;
- Increase habitat connectivity/reduction in habitat fragmentation;
- Improved permeability of a crossing structure;
- Increased genetic exchange;
- Reduction in predator influence created by facility; and
- Increased public safety.

7.9 POTENTIAL ENVIRONEMNTAL IMPACTS DURING OPERATIONAL PHASE

The anticipated environmental impacts related to the proposed project have been studied for the operational stage of the project as discussed hereunder.

7.9.1 Air Quality

Potential Impacts

Improvement in road condition will help to reduce traffic related emissions in the short term by allowing a smoother traffic flow. However, in the longer run, increased traffic levels and congestion will lead to PM10 pollution levels above the NEQS and international standards, which may result in causing public health risks, nuisance and other impacts on bio-physical environment. These conditions will result in the rise of vehicular emissions (CO, NOx, SOx, PM_{10}) associated with the adverse effects on the environment and human.

This impact is permanent and positive, in case of improvement of road conditions and minor negative, when traffic volume is increased.

Mitigation Measures:

- Setting up of a system to monitor air quality along project area in accordance with the applicable standards/limits;
- Helping the owners and occupants of the affected premises to identify and implement special measures such as hedges and vegetation to reduce air pollution;
- Roadside tree plantations as applicable and feasible under harsh climatic conditions; plants should be selected in accordance to their ability to absorb emissions;
- Regular road maintenance to ensure good surface condition;
- Restricting speed limits at sensitive locations;
- Monitoring air quality at defined schedule;
- Regular vehicle checks to control/ensure compliance with NEQS; and
- Enforcement and penalties against traffic rules violators

7.9.2 Noise

Potential Impacts

During the operational phase, the noise levels are anticipated to increase due to traffic related noise pollution; vibrations from engines and tires and mainly use of pressure horns. This impact is permanent and moderate negative in nature.

Mitigations Measures:

- According to monitoring results, additional sound barriers in form of trees and hedges will be discussed with the affected people and planted if agreed;
- Signs for sensitive zones (health centers / educational institutions etc.) to disallow the use of pressure horns; and
- Enforcement and penalties against traffic rules violators.

7.9.3 Wastes/ Hazardous Waste

Potential Impacts

Due to increased no. of tourists using this road, municipal waste is expected to be generated during operation phase. No hazardous waste is expected to generate in operation phase except during road maintenance works.

Mitigations Measures:

- Solid waste generated shall be properly disposed off through local solid waste management system.
- Providing the necessary means for emergency response on call 24 hours/day;
- Management of hazardous waste during road maintenance works will be similar as given for construction phase.

7.9.4 Road Safety

Potential Impacts

Enhanced vehicular movement and speed may result in road safety issues like road side accidents. This impact is permanent but moderately 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. The impact may be considered permanent and high adverse in nature.

Mitigation Measures

Strict enforcement of speed limits, installation of speed guns and channelization of traffic with respect to categories (heavy vehicle traffic and light vehicle traffic) and enforcement of penalties for the violators will reduce the significance of this impact.

7.9.5 Drainage

Potential Impact

During the operational phase, poor maintenance of the road drainage 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 start and end point of the proposed project and can cause traffic jams. The impact may consider to be moderate adverse in nature.

Mitigation Measures

- 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 around the flyover and at grade road alignment.

7.9.6 Soil Erosion and Contamination

Potential Impact

During the operation phase the routine impacts to soils would be limited largely to soil erosion impacts caused by vehicular traffic. Any excavations required for maintenance would cause impacts similar to those from construction phase, but at a lesser spatial and temporal extent. The accidental spill of product such as accidental fuel and material spills would likely cause soil contamination. Except in the case of a large spill, soil contamination would be localized and limited in extent and magnitude.

Mitigation Measures

To minimize the disruption of top soil following remedial measures should be taken:

- The top soil that will be excavated from the area will be preserved and reused for the horticulture purpose;
- Proper solid waste management program is prepared and executed to ensure and Land waste containment, collection, transfer and disposal; and
- Monitoring is carried out at specific locations for strict compliance to the developed ESMP in implementing measures to waste management.

7.9.7 Flora

Potential Impact

During Operational stage the Project will not affect Flora (Trees and agricultural crops) or release any significant pressure detrimental to flora. Low level impact is expected at operational phase on Flora due to the O&M activities. This impact is site-specific, temporary, short-term, irreversible, unlikely and low significant.

Agriculture and Fruit Trees

Improved infra-structure facilities will help the farmers and owners of the orchards to fetch better prices for their produce, due to easy and swift approach to the local markets and other big cities of the country, which will have a positive impact.

Mitigation Measures

- The implementation of plantation plan recommended in compensation for cutting of trees should start working during operational stage, to ensure the ecological balance and to avoid any impact on local environment.
- Large scale planting with suitable indigenous fruit and forest trees, shrubs and ornamental plants, and Linear plantation will be carried out in accordance with the

Tree Plantation Plan to improve aesthetic value and offset the effect of removal of vegetation.

- Proper check and balance for above activities is highly recommended. Plantations so, raised must be maintained according to the standard forestry practices which include proper Irrigation, Cleaning, Pruning, thinning at prescribed intensity, Silt clearance and Trench-opening, etc.
- Maintenance and security of the plantation should be done for at-least five years (in consultation with the Forest Department). Measures such as fencing, watch guards and fire protection should be considered.
- Presence of adequate flora, along the Thandiani road, will absorb through photosynthesis, noxious hydrocarbon gases, emitted from an expected large number of cars, vehicles and public transport, which shall be diverted from the existing routes, thus purifying air of hazardous particles.
- The intensive plantation will be effective live screens against night glare, dust, noise and pollutant emissions. These vegetated strips shall develop into a complete ecosystem. Planting will however be done keeping in view the principles of landscape designing;
- The intensive plantation will be effective live screens against night glare, dust, noise and pollutant emissions. These vegetated strips shall develop into a complete ecosystem. Planting will however be done keeping in view the principles of landscape designing;
- An awareness campaign targeted on the neighborhood farmers shall be run to popularize the planting of trees; and to educate them, regarding importance of trees.
- All activities must be done under the technical supervision of Forest department.

7.9.8 Fauna

Potential Impact

There is very small area/ trees of reserve forest will be disturbed and having no protected forests, Game reserve, Game sanctuary or national park in the project area so, no major impact on Wildlife & Livestock in the area is expected through, noise, vibration and any type of normal activity in the project area, as the road is already exists thus will have no effect on productivity. This impact is site-specific, permanent, irreversible, possible and medium significant.

The project area is rich in wildlife. The proposed interventions related to the sub project, and the resultant increased number of tourist activity, can impact animal movements by direct mortality or avoidance behaviour. Enhanced tourist mobility will increase the traffic load that may consequently increase the mortality of wild animals. However, the impact is likely to be minor / small.

Mitigation Measures

- The precautionary measures described for future shall be applicable during operation phase as relevant for the conservation of wildlife species in the Study Area.

- Proper maintenance of fence must be ensured during operational and maintenance phase of the road along the roadside to avoid road killing of wildlife, livestock and most importantly any inconvenient for local inhabitants.
- Post plantation care and wildlife pathways maintenance during operational phase is imperatively required as both the flora and fauna are integral part of the ecosystem. In many ways, fauna of a tract is dependent upon flora for its resting, nesting and roosting activities. With the improved flora of the project area, due to raising of large number of trees, the fauna and especially the avi-fauna shall be attracted to the area. The birds, which were scared away due to noise and degradation of their habitat, shall return to the area. Plantation on both sides shall not only reduce the noise and air pollution but will also be a source of attraction for the birds.
- Forest and Wildlife Department should check the above activates and to ensure the protection of local ecosystem.

Post-project Monitoring and Adaptive Management

It is essential to incorporate post-project monitoring and adaptive management into project planning and to assess the effectiveness of mitigation measures (Clevenger 2005; Dodd et al. 2004). Such monitoring and assessment actions are of great benefit to local, regional, and country wide transportation professionals, as knowledge of what does and does not work in particular circumstances will lead to better mitigation outcomes and save time, effort, and money. Projects should be monitored for several years, as field research has shown that there may be a lag period after project completion and effects on species populations (Findlay and Houlahan 1997, Findlay and Bourdages 2000). Long-term, post-project monitoring is also essential to accurately assess the results of installing crossing enhancements, as in many cases there is a period, often lasting up to 3 years for large-bodied mammals, of "structure shyness", that is, an active avoidance of new structures by the very animals that they are designed to benefit.

Similarly, the post-project monitoring suggests that modifications to the original design will result in greater use, these modifications should be implemented, documented, and made widely known to concerned body. For example, if an original project plan called for the installation of a culvert with associated fencing but the fencing was subsequently found to be inappropriate or ineffective, modified, and the modified design was shown to be more effective, this provides a valuable example of adaptive management. Such adaptive management actions may be especially helpful to improve mitigation performance elsewhere, and the results of such actions should be widely disseminated among Departmental staff.

7.10 POTENTIAL SOCIAL IMPACTS AND MITIGATION MEASURES

This section provides the identification and assessment of the potential impacts during different phases of the project on the physical, biological and socio-economic environment of the project area. The impacts are assessed based on significance of impacts and sensitivity of the surrounding environment. The significance of impacts is evaluated using Impact Matrix for construction phase and operation phase. Mitigations measures recommended for the potential environmental impacts are also given with each impact.

7.10.1 Summary of Potential Impacts

Summary of significant impacts are listed in **Table 7.4,** grouped into the project components and impact groups.

Table 7.3: Summary of Significant Environmental Impacts

Project Activities / Issue	Potential Impact
A. Design & Planning Phase	
Acquisition of land and other private assets/ Route Selection(alignment)	Acquisition of land for the construction of the proposed project. Involuntary resettlement and loss of livelihoods Other social issues related to resettlement Change in Land Value Disruption of public utilities
B. Construction Phase	
Construction contractor mobilization and establishment of campsite and machinery/ equipment Yard	Socio–economic and cultural issues, like women privacy, child labor, burden on local health services etc. Influx of external work force Health and Safety issues
C. Operation Phase	
Road and traffic management and maintenance activity	Road and traffic safety issues Land degradation due to solid waste Social & cultural change Health and Safety

7.11 POTENTIAL SOCIAL IMPACTS DURING PRE-CONSTRUCTION PHASE

This phase mainly comprises of comprehensive feasibility study of the proposed alignment. There will be no major physical interference such as construction and movement of heavy machinery during this phase except site inspection and other surveys for the completion of feasibility study.

Following is the brief description of impacts envisaged and the recommended mitigation measures during pre-construction phase.

7.11.1 Land Acquisition, Resettlement and Compensation

Potential Impact

The proposed project involves the rehabilitation and remodeling of existing Thandiani Road. Therefore, project interventions will require land and involuntary resettlement which will result in loss of shelters, economic displacement, loss of livelihoods as it passes through major bazar of Thandiani Chock, Kala pani and Kunde areas. For the proposed project 611.256 kanals (Lot-I & Lot-II) of land will be acquired for establishment of road side. Moreover, about 08 residential and 07 commercial structures (mostly shops) will be disturbed due to the widening of road. Besides these, 01 Umer Farooq mosque in Ghumawa village will be affected partially.

The detail of land under the impact with ownership status will be prepared by the Revenue Department. Therefore, the impact of land acquisition and resettlement will be moderate.

Mitigation Measures

Careful alignment and route selection by the designer to minimize the impact by avoiding the residences of these families and shops. A detailed Resettlement Action Plan will be prepared as per World bank OP 4.12 and Land Acquisition 1894 including later amendments.

The compensation for the structures, houses, shops, trees, private and public properties etc. has to be made as per Resettlement Action Plan.
Mitigation measures will involve land management and providing judicious compensation to the affectees by providing sufficient budget in the project cost. The process of land acquisition and compensation will be followed in a transparent manner to minimize the impacts.

Adequate budget will be provided in the Project cost for the compensation to the affected people as per Land Acquisition Act, 1894 and framing of a judicious and fair compensation package for provision of compensation on at least the prevailing market rates.

7.11.2 Temporary Acquisition of Land

Potential Impacts

The Contractors will require temporary land acquisition for:

- 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.

The approximate area required for the establishment of one Contractor's camp facilities will be 1500m^2 at the different locations. Land utilization for Project activities and subsequent operation of Project may induce temporary as well as permanent changes in the existing landuse pattern. Moreover, the contractor will provide the estimated quantity of excavation material during the construction phase. This impact can be categorized as direct, low, site-specific, short term, temporary, medium probability and reversible.

Mitigation Measures

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 should be selected and leased prior to the start of construction phase.

Land for above mentioned facilities will be directly rented from the private landowners by the Contractors. The provisions of the Land Acquisition Act (LAA), 1894 will not be involved as the acquisition of the land will be temporary and will be covered by short-term lease agreements between the landowners and Contractor. Rental terms should be negotiated to the satisfaction of the concerned landowners and the agreement should be in local language to make the process clear.

In addition, these project facilities should be located at a minimum distance of 500 meter from the existing settlements, built-up areas, archaeological and cultural monuments (if any) as the case may be. Prior to the commencement of the construction activities, the Contractor should submit a construction camp development/management plan to the Engineer-incharge and the KPEPA (if required) for its scrutiny and approval. As far as possible, waste/barren land i.e. areas not under agricultural or residential use and natural areas located at high elevation should be used for setting up the contractor camps.

7.11.3 Route Selection (Alignment)

Potential Impact

Improper route selection for the road alignment could lead to increase in social issues of resettlement/relocation of assets and displacement of people. This impact would be of high significance.

Mitigation Measures:

Most of the significant environmental and social impacts of the project can be addressed at the design phase, which is mainly the responsibility of the Design Engineers. The location of various components and structures, nature of construction technology etc. predominantly determine the environmental implications of the project. Despite having examples of other similar projects, the exact quantum of environmental impacts cannot be predicted at that times. Hence, the efficacy of the design will finally be tested only when the results of follow up monitoring become available. The Design Engineers must also add all features for safety of the workers during operation and maintenance.

7.11.4 Change in Land Value

Potential Impact

The proposed Project is expected to increase the land values, especially in villages where little or no road infrastructure is present. Land owners will have an opportunity to sell their land on increased prices and invest into new businesses. This impact will be major positive in nature.

Mitigation Measures

This is a positive impact, no mitigation required.

7.11.5 Public Utilities

Potential Impact

Due to the proposed project, water supply pipeline, PTCL towers and electric towers will have to be relocated.

Mitigation Measures

During the design maximum effort will be made to avoid the above mentioned public utilities, if these are unavoidable than these will be relocated through concerned department.

7.11.6 Poor Design leading to Reduced Project Life

Potential Impact

The project area being a hilly terrain, is prone to strong water currents, land sliding etc. If the design is poor, it may cause erosion leading to reduced project life. This impact is permanent and negative in nature.

Mitigation Measures

Review design to ensure that it incorporates design related mitigation measures such as surface water body crossing for easy flow of discharge produced by upstream, appropriate selection of sites for waste dumping and borrow, slope stabilization, etc. • Edge Scouring of earthen embankments or concrete work must first be dealt at design phase. Wherever such a situation is anticipated, aprons should be provided to secure edges and specifications must be kept of high standards.

7.12 POTENTIAL SOCIAL IMPACTS DURING CONSTRUCTION PHASE

7.12.1 Location of Labor Camp, Material Depots, Equipment Yards and Approach Roads

Potential Impact

Location of camps near sensitive receptors like water resources and use of private lands without prior consent of landowners for dumping and storage of construction material and equipment can result in adverse environmental impacts and create sever social issues.

Location of labor camp, material depot, equipment yard and approach roads will not cause any serious problem if selected in consultation with local communities and landowners and impacts can easily be mitigated.

Mitigation Measures

- The contractor will, in consultation with PD, select the location of all these facilities after a rapid assessment through the Screening checklist. Satellite imagery can also be used to select the suitable sites, to record the pre-construction conditions and to monitor the condition of these sites during and after the construction phase.
- The camp/other site facilities will be established on a flat land without much natural vegetation, at least 500 m away from the communities and surface water bodies.
- The contractor will prepare a Camp Site Management Plan, get it approved by the PD and abide by its provisions. The plan will include measures for rehabilitation of site upon completion. It will also include the photographical and botanical inventory of vegetation before clearing the site.

7.12.2 Accessibility Issue

Potential Impact

Closure of existing unpaved / deteriorated road and other pathways during the construction phase of the project will cause inconvenience to the nearby residents and affecting their daily life activities. It might be difficult for the students to reach their school/colleges. Similarly, the patients may also face difficulty of access to the basic health unit and hospital.

Mitigation Measures

- Mitigation measures will include public awareness through media, proper traffic diversion plans, appropriate sign boards and timely completion of the project.

7.12.3 Community Health and Safety

Potential Impact

The construction activities and vehicular movement at construction sites may result in roadside accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. Quality of groundwater and surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents, etc. The proposed project will also have potential of air (dust pollution), noise and vibrational impacts on nearby community. The labour works with different transmittable diseases may cause spread out of those diseases in the local residents. The construction areas located near the residential, settlements, may cause accident for the people moving near to those areas. Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, or based on competition for local resources. Tensions may also arise between different groups within the labor force, and pre-existing conflicts in the local community may be exacerbated. Ethnic and regional conflicts may also be aggravated if workers from one group are moving into the territory of the other. Considering these consequences, this impact can be categorized as direct, moderate, site-specific, medium term, temporary, medium probability and irreversible.

Mitigation Measures

- The contractor will be required to strictly follow WB EHS Guidelines.
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
- There will be proper control on construction activities and oil spillage leakage of vehicles;
- The labourers with different transmittable diseases will be restricted within the construction site;
- Ensure that the site is restricted for the entry of irrelevant people particularly children;
- Efforts will be made to create awareness about road safety among the drivers operating construction vehicles;
- Timely public notification on planned construction works;
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity and social links;
- Seeking cooperation with local educational facilities (school teachers) at each village along the route for road safety campaigns;
- Provision of proper safety and diversion signage, particularly at urban areas and at sensitive/accident-prone spots;
- Setting up speed limits in close consultation with the local stakeholders; and
- If identified, consider additional guard rails at accident-prone stretches and sensitive locations (schools);
- The mitigation measures provided in the following sub-sections for air and noise shall be adopted to reduce the air pollution, noise pollution and vibrational impacts on nearby community;
- Construction Camp Management Plan (CCMP) and effective implementation of GRM may reduce this impact;
- The communicable disease of most concern during construction phase, like Sexually-Transmitted Disease (STDs) such as HIV/AIDS, will be prevented by successful initiative typically involving health awareness; education initiatives; training heath workers in disease treatment; immunization program and providing health service;
- Reducing the impacts of vector borne diseases will be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease, which include prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to human settlements and by eliminating any unusable impounding of water;
- The Contractor will prepare the construction camp management plan which, in addition to other components, will include the labor influx management plan. This will be reviewed and approved by C&W Department; and
- Contractor will take due care of the local community and observe sanctity of local customs and traditions by his staff. Contractor will warn the staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions.

7.12.4 Occupational Health and Safety

Potential Impact

Occupational Health and Safety (H&S) related impacts will arise during construction phase activities including clearing of earth, levelling, compaction, carpeting, pavement finishing and testing & commissioning. Eye injury can be caused by stone or metal particles. Hazard of being hit by falling objects, major hand-arm and whole body vibration hazards, skin and respiratory tract irritation from exposure to cement dust, overexertion and awkward postures etc. will be another impact. Welding hazards include electric shock, fumes and gases, fire and explosions, falls from height, eye and head injuries etc.

Other impacts will be fall from height, contact with heavy electrical and mechanical equipment, equipment failure, uncontrolled movement, unguarded moving mechanical equipment parts, fatigue, unbalanced load, falling objects, hand injury, slip and trip hazards, wind / storm activity, injury from releasing load too soon etc. Operating mechanical and electrical equipment will trigger the H&S issues e.g. struck by moving vehicles or other equipment, slips or trips, struck by flying objects, such as dirt or splashed fluids, caught in pinch points, shear points, crush points, falling from machine etc. The proposed project area is also sensitive from the law and order point of view and the security as well as the safety of the Contractor and Consultant staff will be a major issue. Considering these consequences, this impact can be categorized as direct, moderate, site-specific, medium term, temporary, medium probability and irreversible.

Mitigation Measures

Following mitigation is given to avoid the accidental risks:

- The contractor will be required to strictly follow WB EHS Guidelines.
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
- Complying with the safety precautions for the construction workers as per International Labour Organization (ILO) Convention No. 62, as far as applicable to the Project Contract;
- Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves and protective masks, goggles, shields and monitoring their proper and sustained usage;
- Contractor will ensure the provision of medicines, first aid kits, ambulance etc. at the camp site;
- Moreover, proper planning should be done for food storage, setting up of kitchens, production of sewage and waste water may result in multiplication of rodents like rats, mice and shrew etc and vectors like mosquitoes, bugs and flies which will have a negative impact;
- Work areas will be cordoned off where necessary;
- Contractors will instruct their staff to use Personnel Protective Equipment (PPE) (e.g., wire containment, displaying warning signs along the work site, communicating advance warnings to mats) to enhance the safety; and

- Safety lookouts will be built to prevent people and vehicles from passing at the time of hot or cold work; and
- An emergency management plan must be devised by the contactor in close coordination with the provincial emergency services.

7.12.5 Labor Influx

Potential Impact

This can be particularly acute in smaller communities hosting a largely male workforce and/or a workforce from other regions which may result in conflicts between locals and non-locals concerning employment opportunities, wages and natural resources. Mobile workers can also contribute significantly to gender-based social impacts and risks.

Risk of social conflict: Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, or based on competition for local resources. Tensions may also arise between different groups within the labor force and pre-existing conflicts in the local community may be exacerbated. Ethnic and regional conflicts may be aggravated if workers from one group are moving into the territory of the other.

Increased risk of illicit behavior and crime: The influx of workers and service providers into communities may increase the rate of crimes and/or a perception of insecurity by the local community. Such illicit behavior or crimes can include theft, physical assaults, substance abuse, prostitution and human trafficking. Local law enforcement may not be sufficiently equipped to deal with the temporary increase in local population.

Increased burden on and competition for public service provision: Presence of construction workers and service providers (and in some cases family members of either or both) can generate additional demand for the provision of public services, such as water, electricity, medical services, transport, education and social services. This is particularly the case when the influx of workers is not accommodated by additional or separate supply systems.

Increased risk of communicable diseases and burden on local health services: The influx of people may bring communicable diseases to the project area, including sexually transmitted diseases (STDs), COVID- 19 or the incoming workers may be exposed to diseases to which they have low resistance. This can result in an additional burden on local health resources. Workers with health concerns relating to substance abuse, mental issues or STDs may not wish to visit the project's medical facility and instead go anonymously to local medical providers, thereby placing further stress on local resources. Local health and rescue facilities may also be overwhelmed and/or ill- equipped to address the industrial accidents that can occur in a large construction site.

Inadequate waste disposal and illegal waste disposal sites: Large populations of workers generate increased amounts of waste, for which no sufficient local waste management capacities may exist, which would likely lead to improper disposal practices.

Camp related land use, access roads, noise and lights: The camp use can result in increase in noise and light pollution especially at night. The construction of new access roads can also lead vegetation removal and landscape transformation.

Mitigation Measures

- Local population will be given preference in construction related jobs. Most unskilled workers will be hired from local communities, while for skilled manpower also, first choice will be given to local area residents.
- The Contractor will prepare the construction camp management plan which, in addition to other components, will include the labor influx management plan. This will be reviewed and approved by World Bank.
- The Contractor will select the specific timings for the construction activities particularly near the settlements, so as to cause least disturbance to the local population, particularly women.
- Contractor will take due care of the local community and observe sanctity of local customs and traditions by his staff. Contractor will warn the staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions.
- The Contractor will carry out the construction activities in such a way that the open defecation timings by the local community should not be affected. The normal defecation timings are early in the morning and at late in the evening. So, the Contractor will have to take care of these timings.
- SOPs related to the construction industry to control spreading of COVID-19, should be implemented by the contractor and should be strictly monitored;
- During construction activities, if privacy of the nearby households is affected, the Contractor will inform the house owner to make some arrangements. Similarly, Contractor will take care as much as possible that the construction activities should not affect the privacy.
- The contractor will also ensure that solid waste and wastewater is disposed of in an environmentally friendly manner in designated areas and by approved methods only.
- The contract will explore alternative water sources and ensure that water usage by the project does not affect or compete with water requirements of the local community.
- The Contractor will also ensure that noise and light pollution from the labor camp is kept at minimal levels especially at night.

Guidelines to combat with COVID-19 are attached as **Annex-X.**

7.12.6 Gender Issues

Potential Impact

Due to the project activities, local women many not be able to perform their daily outdoor chores. The induction of outside labor may create social and gender issues due to the labor force being unaware of local customs and norms. It may also cause hindrance to the mobility of local women for working in the field, herding livestock, picking fuel wood, etc.

Gender-based violence: Construction workers are predominantly younger males. Those who are away from home on the construction job are typically separated from their family and act outside their normal sphere of social control. This can lead to inappropriate and criminal behavior, such as sexual harassment of women and girls, exploitative sexual relations and illicit sexual relations with minors from the local community. A large influx of male labor may also lead to an increase in human trafficking whereby women and girls are forced into sex work.

Child labor and school dropout: Increased opportunities for the host community to sell goods and services to the incoming workers can lead to child labor to produce and deliver these goods and services, which in turn can lead to enhanced school dropout.

Mitigation Measures

- The contractor will be required to provide qualified key personnel to address the specific risks identified in the project.
- The bidding documents will include specific requirements that minimize the use of expatriate workers and encourage hiring of local workers, thereby minimizing labor influx.
- All project consulting firms will also be required to submit Codes of Conduct with their proposals.
- The contractor will be required to establish anti-sexual harassment policies that governs conduct in the workplace.
- The contractor will be required to provide mandatory and repeated training to workers on sexual exploitation and abuse and HIV/AIDS prevention and on the content and obligations derived from the code of conduct

7.12.7 Rise in the Prices of Essential Commodities

Potential Impact

Due to induction of outside labor for project works, the demand for basic items will increase thereby causing an increase in the prices of essential commodities. Additionally, the road improvement activities during the construction phase may disrupt the normal flow of trade and supply of essential goods.

Mitigation Measures

In terms of labor induction, the project will exert no significant impacts on the prices of essential commodities. To avoid risk of such price hikes, majority of the unskilled and semi-skilled labor will be recruited from the local areas and specific clauses will be added in the Contracts of Contractor. Project Engineer and the Contractor will ensure that normal trade routes remain open and supply of goods is not severely impacted. Furthermore, the contractor should normally procure the field camps supplies from the main markets or any nearby commercially active city.

7.13 POTENTIAL SOCIAL IMPACTS DURING OPERATIONAL PHASE

Significant negative as well as positive impacts are expected during the operation period of the project. Most of the associated impacts relate to road/ traffic safety and the socioeconomic benefit of the living community. The anticipated environmental, social and safety impacts related to the proposed Project have been studied for the operational phase of the Project as discussed hereunder.

7.13.1 Employment Opportunities

Due to the construction of the proposed Project, economic activity will be generated in the project area as the laborers and semi-skilled staff will have an opportunity to work for the construction of the proposed project. This will help in developing their skills and capacities. This is a moderate positive impact.

7.13.2 Increase in Land Value

The proposed widening of the road is expected to increase the land values, especially in villages where little infrastructure is present Land owners will have an opportunity to sell their land on increased prices and start new businesses. This impact will be major positive in nature.

7.13.3 Decrease in Operating Cost of Vehicles

During the operation of the proposed project, lesser wear and tear of the vehicles will occur and it will also result in lesser fuel consumption and decrease in operating cost. This impact is permanent and has a major positive impact

7.13.4 Safe Travel Conditions

Improved Road conditions will result in smooth vehicular movement providing safer conditions for tourists and locals to commute. This is positive impact.

7.13.5 Economic Boost

Improved infrastructure will promote new business opportunities in project region. In addition, the local community will be benefited with economic boost, better employment, education & healthcare facility especially for women and children will be improved. This impact will be permanent and major positive in nature.

7.13.6 Community Development

Improved communication infrastructure will promote new business opportunities. Due to the construction of the proposed Project, access mobility to other area will become easy. New marketing activities will boost with the development of road. With the boost of commercial activity and enhanced employment opportunities and standard of living of the local people will be raise.

8 ENVIRONMENTAL AND SOCIAL MITIGATION AND MONITORING PLAN

8.1 GENERAL

This chapter summarizes the mitigation, monitoring, and institutional measures to be taken during implementation and operation to eliminate adverse environmental and social impacts.

8.2 INCLUSION OF ESMP IN BIDDING/ CONTRACT DOCUMENTS

The present ESMP will be included in the bidding/ contract documents and their implementation will be a contractual binding for the contractors. The document "contractor's guidelines" prepared by C&W and safeguards procedures will also be handed over to Contractor.

8.3 INSTITUTIONAL ARRANGEMENTS

The proposed organizational structure under Project Steering Committee (PSC) for the implementation of the ESMP is presented in **Figure 8.1** and roles and responsibilities of key role players are given in **Table 8.1.**

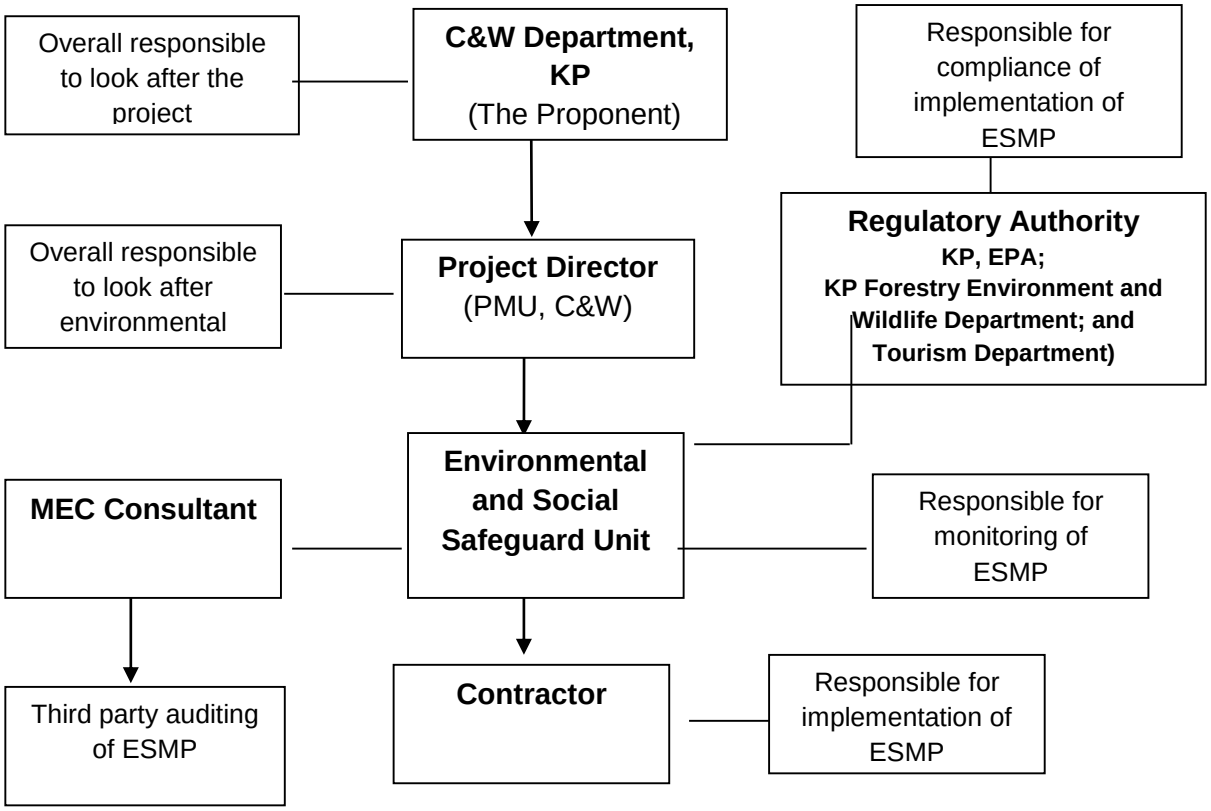

Figure 8.1 : Institutional Arrangement for Implementation of ESMP

Table 8.1: Roles and Responsibilities of Key Role Player for Implementation of ESMP

Organization	Position	Responsibility
PMU -C&W Department	Project Director	▪ Ensure ESMP Implementation; ▪ Supervise procurement and hiring of staff and; ▪ Overall supervision of project.
PMU -C&W Department	Environment Safeguards Specialist	▪ Ensure that the construction contracts include clauses for ESMP implementation; ▪ Ensure implementation of the ESMP during various stages of design and construction; ▪ Certify timely and robust environmental monitoring in the field by local facilitators and technical resource persons; ▪ Ensure that environmental trainings are planned and implemented; ▪ Overall monitoring and reporting of environmental impacts; ▪ Coordinate and ensure development of awareness material;Prepare Environmental Progress Reports e.g. Annual/ Biannual/ Quarterly/ monthly Progress Reports including monitoring reports for the project.for the project.
PMU -C&W Department	Social Safeguards Specialist	▪ Monitor and check the proper implementation of all social mitigation measures as suggested in ESMP; ▪ Monitoring and evaluation of social related matters of the project and maintain a social complaint register to document social issues; ▪ Certify timely and robust social monitoring in the field by local facilitators and technical resource persons ▪ Ensure inclusion of ESMP requirements in project designs. ▪ Remain the focal point for managing the project GRM, and maintain analysis and reports on types of complaints received, resolved, time taken to action, etc. ▪ Provide technical lead to the field teams regarding gender mainstreaming activities of the project ▪ Linkages development with NGOs and public-sector entities working on empowerment of women and marginalized segments of society. ▪ Ensure the Grievance Redressal Mechanism (GRM) is gender friendly ▪ Provide assistance and advice to field staff for resolving grievances related to gender arising on account of project implementation. Prepare Grievance Report on as and when required basis
PMU -C&W Department	Occupational Health and Safety Specialist	▪ Monitor and check the proper implementation of all occupational health and safety mitigation measures as suggested in ESMP through field visits as well as site records. ▪ Ensure that environmental trainings regarding occuptaional health and safety are planned and

Organization	Position	Responsibility
		implemented; ▪ Overall monitoring and reporting of occupational health and safety issues; ▪ Prepare Progress reports regarding compliance of mitigatiom measures for occupational health and safety for the project.
PMU -C&W Department	MEC	▪ Evaluation of ESMP implementation; ▪ Supervision of construction contractor; ▪ Reporting to higher authorities.

8.3.1 Project Steering Committee (PSC)

A Project Steering Committee (PSC) is proposed to supervise project implementation which will be chaired by the Additional Chief Secretary (ACS) of KP to provide guidance and facilitate inter- agency coordination. The members of the committee will be the following:

- Representatives from C&W Department
- Representatives from Forestry, Environment and Wildlife Department

8.3.2 Communication and Works (C&W) Department Project Management Unit (PMU)

The C&W PMU will be established within the head office of C&W in Peshawar. It will monitor and coordinate all project implementation activities. The PMU, led by a Project Director, will be responsible for all aspects of project implementation including financial management, procurement, recruitment of staff, consultants and contractors, and overseeing the implementation of ESMP.

8.3.3 Environmental and Social Safeguard Unit (ESSU)

Environmental and Social Safeguard Unit (ESSU) will be established under PMU, consisting of the following staff:

- Environmental Specialist;
- Social Specialist; and
- Occupational Health and Safety Specialist.

Overall responsibility of ESSU include:

(i) Supervising, facilitating and coordinating implementation of environmental and social plans including ESMP;
(ii) Ensuring that contractors follow EPA – KP regulations, World Bank Safeguard Policies, and other requirements mentioned in the ESMP;
(iii) Identifying any issues of non-compliance and report these;
(iv) Preparing monthly/quarterly monitoring and progress reports for submission to the World Bank

(v) Suggesting mechanisms to link contractor performance in relation to the ESMP to the timing of financial payments, incentives or penalties;
(vi) Interacting with stakeholders for their concerns about the construction activities.
(vii) Assisting Project Director in addressing and resolving environment-related complaints and grievances;
(viii) Identifying and preparing environmental training materials and conducting environmental trainings; and
(ix) Reviewing ESMP and revising it if required.

8.3.4 Contractors

Contractors are also required to appoint the following environmental staff for the implementation of ESMP in the field, particularly the mitigation measures.

- Environmental and Social Expert;
- Health and Safety Officer; and
- Community Liaison Officer.

The Contractor will develop various plans directed towards health, safety and environment and social issues, and get them approved by the PMU. The contractor will also be responsible for communicating with and training of its staff in the environmental/social aspects before the commencement of the construction works. The construction contract will have appropriate clauses to bind the contractor for the above obligations.

8.3.5 Monitoring and Evaluation Consultant (MEC)

MEC will be recruited by PMU to carry out independent monitoring of implementation of ESMP. The MEC will have environmental and social experts and shall carryout intermittent third party monitoring of the project. MEC will also carry out annual third party auditing of ESMP and make further modifications if required. The M&E cost will be borne by the PMU for the project.

8.4 ENVIRONMENTAL MANAGEMENT

8.4.1 Mitigation Plans

Mitigation plans have been prepared on the basis of the detailed impact assessment given in **Table 8.1**. These plans are project-specific, and to the extent possible, site-specific, however contractors will be required to carry out further detailing of the key aspects, to prepare site-specific contractor's management plans as discussed below.

8.4.2 Subproject and Site-Specific Management Plan

These plans are site-specific and where applicable, contract-specific and will be prepared by the contractor(s) prior to the commencement of construction activities. The Plans to be

prepared by the contractors for various aspects of the environmental management will mostly include the detailing of the measures included in Mitigation Plans. A brief description of each of these plans is provided below:

Erosion and Drainage Control Plan will be prepared by the contractor on the basis of the mitigation measures given in ESMP. The Plan will be submitted to PMU for review and approval before contractor mobilization.

Pollution Prevention Plan will be prepared and implemented by the Contractor on the basis of WBG EHS Guidelines (2007), as well as the mitigation plans given in ESMP. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Waste Disposal and Effluent Management Plan will be prepared and implemented by the Contractor on the basis of WBG EHS Guidelines (2007), as well as the mitigation plans given in ESMP. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Traffic Management Plan will be prepared by the Contractor on the basis of the mitigation plans given in ESMP, after discussion with C&W and authorities responsible for roads and traffic. The Plan will be submitted to the PMU for their review and approval before contractor mobilization.

Borrow Area Management and Restoration Plan for management and restoration of borrow areas will be prepared by the Contractor on the basis of requirements described in the mitigation plans. This Plan will aim at minimizing the environmental and social impacts during borrowing activities and restoring as much as possible the original natural situation of these sites by various measures (refill, leveling or smoothening). Restoration methodologies will be included in the Plan. The Plan will be approved by the PMU.

Occupational Health and Safety Plan will be prepared and implemented by the Contractor on the basis of the WBG EHS Guidelines (2007) and other relevant standards. The plan also includes the transportation / movement, storage and usage of explosive materials in compliance with Explosive Act, 1884, Explosive Rules, 2010 and BS5607 (British Standards). A separate plan to combat COVID-19 containing SOPs is provided as Annex-X The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Drinking Water Supply and Sanitation Plan: Separate water supply and sanitation provisions will be needed for the temporary facilities, labor camps and workshops, in order not to cause shortages and/or contamination. A plan will be prepared by the Contractor on the basis of WBG EHS Guidelines. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Construction Camp Management Plan will be prepared by the Contractor on the basis of the mitigation plans given in ESMP. The Plan will include the camp layout, details of various

facilities including supplies, storage, and disposal. The Plan will be submitted to the PMU for review and approval before camp establishment.

Fuel and Hazardous Substances Management Plan will be prepared by the Contractor on the basis of the mitigation plans given in ESMP and in accordance with the standard operating procedures, relevant guidelines, and where applicable, material safety data sheets. The Plan will include the procedures for handling oils and chemical spills. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Emergency Preparedness Plan will be prepared by the Contractor after assessing potential risks and hazards that could be encountered during construction of road. The Plan will be submitted to the PMU for review and approval before contractor mobilization.

Communication Plan will be prepared by the contractor to demonstrate how they will communicate with local community leaders, provide details regarding employment opportunities, and traffic management throughout the construction period. The contractor's communication plan should define a process for receiving, recording and responding to complaints and also monitoring of the success of any responsive action taken to prevent the escalation of any conflicts.

Site Restoration and Rehabilitation Plan The main areas to be considered for site restoration & rehabilitation include the construction area, campsite area, temporary tracks; land used for vehicles, material stores etc. These areas should be restored to their original condition with the maximum possible effort. The restoration work comprises the removal of temporary construction works and removal of any fences installed and levelling of the area (wherever required) etc. The following procedures will be adopted for the restoration of the subproject sites:

- All temporary construction built for the site development will be removed;
- Site for construction camps will be restored to its original (pre-construction) condition as much as possible;
- All the toxic and hazardous chemicals/materials will be completely removed from the site. Efforts will be made to completely remove the oils and chemical spills which occurred during the construction stage;
- Any debris from the construction site will be removed properly from the site and disposed of in an environmental friendly manner;
- All fencing and gates will be removed and pits will be backfilled; and
- Whole of the site will be covered with the original soil and plantation will be done, wherever required.

To achieve the above objectives, the Contractor will prepare a Site Restoration & Rehabilitation Plan well before the completion of the construction activities and submit to PMU through the SC for approval. Finally, after the completion of the restoration process, PMU through the representatives of the ESSU and other community members will inspect the site and give restoration clearance to the Contractor.

Disposal Area Management and Restoration Plan The management and restoration plan of disposal areas will be prepared by the Contractor. The Plan will describe the procedures for spoil management, transportation and disposal at the selected site(s). The Plan will also describe the procedures for systematically disposing the spoil at the disposal site. This Plan would aim at minimizing the environmental and social impacts during disposal activities and restoring as much as possible the original natural situation of these sites by various measures (landscaping, leveling or smoothening). The Plan will include measures to avoid land / soil erosion and landslides. Restoration methodologies will be included in the Plan. The Plan would be approved by the SC and a landscape architect assigned by PMU.

8.5 ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

The impacts, mitigation measures, monitoring indicators, frequency and responsibility has been documented in ESMP and given in **Table 8.2.**

Table 8.2: Environmental and Social Mitigation Plan

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
POTENTIAL ENVIRONMENTAL IMPACTS				
Pre-Construction / Design Phase				
1	**Technical Design and Layout Planning** Incompatible layout plan and engineering design of the project's structures can undermine the overall aesthetic beauty and ambience of the project area. Also low utilization of the available spaces and designing the structures without considering the prospective and futuristic needs can result in structures with low social acceptability and functionality. The future traffic factor if not considered in the design properly, will also affect the project and public safety of the proposed Project. Similarly, the locals may also face access problems for their land.	▪ The technical design of the proposed project must consider all the above mentioned factors for the final design and should meet all the AASHTO Guidelines and other local and international standards. ▪ The C&W Department (proponent) must review and validate all the design considering the possible impacts (as mentioned) before the start of construction of proposed Project.	Design Consultant	Project Director, PMU
2	**Topography** The topography in the project area will change due to the construction of project. Construction of existing track will result in considerable earthworks and excavation including cutting of rocks, cutting of hill slopes, land clearing and leveling resulting in significant change in topography.	▪ Best engineering design measures should be adopted keeping in view the aesthetics of the project area; ▪ The project design should avoid excessive cutting of rocks/hill slopes where cutting is unavoidable make maximum efforts to ensure minimum changes in the topography; and ▪ Ground disturbances should be limited to only the areas necessary for project related construction activities.	Design Consultant	Project Director, PMU
3	**Drainage**	▪ Mitigation measures will include provision of	Design Consultant	Project Director,

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	The project area has high frequency of rainfall especially during monsoon, and water flows through the hills passing through the road which may deteriorate the road surface decreasing the life of road.	appropriate drainage structures with appropriate design capacity to avoid flooding especially during the rains. Proper slopes shall be incorporated in design to avoid the stagnant water on At-grade road surface		PMU
4	**Seismic Hazard** The location of the project area varies from Seismic 3 as per Earthquake Zones Classification of the Building Code of Pakistan, 2007, where 3 (high) represents peak horizontal ground acceleration from 0.24 to 0.32 g. In this Zone, designing of various types of structures should be done on the basis of Peak Ground Acceleration (PGA). A high intensity earthquake impacting the project site can adversely impact the development.	▪ The proposed project should be designed and constructed to withstand earthquake hazards considering the peak ground acceleration of the area. ▪ Retaining walls should be constructed along the road and also included in project design. ▪ For seismic hazard analysis, updated structural and seismic evaluations should be carried out.	Design Consultant	Project Director, PMU
5	**Slope Stability** Slope stability may be affected by construction of road cuts or embankments. Excessive slope of steep cuts, changes in drainage capacity and pattern can result in landslides as the project area is prone to land sliding. Land sliding may cause blockage of roads and serious accidents and can affect the nearby structures. The damages may vary from loss of life to injuries and loss of property.	▪ Design should consider maintaining natural angle of cut slopes and embankments to avoid land sliding; ▪ Minimum clearance of vegetation especially tall trees shall be considered in design. ▪ Engineering measures should be incorporated in design to control runoff and increase slope stability e.g. Rip Rap and Retaining wall etc.	Design Consultant	Project Director, PMU
6	**Flora** Most common impacts due to a roadproject are habitat damage and fragmentation, exotic	▪ As linear tree plantation on both sides of road is already exits along existing Thandiani road. Therefore, efforts should be done to	Design Consultant	Project Director, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	species incursion, pollution, over hunting and genetic obstacles. The proposed subproject is already exits so no major fragmentation is expected which can disintegrate the habitat areas into smaller and more isolated units. During the pre-construction phase, activities such as installation of construction camp, construction of temporary roads & mobility of construction staff may damage the local vegetation/trees. As the heavy machinery and camp will be moved and installed, which require significant space due to which available vegetation is expected to be removed. This impact is site-specific, permanent, irreversible, possible, medium significant and needs to be encountered prior to the start of construction stage. A large number of trees of various species, approximately 848[11] (Counting based on aerial imaginaries from Google Earth and Ground truthing for species identification), in the RoW, will be affected due to implementation of the proposed subproject. This will have an adverse	avoid at least tree on either side during the process of widening. If possible the route may be shifted on to those areas which having minimum green cover. ▪ Plan for compensatory planting of ten trees or more against each fallen tree of similar floral function on both sides of the proposed Alignment that will help in rehabilitating the floral and faunal activities of the subproject area; ▪ While working in or close to Reserve Forests, their management plans will be strictly followed. ▪ In case a management plan of any protected area does not exist, the project will develop a site specific plan (separate study) for natural habitat conservation in consultation with the forest and wildlife department. ▪ KP Forest Ordinance 2002, Khyber Pakhtunkhwa Wildlife and Biodiversity (Protection, Preservation, Conservation and Management) Act, 2015. Protection of Trees and Brushwood Act, 1949, WB OP on Natural Habitats (OP/BP 4.04) and Forests (OP/BP 4.36) should be strictly followed.		

[11] Estimated no. of trees to be affected for Lot-I/Subproject.

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	effect on the natural environment of the project area.			
7	**Disturbance to Wildlife** The project area is rich in wildlife. The proposed interventions related to the sub project, and the resultant increased number of tourist activity, can impact animal movements by direct mortality or avoidance behaviour. Enhanced tourist mobility will increase the traffic load that may consequently increase the mortality of wild animals. However, the impact is likely to be minor / small. As movement and installations of machinery and vehicles will take place so noise and habitat loss is expected. The routes of the available wildlife and other habitats may be affected due to camp set-up and machinery movements and installations. The temporary roads may also affect the habitat of locally available fauna.	▪ 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 should be given in this regard. ▪ Proponent must take NOC from the relevant department prior to construction phase. ▪ After consultation with the Wildlife Department, site specific Wildlife Safety Plans (Separate study) should be developed. ▪ KP Wildlife & Biodiversity Act 2015, WB OP 4.04 Natural Habitats will be followed for compliance. ▪ Moreover, proper planning should be done for food storage, setting up of kitchens, production of sewage and waste water may result in multiplication of rodents like rats, mice and shrew etc. and vectors like mosquitoes, bugs and flies which will have a negative impact.	Design Consultant	Project Director, PMU
		Construction Phase		
1	**Soil Erosion and Contamination** The clearing of vegetation can also loosen the soil and make it more susceptible to erosion due to wind and rain. There is also a possibility of silt runoff during rainy season causing soil erosion. During the rain, the eroded soil mix with stagnant	▪ Soil contamination by asphalt will be minimized by placing all containers in a bounded area away from water courses; ▪ Provision of impervious platform with oil and grease trap for collection of spillage during equipment and vehicle maintenance;	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	water to transform into slush, which can affect movement of vehicles and machinery and construction work as well as limit the movements of local people. Soil may be affected by erosion, compaction and contamination. Soil erosion may occur on roadside, at contractors' camps and at embankment works, as a result of uncontrolled run-off from equipment washing yards, excavation of earth/cutting operations and clearing of vegetation. Soil may also be impacted due to unauthorized use of borrow areas and quarries, resulting in degradation of landscape. Whereas, contamination of soil may be caused by solid waste generated at campsites and by oil and chemical spills at asphalt plant sites, workshop areas and equipment washing yards. This may limit the future use of land for agriculture.	▪ All spoils shall be disposed of safely and the site shall be restored back to its original conditions; ▪ Non-bituminous wastes from construction activities shall be dumped in approved sites, in line with the legal prescriptions for dumpsites; ▪ In areas with strong sheet flow, high embankments will be provided with chutes and drains/culverts to minimize soil erosion. Stone pitching and retaining walls will be made at high embankments in critical areas; ▪ As applicable and needed, plantation of grasses and shrubs will be done for slope protection; ▪ Use of modern, well-maintained machinery and vehicles by the contractor to avoid leakages; and ▪ Soils removed during construction would be stockpiled for reuse where possible.		
2	**Excavation of Earth** During construction, there is a chance of finding archeological remains. Mismanagement of the archeological remains may result loss of a valuable assets. Further, excavation of earth from borrow areas and for clearance of ROW may result in erosion of soil. Erosion results in change of edaphic characteristics of soil. Loss of fertile top soil may affect adversely on the	▪ In case of finding archeological remains during excavation, the contractor shall immediately report through Supervision Consultant to Directorate of Archaeology and Museums, KP to take further suitable action to preserve those antiques or sensitive remains. ▪ Avoid agriculture land for borrow materials. ▪ Contractor needs to obtain approval for	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	productivity of the project area.	excavation and submit the plan of rehabilitation of the site after excavation. ▪ Time scheduling to avoid excavation during rain ▪ Proper site staging to ensure that the maximum amount of existing vegetation is left in place during the excavation phase ▪ Cover all exposed soil as soon as soils are exposed ▪ Leave a continuous buffer of vegetation around the site perimeter to intercept any sediment that might be transferred off site via surface water flow		
3	**Surface and Groundwater** The surface water may get contaminated due to the surface runoff during construction phase. Construction activities may result in debris entering water body resulting in sedimentation. Storage and transport of construction material may also result in spills of chemical and contamination of water bodies. Groundwater may also get contaminated from the wastewater generation from the construction camps, leachate from improper dumping of solid waste. Consumption of water for construction activities may also affect other designated uses of water especially drinking water due to less availability of drinking water in the area.	▪ As a mandatory step, all the effluents will be disposed as per the requirements of NEQS. 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.	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
4	**Traffic Issues** Due to the proposed construction activities and movement of heavy project vehicles for construction material supply, traffic problems may arise for the commuters and transporters travelling to the proposed areas. The problems will include traffic jams and inconvenience to the public passing through the Project Area. It will also increase traffic load on the existing road network or access roads ultimately deteriorating the existing condition of the roads. The movement of vehicles along the haulage routes will cause soil erosion, debris flow, dust emissions, vibrational impacts, etc.	▪ Proper sign boards will be provided for smooth flow of traffic; ▪ Period of construction and area / location of construction site shall be informed to public in general and specifically to local residents. ▪ Any closure of the roads (especially main roads) and deviations / diversions proposed should be informed to the riders through standard signs and displays.	Contractor	MEC, ESSU, PMU
5	**Air Quality** Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. Besides, multifarious construction activities and increased vehicular traffic (construction vehicles) would also contribute to the localized airborne dust. Once in the air, the larger sized particles, under influence of gravity, tend to settle down in the immediate vicinity of the source. The Suspended Particulate Matter (SPM) of the size smaller than 10	▪ All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions; ▪ Open burning of solid waste from the Contractor's camps and at construction site should be strictly banned; ▪ equipment and machinery should be enforced during construction works; ▪ Construction workers should be provided with masks for protection against the inhalation of dust; and ▪ Regular monitoring of air quality in	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	micrometre (PM_{10}) tends to remain suspended in the environment for much longer and persistent time and is an environmental hazard. The objectionable impacts of settling of the suspended dust would be its dry deposition on vegetation, motor vehicles, structures, and other exposed surfaces. Exhausts from fossil fuel burning in the construction machinery will also deteriorate local air quality. Similarly, exhausts from generators can also have impacts on air quality in the vicinity.	accordance with NEQS.		
6	**Noise/Vibration** The noise and vibration will be produced due to the operation of construction machinery and equipment and blasting activities. Sources of noise and vibration during construction are heavy machinery such as bulldozers, excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers, asphalt plants and other equipment's. Noise and vibration are perceived as one of the most undesirable consequences of construction activity. The above machinery is expected to generate noise levels that would be severe in the project area.	▪ Selection of up-to-date and well-maintained plant or equipment with reduced noise levels ensured by suitable in-built damping techniques or appropriate muffling devices; ▪ Confining excessively noisy work to normal working hours in the day, as far as possible; ▪ Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in their use; ▪ Preferably, restricting construction vehicles movement during night time; ▪ Heavy machinery like percussion hammers and pneumatic drills shall not be used during the night without prior approval of the client; and ▪ Vehicles and equipment used shall be fitted, as applicable, with silencers and properly maintained.	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		▪ Contractors shall comply with submitted work schedule, keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures; ▪ Blasting shall be carried out according to relevant safety standards; ▪ Blasting schedules shall be publicly disseminated in areas where residences will be impacted by the blasting noise and vibration; and ▪ Potential structures which may be adversely affected by blasting vibration will be identified prior to blasting and monitored during blasting. Appropriate safety measures will be implemented. Following safety considerations shall be ensured during blasting activities; o Blast monitoring stations are operational. o Required levels of ground vibration are not exceeded. o Required levels of noise are not exceeded. o Required levels of air blast are not exceeded. o No fly rock is emitted beyond zone of exclusion.		

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		○ No visible emissions of dust/fumes from site. ○ Interruptions to road are minimized. ○ A safe area is evacuated around all blasts. ○ All blasts are monitored. ○ No damage occurs to people, property, livestock or power lines. ○ Personal Protective Equipments shall be provided and worn by the personnel involved in blasting operations. ○ First aid kit shall be available at easily accessible location. ○ The team shall be able to handle emergency situations and the possible emergency services shall be notified in advance. ○ All complaints are recorded and responded to in a timely and professional manner. ○ The Blast Record shall be maintained containing all the information required to re-create the blast site, locate blast holes and shot/loading details		
7	**Borrow Areas/ Open Pits** Borrow / open pits and its excavation activities	▪ Necessary permits shall be obtained for any borrow pits from the competent authorities; ▪ No excavations are allowed within distance	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	may result in land disputes, soil erosion, loss of potential cropland, loss of vegetation, landscape degradation, and damage to road embankments. Borrow/ Open pits may also result in 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.	of 500 m to ROW; ▪ In borrow pits, the depth of the pit shall be restricted upto 5' and the sides of the excavation will have a slope not steeper than 1:4; ▪ Soil erosion along the borrow pit shall be regularly checked to prevent/mitigate impacts on adjacent lands; ▪ Other measures for soil erosion given under para 7.8.1 shall be followed; and ▪ In case borrow pits fill with water, measures have to be taken to prevent the creation of mosquito-breeding sites.		
8	**Construction Camps / Camp Sites** Improper construction camp location and mismanagement of construction camp activities can lead to various social and environmental impacts which include health and safety, traffic problems, soil degradation, loss of vegetation and assets on the selected land, solid waste and water pollution. Furthermore, cultural differences, behavior of construction workers, potential disregard for local cultural norms can lead to increased tension between local communities and workers residing in the construction camps.	▪ WB Environment Health and Safety Guidelines (Attahced as annedxure-iii) will be followed; ▪ The project will seek to avoid sitting camps where their presence might contribute to any conflicts with locals; ▪ Employment policies which aim to maximize job opportunities for local people will help to minimize tensions caused by different socio-cultural values; ▪ Camps will be designed to be self-contained to reduce demand on infrastructure and services of nearby communities ▪ A comprehensive safety and security plan for the camps will be prepared which will comprise of a training manual, use of safety	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		equipment and emergency preparedness; ▪ Waste Management Plan will be implemented to ensure safe handling, storage, collection and disposal of construction wastes and the training of employees who handle waste.		
	Wastewater Generation at Construction Camps Wastewater will be generated at the construction camps by the workers. If the generated wastewater is not properly treated or disposed of, this may contaminate the surface water sources such as nullahs, drains, water channels etc. apart from soil contamination.	▪ Domestic and chemical effluents from the construction camp will be disposed by the development of on-site sanitation systems i.e. septic tanks, etc. ▪ Proper monitoring to check the compliance of NEQS will be carried out; and ▪ Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit. ▪ The Contractor(s) will be responsible to submit details of site-specific wastewater management plan along with details of wastewater collection, transportation and its disposal.	Contractor	MEC, ESSU, PMU
10	**Solid Waste Generation at Construction Camps** Considering the labourers (about 47 in numbers) residing in the construction camp and the locally available labour, an average solid waste generation rate of 0.5 kg/capita/day12 is adopted	▪ WB Environment Health and Safety Guidelines (Attached as annedx-III) will be followed for management of solid waste including hazardous, municipal and construction waste ▪	Contractor	MEC, ESSU, PMU

Source: The World Bank Report 2012 – What a Waste: A global review of solid waste management. Based on UNEP estimates for waste generation in the Asia Pacific. Average is 0.45 kg/capita/day.

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	for the estimation of solid waste generation. Based on this assumption, a total of about 23.5 kg of solid waste will be generated from construction camps on daily basis. Different type of waste is likely to be generated during the construction phase of the subproject. The municipal waste will be in the form of food, cans, paper and wastewater from construction camps toilets and washing yards. Construction waste will include excavated soil, sand, gravel, rocks, asphalt, pieces of concrete, bricks, wood, metal pieces and electrical wires. Whereas, hazardous waste can be comprised of paints and construction chemicals. All these, if left unattended, can become a source of nuisance and environmental pollution in the subproject area. Insecure and unhygienic disposal of the solid wastes particularly garbage and trash may cause degradation of soil and land. Insecurely disposed of heaps of wastes containing kitchen garbage and food waste can serve as breeding grounds for the disease spreading vectors and rodents. Throwing away of solid wastes into water channels and the wastewater network can result into choking of the latter.	▪ Solid Waste generated during construction and camp sites will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan; ▪ Training of work force in the storage and handling of hazardous materials and chemicals Construction workers and supervisory staff should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste; ▪ Proper labeling of containers, including the identification and quantity of the contents, hazard contact information etc; ▪ Waste disposal plan must be reviewed during the entire construction phase in the light of changing weather conditions ▪ Emergency Response plan shall be prepared to address the accidental spillage of fuels and hazardous goods; ▪ Immediate collection of spilled oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies. ▪		
11	**Green House Gas (GHG) Abatement** The main sources of greenhouse gases (CO_2,	▪ Regular motioning of the vehicles for engine efficiency;	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	CH_4, NO_x etc.) during the construction activities of the proposed project will include both mobile and stationary sources. The mobile source will be the construction and transportation vehicles while the stationary source will be the batching and asphalt plants. Emission of greenhouse gases cause global warming and other climatic changes on regional and global scale.	▪ Avoid idling of construction vehicles; ▪ Alternative energy resources shall be considered where possible; ▪ NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery shall be enforced during construction works.		
12	**Resource Conservation** Resources involved in the construction of proposed project would include water, fuel and construction materials. Use of electricity will be insignificant. Diesel and residual fuel oils will be used to operate construction machinery and asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use, but it will also help to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes is very important. Electricity shortage is not expected but the sustainable use of diesel and residual fuel is necessary. Fuel will be used to operate construction machinery. Efficient use of energy resources is important to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes is important.	▪ Use potable water bowsers for construction works and mineral water bottles/ ground water for drinking purpose; ▪ Plan for the provision/purchase of adequate insulation to reduce heat loss through batching plants; ▪ Reduction of wastage of water through training of workers involved in water use; ▪ Ensure adequate insulation to reduce heat loss through batching plants; ▪ Regularly monitor CO and CO_2 content of the flue gases to verify that combustion systems are using practical excess air volumes; ▪ Maintain clean heat transfer surfaces in asphalt batching plant; ▪ Regular service of the vehicles and batching plants will reduce the mechanical losses of energy.	Contractor	MEC, ESSU, PMU
13	**Disposal of Mucking Material** Inevitable cut and fill earthwork operations will	▪ Proper landscaping, which should be given due consideration along with re-	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	open up scars on the land around the project area.	establishment of the local/indigenous vegetation as given in tree plantation plan attached as **Annex-VIII**. ▪ The excavated materials that are unsuitable for use will need to be stored, transported and reused and the residual material shall be disposed of appropriately at designated sites.		
14	**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. The workers shall be trained and facilitated to cope with such disasters.	▪ An ERP for earthquakes and manmade disasters should be developed by contractor in coordination with SC and C&W Department should be implemented in close consultation with the RESCUE Services and other concerned departments; and ▪ Minor incidents and near misses should be reported, and preventive measures should be formulated accordingly by the C&W Department.	Contractor	MEC, ESSU, PMU
15	**Flora** The project will involve destruction of vegetation cover on construction areas particularly along existing alignment. It is initially examined that approximately 848 mature, sub-mature, and pole crop and saplings of different tree/plants species will be disturbed during the construction phase of the subproject. The provided number of trees is approximate and tentative which needs proper detailed field surveys by KP Forest Department. The number of possibly impacted trees is	▪ As tree plantation on both sides of road already exits along existing alignment. Therefore, efforts should be done to avoid at least trees on either side during the process of widening. ▪ NOC from KP, Forest department is mandatory prior to start any interventions in reserve or any designated fortes, as per law of land/ forest act 2002. Compensation of damaged trees, soil and other assists should be paid to forest department	Contractor in Consultation with Forest & Wildlife Departments	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	provided by GIS and tree identification was carried in field. Moreover, trees of small and medium sizes will be removed due to the layout of the project for which compensation will be made to concerned parties (Local community, forest and other relevant departments.) The subproject interventions will be undertaken in subtropical chir pine and moist temperate Kail forests zones. The proposed sub project may pass through Chatri Reserve Forests and Location Forest Thandiani along the road. The proposed subprojectis already exits so, no major fragmentation is expected which can disintegrate the habitat areas into smaller and more isolated units. Subproject construction activities might create disturbance to local flora and fauna but limited and temporary. However, the extent of subproject activities is low in terms of physical intervention as the proposed subproject involves the rehabilitation and remodeling of existing Abbottabad-Thandiani road/ Lot-I. Therefore, the impact of disturbance to flora and fauna will be moderate Exhaust of noxious gases from movement of heavy machinery and dust will pollute air which	▪ A tree plantation plan / program has been prepared with the recommendations and technical support of concerned Forest Department. ▪ As a principal, ten trees are planted in place of felling of one tree in consideration of mortality but here 12,720 are recommended for plantation along the road to compensate the losses in mountainous biodiversity in lieu of 848 trees . ▪ The client shall implement the program with the help of Forest Department and with the consultation of concerned consultant ecologist. ▪ The Forest Department shall involve the communities for carrying out plantation. ▪ Open fires should be banned in the area to avoid hazards of fire in the area. ▪ Clearing of vegetation cannot be avoided at the areas specified for project structures, but damage to the natural vegetation may be minimized by establishing camp sites, workshops and batching plants on waste/barren land rather than on forested or agriculturally productive land. ▪ However, if such type of land is not available, it shall be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and		

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	will adversely affect health and vigor of plants. During construction activities, the Contractor's workers may damage the vegetation and trees (for use as fire-wood to fulfill the camp's requirements). Overall, it can be stated that the large number of wood trees will be damaged and expecting low impact on agriculture crops and fruit trees in the proposed alignment of the subproject.	undergrowth. ▪ The Contractor's staff and labor shall be strictly directed not to damage any vegetation such as trees or bushes. They shall use the paths and roads for movement and shall not be allowed to trespass through farmlands or forested areas. ▪ Contractor shall provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel shall not be allowed. ▪ Land holders should be paid reasonable compensation for the loss of their standing trees, in accordance with the prevailing market rates. This will mitigate the financial losses of the land holders ▪ Campsites and asphalt plants will be established on waste/barren land rather than on land with vegetation or agriculturally productive land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to crops, trees and undergrowth. ▪ Existing access tracks to the proposed alignment of the Thandiani Road should be utilized and new paths should be constructed only in case, no existing path is available. While making paths for carriage of equipment and material to the site new		

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		tracks, care should be taken that minimum land is utilized and minimum area of crop is disturbed. Cutting of trees should be avoided by making diversions. Construction vehicles, equipment and machinery will remain confined within their designated areas of movement. ▪ Prior formal approval from the Forest department will be obtained if removal of vegetation/ tree cutting is required. ▪ KP Forest Ordinance 2002, Khyber Pakhtunkhwa Wildlife and Biodiversity (Protection, Preservation, Conservation and Management) Act, 2015, Protection of Trees and Brushwood Act, 1949, WB OP on Natural Habitats (OP/BP 4.04) and Forests (OP/BP 4.36) should be strictly followed.		
16	**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, blasting, movement of machinery and vehicular traffic, movement of labor, camping, etc. The existing animals will leave the directly affected areas due to construction activities and human intervention. Some animals particularly reptiles may get killed during the earthworks operations. Moreover, the	▪ Degraded micro habitat of the project site needs landscape restoration plan including fencing of both sides of the proposed project and planting of native plant species. Such closures will help in restoration of natural vegetation and micro habitats. ▪ Across the road, wildlife corridors, culverts and underpasses (Total Crossing/ drainage structures = 46, these structure will have provision for wildlife crossing and water drainage as well) shall be provided for safe movement of reptiles and mammals in	Contractor in Consultation with Forest & Wildlife Departments	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	movements of the mammals and reptiles will be restricted during the construction phase. Birds as well will tend to move away from the construction areas and find shelter and food elsewhere due to the activities mentioned above for fear of being hunted / trapped. Noise generated from blasting and machinery particularly during the night hours will even scare the wildlife residing in habitats located at some distance from the construction areas. Uncontrolled blasting may even disturb the wildlife of the Project Areas. Food and refuse at the Contractor's camps may attract animals that might in turn be hunted by the workers. This impact is indirect, site-specific, temporary, reversible, possible and medium significant. This road may slightly alter the landscape and can impact biodiversity. In addition to destruction of habitat, the construction of roads would cause mortality, shift population demographics and be a source of pollution into the environment. The proposed work will not cause major impact or change to the habitat as the road already exits and the wildlife of the project area is already shifted to safer places from the decades.	between both sides of the road. This will reduce the incidences of road kills. ▪ Establishment of rain water catchment bands for bringing improvement in natural landscape shall be considered by contactor during construction phase of the project and should be the part of planning in design phase as well.. ▪ Wildlife overpasses should be provided (especially for monkeys & others) starting from RD-5 (5th km, considering the habitat) after each 3rd km same structure must be provided (as mentioned in design phase) and same should be considered for signage and boards as well ▪ For sustaining existing avifauna in the project area, small size water points shall be constructed along the road with provision of water on regular basis. ▪ Dumping of wastes along the road sides shall be avoided. ▪ Care shall be taken during construction activities for avoiding purposely or chance killing of animals. ▪ If any wild species and habitat is encountered during construction, that must dealt carefully and local wildlife department officials should be called to rescue the subject animal and may be shifted to nearby		

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		facility(if required) and should be released in the original/native habitat. ▪ 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 should be given in this regard. ▪ The Contractor must be held responsible for instructing his work force accordingly and for enforcing this restriction. In addition, this shall have to be controlled by the Wildlife Department. ▪ Special measures shall be adopted to minimize impacts on the wild birds, such as avoiding noise generating activities during the critical periods of breeding. ▪ Blasting and other noise generating activities shall not be carried out during the night (especially at Dawn and Dusk timings) by the work force, clear orders should be given. ▪ Similarly, wastes of the camps shall be properly disposed of to prevent it from being eaten by animals. ▪ Noise produced by blasting and other construction activities will kept to acceptable level. ▪ The local people shared their views regarding the habitat improvement and recommended that strict law enforcement in		

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		the area is imperatively required to safeguard the natural resource of the region. Tree plantation drive should practical and provision of proper funds (timely payments) is key to success. They also shared that local people of the area need to be involved in forest and wildlife conservation activities. ▪ .The camps will be properly fenced and gated to check the entry of wild animals in search of eatable goods. Similarly, wastes of the camps will be properly disposed of to prevent the chances of eating by wild animals, which may become hazardous to them. ▪ The underpasses for movement of wild animals may be provided for crossing of monkeys. For other animals ▪ Caution boards would be erected at crossing areas of wild animals. The exact location for boards would be determined through a survey of crossing animals. ▪ Stabilize road side slopes with plantation of appropriate indigenous grasses and shrubs etc. in addition to engineering techniques. Proper maintenance of road sides is also required. ▪ Speed bumps may be used to reduce vehicle speed and potential for vehicle/animal conflict in Populated		

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		towns/commercial areas, especially where the existing speed limits are relatively low, visibility is limited by a curve in the road or adjacent concealing vegetation, and where surrounding habitat increases the risk of collision (Carr et al. 2003). It may be used in some regions with high rates of animal-vehicle collisions as mentioned above, to get drivers' attention by creating noise and help to get drivers to slow down. ▪ Lighting, especially when used in conjunction with fencing and signage, to be effective in reducing collisions with large mammals by increasing driver visibility and reaction time, especially at night when many large animals are most active, and by reducing animal crossing by those animals that avoid lighted areas. Conversely, lighting components of a project may be evaluated to reduce glare in areas important for wildlife crossing where safe passage is ensured. The erection of lights could only be possible where electric supply will be available. The use of lighting is, however, often limited to areas with a nearby power source, but has generally been found to be a cost effective solution to vehicle-animal collisions, ▪ Water points must be provided to minimize the impact and movement of available wild		

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		and domesticated animals for water.		
		Operational 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 and congestion will lead to PM_{10} pollution levels above the NEQS / international standards, which may result in causing public health risks, nuisance and other impacts on bio-physical environment. These conditions will result in the rise of vehicular emissions (CO, NOx, SOx, PM_{10}) associated with the adverse effects on the environment and human.	▪ Setting up of a system to monitor air quality along project area in accordance with the applicable standards/limits; ▪ Regular road maintenance to ensure good surface condition; ▪ Monitoring air quality at defined schedule; ▪ Regular vehicle checks to control/ensure compliance with NEQS; and ▪ Enforcement and penalties against traffic rules violators.	C&W Department	
2	**Noise** During the operational phase, the noise levels are anticipated to increase due to traffic related noise pollution; vibrations from engines and tires and mainly use of pressure horns.	▪ According to monitoring results, additional sound barriers in form of trees and hedges will be discussed with the affected people and planted if agreed; ▪ Signs for sensitive zones (health centers / educational institutions etc.) to disallow the use of pressure horns; and ▪ Enforcement and penalties against traffic rules violators.	C&W Department	
3	**Wastes/ Hazardous Waste** Due to increased no. of tourists using this road, municipal waste is expected to be generated during operation phase. No hazardous waste is expected to generate in operation phase except	▪ Solid waste generated shall be properly disposed of through local solid waste management system. ▪ Providing the necessary means for emergency response on call 24 hours/day; ▪ Management of hazardous waste during	C&W Department	

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	during road maintenance works.	road maintenance works will be similar as given for construction phase.		
4	**Road Safety** Enhanced vehicular movement and speed may result in road safety issues like road side accidents. This impact is permanent but moderately 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) and enforcement of penalties for the violators will reduce the significance of this impact.	C&W Department	
5	**Drainage** During the operational phase, poor maintenance of the road drainage 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 start and end point of the proposed project and can cause traffic jams.	▪ 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 around the flyover and at grade road alignment.	C&W Department	
6	**Soil Erosion and Contamination** During the operation phase the routine impacts to soils would be limited largely to soil erosion impacts caused by vehicular traffic. Any excavations required for maintenance would cause impacts similar to those from construction phase, but at a lesser spatial and temporal extent. The accidental spill of product such as accidental fuel and material spills would likely	▪ The top soil that will be excavated from the area will be preserved and reused for the horticulture purpose; ▪ Proper solid waste management program is prepared and executed to ensure and Land waste containment, collection, transfer and disposal; and ▪ Monitoring is carried out at specific locations for strict compliance to the developed ESMP in implementing measures to waste	C&W Department	

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	cause soil contamination.	management.		
7	**Flora** During Operational stage the Project will not affect Flora (Trees and agricultural crops) or release any significant pressure detrimental to flora. Low level impact is expected at operational phase on Flora due to the O&M activities. Improved infra-structure facilities will help the farmers and owners of the orchards to fetch better prices for their produce, due to easy and swift approach to the local markets and other big cities of the country, which will have a positive impact.	▪ Large scale planting with suitable indigenous fruit and forest trees, shrubs and ornamental plants, and Linear plantation will be carried out in accordance with the Tree Plantation Plan to improve aesthetic value and offset the effect of removal of vegetation. ▪ Proper check and balance for above activities is highly recommended. Plantations so, raised must be maintained according to the standard forestry practices which include proper Irrigation, Cleaning, Pruning, thinning at prescribed intensity, Silt clearance and Trench-opening, etc. ▪ Maintenance and security of the plantation should be done for at-least five years (in consultation with the Forest Department). Measures such as fencing, watch guards and fire protection should be considered.	C&W , Forest and Wildlife Departments	
8	**Fauna** There is very small area/ trees of reserve forest will be disturbed and having no protected forests, Game reserve, Game sanctuary or national park in the project area so, no major impact on Wildlife & Livestock in the area is expected through, noise, vibration and any type of normal activity in the project area, as the road is already exists thus will have no effect on productivity.	▪ The precautionary measures described for future shall also be applicable during operation phase as relevant for the conservation of wildlife species in the Study Area. ▪ Proper maintenance of fence must be ensured during operational and maintenance phase of the road along the roadside to avoid road killing of wildlife, livestock and most importantly any inconvenient for local inhabitants.	C&W , Forest and Wildlife Departments	

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		▪ Post plantation care and wildlife pathways maintenance during operational phase is imperatively required as both the flora and fauna are integral part of the ecosystem. In many ways, fauna of a tract is dependent upon flora for its resting, nesting and roosting activities. With the improved flora of the project area, due to raising of large number of trees, the fauna and especially the avi-fauna shall be attracted to the area. The birds, which were scared away due to noise and degradation of their habitat, shall return to the area. Plantation on both sides shall not only reduce the noise and air pollution but will also be a source of attraction for the birds. ▪ Forest and Wildlife Department should check the above activities to ensure protection of local ecosystem ▪ Post-project monitoring and adaptive management techniques should be adopted.		
POTENTIAL SOCIAL IMPACTS				
Pre-Construction / Design Phase				
1	**Land Acquisition, Resettlement and Compensation** The proposed project involves the rehabilitation and remodeling of existing Thandiani Road. Therefore, project interventions will require land	• Careful alignment and route selection by the designer to minimize the impact by avoiding the residences of these families and shops. • A detailed Resettlement Action Plan will be	District Government Abbottabad	PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	and involuntary resettlement which will result in loss of shelters, economic displacement, loss of livelihoods as it passes through major bazar of Thandiani Chock, Kala pani and Kunde areas. For the proposed project (Lot-I & Lot-II) 611.256 kanals of land will be acquired for rehabilitation of road. Moreover, about 08 residential and 07 commercial structures (mostly shops) will be disturbed due to the widening of road. Besides these, 01 Umer Farooq mosque in Ghumawa village will be affected partially.	prepared as per World bank OP 4.12 and Land Acquisition 1894 including later amendments. • The compensation for the structures, houses, shops, trees, private and public properties etc. has to be made as per Resettlement Action Plan. • Mitigation measures will involve land management and providing judicious compensation to the affectees by providing sufficient budget in the project cost. The process of land acquisition and compensation will be followed in a transparent manner to minimize the impacts.		
2	**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 temporary acquisition. The approximate area required for the establishment of one Contractor's camp facilities will be 1500m^2 at the different locations.	▪ Land for construction camps will be directly rented from the private landowners by the Contractors. The provisions of the Land Acquisition Act (LAA), 1894 will not be involved as the acquisition of the land will be temporary and will be covered by short-term lease agreements between the landowners and Contractor. Rental terms should be negotiated to the satisfaction of the concerned landowners and the agreement should be in local language to make the process clear.	District Government Abbottabad	PMU
3	**Route Selection (Alignment)** Improper route selection for the road alignment	▪ Most of the significant environmental and social impacts of the project can be	Design Consultant	PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	could lead to increase in social issues of resettlement/relocation of assets and displacement of people.	addressed at the design phase, which is mainly the responsibility of the Design Engineers. The location of various components and structures, nature of construction technology etc. predominantly determine the environmental implications of the project.		
4	**Public Utilities** Due to the proposed project, water supply pipeline, PTCL towers and electric towers will have to be relocated.	▪ During the design maximum effort will be made to avoid the above mentioned public utilities, if these are unavoidable than these will be relocated through concerned department.	Design Consultant	PMU
5	**Poor Design Leading to Reduced Project Life** The project area being a hilly terrain, is prone to strong water currents, land sliding etc. If the design is poor, it may cause erosion leading to reduced project life.	▪ Review design to ensure that it incorporates design related mitigation measures such as surface water body crossing for easy flow of discharge produced by upstream, appropriate selection of sites for waste dumping and borrow, slope stabilization, etc.	Design Consultant	PMU
		Construction Phase		
1	**Location of Labor Camp, Material Depots, Equipment Yards and Approach Roads** Location of camps near sensitive receptors like water resources and use of private lands without prior consent of landowners for dumping and storage of construction material and equipment can result in adverse environmental impacts and create sever social issues. Location of labor camp, material depot, equipment yard and approach roads will not	▪ The contractor will, in consultation with PD, select the location of all these facilities after a rapid assessment through the Screening checklist. Satellite imagery can also be used to select the suitable sites, to record the pre-construction conditions and to monitor the condition of these sites during and after the construction phase. ▪ The camp/other site facilities will be established on a flat land without much	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	cause any serious problem if selected in consultation with local communities and landowners and impacts can easily be mitigated.	natural vegetation, at least 500 m away from the communities and surface water bodies.		
2	**Accessibility Issues** Closure of existing unpaved / deteriorated road and other pathways during the construction phase of the project will cause inconvenience to the nearby residents and affecting their daily life activities. It might be difficult for the students to reach their school/colleges. Similarly, the patients may also face difficulty of access to the basic health unit and hospital.	▪ Mitigation measures will include public awareness through media, proper traffic diversion plans, appropriate sign boards and timely completion of the project.	Contractor	MEC, ESSU, PMU
3	**Community Health and Safety** The construction activities and vehicular movement at construction sites may result in roadside accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. Quality of groundwater and surface water resources available in the nearby local communities may be affected due to the construction activities, oil spillage and leakage, roadside accidents, etc. The proposed project will also have potential of air (dust pollution), noise and vibrational impacts on nearby community. The labour works with different transmittable diseases may cause spread out of those diseases in the local residents. The construction areas located near the residential, settlements, may cause accident for the people	▪ The contractor will be required to strictly follow WB EHS Guidelines. ▪ Providing basic medical training to specified work staff and basic medical service and supplies to workers; ▪ There will be proper control on construction activities and oil spillage leakage of vehicles; ▪ Efforts will be made to create awareness about road safety among the drivers operating construction vehicles; ▪ The Contractor will prepare the construction camp management plan which, in addition to other components, will include the labor influx management plan. This will be reviewed and approved by C&W Department; and	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	moving near to those areas. Conflicts may arise between the local community and the construction workers, which may be related to religious, cultural or ethnic differences, or based on competition for local resources. Tensions may also arise between different groups within the labor force, and pre-existing conflicts in the local community may be exacerbated. Ethnic and regional conflicts may also be aggravated if workers from one group are moving into the territory of the other.	▪ Contractor will take due care of the local community and observe sanctity of local customs and traditions by his staff. Contractor will warn the staff strictly not to involve in any unethical activities and to obey the local norms and cultural restrictions.		
4	**Occupational Health and Safety** Occupational Health and Safety (H&S) related impacts will arise during construction phase activities including clearing of earth, levelling, compaction, carpeting, pavement finishing and testing & commissioning. Eye injury can be caused by stone or metal particles. Hazard of being hit by falling objects, major hand-arm and whole body vibration hazards, skin and respiratory tract irritation from exposure to cement dust, overexertion and awkward postures etc. will be another impact. Welding hazards include electric shock, fumes and gases, fire and explosions, falls from height, eye and head injuries etc.	▪ The contractor will be required to strictly follow WB EHS Guidelines. ▪ Providing basic medical training to specified work staff and basic medical service and supplies to workers; ▪ Complying with the safety precautions for the construction workers as per International Labour Organization (ILO) Convention No. 62, as far as applicable to the Project Contract; ▪ Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves and protective masks, goggles, shields and monitoring their proper and sustained usage; ▪ Contractor will ensure the provision of medicines, first aid kits, ambulance etc. at	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
		the camp site; ▪ Moreover, proper planning should be done for food storage, setting up of kitchens, production of sewage and waste water may result in multiplication of rodents like rats, mice and shrew etc and vectors like mosquitoes, bugs and flies which will have a negative impact ▪ Work areas will be cordoned off where necessary; ▪ Contractors will instruct their staff to use Personnel Protective Equipment (PPE) (e.g., wire containment, displaying warning signs along the work site, communicating advance warnings to mats) to enhance the safety; and ▪ Safety lookouts will be built to prevent people and vehicles from passing at the time of hot or cold work; and ▪ An emergency management plan must be devised by the contactor in close coordination with the provincial emergency services		
5	**Labor Influx** This can be particularly acute in smaller communities hosting a largely male workforce and/or a workforce from other regions which may result in conflicts between locals and non-locals concerning employment opportunities, wages and natural resources. Mobile workers can also	▪ Local population will be given preference in construction related jobs. Most unskilled workers will be hired from local communities, while for skilled manpower also, first choice will be given to local area residents. ▪ The Contractor will prepare the construction camp management plan which, in addition to	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	contribute significantly to gender-based social impacts and risks.	other components, will include the labor influx management plan. This will be reviewed and approved by World Bank. The Contractor will select the specific timings for the construction activities particularly near the settlements, so as to cause least disturbance to the local population, particularly women.		
6	**Gender Issues** Due to the project activities, local women many not be able to perform their daily outdoor chores. The induction of outside labor may create social and gender issues due to the labor force being unaware of local customs and norms. It may also cause hindrance to the mobility of local women for working in the field, herding livestock, picking fuel wood, etc.	▪ The contractor will be required to provide qualified key personnel to address the specific risks identified in the project. ▪ The bidding documents will include specific requirements that minimize the use of expatriate workers and encourage hiring of local workers, thereby minimizing labor influx. ▪ All project consulting firms will also be required to submit Codes of Conduct with their proposals. The contractor will be required to establish anti-sexual harassment policies that governs conduct in the workplace.	Contractor	MEC, ESSU, PMU
7	**Rise in Prices of Essential Commodities** Due to induction of outside labor for project works, the demand for basic items will increase thereby causing an increase in the prices of essential commodities. Additionally, the road improvement activities during the construction phase may disrupt the normal flow of trade and	▪ In terms of labor induction, the project will exert no significant impacts on the prices of essential commodities. To avoid risk of such price hikes, majority of the unskilled and semi-skilled labor will be recruited from the local areas and specific clauses will be added in the Contracts of Contractor. Project	Contractor	MEC, ESSU, PMU

Sr. No	Impacts	Mitigation Measures	Responsibility	
			Implementation	Monitoring
	supply of essential goods.	Engineer and the Contractor will ensure that normal trade routes remain open and supply of goods is not severely impacted. Furthermore, the contractor should normally procure the field camps supplies from the main markets or any nearby commercially active city.		
Operation and Maintenance Phase				
1	Significant negative as well as positive impacts are expected during the operation period of the project. Most of the associated impacts relate to road/ traffic safety and the socioeconomic benefit of the living community. The anticipated environmental, social and safety impacts related to the proposed Project have been studied for the operational phase of the Project.	▪ No mitigations required.	C&W Department	

8.6 MONITORING PLAN

Monitoring Plan is also associated with mitigation plan during the different stages of the subproject. It ensures that mitigation measures are being effectively implemented. The monitoring of the project is very imperative for implementation of the ESMP. The ESSU will carry out the monitoring at the field level on a continuous basis while MEC will also carry out intermittent third-party monitoring of ESMP implementation.

8.6.1 Monitoring Mechanism

Safeguard monitoring is an essential tool for assessing whether the adopted environmental and social management measures are meeting their stated objectives. Two complementary methodology approaches are being applied to monitor the proposed actions under the ESMP:

- Compliance monitoring; which checks whether the actions proposed by the ESMP have been carried out by visual observation, photographic documentation and the use of checklists prepared for the ESMP; and
- Effects monitoring; which records the consequences of program activities on the biophysical and social environment; as applicable, these effects are repeatedly measured by applying selected indicators.

The plan also defines the monitoring mechanism and identifies a set of verifiable monitoring parameters to ensure that all proposed mitigation measures laid down in the ESMP are completely and effectively implemented.

Monitoring will be carried out to ensure that the mitigation plans are regularly and effectively implemented. It will be performed at three levels. At the PMU level, the environmental team supported by C&W will do ESMP monitoring to ensure that the mitigation plans are being effectively implemented. The environmental team of ESSU will regularly monitor the ESMP implementation by the contractor. At contractor's level, the environmental monitoring checklist will be filled on daily basis by their environmental manager and countersigned by the representative of ESSU.

8.6.2 Monitoring Plan

Proposed monitoring plan to be carried out during pre-construction, construction and operation phases of the subproject to establish the baseline condition and ensure contractors compliance with the mitigation measures and evaluation of the subproject impact on post-completion is given in **Table 8.3** along with the monitoring indicators and frequency. A template form for environment and social monitoring is provided as **Annex-XI**.

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Table 8.3: Environmental Monitoring Plan

Sr. No.	Receptor	Monitoring Parameters / Performance Indicator	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency
1	Water Resources/ Water Quality	Compliance with all parameters as per NEQS.	Abbottabad-Thandiani Road-Lot-I. Sampling from nearby surface/wastewater bodies. However, estimated sampling point for surface / wastewater is one (01) from main nullah along the road and one (01) ground/drinking water sample from nearby settlement. 1. Other proposed effluent discharge points are: 2. Contractors camps 3. Concrete preparation plants 4. Fuel (Petrol. Oil and Grease) products storages. 5. Vehicle and machines repairing and servicing yards.	Visual checks of laboratory activities Discrete grab sampling and laboratory testing of water samples by EPA approved Laboratory for monitoring.	Once before the start of construction by activity monitors and reported on quarterly basis during the construction At the end of construction Bi-annually for at least one year during O&M.
2	Soil Contamination	Soil contamination, uncontrolled solid waste disposal activities at sites.	Abbottabad-Thandiani Road-Lot-I 6. Sites with severe contamination.	Visual observations and checks of laboratory	Once before the start of construction by activity monitors and reported On quarterly basis during the

Sr. No.	Receptor	Monitoring Parameters / Performance Indicator	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency
			Other proposed sampling sites are: 7. Construction Camp. 8. Equipment washing yards. 9. Spillage points of fuel, chemicals and lubricants.	activities Sampling and laboratory testing for soil samples.	construction At the end of construction Bi-annually for at least one year during O&M.
3	Land Resources	Change in nature of Landuse	Abbottabad-Thandiani Road-Lot-I 10. Sites with significant landuse change.	Random visits and visual observations of landuse change.	Once before the start of construction by activity monitors and reported On Monthly basis during the construction At the end of construction Bi-annually for at least one year during O&M.
4	Dust Emissions	Compliance with PM_{10} $PM_{2.5}$ as per NEQS	Abbottabad-Thandiani Road-Lot-I 11. Sensitive receptors within the RoW/CoI. Estimated sampling point is one (01) which may be located near areas having traffic congestion. .	Visual checks of laboratory activities Onsite Ambient Air Monitoring equipment	Once before the start of construction by activity monitors and reported On quarterly basis during the construction At the end of construction Bi-annually for at least one year during O&M.
5	Noise Pollution	Compliance with dBA Leq. as per NEQS	Abbottabad-Thandiani Road-Lot-I 12. Sensitive receptors within the RoW/CoI.	Visual checks of laboratory activities	Once before the start of construction by activity monitors and reported On quarterly basis during the

Sr. No.	Receptor	Monitoring Parameters / Performance Indicator	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency
			Estimated sampling point is one (01) which may be located near area of high traffic volumes Other proposed sampling sites are: 13. Construction camps. 14. Equipment yards.	Monitoring of noise level at site.	construction At the end of construction Bi-annually for at least one year during O&M.
6	Fumes and gases	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} and compliance with NEQS. Vehicular emissions as per NEQS	Abbottabad-Thandiani Road-Lot-I 15. Major receptors within the RoW/CoI. Estimated sampling point is one (01) which may be located near area of high traffic volumes. Emissions from the silencers of heavy machinery, trucks and other vehicles.	Visual checks of laboratory activities Onsite monitoring of ambient air quality will be preferred.	Once before the start of construction by activity monitors and reported On quarterly basis during the construction At the end of construction Bi-annually for at least one year during O&M.
7	Ecological Resources	Disturbance to natural habitat, uncontrolled floral cutting which can be avoidable.	Abbottabad-Thandiani Road-Lot-I 16. Natural habitats along the RoW/CoI (i.e. Reserve Forests).	Visual checks to ensure that only marked trees are cut within the Project corridor. Monitoring of Wildlife / birds hunting.	Once prior to the start of construction Monitoring and reporting on monthly basis during the construction stage. At the end of construction Bi-annual monitoring and

Sr. No.	Receptor	Monitoring Parameters / Performance Indicator	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency
					reporting during the operation stage.
8	Houses	Disturbance and removal avoidable of houses which are within the subproject corridor.	Abbottabad-Thandiani Road-Lot-I. 17. Houses within the RoW. These structures will be verified prior to the start of construction.	Random visits and consultations with AP's.	Prior to the start of construction. Reporting will be done on the basis of RAP recommendation.
9	Public Infrastructure	Disturbance or damage to public infrastructure	Abbottabad-Thandiani Road-Lot-I. 18. Public infrastructures within the RoW. These structures will be verified prior to the start of construction.	Random visits and consultations with AP's.	Prior to the start of construction. Reporting will be done on the basis of RAP recommendation.
10	Community around the subproject corridor	Use of common resources. Hindrance to mobility. Community health and safety	Communities within the RoW/CoI.	Community consultations.	Prior to the start of construction and during the construction stage. Reporting will be done on the basis of RAP recommendation.
11	Labour Management	Child labour, employment conditions, workers' accommodation, Housekeeping, HIV/STDs, COVID 19 etc.	At construction camps	Consultations and medical checkups	Daily
12	Labour Influx	Conflicts related to labour influx	At construction camps	Consultations.	Daily
13	Grievances Redressal	Type and number of grievances	At construction camps	Complaint register	Daily
14	Community/occupational health & safety	Type and number of accidents	At construction camps	Consultations and complaint register	Daily

Sr. No.	Receptor	Monitoring Parameters / Performance Indicator	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency
15	Gender Based Violence	Number of incidents of women harassment	At construction camps	Community consultations	Daily
16	Training	Community/occupational health and safety and Gender in-equalities	At construction camps	Consultations and training record	As and when required during construction period

8.7 CHANGE MANAGEMENT PLAN

The present ESMP has been prepared on the basis of the Project information available at this stage. It is however possible that the changes are made in some components of the Project during the design and construction phases. In order to address the environmental and social implications of these changes, a simple framework has been devised, which is described in this section. The change management framework recognizes the three broad categories (A, B & C) of the changes in the Project as detailed below:

8.7.1 Category 'A' Change

The 'Category A' change is one that will lead to a significant departure from the Project described in the ESMP and consequently requires a reassessment of the environmental and socioeconomic impacts associated with the change. In such an instance, Client will be required to conduct a fresh ESMP of the changed aspect of the Project design and send the updated report to the relevant agencies for approval.

8.7.2 Category 'B' Change

The category 'B' change is one that will entail Project activities not significantly different from those described in the ESMP, which may result in the Project effects with overall magnitude to be similar to the assessment made in this report. In case of such changes, the ESMP will be required to reassess the environmental and socio-economic impacts of the activity, specify additional mitigation measures, if necessary and report the changes to the relevant agencies (Contractors, EPAs).

8.7.3 Category 'C' Change

A Category-C change is one that is of little consequence to the ESMP findings such as change in alignment. This type of change does not result in effects beyond those already assessed in the ESMP; rather it may be made onsite to minimize the impact of an activity, such as re-aligning a particular section to avoid cutting a tree or relocating construction campsites to minimize clearing vegetation. The only actions required for such changes are informing all the key personnel and document the change.

8.8 CAPACITY BUILDING/STRENGTHENING

The environmental and social trainings will help to ensure that the requirements of the ESMP are clearly understood and followed by all subproject personnel. The primary responsibility of providing these trainings to all subproject personnel will be that of the contractor and PMU. The trainings will be provided to different professional groups separately such as managers, skilled personnel, unskilled labors, and camp staff. Capacity building will be aimed at strengthening the PMU, and operational staff in the field of environmental management and social development. Members of the ESSU responsible for supervision of environmental and social mitigation measures would be trained in environmental management, environmental quality control, ecology, environmental awareness, participatory approach and social

development. The contractor will also be required to provide environmental and social trainings to its staff, to ensure effective implementation of the ESMP. The training plan shall include a program for the delivery of intermittent training, to cover the subjects included in **Table 8.4**. Training should be carried out initially at induction of staff and repeated throughout the project.

Table 8.4 : Training Subjects for Inclusion in Contractors Training Plan

Training Subject	Target Audience
Environmental Code of Practices	All staff
Awareness workshop regarding Covid 19 and other vector borne diseases	All staff
Handling, use & disposal of hazardous material	Construction workers involved in handling, use & disposal of hazardous material storage areas and required to use hazardous material during their works
Waste Management	All construction staff
Efficient & safe driving practices, including road & vehicle restrictions	Drivers & mobile plant operators
Pollution prevention: Best practice	All staff
Health & Safety: Safe way to work & hazard awareness	All construction staff and O&M Staff
Health & Safety: Safe use of plant & equipment	Operators of plant & equipment
Health & Safety: Working at height	Staff colony and regulator construction staff
Health & Safety: Use of PPE	All construction staff
Occupational Health and Safety	To all persons entering the construction site
Emergency procedures and evacuation	All staff
Diver training	All divers
Spill clean-up training	Contractor's spill management staff
Fire fighting	All staff
Site inductions, including requirements under the Environmental and Social Mitigation and Monitoring Plan	All staff
Culturally sensitive awareness rising on HIV/ AIDS and the spread of sexually transmitted diseases.	All staff

8.9 AUDITS AND ANNUAL REVIEW OF ESMP

Internal environmental audits will be held with an objective to review the effectiveness of environmental management of the project. ESSU will carry out annual review of the appropriateness and adequacy of ESMP in the light of its own monitoring and supervision as well as on the basis of the third-party monitoring and audits. ESSU will revise the EMP in case substantial gaps and shortcomings are identified in these plans

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External third party environmental audits will be held with an objective to review the effectiveness of environmental and social management of the project. It is proposed that MEC carry out these audits on yearly basis and prepare Audit Reports. These Audit Reports would be used to re-examine the continued appropriateness of the ESMP and to provide advice on any updates required.

8.10 GRIEVANCES REDRESS MECHANISM

The grievance redress mechanism will focus on the following during the implementation process:

- Record grievances, both written and oral, categorizing and prioritizing them, and providing solutions within an agreed timeframe;
- Discuss the grievances on a regular basis with relevant authorities and identify decisions/actions for issues that can be resolved at that level;
- Informing the PMU and project steering committee of any more serious issues;
- Reporting to the aggrieved parties about the developments regarding their grievances and the decisions;
- All expenses incurred in arranging grievance negotiations and meetings of Grievance Redress Committee (GRC) as well as logistics required, shall be arranged by the C&W Department being the executing agency; and
- All information about grievance procedures, grievance forms, and responses will be available in languages readily understandable to the locals.

8.10.1 Composition of GRC

GRM will be set up with a two-tiered structure; one GRC will be set up at PMU (C&W) head office level and one GRC will be set up at the field level enabling immediate local responses to grievances and higher-level review addressing more difficult cases not resolved at the field level. The GRCs will continue to function for the benefit of the PAPs, till complete implementation of RAP. GRC composed at two (02) levels are explained below:

First Tier GRC at Field Level

PAPs can submit a formal complaint to the GRC located at the project site at the field level, and headed by the SDO, C&W Department. Members of the GRC will include PMU social, environment and gender specialists, officials from the Abbottabad, revenue department, and relevant official of the local district administration. The Social Development Specialist will serve as the Secretary to the GRC and will maintain its records. Once the complaint is submitted, it shall be recorded in the complaints register and uploaded to a computer excel sheet without delay and an acknowledgement sent to the complainant within three (3) business days. Project technical staff will be assigned to investigate the complaint by visiting the site location to meet complainants and all related stakeholders, and submit a fact-finding report and recommendations to the GRC within seven (07) business days of receipt of complaint. The GRC will have weekly meetings and will take decisions on all complaints and their fact-finding reports in accordance with the agreed entitlements and provisions in the RAP/ entitlement matrix or ESMP. A decision will be communicated to the complainant

within fifteen (15) business days and recorded in the complaint register and excel sheet. The 1st tier GRC will comprise the following members:

- Sub-divisional Officer (SDO), C&W (Chair);
- Notable Person from the Local Community (Member);
- Local Revenue Department Official (Member);
- Social Safeguard Specialist (Secretary);
- Environment Specialist;
- Representative of Project Supervision and Management Consultants;
- Two Representatives of PAPs (male and female); and
- A Representative of Contractor.

Second Tier GRC at PMU Level

If the complainant is not satisfied with the decision received, he/she can elevate the complaint to the 2nd tier grievance redress committee located at the PMU C&W headed by the Project Director. The PMU-GRC will receive secretarial support from the Social Safeguards Specialist and will meet fortnightly. The 2nd Tier GRC will acknowledge the complaint within three (03) business days, scrutinize the record of the 1st Tier GRC, meet with the complainant/s and relevant departments, and investigate the remedies available. After thorough review and scrutiny of the available record and conducting a visit of site to collect additional information if required, the 2nd Tier GRC will inform the complainant of the GRC's decision within thirty (30) business days of receipt of the complaint. The 2nd tier GRC will comprise the following members:

- Project Director, PMU, C&W (Chair);
- Revenue Department Official (Member);
- Social Safeguard Specialist (Secretary);
- Environment Specialist;
- A Representative of PAPs Committee; and
- A Representative of Contractor.

If the complainant is still dissatisfied with the decision, he can go to the court of law, if he/she wishes so.

8.10.2 Grievance Reporting

The GRC will record the grievance, investigate, and after subsequent actions, the results will be included in the monthly project progress reports. In the construction period and the initial operation and maintenance period covered by loan covenants, the project proponent will periodically report progress to the World Bank. This will include reporting of complaints and their resolution.

Flow chart of the proposed GRM is provided in **Figure 8.2**.

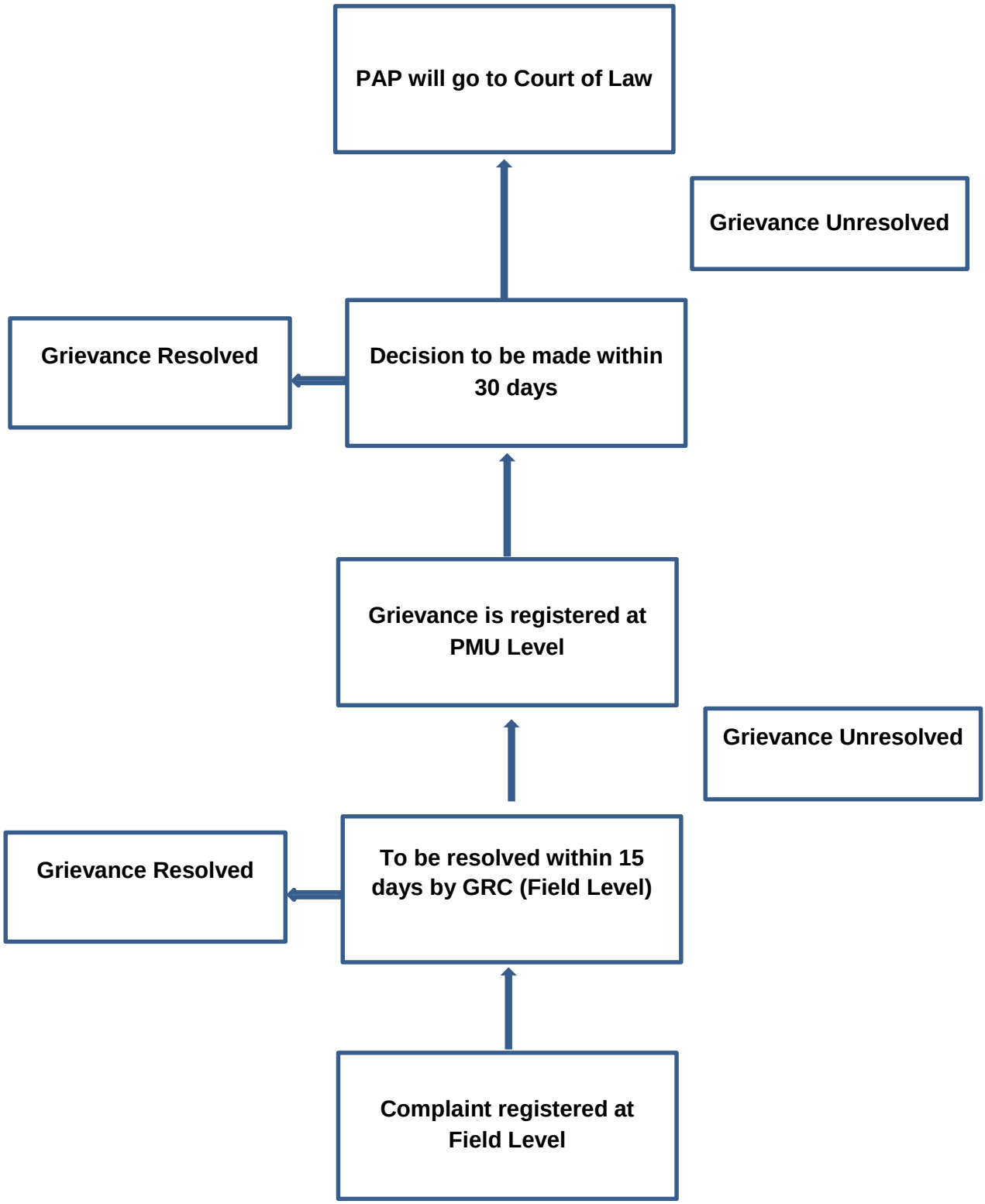

Figure 8.2: Flow Chart of the Proposed Grievances Redress Mechanism

8.11 REPORTING

The ESSU will prepare monthly reports covering various aspects of the ESMP implementation including compliance and effects monitoring, capacity building, and grievance redressal during project implementation. MEC will prepare reports during post-completion. List of reports to be prepared during implementation and operation stages are presented in **Table 8.5.**

Table 8.5: Reporting during Implementation and Operation Phases

Report	Contents	Prepared by	Submitted to
Monthly Progress Report for ESMP Compliance	Non-Compliances observed on sites and actions required	Environmental/Social Safeguards of ESSU	ESSU, PMU, MEC; C&W, Contractor
Monthly Progress Report for ESMP Compliance	Actions taken on site in response to ESSU monthly report Project progress and works to be undertaken in the coming three months Details of training delivered Details of accidents reported	Contractor	ESSU, PMU, MEC
Quarterly Progress Report for ESMP Compliance	Quarterly review on implementation of ESMP including compliance and monitoring, capacity building, and grievance redressal	ESSU	PMU, C&W, World Bank, EPA – KP, Contractor
Biannual Progress Report for ESMP Compliance	Biannual reporting for OHS, including workhours, number of lost-time accidents/incidents, serious injuries and fatalities, amount of lost time, root cause investigations, etc. There should also be some incident reporting requirements, such as for major spills, fatalities, local unrest, etc.	ESSU	PMU, C&W, World Bank, EPA – KP, Contractor

Report	Contents	Prepared by	Submitted to
Annual Report for ESMP Compliance	Results of effects monitoring Independent review of environmental and social performance on site Recommended actions required by all parties	MEC	PMU, C&W, World Bank, EPA – KP, Contractor

8.12 COST FOR IMPLEMENTATION OF ESMP

8.12.1 Cost for Testing of Ambient Air, Noise, Water

Testing and analysis for ambient air, noise and ground and surface water will be undertaken during pre- construction, construction and operational phases to ensure the effectiveness of the proposed mitigation measures. Certain environmental parameters will be selected and quantitative analysis will be carried out. The results of analysis will be compared with the guidelines; standards and pre-subproject conditions to investigate whether the ESMP and its implementation are effective for the mitigation of impacts or not. Parameters to be analyzed during pre- construction, construction and opera6ion phase of the subproject and responsibilities for monitoring and reporting have been discussed in the **Table 8.6.**

Table 8.6: Environmental Monitoring and Testing Cost Estimate

Sr. No.	Parameter	Mechanism	Frequency	Unit Rate (PKR)	Quantity	Cost (PKRs)	Remarks
A	**Pre- Construction Phase**						
1	Surface Water / Wastewater	Discrete grab sampling and laboratory testing of water samples by EPA approved Laboratory for monitoring as per NEQS.	Once	20,000	01	20,000	One-time monitoring shall be carried out before the mobilization of Contractor.
2	Drinking Water / Ground Water	Discrete grab sampling and laboratory testing of water samples by EPA approved Laboratory for monitoring as per NEQS.	Once	20,000	01	20,000	
3	Noise Levels	dBA Leq. as per NEQS	Once	2,000	01	2,000	
4	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by EPA approved Laboratory as per NEQS.	Once	30,000	01	30,000	
	Total					**72,000**	
B	**Construction Phase (2 Years Cost)**						
1	Surface Water /	Discrete grab	Quarterly	20,000	01x04	80,000	Quarterly monitoring cost for

Sr. No.	Parameter	Mechanism	Frequency	Unit Rate (PKR)	Quantity	Cost (PKRs)	Remarks
	Wastewater	sampling and laboratory testing of water samples by EPA approved Laboratory for monitoring as per NEQS.					the one-year construction period and will be updated each year based on latest rates during construction timeline of the proposed Project.
2	Drinking Water / Ground Water	Discrete grab sampling and laboratory testing of water samples by EPA approved Laboratory for monitoring as per NEQS.	Quarterly	20,000	01x04	80,000	
3	Noise Levels	dBA Leq. as per NEQS	Quarterly	2,000	01x04	8,000	
3	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by EPA approved Laboratory as per NEQS.	Quarterly	30,000	01x04	120,000	
Total						**288,000x02 = 576,000**	**Cost is calculated for two (02) years**
C	**OPERATION & MAINTENANCE PHASE (One Year Cost)**						
1	Water Resources	Discrete grab sampling and laboratory testing	Biannually	20,000	02x1	40,000	Biannually monitoring cost for the one year O&M Phase and will be reproduced for next

Sr. No.	Parameter	Mechanism	Frequency	Unit Rate (PKR)	Quantity	Cost (PKRs)	Remarks
		of water samples by EPA approved Laboratory for monitoring as per NEQS.					years of O&M based on updated rates.
2	Noise Levels	dBA Leq. as per NEQS.	Biannually	2,000	02x1	4,000	
3	Ambient Air Monitoring	Monitoring of CO, CO_2, SOx, NO_x, HC and $PM_{2.5}$ PM_{10} by EPA approved Laboratory as per NEQS.	Biannually	30,000	02x1	60,000	
Total						**104,000**	**Cost is calculated for one (01) years**
Grand Total						**752,000**	

8.13 COST FOR TRAINING AND CAPACITY BUILDING/STRENGTHENING

In order to ensure that the ESMP provisions are implemented efficiently and effectively, training and capacity building and strengthening are required. Therefore, based on the assessment of the institutional capacities that will be involved in the implementation of the ESMP, the following broad areas of capacity building/strengthening have been identified and recommended for the PMU for effective implementation of the ESMP. **Table 8.7** shows the positions proposed for institutional strengthening for an effective implementation of environmental and social mitigation measures, whereas **Table 8.8** shows various training.

Table 8.7: Cost for Institutional Strengthening

Institutional strengthening	Position	Scheduling (Months)	Cost Estimates Rs.
Establishment of ESSU	Environmental Specialist	24	150,000 x 24 = 3,600,000/-
	Social Specialist	24	150,000 x 24 = 3,600,000/--
	Occupational Health & Safety Specialist	24	150,000 x 24 = 3,600,000/-
Total			**10,800,000/-**

Table 8.8: Institutional Training for Implementation

Training Activity	Participants	Type of Training	Content	Scheduling	Cost Estimates Rs.
Construction Phase (02 years)					
ESHGS of WB WB Safeguard policies EPA Regulation	Contractor Staff	Presentation	Awareness; and Applicability of environmental code of practices and WB operational policies, best practices on environment and social issue. Awareness on EPA rules, guidelines, regulation and standards for satisfactory compliance.	Biannually	200,000/-
Awareness workshop regarding Covid 19 and other vector borne diseases	Contractor Staff	Presentation	Risk, Prevention and available treatment	Biannually	200,000/-

Pollution prevention practices	Contractor Staff	Lecture	Awareness and importance of Practices to be adopted for pollution preventions	Biannually	200,000/-
Emergency Response Driver safety	Contractor Staff	Workshop/ Lecture	Potential natural and other hazard/emergencies and dealing with emergency to minimize damage Risks, safe practices and responding to accidents	Biannually	200,000/-
Ecological Conservation	Contractor Staff	Lecture	Awareness on regulations wild life and forest and penalties against violation of laws. Importance of protection of endangered species	Biannually	200,000/-
Resettlement Related Issues	Contractor and ESSU Staff	Lecture	Awareness on ESS-5. Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	Biannually	200,000/-
Labour Management Procedures	Contractor Staff	Lecture	Awareness on World Bank ESS-2, Labour and working conditions and HIV/STDs	Biannually	200,000/-
Community/ occupational health and safety	Contractor Staff	Lecture	Awareness on World Bank ESS-4, Community health and safety Awareness of local culture and practices	Biannually	200,000/-
Gender Aspects	Contractor Staff	Lecture	Awareness on gender inequalities/GBV	Biannually	200,000/-
Total					**1,800,000/-**

8.14 COST FOR PERSONAL PROTECTIVE EQUIPMENT (PPE)

The cost required for PPEs for forty seven (47) staff including skilled and unskilled during the whole construction period of twenty-four (24) months is given in the **Table 8.9.**

Table 8.9: Break-up for Personal Protective Equipment cost

Items	Quantity	Cost / Item (Rs.)	Total Cost (Rs.)
Dust masks	2256	20	45,120
Safety Shoes	94	2000	188,000
Gloves	1128	300	338,400
First Aid Box	2	5000	10,000
Ear Plugs	564	30	16,920
Safety Helmets	47	1500	70,500
Safety Jackets (Hi Vis)	94	600	56,400
		Total	**725,340**

Time required for Construction = 24 months

Estimated No. of labor required during construction = 47

The cost required to effectively implement the mitigation measures is important for the sustainability of the subproject. The Contractor will be paid against only those (mitigation) measures that actually executed at site. The estimated cost for the implementation of ESMP

Sr. No.	Items	Unit	Cost
1.	Personal Protective Equipment cost	Rs.	725,340/-
2.	Environmental Monitoring and Testing Cost	Rs.	752,000/-
3.	Tree Plantation Cost	Rs.	24,575,040/-
4.	Institutional Strengthening Cost	Rs.	10,800,000/-
5.	Institutional Training Cost	Rs.	1,800,000/-
6.	Hiring of Monitoring and Evaluation Consultant (MEC) by Client /PMU[13]	Rs.	3,000,000/-
7.	**Sub Total**	**Rs.**	**41,652,380/-**
8.	**Contingencies 10%**	**Rs.**	**4,165,238/-**
	Total	**Rs.**	**45,817,618/-**

and is summarized as under:

[13] This M&E cost is for overall Project and will be borne by the Client/PMU.

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ANNEXES

ANNEX-I: ESMP TEAM COMPOSITION

ANNEX-I

ESMP TEAM COMPOSITION

Sr. No.	Name of Expert	Designation
1.	Muhammad Shariq Ahmed	Chief Engineer/Head ERSD
2.	Uzma Rafique	Sr. Environmental Scientist
3.	Mr. Hafiz Muhammad Abid Saleem	Sr. Environmental Engineer
4.	Mr. Aashar Habib	Sr. Environmental Scientist
5.	Mr. Saeed Hussain	Sr. Sociologist
6.	Mr. Waqar Saleem	Sr. Sociologist
7.	Mr. Ibadullah Khan	Sr. Ecologist
8.	Mr. Bilal Saleem	GIS Expert

ANNEX-II: ENVIRONMENTAL AND SOCIAL SCREENING CHECKLIST

ANNEX II

PARAMETERS	ENVIRONMENTAL AND SOCIAL SCREENING CHECKLIST IMPACTS			
Physical Parameters	**None**	**Minor / Small**	**Moderate/Medium**	**Significant/Large**
1- Surface water, Groundwater and sediments				
1.1 Would the project pose the risk of clearance of vegetation that may result an increase in level of suspended solids washing into the rivers / surface water bodies?		Minor / Small		
Yes. Nullah crossing the Thandiani Road may be temporarily impacted and will be mitigated. There is no River along the Thandiani Road.				
1.2 Would the project contaminate the surface water, catchment boundaries and overland flow paths?	None			
No.				
13 Will the proposed project involve the application of chemicals that may have a negative effect on the environment or human health?	None			
No.				
1.4 Will the project have potential negative impacts on groundwater?	None			
No.				
1.5 Will the project make large scale spillage by the movements of vehicles that may results in fuel and oil leaking in to underlying soil resulting contamination of water table?	None			
No.				
1.6 Would the project pose a risk of contaminating drinking water sources	None			
No.				
1.7 Would the project deplete the ground water if it is not properly disposed?	None			
No.				

2- Air Emissions and Ambient Air Quality				
2.1 Would the project result in an increase in the level of dust and particulate matter in the air surrounding the site?		Minor/ Small		
Yes. Temporary impact due to certain construction activities which will be mitigated.				
2.2 Would the project result in indoor air pollution?	N.A.	N.A.	N.A.	N.A.
N.A.				
2.3 Will there be any impact upon air quality during the decommissioning phase?	None			
No.				
2.4 Would the project release the greenhouse gases?	None			
No. Negligible.				
3- Noise and Vibration				
3.1 Would the project increase the ambient noise level and vibrations?		Minor/ Small		
Yes.				
4- Landscape and Visual Amenity				
4.1 Would the project include above ground installation that may alter the views to, from or beyond the site?	None			
No. rehabilitation and remodeling of an existing Road.				
5- Soil and land use				
5.1 Would the project result in the clearance of the vegetation that may increase soil erosion?		Minor/ Small		
Yes. Limited impact.				
5.2 Would the project affect agricultural land?	None			
No.				
5.3 Would the project lead to landslides hazard?		Minor/ Small		
Yes. The project area is a hilly terrain and may be prone to land sliding. However, mitigation will adopted.				
6- Climate Change Mitigation and Adaptation				
6.1 Will the proposed project result in significant greenhouse gas emissions or exacerbate climate change?	None			
No.				
6.2 Would the potential	None			

outcomes of the project be sensitive or vulnerable to potential impacts of climate change?				
No.				
6.3 Is the proposed project likely to directly or indirectly increase social and environmental vulnerability to climate change now or in the future?	None			
No.				
7.1 Does the project pose high risk to the workers/laborers?	None			
No.				
8.1 Would the project potentially result in the release of pollutants to the environment due to routine or non-routine circumstances with the potential for adverse local, regional, and/or trans boundary impacts?	None			
No.				
8.2 Would the proposed project potentially result in the generation of waste (both hazardous and non-hazardous)?		Minor / Small		
Yes. Small quantity of Wastewater and solid waste will be generated from the construction camps and related construction activities.				
8.3 Will the proposed project potentially involve the manufacture, trade, release, and/or use of hazardous chemicals and/or materials?	None			
No. The project will not involve any chemical that requires special approval.				
8.4 Does the project include activities that require significant consumption of raw materials, energy, and/or water?			Moderate	
Yes. The materials used in construction of this road would include coarse aggregates (crush), fine aggregates (sand), soil, water, energy, asphalt, reinforcement, cement etc.				
9.1 Would the project pose potential risks to community health and safety due to the transport, storage, and use and/or disposal of hazardous		Minor /small		

or dangerous materials (e.g. explosives, fuel and other chemicals during construction)?				
Yes. During construction stage the project may pose limited potential risks while transporting which will be mitigated.				
9.2 Would the project result in potential increased health risks (e.g. from water-borne or other vector-borne diseases or communicable infections such as HIV/AIDS, COVID-19)?	None			
No. SOPs for COVID-19 will be followed.				
9.3 Would elements of project construction pose potential safety risks to local communities?		Minor /small		
Yes. Limited potential safety risks to the locals are anticipated.				
9.4 Does the project engage security personnel that may pose a potential risk to health and safety of communities and/or individuals (e.g. due to a lack of adequate training or accountability)?	None			
No.				
10.1 Would the project potentially involve temporary or permanent and full or partial physical displacement?			Moderate	
Yes. The project would involve some permanent and partial land acquisition which may result in few displacement.				
10.2 Would the project possibly result in economic displacement?			Moderate	
Yes. The project would result in economic displacement.				
10.3 Would the proposed project possibly affect land tenure arrangements and/or community-based property rights or resources?	None			
No.				
11.1 Would the project potentially cause adverse impacts to habitats (e.g. modified, natural, and critical habitats) and/or ecosystems and ecosystem services?			Moderate	
Yes. The project interventions will be undertaken in areas with presence of rich biodiversity and natural habitats as the proposed sub project may passes through three (03) reserve forests along the				

Thandiani road namely Chattri, Anderserri and Thandiani Location and maybe some Guzara forest. Project construction activities might create disturbance to these rich biodiversity and natural habitats as the existing RoW is 5- 6 m and proposed RoW is 20 m which may involve the tree cutting. However, since the Thandiani Road is already existing and in operational phase, therefore, the habitat has been already modified due to the anthropogenic activities. Hence, minor/ small to moderate level impacts are anticipated.				
11.2 Is there any project activity that may have potential impacts on parks, natural reserve or local community)			Moderate	
Yes. The proposed sub project may passes through three (03) reserve forests along the Thandiani road namely Chattri, Anderserri and Thandiani Location and may be some Guzara forest. Therefore, the proposed project may pose limited potential impacts on the natural reserve.				
11.3 Would the project activities pose risks to endangered species?	None			
No. The proposed project activities pose no risks to endangered species.				
12.1 Are indigenous peoples present in the project area (including project area of influence)? Any health impact to them?	None			
No. There are no indigenous people in the project area.				
12.2 Is it likely that the project or portions of the project will be located on lands and territories claimed by indigenous peoples?	None			
No. The project will not be operating on land or territories claimed by IPs.				
12.3 Would the proposed project potentially affect the rights, lands and territories of indigenous peoples?	None			
No. The project will not affect the rights, land, and territories of IPs.				
12.4 Does the proposed project involve the utilization and/or commercial development of natural resources on lands and territories claimed by indigenous peoples?	None			
No. The project will not be utilizing or commercially developing natural resources on lands and territories claimed by IPs				
12.5 Would the project potentially affect the traditional livelihoods, physical and cultural survival of indigenous peoples?	None			
No. The project will not be affecting the traditional livelihoods, physical and cultural survival of IPs.				
13.1 Will the proposed project			Moderate	

result in interventions that would potentially adversely impact the Religious / Cultural Heritage sites / values?				
Yes. During field survey, community level mosques, graveyards and shrines were identified in various settlements along the existing Thandiani Road.				
14.1 Would the project help to improve information flows between proponents and different stakeholder groups, improving the understanding and 'ownership' of a project?	N. A	N. A	N. A	N. A
Yes, the project will improve information flows between proponents and different stakeholder groups. It's a positive impact.				
14.2 Would the engagement enable project proponents to better respond to different stakeholders' needs?	N. A	N. A	N. A	N. A
Yes, the engagement will enable better responses to stakeholder needs. It's a positive impact.				
14.3 Would the project help to identify important environmental characteristics or mitigation opportunities that might be overlooked?	N. A	N. A	N. A	N. A
Yes, the project will help to identify important environmental characteristics or mitigation opportunities that might be overlooked. It's a positive impact.				
14.4 Would the project ensure that the magnitude and significance of impacts has been properly assessed and improves the acceptability and quality of mitigation and monitoring process?	N. A	N. A	N. A	N. A
Yes, the project will ensure that the magnitude and significance of impacts has been properly assessed. It's a positive impact.				
14.5 Would the project potentially engage the stakeholders, implementing agencies and local communities while implementing the information disclosure	N. A	N. A	N. A	N. A
Yes, the project will engage the stakeholders, implementing agencies and local communities while implementing the information disclosure. It's a positive impact.				

ANNEX-III: ENVIRONMENTAL MONITORING RREPORTS

Green Crescent
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Punjab-EPA Certified
Lahore Laboratory

Environmental Monitoring & Analysis Report

- Ground Water
- Surface Water
- Ambient Air
- Metrological Data
- Noise Monitoring

NESPAK (PVT) LTD.

08th Jan. 2021

Job Reference No.: GCEC-PK-02/2021

112 C/E-1, Hali Road, Gulberg III, Lahore
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Green Crescent
Environmental Consultants (Pvt) Ltd.

Punjab-EPA Certified
Lahore Laboratory

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Address	112 C/E-1, Hali Road, Gulberg III, Lahore

Signatories:

Rashid Maqbool
(Country Manager)

Green Crescent
Environmental Consultants (Pvt) Ltd.

Punjab-EPA Certified
Lahore Laboratory

Sample Details			
Job Ref. No:	GCEC-PK-02/2021	Client Name:	Nespak
No. of Samples:	One	Sample Matrix:	Drinking Water Sample
Sample Date:	04-01-2021	Sampling Method:	APHA 1060-B & C
Sample Receipt Date:	05-01-2021	Sampled By:	GCEC

Sample Identification	
01	Kund

Parameters	Analysis Method	Unit	LOR	Result 01	NEQS
PHYSICAL & CHEMICAL ANALYSIS					
pH	APHA-4500H+ B	-	0.01	7.50	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Objectionable
Taste	In-house	-	-	Sweet	Non-Objectionable
Color	APHA-2120 B/C	Pt/Co	1.0	<1.0	≤15 TCU
Turbidity	APHA-2130 B	NTU	-	ND	<5 NTU
Total Hardness	APHA-2340 C	mg/l	0.1	180.32	< 500 mg/l
Total Dissolved Solid (TDS)	APHA-2540 C	mg/l	1.0	255.0	< 1000
Chloride	APHA-4500Cl- B	mg/l	0.24	7.94	< 250
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	≤ 0.05
Fluoride (F)	APHA-4500F- C	mg/l	0.01	<0.01	≤ 1.5
Nitrite	APHA-4500NO2 B	mg/l	0.01	<0.01	≤ 3 (P)
Nitrate	APHA-4500NO3 B	mg/l	0.1	0.8	≤ 50
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.1	0.2-0.5
Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.028	≤ 0.2
Cadmium	APHA-3111Cd B	mg/l	0.0028	<0.0028	0.01
Copper	APHA-3111Cu B	mg/l	0.0045	<0.0045	2
Chromium	APHA-3111Cr B	mg/l	0.0054	<0.0054	≤ 0.05 (P)
Mercury	APHA-3112 Hg B	mg/l	0.0008	<0.0008	≤ 0.001
Antimony (Sb)	APHA-3111Sb B	mg/l	-	ND	≤ 0.005 (P)
Nickel	APHA-3111 Ni B	mg/l	0.008	<0.008	≤ 0.02
Zinc	APHA-3111 Zn B	mg/l	0.0033	<0.0033	5.0
Arsenic	APHA-3111 As B	mg/l	0.01	<0.01	≤ 0.05 (P)
Barium	APHA-3111 Ba B	mg/l	0.031	<0.031	0.7
Manganese	APHA-3111 Mn B	mg/l	0.0016	<0.0016	≤ 0.5
Boron	APHA-4500B C	mg/l	0.1	<0.1	0.3
Lead	APHA-3111 Pb B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111 Se C	mg/l	-	ND	0.01 (P)
MICROBIOLOGICAL ANALYSIS					
Total Coliforms	APHA:9222 B	CFU/100ml		Absent	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		Absent	0/100ml

Abbreviations:
ND: Not Detected **LOR:** Limit of Reporting **NEQS:** Natioal Environmental Quality Standard
Note:
**Uncertainty of all the parameters and laboratory conditions at the time of analysis will be provided as per client's requirement. The lab environmental conditions are maintained at 25±5C° and humidity at 50±15%.*

Lab Manager

PAGE 1 OF 4

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Sample Details			
Job Ref. No:	GCEC-PK-02/2021	Client Name:	Nespak
No. of Samples:	One	Sample Matrix:	Surface Water Sample
Sample Date:	04-01-2021	Sampling Method:	APHA 1060-B & C
Sample Receipt Date:	05-01-2021	Sampled By:	GCEC

Sample Identification	
02	Harud Nullah, Kala Pani

Parameters	Analysis Method	Unit	LOR	Result 02	FAO**
PHYSICAL & CHEMICAL ANALYSIS					
Temperature	-	°C	-	24.1	-
pH	APHA-4500H+ B	pH unit	0.01	7.96	6.5-8.4
Biological Oxygen Demand	APHA, 5210	mg/l	1.0	In-Process	-
Chemical Oxygen Demand	APHA-5220-D	mg/l	1.0	5.0	-
Total Suspended Solid	APHA-2540-D	mg/l	1.0	10.0	-
Chloride (Cl)	APHA-4500Cl- B	mg/l	0.24	25.80	4-10
Total Dissolved Solid (TDS)	APHA-2540 C	mg/l	1.0	211.0	450-2000
Sulphate	APHA-4500-SO_4C	mg/l	0.41	67.91	-
Oil and Grease	USEPA-1664	mg/l	0.1	<0.1	-
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Fluoride (F)	APHA-4500F- C	mg/l	0.01	<0.01	1.0
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	-
Detergent	APHA-5540 B	mg/l	-	ND	-
Sulphide	APHA-4500-S_2-E	mg/l	0.4	<0.4	-
Ammonia	APHA-4500-NH_3-B	mg/l	0.002	<0.002	-
Cadmium	APHA-3500Cd B	mg/l	0.0028	0.0057	0.10
Chromium	APHA-3500Cr B	mg/l	0.0054	<0.0054	0.10
Copper	APHA-3500Cu B	mg/l	0.0045	<0.0045	0.20
Lead	APHA-3500-Pb B	mg/l	0.013	<0.013	5.0
Nickel	APHA-3111 Ni B	mg/l	0.008	<0.008	0.20
Iron	APHA-3111Fe B	mg/l	0.1	0.2	-
Manganese	APHA-3111Mn B	mg/l	0.0016	<0.0016	0.20
Mercury	APHA-3500-Hg B	mg/l	0.0008	<0.0008	-
Zinc	APHA-3500-Zn B	mg/l	0.0033	<0.0033	2.0
Arsenic	APHA-3500As B	mg/l	0.01	<0.01	0.10
Silver	APHA-3111Ag-B	mg/l	0.0032	<0.0032	-
Barium	APHA-3500Ba B	mg/l	0.031	<0.031	-
Boron	APHA-4500B-C	mg/l	0.1	<0.1	0.7-3.0
Total Chlorine	APHA-4500Cl-B	mg/l	0.1	<0.1	-
Selenium	APHA-3500Se C	mg/l	-	ND	-
Total Toxic Metals	By Calculation	mg/l	-	<0.01	-

Abbreviations:

ND: Not Detected **LOR:** Limit of Reporting **FAO:** Food and Agriculture Organization

Note:

**Uncertainty of all the parameters and laboratory conditions at the time of analysis will be provided as per client's requirement. The lab environmental conditions are maintained at 25±5C° and humidity at 50±15%.*

***FAO Standards applied especially if the water is being used for irrigation purpose.*

Lab Manager

Green Crescent
Environmental Consultants (Pvt) Ltd.

Punjab-EPA Certified
Lahore Laboratory

Sample Details			
Job Ref. No:	GCEC-PK-02/2021	**Client Name:**	Nespak
No. of Samples:	One	**Sample Matrix:**	Drinking Water Sample
Sample Date:	04-01-2021	**Sampling Method:**	APHA 1060-B & C
Sample Receipt Date:	05-01-2021	**Sampled By:**	GCEC
Sample Identification			
03	Safeda Gali		

Parameters	Analysis Method	Unit	LOR	Result 03	NEQS
PHYSICAL & CHEMICAL ANALYSIS					
pH	APHA-4500H+ B	-	0.01	7.45	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Objectionable
Taste	In-house	-	-	Sweet	Non-Objectionable
Color	APHA-2120 B/C	Pt/Co	1.0	<1.0	≤15 TCU
Turbidity	APHA-2130 B	NTU	-	ND	<5 NTU
Total Hardness	APHA-2340 C	mg/l	0.1	188.16	< 500 mg/l
Total Dissolved Solid (TDS)	APHA-2540 C	mg/l	1.0	268.0	< 1000
Chloride	APHA-4500Cl- B	mg/l	0.24	7.94	< 250
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	≤ 0.05
Fluoride (F)	APHA-4500F- C	mg/l	0.01	<0.01	≤ 1.5
Nitrite	APHA-4500NO2 B	mg/l	0.01	<0.01	≤ 3 (P)
Nitrate	APHA-4500NO3 B	mg/l	0.1	0.9	≤ 50
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.1	0.2-0.5
Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.028	≤ 0.2
Cadmium	APHA-3111Cd B	mg/l	0.0028	<0.0028	0.01
Copper	APHA-3111Cu B	mg/l	0.0045	<0.0045	2
Chromium	APHA-3111Cr B	mg/l	0.0054	<0.0054	≤ 0.05 (P)
Mercury	APHA-3112 Hg B	mg/l	0.0008	<0.0008	≤ 0.001
Antimony (Sb)	APHA-3111Sb B	mg/l	-	ND	≤ 0.005 (P)
Nickel	APHA-3111 Ni B	mg/l	0.008	<0.008	≤ 0.02
Zinc	APHA-3111 Zn B	mg/l	0.0033	<0.0033	5.0
Arsenic	APHA-3111 As B	mg/l	0.01	<0.01	≤ 0.05 (P)
Barium	APHA-3111 Ba B	mg/l	0.031	<0.031	0.7
Manganese	APHA-3111 Mn B	mg/l	0.0016	<0.0016	≤ 0.5
Boron	APHA-4500B C	mg/l	0.1	<0.1	0.3
Lead	APHA-3111 Pb B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111 Se C	mg/l	-	ND	0.01 (P)
MICROBIOLOGICAL ANALYSIS					
Total Coliforms	APHA:9222 B	CFU/100ml		07	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		Absent	0/100ml

Abbreviations:
ND: Not Detected **LOR:** Limit of Reporting **NEQS:** National Environmental Quality Standard

Note:
**Uncertainty of all the parameters and laboratory conditions at the time of analysis will be provided as per client's requirement. The lab environmental conditions are maintained at 25±5C° and humidity at 50±15%.*

Lab Manager

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Sample Details			
Job Ref. No:	GCEC-PK-02/2021	Client Name:	Nespak
No. of Samples:	One	Sample Matrix:	Surface Water Sample
Sample Date:	04-01-2021	Sampling Method:	APHA 1060-B & C
Sample Receipt Date:	05-01-2021	Sampled By:	GCEC

Sample Identification	
04	Near Thandiani Chowk

Parameters	Analysis Method	Unit	LOR	Result 04	FAO**
PHYSICAL & CHEMICAL ANALYSIS					
Temperature	-	°C	-	24.1	-
pH	APHA-4500H+ B	pH unit	0.01	7.68	6.5-8.4
Biological Oxygen Demand	APHA, 5210	mg/l	1.0	In Process	-
Chemical Oxygen Demand	APHA-5220-D	mg/l	1.0	28.0	-
Total Suspended Solid	APHA-2540-D	mg/l	1.0	96.0	-
Chloride (Cl)	APHA-4500Cl- B	mg/l	0.24	<0.24	4-10
Total Dissolved Solid (TDS)	APHA-2540 C	mg/l	1.0	390.0	450-2000
Sulphate	APHA-4500-SO_4C	mg/l	0.41	96.72	-
Oil and Grease	USEPA-1664	mg/l	0.1	<0.1	-
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Fluoride (F)	APHA-4500F- C	mg/l	0.01	<0.01	1.0
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	-
Detergent	APHA-5540 B	mg/l	-	ND	-
Sulphide	APHA-4500-S_2-E	mg/l	0.4	<0.4	-
Ammonia	APHA-4500-NH_3-B	mg/l	0.002	0.8	-
Cadmium	APHA-3500Cd B	mg/l	0.0028	0.0042	0.10
Chromium	APHA-3500Cr B	mg/l	0.0054	<0.0054	0.10
Copper	APHA-3500Cu B	mg/l	0.0045	<0.0045	0.20
Lead	APHA-3500-Pb B	mg/l	0.013	<0.013	5.0
Nickel	APHA-3111 Ni B	mg/l	0.008	<0.008	0.20
Iron	APHA-3111Fe B	mg/l	0.1	1.3	-
Manganese	APHA-3111Mn B	mg/l	0.0016	<0.0016	0.20
Mercury	APHA-3500-Hg B	mg/l	0.0008	<0.0008	-
Zinc	APHA-3500-Zn B	mg/l	0.0033	<0.0033	2.0
Arsenic	APHA-3500As B	mg/l	0.01	0.01	0.10
Silver	APHA-3111Ag-B	mg/l	0.0032	<0.0032	-
Barium	APHA-3500Ba B	mg/l	0.031	<0.031	-
Boron	APHA-4500B-C	mg/l	0.1	<0.1	0.7-3.0
Total Chlorine	APHA-4500Cl-B	mg/l	0.1	<0.1	-
Selenium	APHA-3500Se C	mg/l	-	ND	-
Total Toxic Metals	By Calculation	mg/l	-	0.01	-

Abbreviations:

ND: Not Detected **LOR:** Limit of Reporting **FAO:** Food and Agriculture Organization

Note:

**Uncertainty of all the parameters and laboratory conditions at the time of analysis will be provided as per client's requirement. The lab environmental conditions are maintained at 25±5C° and humidity at 50±15%.*

***FAO Standards applied especially if the water is being used for irrigation purpose.*

Lab Manager

PAGE 4 OF 4

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Ambient Air & Noise Monitoring Location-1

Ghumanwah

(Abbotabad)

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Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-02/2021
Monitoring Point	Ghumanwa (Abbotabad)
Date of Intervention	02-01-2021 to 03-01-2021
Monitoring Coordinates	34°09'47.6" **N** 73°16'56.5" **E**

Sr. #	Time	CO (mg/m³)	NO (µg/m³)	NO_2 (µg/m³)	NO_x (µg/m³)	SO_2 (µg/m³)
1.	14:30	1.16	17.73	27.07	44.81	16.46
2.	15:30	1.13	18.81	25.24	44.05	18.58
3.	16:30	1.09	19.11	21.92	41.03	16.03
4.	17:30	1.13	18.03	21.73	39.76	17.90
5.	18:30	0.99	16.99	24.37	41.36	16.08
6.	19:30	1.02	18.60	25.99	44.60	18.59
7.	20:30	1.06	17.78	28.75	46.53	20.31
8.	21:30	1.00	17.97	25.84	43.81	19.75
9.	22:30	1.03	17.33	24.35	41.68	16.35
10.	23:30	1.08	16.40	22.88	39.28	14.23
11.	00:30	1.13	17.80	24.65	42.45	12.08
12.	01:30	1.10	19.08	25.82	44.90	13.47
13.	02:30	1.01	16.66	26.78	43.44	14.10
14.	03:30	1.06	16.37	28.13	44.50	12.74
15.	04:30	1.12	15.39	25.65	41.04	14.77
16.	05:30	1.14	15.61	27.42	43.03	16.96
17.	06:30	1.16	16.88	28.39	45.27	12.67
18.	07:30	1.06	15.94	23.88	39.82	16.33
19.	08:30	1.07	14.70	25.25	39.94	16.98
20.	09:30	1.03	16.55	26.91	43.45	15.76
21.	10:30	0.99	18.18	29.01	47.19	14.36
22.	11:30	1.01	15.60	25.58	41.17	15.69
23.	12:30	0.96	16.75	24.47	41.22	18.14
24.	13:30	1.03	17.60	22.58	40.17	19.69
Average Concentration		**1.06**	**17.16**	**25.53**	**42.69**	**16.17**

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Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-02/2021
Monitoring Point	Ghumanwa (Abbotabad)
Date of Intervention	02-01-2021 to 03-01-2021
Monitoring Coordinates	34°09'47.6" **N** 73°16'56.5" **E**

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	NEQS
Nitrogen Dioxide (NO_2)	µg/m³	24 Hours	1.00	25.53	80.0
Nitrogen Oxide (NO)	µg/m³	24 Hours	1.00	17.16	40.0
NO_x	µg/m³	24 Hours	1.00	42.69	120.0
Sulphur Dioxide (SO_2)	µg/m³	24 Hours	1.00	16.17	120.0
Carbon Monoxide (CO)	mg/m³	08 Hours	0.01	1.06	05.0*
Ozone (O_3)	µg/m³	01 Hour	-	15.77	130.0**
Particulate Matter ($PM_{2.5}$)	µg/m³	24 Hours	1.00	26.96	35.0
Particulate Matter (PM_{10})	µg/m³	24 Hours	1.00	132.46	150.0
Suspended Particulate Matter (SPM)	µg/m³	24 Hours	1.00	190.42	500.0
Lead Airborne Particles	µg/m³	24 Hours	-	0.049	1.5

Abbreviations:
µg/m³= Micrograms per Cubic Meter
mg/m³= Milligrams per Cubic Meter
LDL= Lowest Detection Limit
NEQS= National Environmental Quality Standards
*08 hour standard for CO
**01 hour standard for O_3

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Meteorological Data

Job Reference Number	GCEC-PK-02/2021
Monitoring Point	Ghumanwa (Abbotabad)
Date of Intervention	02-01-2021 to 03-01-2021
Monitoring Coordinates	34°09'47.6" **N** 73°16'56.5" **E**

Time	Ambient Temperature ^{0}C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
14:30	16	N	1.2	53	667.2
15:30	17	N	1.1	51	667.4
16:30	15	N	1.4	48	667.8
17:30	13	NE	1.6	50	668.0
18:30	11	NE	1.5	52	668.7
19:30	10	NE	1.6	55	668.4
20:30	10	NE	1.4	57	668.9
21:30	09	NE	1.3	59	668.8
22:30	08	NW	1.5	62	668.3
23:30	07	NW	1.4	64	668.6
00:30	06	NW	1.7	65	668.8
01:30	06	NW	1.5	67	669.0
02:30	05	NW	1.4	68	669.4
03:30	05	W	1.2	70	669.3
04:30	05	W	1.3	72	669.5
05:30	04	W	1.1	74	669.1
06:30	04	W	1.0	75	668.7
07:30	05	NW	1.2	72	668.4
08:30	07	NW	1.0	70	668.8
09:30	08	NW	0.9	67	668.5
10:30	09	NW	1.1	63	668.6
11:30	10	N	1.2	60	668.3
12:30	12	N	1.4	58	667.7
13:30	13	N	1.5	56	667.5

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Noise Level Monitoring Report

Job Reference Number	GCEC-PK-02/2021
Monitoring Point	Ghumanwa (Abbotabad)
Date of Intervention	02-01-2021 to 03-01-2021
Monitoring Coordinates	34°09'47.6" **N** 73°16'56.5" **E**

Sr. #	Time	Method/Technique	Unit	Results LAavg	NEQS (Commercial))
Night Time					
1.	23:30	Noise Meter	dB	42.1	
2.	00:30	Noise Meter	dB	40.1	
3.	01:30	Noise Meter	dB	38.7	
4.	02:30	Noise Meter	dB	35.4	
5.	03:30	Noise Meter	dB	36.6	55.0
6.	04:30	Noise Meter	dB	34.8	
7.	05:30	Noise Meter	dB	37.6	
8.	06:30	Noise Meter	dB	40.1	
Night Time Average			**dB**	**38.18**	**55.0**
Day Time					
9.	07:30	Noise Meter	dB	43.6	
10.	08:30	Noise Meter	dB	49.8	
11.	09:30	Noise Meter	dB	55.6	
12.	10:30	Noise Meter	dB	57.2	
13.	11:30	Noise Meter	dB	58.4	
14.	12:30	Noise Meter	dB	56.9	
15.	13:30	Noise Meter	dB	57.0	
16.	14:30	Noise Meter	dB	58.4	
17.	15:30	Noise Meter	dB	55.3	65.0
18.	16:30	Noise Meter	dB	55.4	
19.	17:30	Noise Meter	dB	53.7	
20.	18:30	Noise Meter	dB	52.6	
21.	19:30	Noise Meter	dB	50.4	
22.	20:30	Noise Meter	dB	44.7	
23.	21:30	Noise Meter	dB	43.2	
24.	22:30	Noise Meter	dB	44.6	
Day Time Average			**dB**	**52.30**	**65.0**

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Ambient Air & Noise Monitoring Location-2

Kund

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Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-02/2021
Monitoring Point	Kund (Abbotabad)
Date of Intervention	03-01-2021 to 04-01-2021
Monitoring Coordinates	34°13'23.8" **N** 73°20'01.9" **E**

Sr. #	Time	CO (mg/m³)	NO (µg/m³)	NO_2 (µg/m³)	NO_x (µg/m³)	SO_2 (µg/m³)
1	15:30	1.03	15.11	23.32	38.43	15.87
2	16:30	1.00	16.18	21.49	37.67	17.98
3	17:30	0.96	16.48	18.17	34.65	15.43
4	18:30	1.00	15.40	17.98	33.38	17.30
5	19:30	0.87	14.36	20.62	34.98	15.48
6	20:30	0.90	15.98	22.24	38.22	17.99
7	21:30	0.93	15.16	25.00	40.16	19.71
8	22:30	0.87	15.34	22.09	37.43	19.15
9	23:30	0.91	14.71	20.60	35.31	15.75
10	00:30	0.95	13.78	19.13	32.90	13.64
11	01:30	1.01	15.18	20.89	36.07	11.49
12	02:30	0.98	16.45	22.07	38.52	12.87
13	03:30	0.88	14.04	23.03	37.07	13.50
14	04:30	0.94	13.75	24.38	38.12	12.14
15	05:30	1.00	12.76	21.90	34.66	14.18
16	06:30	1.02	12.98	23.67	36.65	16.36
17	07:30	1.03	14.25	24.64	38.90	12.08
18	08:30	0.94	13.31	20.13	33.44	15.74
19	09:30	0.94	12.07	21.49	33.57	16.39
20	10:30	0.91	13.92	23.15	37.08	15.16
21	11:30	0.86	15.55	25.26	40.82	13.77
22	12:30	0.88	12.97	21.83	34.80	15.09
23	13:30	0.83	14.12	20.72	34.84	17.54
24	14:30	0.90	14.97	18.83	33.80	19.09
Average Concentration		**0.94**	**14.54**	**21.78**	**36.31**	**15.57**

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Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-02/2021
Monitoring Point	Kund (Abbotabad)
Date of Intervention	03-01-2021 to 04-01-2021
Monitoring Coordinates	34°13'23.8" **N** 73°20'01.9" **E**

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	NEQS
Nitrogen Dioxide (NO_2)	µg/m³	24 Hours	1.00	21.78	80.0
Nitrogen Oxide (NO)	µg/m³	24 Hours	1.00	14.54	40.0
NO_X	µg/m³	24 Hours	1.00	36.31	120.0
Sulphur Dioxide (SO_2)	µg/m³	24 Hours	1.00	15.57	120.0
Carbon Monoxide (CO)	mg/m³	08 Hours	0.01	0.94	05.0*
Ozone (O_3)	µg/m³	01 Hour	-	14.94	130.0**
Particulate Matter ($PM_{2.5}$)	µg/m³	24 Hours	1.00	20.38	35.0
Particulate Matter (PM_{10})	µg/m³	24 Hours	1.00	163.29	150.0
Suspended Particulate Matter (SPM)	µg/m³	24 Hours	1.00	216.67	500.0
Lead Airborne Particles	µg/m³	24 Hours	-	0.054	1.5

Abbreviations:
µg/m³= Micrograms per Cubic Meter
mg/m³= Milligrams per Cubic Meter
LDL= Lowest Detection Limit
NEQS= National Environmental Quality Standards
*08 hour standard for CO
**01 hour standard for O_3

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Meteorological Data

Job Reference Number	GCEC-PK-02/2021
Monitoring Point	Kund (Abbotabad)
Date of Intervention	03-01-2021 to 04-01-2021
Monitoring Coordinates	34°13'23.8" **N** 73°20'01.9" **E**

Time	Ambient Temperature ^{0}C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
15:30	10	N	1.4	61	604.8
16:30	09	NE	1.7	58	604.3
17:30	07	NE	1.6	60	604.5
18:30	06	NE	1.9	63	604.6
19:30	06	NW	1.8	65	604.4
20:30	05	NW	1.6	66	604.2
21:30	05	NW	1.9	67	604.0
22:30	05	NW	2.1	69	603.7
23:30	05	W	2.4	70	603.8
00:30	04	W	2.6	74	603.6
01:30	04	W	2.2	75	603.9
02:30	04	W	2.0	75	603.7
03:30	03	SW	1.8	76	603.9
04:30	03	SW	1.9	77	604.0
05:30	02	SW	1.7	78	604.4
06:30	03	SW	1.5	78	604.7
07:30	04	SW	1.4	77	604.6
08:30	06	W	1.3	76	604.2
09:30	06	W	1.4	74	604.5
10:30	07	W	1.2	70	604.8
11:30	08	W	1.0	67	604.6
12:30	11	NW	0.9	64	604.9
13:30	13	NW	0.7	62	604.3
14:30	14	NW	0.5	60	604.5

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Noise Level Monitoring Report

Job Reference Number	GCEC-PK-02/2021
Monitoring Point	Kund (Abbotabad)
Date of Intervention	03-01-2021 to 04-01-2021
Monitoring Coordinates	34°13'23.8" **N** 73°20'01.9" **E**

Sr. #	Time	Method/Technique	Unit	Results LAavg	NEQS (Commercial))
Night Time					
1.	23:30	Noise Meter	dB	35.2	
2.	00:30	Noise Meter	dB	35.1	
3.	01:30	Noise Meter	dB	34.8	
4.	02:30	Noise Meter	dB	34.9	
5.	03:30	Noise Meter	dB	36.2	55.0
6.	04:30	Noise Meter	dB	35.7	
7.	05:30	Noise Meter	dB	36.2	
8.	06:30	Noise Meter	dB	37.4	
Night Time Average			**dB**	**35.69**	**55.0**
Day Time					
9.	07:30	Noise Meter	dB	41.6	
10.	08:30	Noise Meter	dB	45.4	
11.	09:30	Noise Meter	dB	47.8	
12.	10:30	Noise Meter	dB	49.7	
13.	11:30	Noise Meter	dB	48.3	
14.	12:30	Noise Meter	dB	49.5	
15.	13:30	Noise Meter	dB	50.3	
16.	14:30	Noise Meter	dB	49.9	
17.	15:30	Noise Meter	dB	46.2	65.0
18.	16:30	Noise Meter	dB	45.7	
19.	17:30	Noise Meter	dB	45.9	
20.	18:30	Noise Meter	dB	44.4	
21.	19:30	Noise Meter	dB	44.7	
22.	20:30	Noise Meter	dB	43.2	
23.	21:30	Noise Meter	dB	39.7	
24.	22:30	Noise Meter	dB	38.4	
Day Time Average			**dB**	**45.67**	**65.0**

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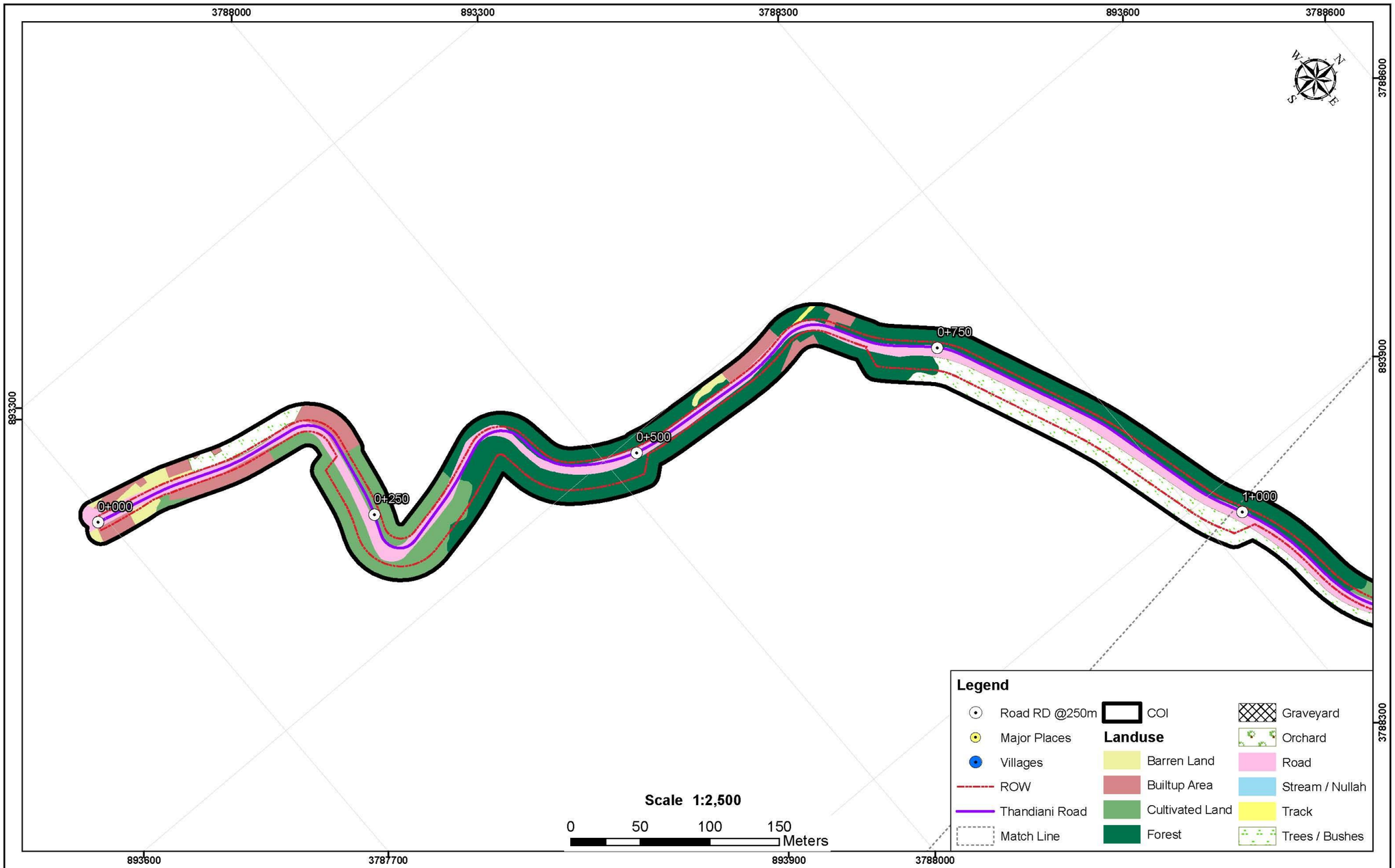
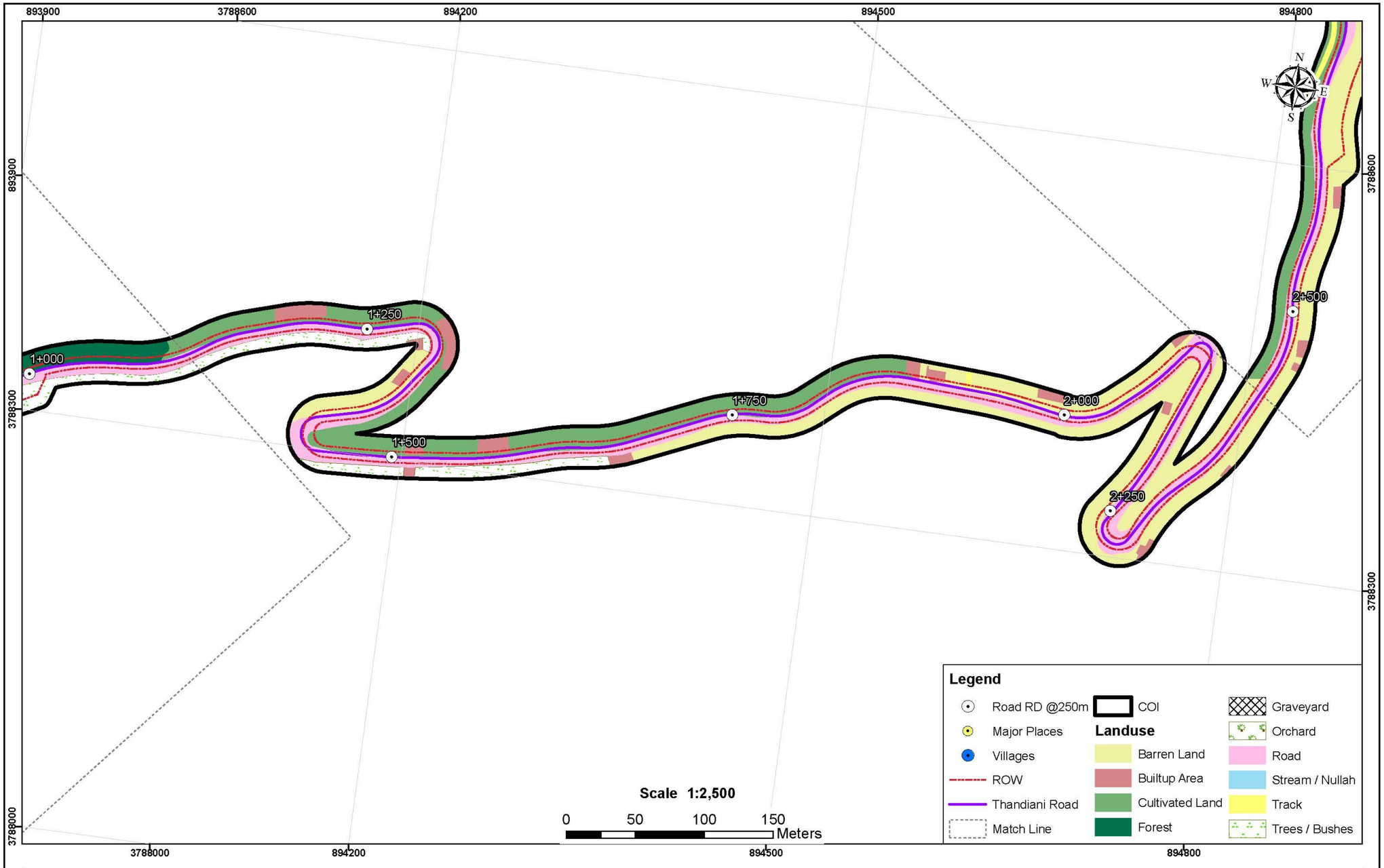
ANNEX-IV: LANDUSE MAPS

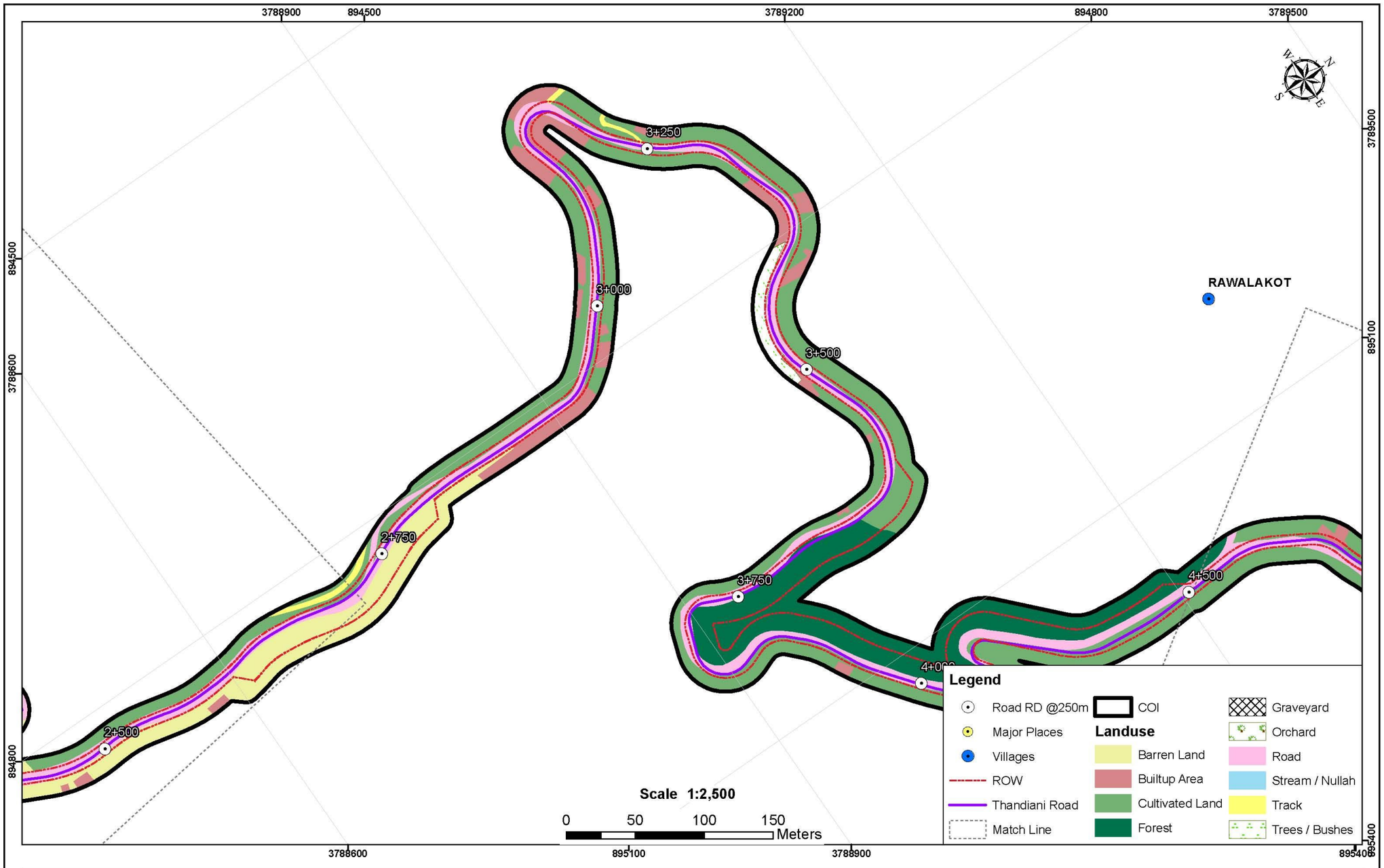
ANNEX-IV



CLIENT	CONSULTANT	04				DRAWN	I.MEHDI	PROJECT	LANDUSE MAP	SCALE
PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD	03				SUBMITTED		UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)		1:2,500
	HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	02				RECOMMENDED			DATE / DRAWING No.	REV.
		01				CHD/VER.	S.BADAR		DECEMBER 2020 / Sheet No.1 of 16	0
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED				



CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	LANDUSE MAP / SCALE 1:2,500
		03				SUBMITTED			
		02				RECOMMENDED			
		01				CHD/VER.	S.BADAR		DATE: DECEMBER 2020 / DRAWING No.: Sheet No.2 of 16 / REV.: 0
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED			



CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	LANDUSE MAP / SCALE 1:2,500
		03				SUBMITTED			
		02				RECOMMENDED			DATE: DECEMBER 2020 / DRAWING No.: Sheet No.3 of 16 / REV.: 0
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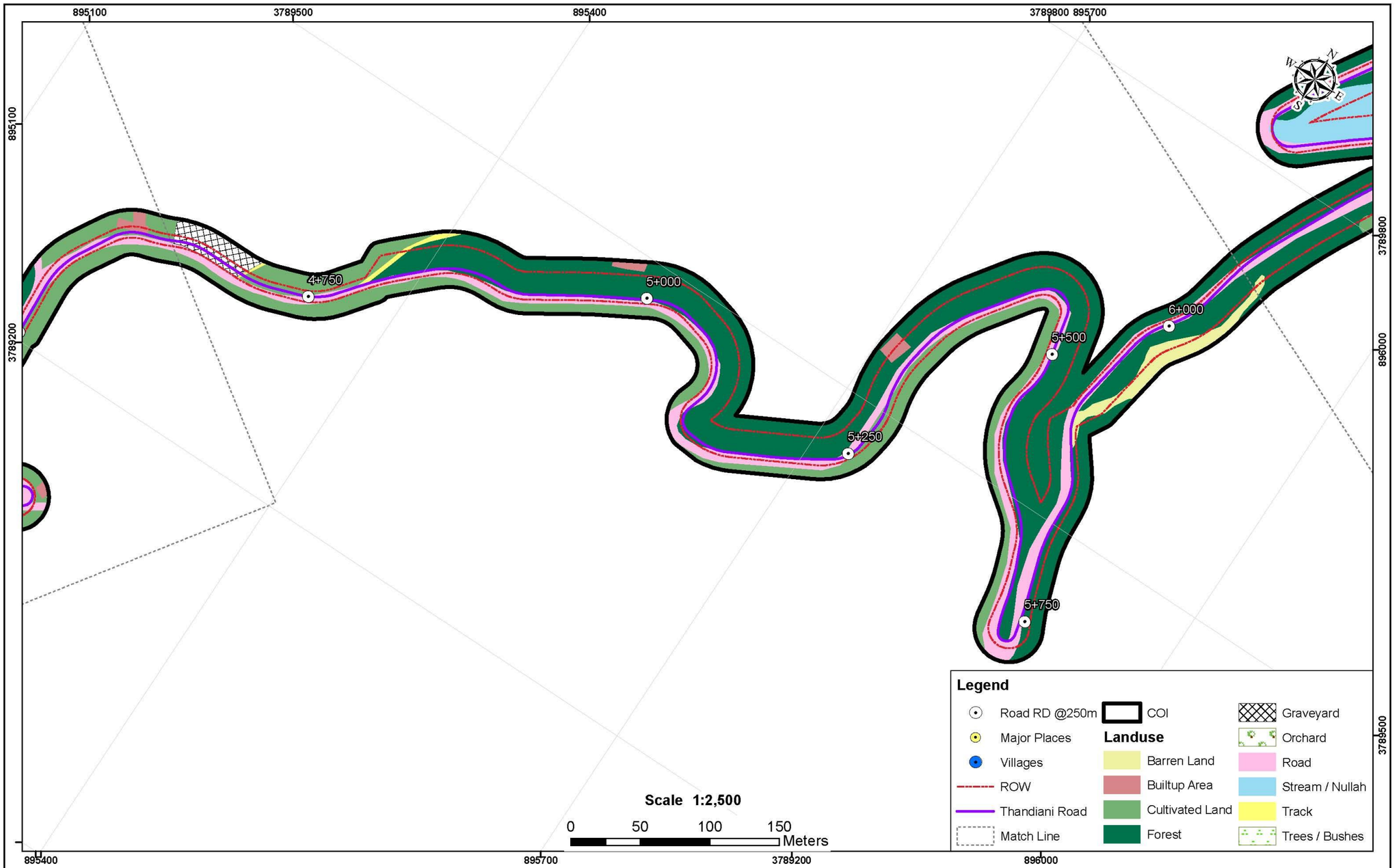

CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	LANDUSE MAP / SCALE 1:2,500
		03				SUBMITTED			
		02				RECOMMENDED			
		01				CHD/VER.	S.BADAR		
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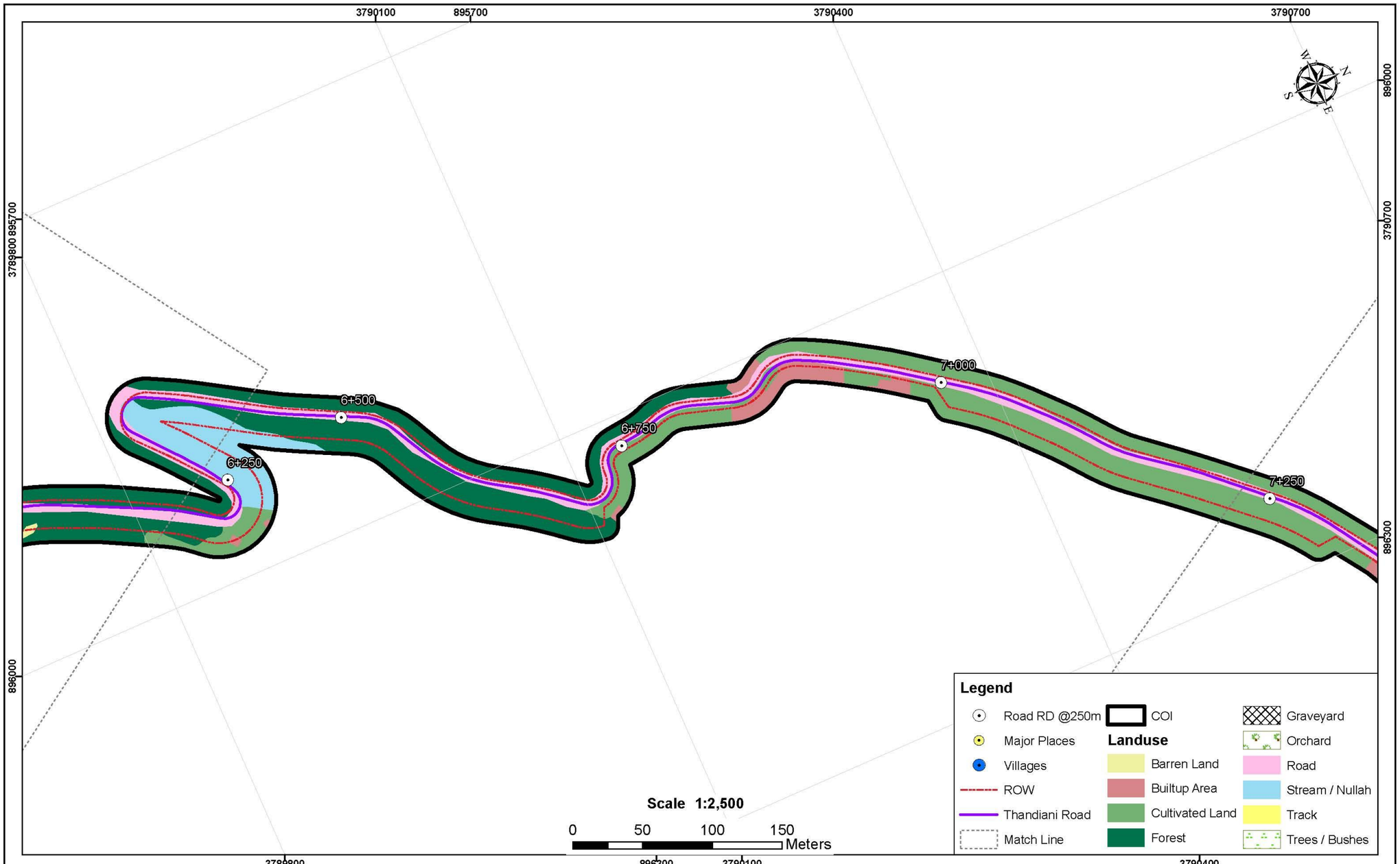

CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	LANDUSE MAP / SCALE 1:2,500
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		02				RECOMMENDED			
		01				CHD/VER.	S.BADAR		DATE: DECEMBER 2020 / DRAWING No.: Sheet No.5 of 16 / REV.: 0
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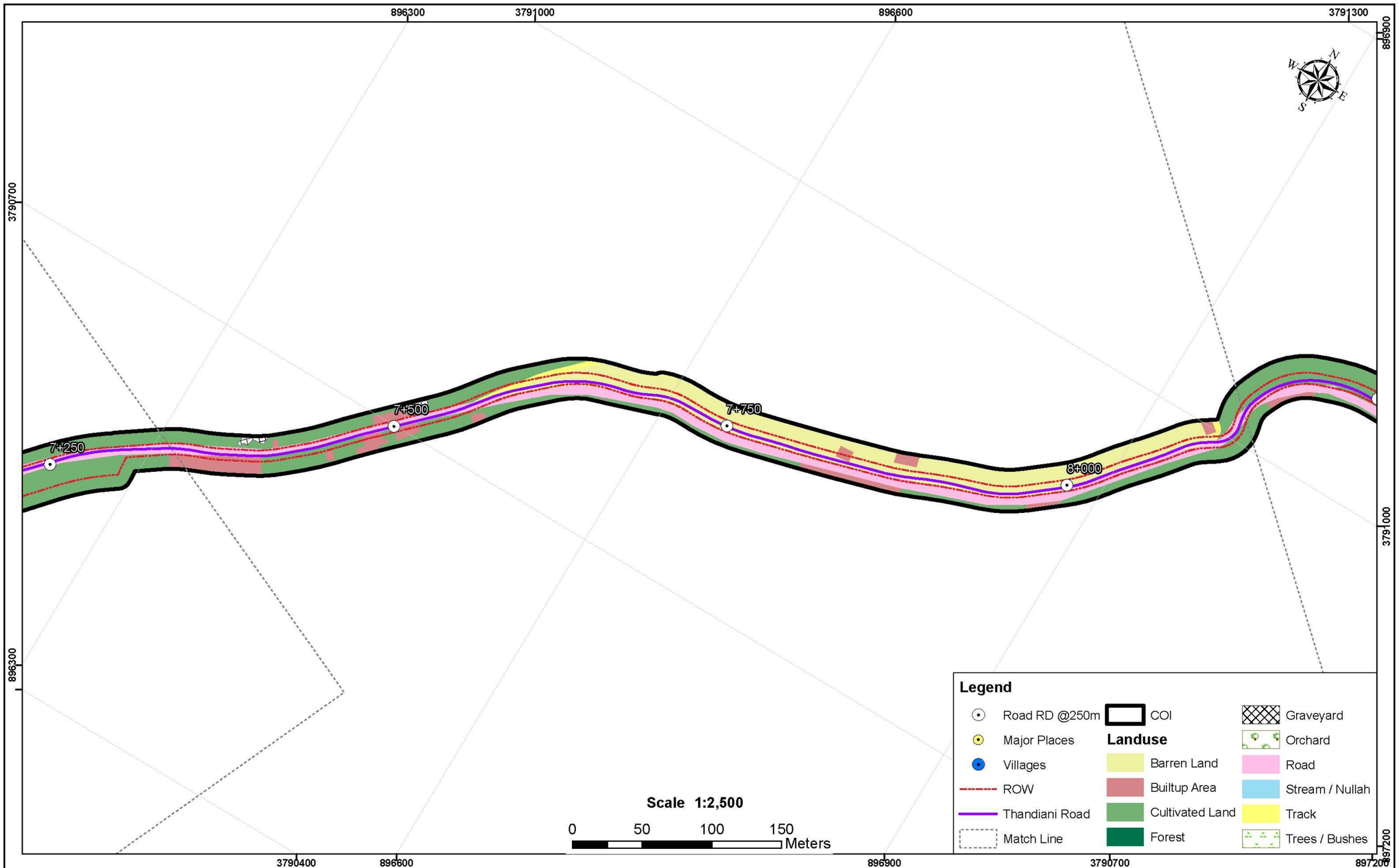

CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	LANDUSE MAP / SCALE 1:2,500
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		02				RECOMMENDED			
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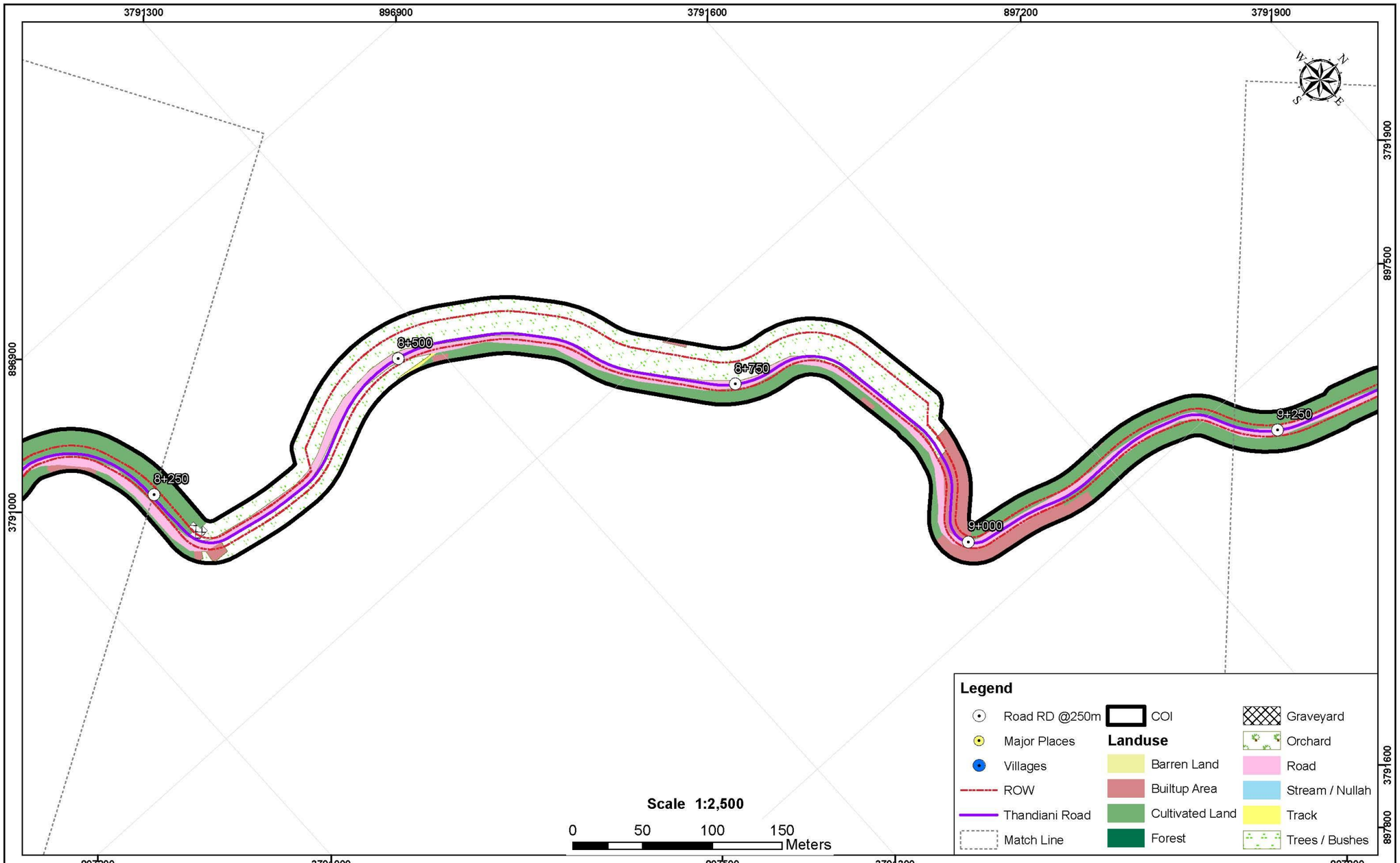
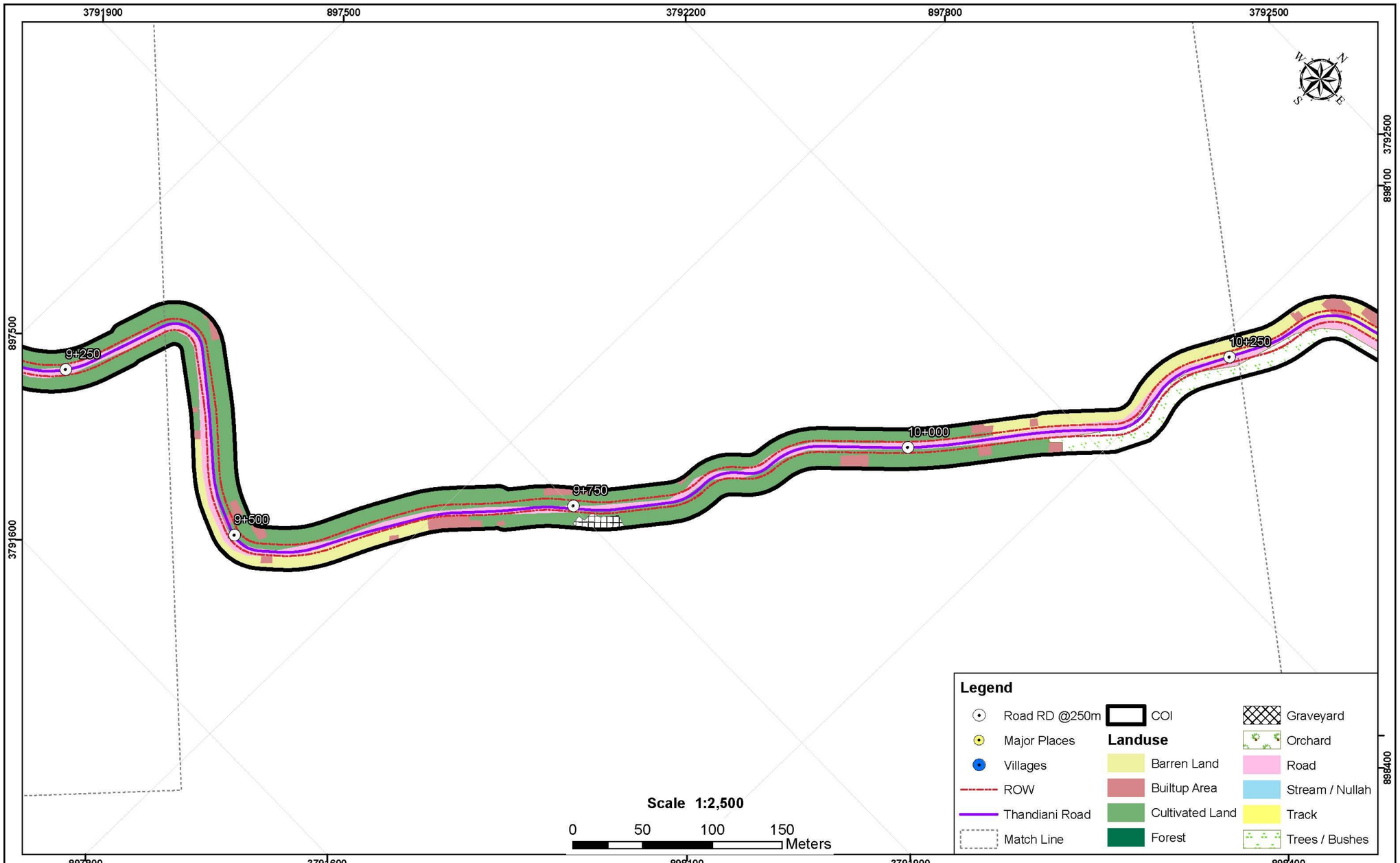


CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)
		03				SUBMITTED		
		02				RECOMMENDED		
		01				CHD/VER.	S.BADAR	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED		

LANDUSE MAP		SCALE
		1:2,500
DATE	DRAWING No.	REV.
DECEMBER 2020	Sheet No.7 of 16	0



CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	LANDUSE MAP
		03				SUBMITTED			SCALE: 1:2,500
		02				RECOMMENDED			DATE: DECEMBER 2020
		01				CHD/VER.	S.BADAR		DRAWING No.: Sheet No.8 of 16
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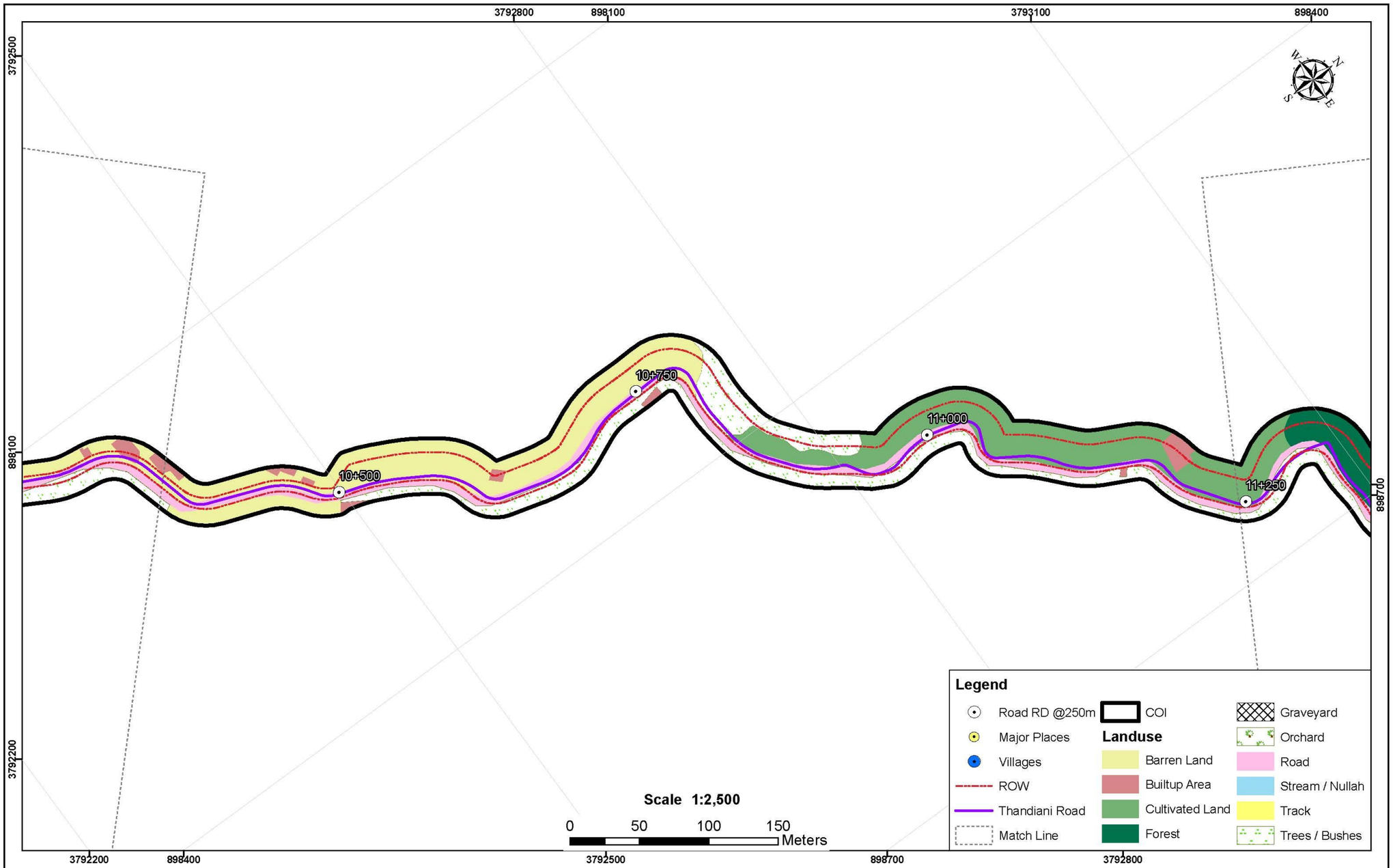
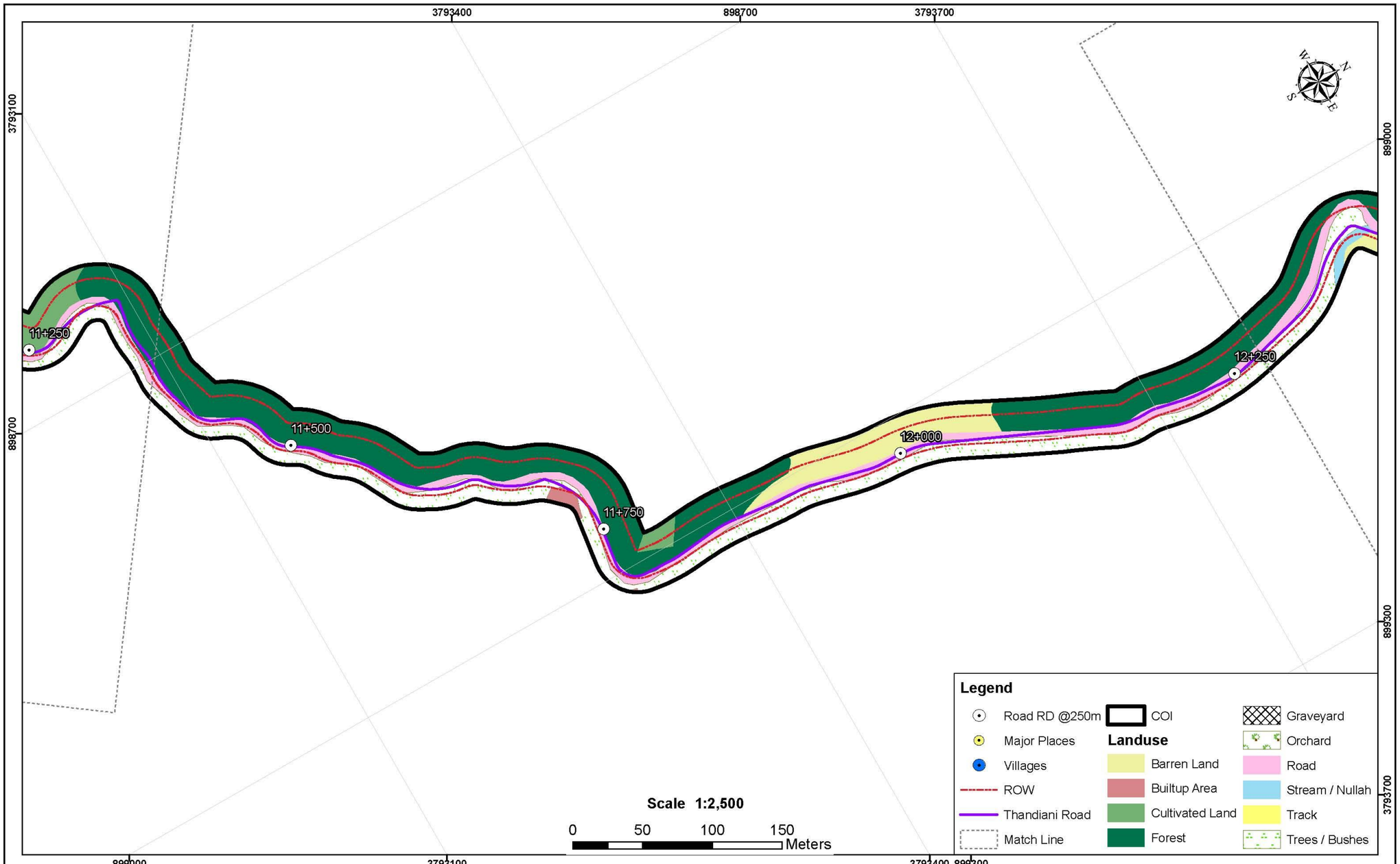


CLIENT	CONSULTANT	04				DRAWN	I.MEHDI	PROJECT	SCALE
PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD	03				SUBMITTED		UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)	1:2,500
	HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	02				RECOMMENDED		LANDUSE MAP	
		01				CHD/VER.	S.BADAR	DATE: DECEMBER 2020	DRAWING No.: Sheet No.9 of 16
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED			REV.: 0



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		03				SUBMITTED			
		02				RECOMMENDED			
		01				CHD/VER.	S.BADAR		
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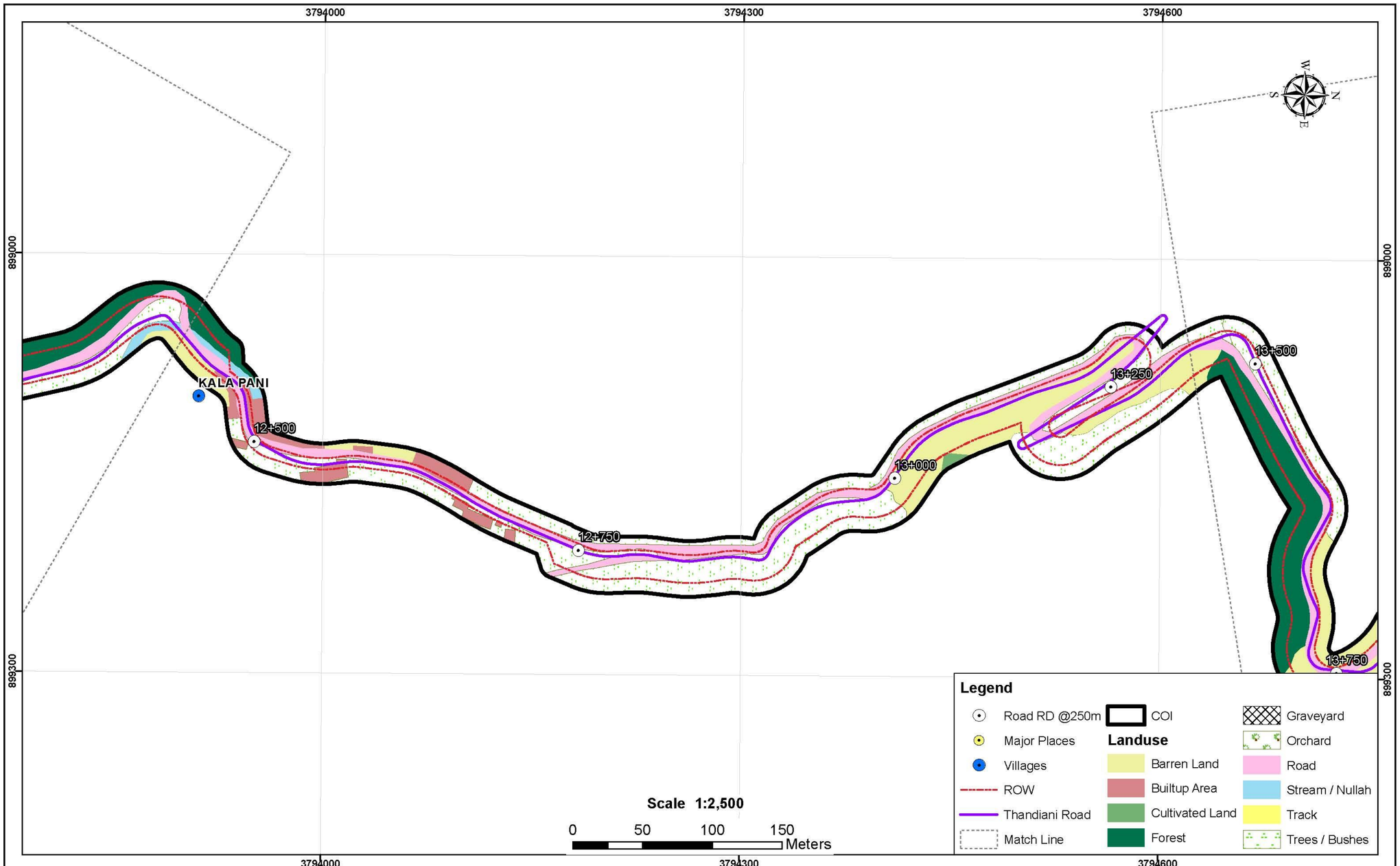
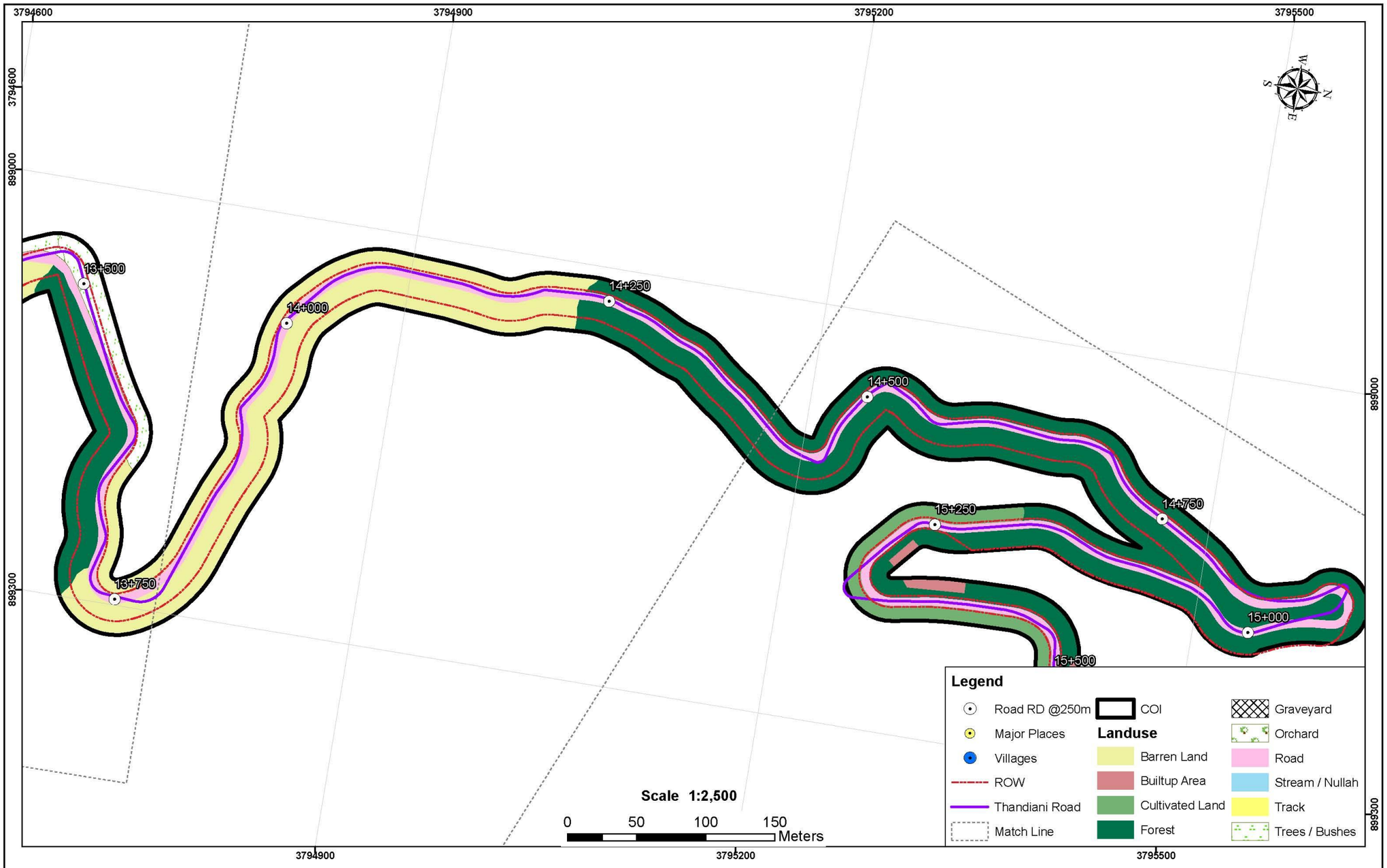


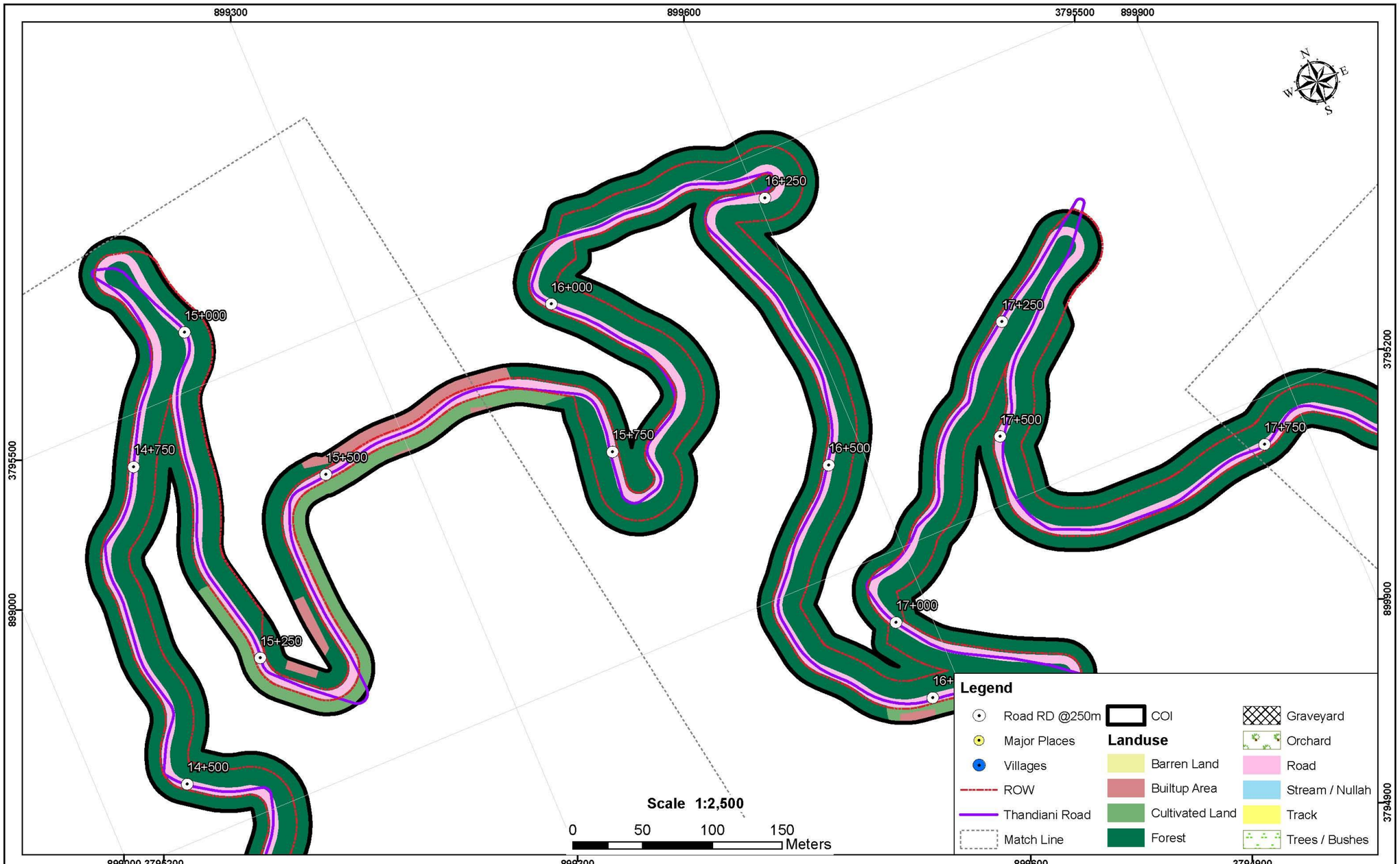
CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)
		03				SUBMITTED		
		02				RECOMMENDED		
		01				CHD/VER.	S.BADAR	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED		

LANDUSE MAP		SCALE
		1:2,500
DATE	DRAWING No.	REV.
DECEMBER 2020	Sheet No.11 of 16	0



CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)
		03				SUBMITTED		
		02				RECOMMENDED		
		01				CHD/VER.	S.BADAR	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED		

LANDUSE MAP		SCALE
		1:2,500
DATE	DRAWING No.	REV.
DECEMBER 2020	Sheet No.12 of 16	0



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		02				RECOMMENDED			
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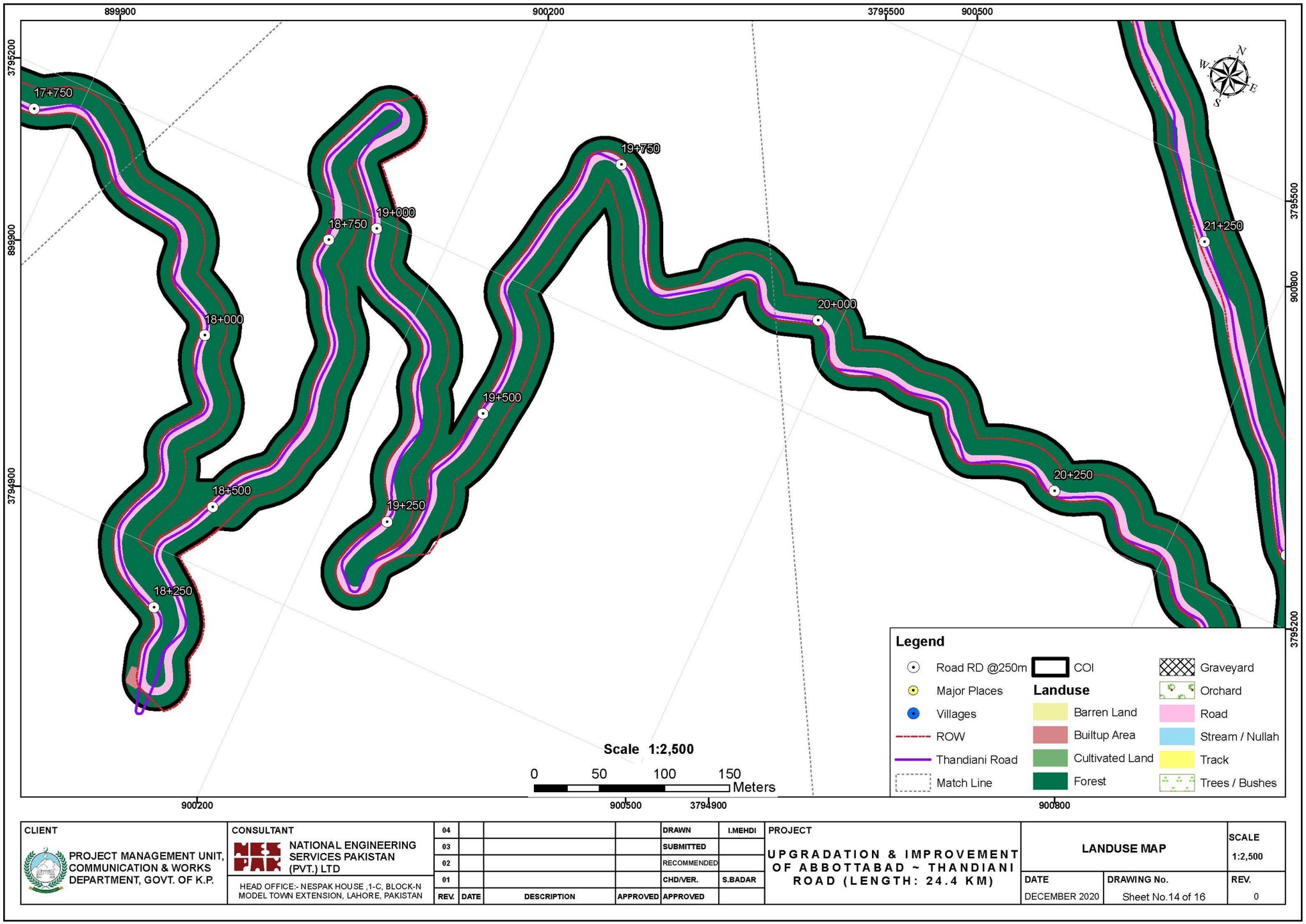
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED			



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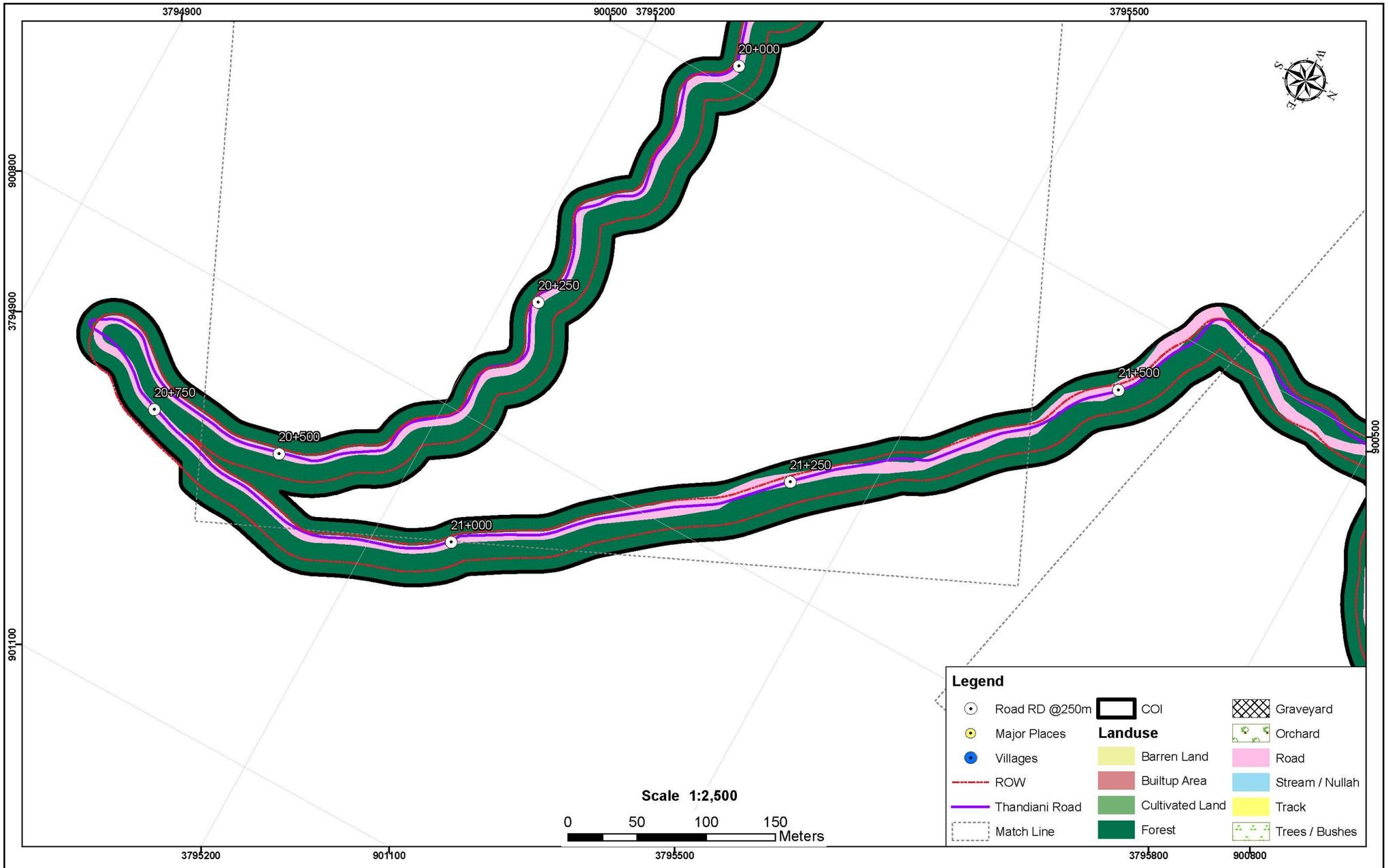
		03			SUBMITTED		
		02			RECOMMENDED		
		01			CHD/VER.	S.BADAR	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	

LANDUSE MAP		SCALE 1:2,500
DATE: DECEMBER 2020	DRAWING No.: Sheet No.14 of 16	REV.: 0



CLIENT: PROJECT MANAGEMENT UNIT, COMMUNICATION & WORKS DEPARTMENT, GOVT. OF K.P.	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04				DRAWN	I.MEHDI	PROJECT: UPGRADATION & IMPROVEMENT OF ABBOTTABAD ~ THANDIANI ROAD (LENGTH: 24.4 KM)
		03				SUBMITTED		
		02				RECOMMENDED		
		01				CHD/VER.	S.BADAR	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED		

LANDUSE MAP		SCALE
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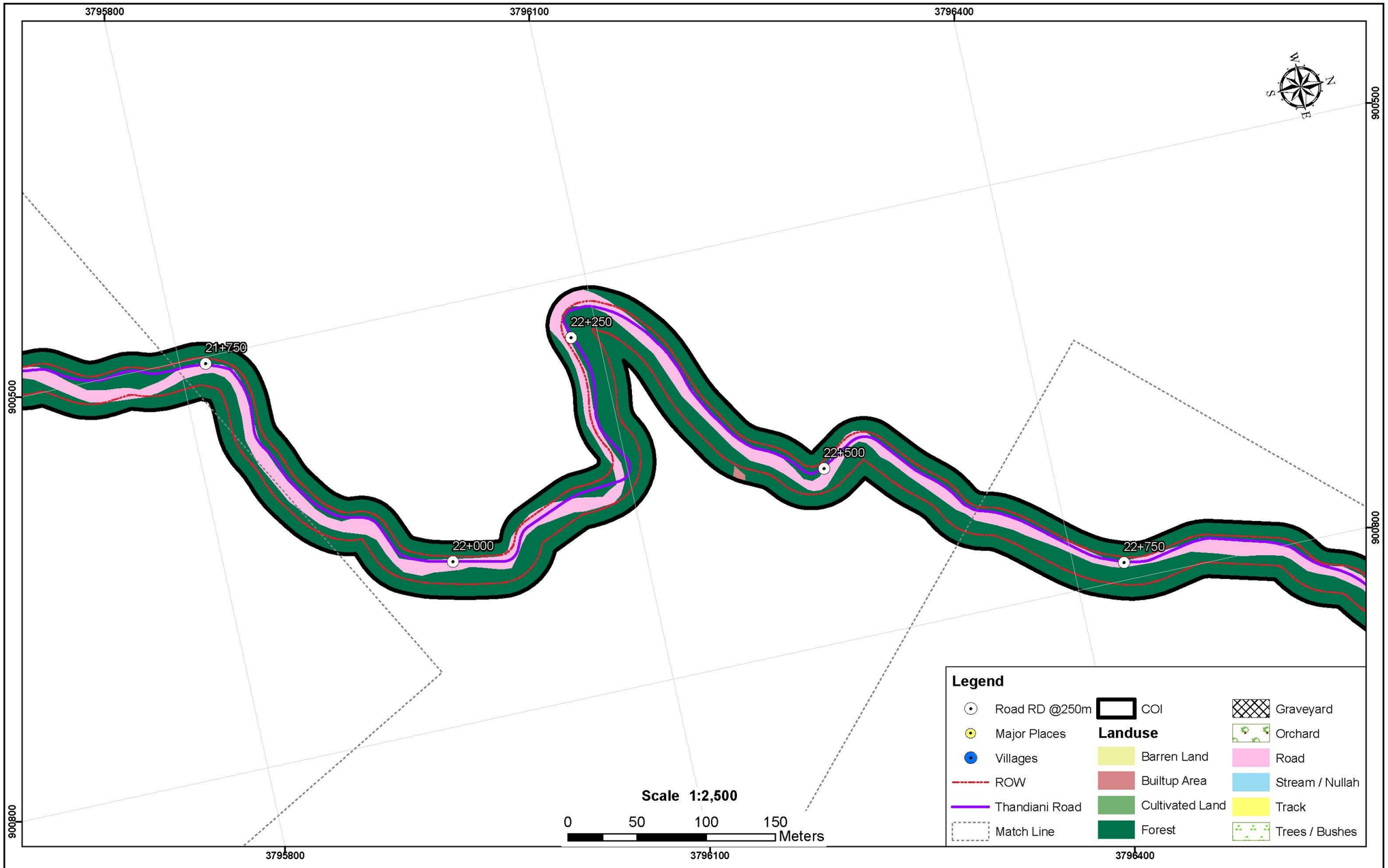
DATE	DRAWING No.	REV.
DECEMBER 2020	Sheet No.15 of 16	0



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		02				RECOMMENDED			
		01				CHD/VER.	S.BADAR		DATE: DECEMBER 2020; DRAWING No.: Sheet No.16 of 16; REV.: 0
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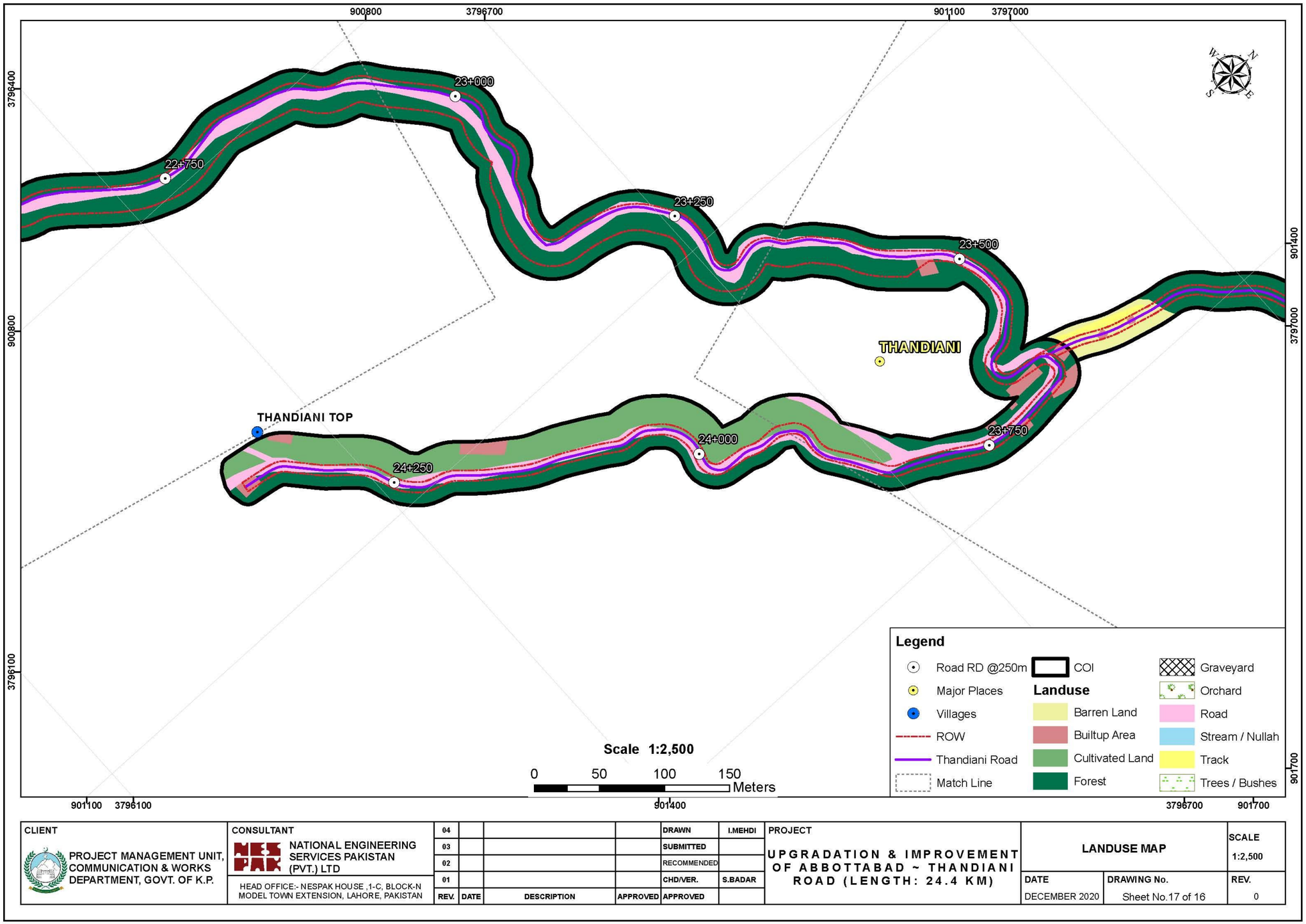

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		03				SUBMITTED			
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		01				CHD/VER.	S.BADAR		
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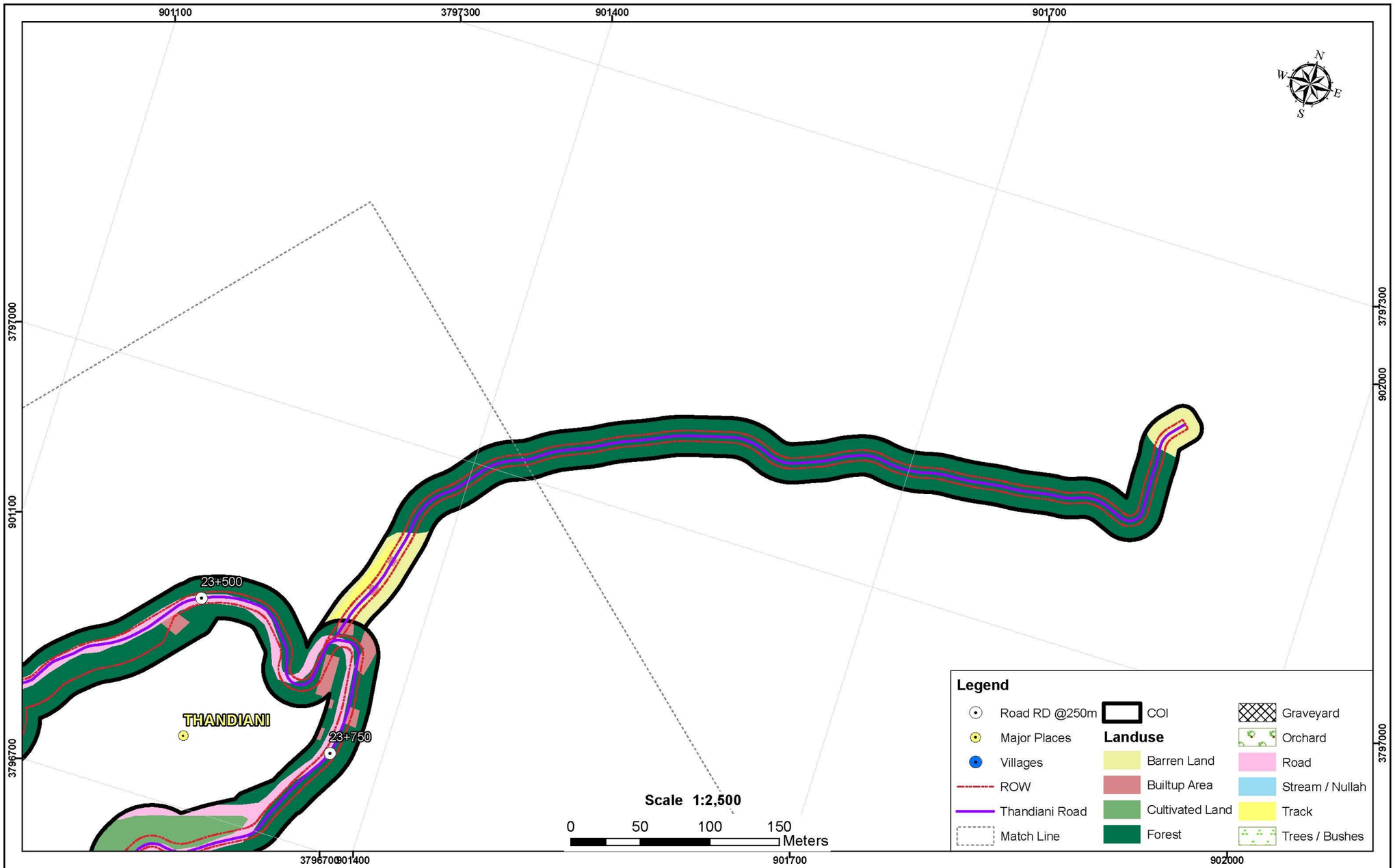

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		02				RECOMMENDED			
		01				CHD/VER.	S.BADAR		DATE: DECEMBER 2020 / DRAWING No.: Sheet No.18 of 16 / REV.: 0
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED			

ANNEX-V ECOLOGICAL CHECKLIST

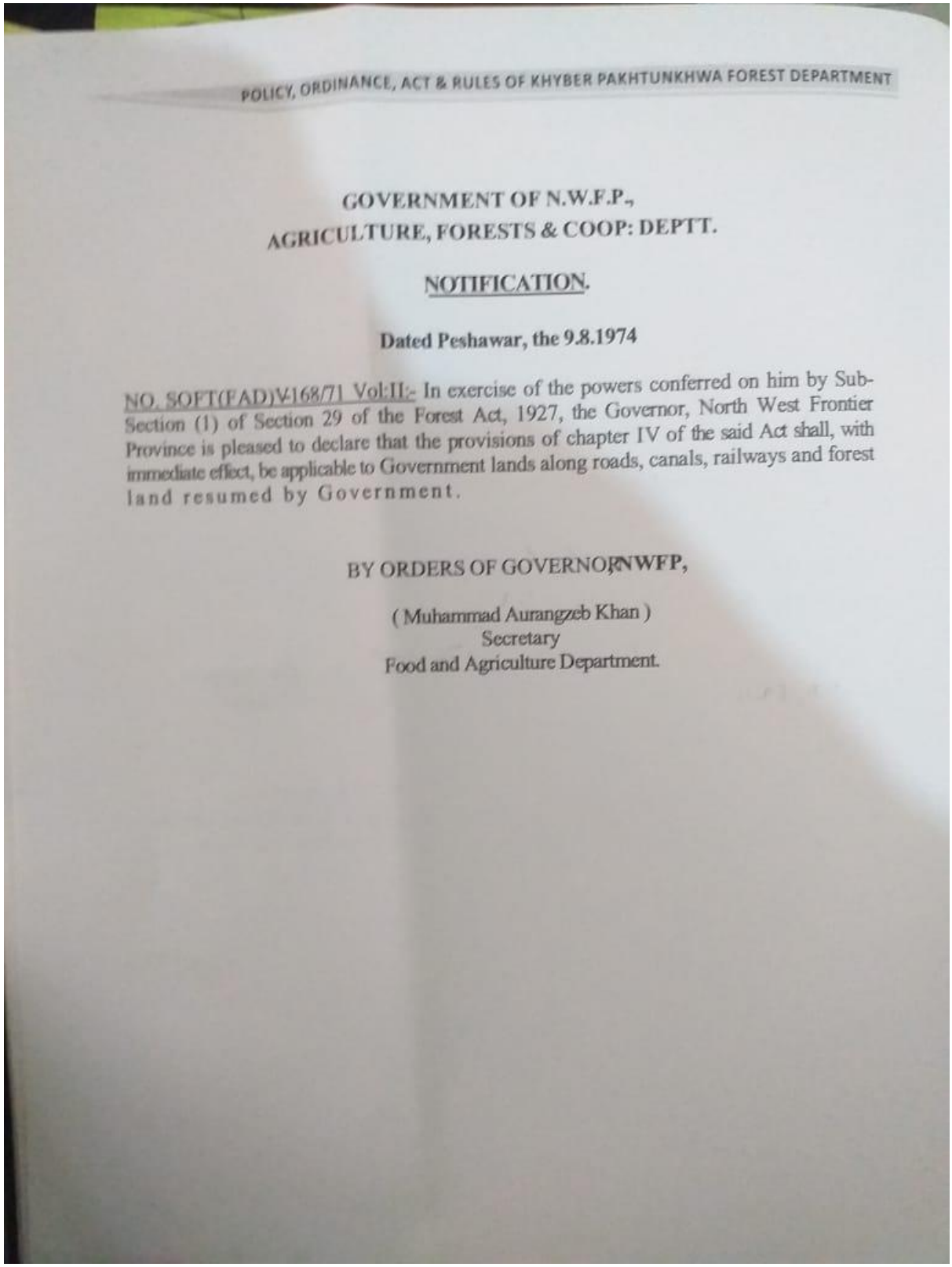
ANNEX-V

ECOLOGICAL CHECKLIST FOR REHABLITATION AND REMODELING OF THANDIANI ROAD (LENGTH: 24.4 KM)

	Data Sheet No.		**Date**	/ /	**Expert Name**				
	Location/Village			**District**		**RD/Kms.**			
	BIODIVERSITY FEATURES								
(i)	**Vegetation Description**								
	Forests (Trees, Herbs, Shrubs)	Yes/No	**Ecological Zone/Forest Type**			**Legal Status**			
	Species Composition	Tower	RoW		**No of Trees (Possibly Affected)**				
	Diameter Class	0-15 cm	16-30 cm	31-45 cm	46-50 cm	51-65 cm	66-80 cm	81-95cm	Above 95 cm
	Rangeland	Yes/No	**Agricultural Land**	Yes/No		**Crop Type**			
(ii)	**Wildlife/ Fauna Description**								
	Wildlife Protected Areas (Notified or Sensitive)								
	Mammals	Yes/No							
	Reptiles	Yes/No							
	Amphibians	Yes/No							
	Aquatic Habitat	Yes/No							
	Avifauna/Birds	Yes/No							
	Natural Wetland	Yes/No							
	Endangered Species	Yes/No							
	Other Biodiversity Features								
	Remarks/Comments:								

ANNEX-VI FOREST LANDS NOTIFICATION

ANNEX-VI



GOVERNMENT OF N.W.F.P.,
AGRICULTURE, FORESTS & COOP: DEPTT.

NOTIFICATION.

Dated Peshawar, the 9.8.1974

NO. SOFT(FAD)V-168/71 Vol:II:- In exercise of the powers conferred on him by Sub-Section (1) of Section 29 of the Forest Act, 1927, the Governor, North West Frontier Province is pleased to declare that the provisions of chapter IV of the said Act shall, with immediate effect, be applicable to Government lands along roads, canals, railways and forest land resumed by Government.

BY ORDERS OF GOVERNOR, NWFP,

(Muhammad Aurangzeb Khan)
Secretary
Food and Agriculture Department.

ANNEX-VII SOCIAL SURVEY QUESTIONNAIRES

1. **Socioeconomic Baseline Survey**
2. **Gender Survey**
3. **Public Consultation**

ANNEX-VII

GOVERNMENT OF THE KHYBER PAKHTUNKHAW
COMMUNICATION AND WORKS DEPARTMENT (C&WD)

NATIONAL ENGINEERING SERVICES PAKISTAN (Pvt.) LIMITED

KHYBER PAKHTUNKHWA INTEGRATED TOURISM DEVELOPMENT PROJECT

Rehabilitation and Remodelingof Thandiani Road (24.4 Km)

Environmental and Social Management Plan (ESMP) and Resettlement Action Plan (RAP)

CENSUS AND SOCIO-ECONOMIC SURVEY OF THE HOUSEHOLD

A. IDENTIFICATION

Sr. No._____ **Date:** _____

Interviewer: _____ Name of Respondent /PAP:_____

S/o:_____ Location:_____

Town/Mohallah: _____

Union Council: _____ Tehsil/District: _____

Age: _____ years Marital Status: _____

Religion: _____ Education: _____

Profession: _____ Caste: _____

PAP-ID:_____ Category of PAP:_____

Contact Details (Cell No.):

B. Household / Family Profile

Sr. No.	Name	Relationship with H.H (Code-A)	Age	Marital Status (Code-B)	Education	Reason for low Education	Occupation (Code-D) /Income Status (Code-E)				Total Monthly Income (Rs.)
							Primary Source		Any Other		
						(Code-C)	Occupation	Income Monthly (Rs)	Occupation	Income Monthly (Rs)	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

ANNEX-VII

Sr. No.	Name	Relationship with H.H (Code-A)	Age	Marital Status (Code-B)	Education	Reason for low Education	Occupation (Code-D) /Income Status (Code-E)				Total Monthly Income (Rs.)
							Primary Source		Any Other		
						(Code-C)	Occupation	Income Monthly (Rs)	Occupation	Income Monthly (Rs)	
11											
12											

Code A: 1. Self 2. Wife 3. Son 4. Daughter 5. Father 6. Mother 7. Grandson 8. Grandmother 9. Sister in law
10. Nephew 11. Niece 12. Daughter in law 13. Mother in law 14. Father in law 15. Brother in law 16. Brother
17 Sister 18. Aunt 19. Any Other

Code B: 1. Single 2. Married 3. Divorced 4. Widow / Widower

Code C: 1. Low income 2. More distance of educational institution 3. Lack of better Transport facilities 4.Negative attitude towards formal education
5. Lack of interest 6. If any other (please specify) ___

Code D: 1. Farming 2. Business (Type_____) 3. Livestock Rearing 4. Service (If Government Type___)
5. Service Private (Type_____) 6. Milk Selling 7. Retired Govt. Employee 8. Agri. Labour
9. Employed Overseas 10. Employment at port 11. Fishing Labor at port 12. Mason 13. If any other (please specify _____)

Code E: 1. Below 5000 2. 5000-9000 3.9001-15,000 4.15001-20000 5. 20001-25000 6. Above 25000

Q.1. How much is your average H.H. monthly expenditure?

1. Below 5000 2. 5000-9000 3. 9001-15,000
4. 15,001-20,000 5. 20,001-25,000 6. Above 25,000

Q.2. What is type of your family system?

1. Joint 2. Nuclear 3. Extended

C. HABITATION

Q.3. What is type of your household structure?

1. Pakka 2. Semi Pakka 3. Katcha 4. Hut

Q.4. What is the type of ownership of your house structure?

1. Owned 2. Government 3. Rented 4. Free on Landlord property
5. Relative House 6. Any other

Q.5. Since how long are you living here? _____ Years

Q.6. Which of the following facilities are available in your house?

1. Electricity 2. Water Supply 3. Gas 4. Telephone
5. Sewerage 6. Solid Waste Management

Q.6A. Possession of Household Items?

Sr. No.	Household Item	Yes/No	Sr. No.	Household Item	Yes/No
	Television			Truck	
	Refrigerator			Motorcycle	
	Computer			Rickshaw	
	Smart phone				
	DVD player				
	Electric cooker				
	Washing machine				
	Electric fan				
	Iron				
	Misc. items				
	Car/jeep				

D. Landholding

Q.7. Do you have any landholding?

1. Yes _____ (Kanals)

2. No _____

Q.8. What is use of that landholding: _____

E. LIVESTOCK

Q.9. Do you have any Livestock? 1. Yes 2.No

Q.10. If Yes, then Details and its use: _____

F. DRINKING WATER

Q.11. What is the source of drinking water?

1. Municipal Tap Water 2. Hand Pump 3. Self-Bore

4. Water carrier/Tanker 5. Any Other

Q.12. Are you satisfied with quantity and quality of drinking water?

1. Satisfied 2. Not Satisfied

Q.13. What is the reason of dissatisfaction?

1. Dirty Water 2. Low Pressure 3. Bad Taste 4. Bad Smell in Water

Q.14. Are you willing to pay for improved water supply? 1. Yes 2. No

G. WASTE WATER

Q.15. How wastewater is disposed of ?

1. Street Drain 2. Municipal Sewer 3. Septic Tank

4. Open Field/Pond 5. Any Other 6. No Facility

Q.16. Are you willing to pay for improved waste water disposal ?

1. Yes 2. No

H. TRANSPORTATION

Q.17. What is the principal mode of transport?

1. Public 2. Private 3. Both

Q.18. Are you connected with the Road network for travelling purpose

1. Yes 2. No

If yes, at how much distance and what is name of that road: Distance: _____ Name: _____

I. FUEL SOURCES FOR COOKING

Q.19. What are the sources of fuel for cooking purpose?

1. Sui gas 2. Gas cylinder 3. Coal/ wood

J. COMMUNICATION SYSTEM

Q.20. What do you use as source of communication system?

1. Mobile Phone 2. Both Mobile Phone & Landline 3. No Phone

4.Internet

K. SOLID WASTE

Q.21. Is there any collection system of solid waste in your community?

1. Collected by the government 2. No collection service 3. Settlement/Society own collection system

L. EDUCATIONAL FACILITIES

Q.22. Which of the following Educational Facility is available in or nearby your residential area ?

1. Primary 2. Middle 3. Matric 4. Above

Q.23. Are you satisfied with existing educational facility in your area?

1. Yes 2. No

M. MEDICAL FACILITIES

Q.24. Which of the following Health Facility is present in or nearby your residential area ?

1. BHU 2. RHC 3. THQ 4. Any Other

Q.25. Are you satisfied with existing Health facility ? 1. Yes 2. No

Q.26. In case of No, what are the reasons of dissatisfaction and major disease in this area ?

_____

_____

_____

_____

N. RELIGIOUS FACILITIES

Q.27. Which of the following religious property is present in or nearby your residential area?

Sr. No.	Religious Facilities	Yes	No	Name	Distance from your Residence
1	Mosque				
2	Madrassa				
3	Shrine				
4	Graveyard				
5	Any Other				

O. RECREATIONAL FACILITIES

Q.28. Which of the following Recreational facility is present in or nearby your residential area?

1. Parks 2. Play Grounds 3. Gardens 4. Zoo 5. Any other

P. SOCIAL COHESION/ CONFLICTS

Q.29. Does your family have any dispute with others ?

1. Yes 2. No

Q.30. If yes, Nature of dispute _____

Q.31. Which type of conflict resolution mechanism mostly adopted in this area?

1. Formal (Judiciary/Courts) 2. Informal (Jirga)

Q. CREDIT

Q.32. Did you borrow money during the last one year?

1. Yes 2. No

Q.33. If yes, for what purpose

1. For Business 2. For other family needs

How much amount did you borrow: _____

Q.34. What was the source of loan?

1. Bank 2. Relatives 3. Friends

R. COMMUNITY PARTICIPATION

Q.35. Is there any social organization in this area?

1. Yes 2. No

Q.36. If yes, then Name of the Organization:'_____

2. Type of activities? _____

_____

_____

_____

Q.37. Are you member of any social organization? 1. Yes 2. No

Q.38. If yes, Name of Social Organization _____

S. SOCIO ECONOMIC IMPACTS

Q.39. Do you feel that economic opportunities/ activities will increase due to this road upgradation?

1. Yes 2. No.

Sr. No.	If yes, then reasons	If no, then reasons
1		
2		
3		
4		

T. FEEDBACK, CONCERNs AND SUGGESTIONS

Q.40. What do you think about the impact of the Rehabilitation and Remodeling of Thandiani Road?

(1) _____

(2) _____

(3) _____

Q.41. What do you think about the positive and negative impacts of the Rehabilitation and Remodeling of Thandiani Road?

(4) _____

(5) _____

(6) _____

Q.42. What would you suggest to minimize or mitigate for the likely Negative Impacts of the Construction of the Thandiani Road?

Suggestions:

(1) _____

(2) _____

(3) _____

Q.43. What else can you suggest regarding design and implementation of the Construction of the

Thandiani Road ?

(1) _____

(2) _____

(3) _____

Q. 44. Any other suggestion

45. General Observations of Interviewers

(1) _____

(2) _____

(4) _____

Any other Remarks: _____

_____

_____

_____

Signature of the interviewer: _____

ANNEX-VII

GOVERNMENT OF THE KHYBER PAKHTUNKHAW
COMMUNICATION AND WORKS DEPARTMENT (C&WD)

NATIONAL ENGINEERING SERVICES PAKISTAN (Pvt.) LIMITED

KHYBER PAKHTUNKHWA INTEGRATED TOURISM DEVELOPMENT PROJECT

Rehabilitation and Remodeling of Thandiani Road (24.4 Km)

Environmental and Social Management Plan (ESMP) and Resettlement Action Plan (RAP)

GENDER SURVEY

T. IDENTIFICATION

Sr. No._____ **Date:** _____

Interviewer: _____ Name of Respondent:_____

W/O,D/O: _____ Location: _____

Residential Address:_____ Cell No: _____

Age: _____ years Marital Status: _____

Education: _____ Profession: _____

Q.1 How many children do you have?

I. Male _____ II. Female _____ III. Total _____

Q.2 Do you participate in Upbringing, Education and Marriage of children?

I. Yes _____ II. No _____

Q.3 What is your occupation?

I. House Wife _____ II. Working Woman _____

Q.4 If case of working women what is your nature of work?

I. Office _____ II. Field _____ III. Both _____

Q.5 How much salary do you receive per month? Rs. _____

Q.6 Do you contribute in household income?

I. Yes _____ II. No _____

Q.7 Do you perform daily household chores?

I. Yes _____ II. No _____

Q.8 What are your expenditures on household items? _____

Q.9 Do you have full power to spend your money the way you like?

I. Yes _____ II. No _____

Q.10 Do you save some money from your household income every month?

I. Yes _____ II. No _____

Q.11 In addition to household, do you do any other work for earning some money?

I. Yes _____ II. No _____

If yes, what type of work is this? _____

Q.12 Where do you work?

I. In your house _____ II. Out of your house _____

Q.13 How many hours per day do you work? _____ Hours

Q.14 What is your earning per month from this work? Rs. _____

Q.15 Do you want to learn some skills for earning your livelihoods?

I. Yes _____ II. No _____

If yes, what type of skills? _____

Q.16 Should women get education?

I. Yes _____ II. No _____

Q.17 Do you take part in purchase and disposal of household property?

I. Yes _____ II. No _____

Q.18 Do you play a significant role in decision-making of family matters?

I. Yes _____ II. No _____

Q.19 Is there any dispute resolution regarding the family matters?

I. Yes _____ II. No _____

Q.20 Do you discuss on household problems with neighbors/local community?

I. Yes _____ II. No _____

Q.21 Are there some matters related to outdoor activities of male family members?

I. Yes _____ II. No _____

Q.22 Is there any association/organization of females in this area?

I. Yes _____ II. No _____

If yes then what is its name and area of work. _____

Q.23 Do you know about the proposed Project?

I. Yes _____ II. No _____

Q.24 In your opinion, should this Project be implemented here?

I. Yes _____ II. No _____

If yes, then reasons	If no, then reasons
_____	_____
_____	_____
_____	_____

Q.25 What are the pressing needs of the women of this area?

_____

___

_____

___

Q.26 What protective measures do you suggest to safeguard your interests?

_____

___

_____

___

Signature of the Interviewer:

_____

GOVERNMENT OF THE KHYBER PAKHTUNKHAW
COMMUNICATION AND WORKS DEPARTMENT (C&WD)

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STAKEHOLDERS CONSULTATION

Sr. No._____ **Date:** _____

Name of Facilitator:_____ Location: _____

Venue: _____

_____

_____

Points to be discussed:

- Scope of the project and its various components
- The stakeholders involvement and their roles and responsibilities
- The process of dismantling of structures and calculation of compensation
- Description of the compensation options for PAPs
- The importance of a Grievance Redress Mechanism & the role of the community in GRM
- Overview of land acquisition and resettlement related impacts
- Concerns and suggestions of the PAPs regarding the projects' impacts on their assets and livelihoods

1. Concerns/ Apprehensions Raised

2. Points of Agreement:

3. Unresolved Issues

4. List of Participants:

Sr. No.	Name	Cell No.	Signatures
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
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32			
33			

ANNEX-VII

Sr. No.	Name	Cell No.	Signatures
34			
35			
36			
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ANNEX-VIII-TREE PLANTATION PLAN

TREE PLANTATION PLAN

1.1 Tree Plantation Plan

The basic purpose of afforestation/plantation of suitable species in the project area is to reduce the risk been made due to cutting of trees for the proposed project and 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 carrying capacity of the area regarding many positive aspects. The forest department was consulted, information regarding local flora was shared and tree plantation in nearby vicinities/along the road was also recommended by the concerned office.

Plantation will be done after the removal of trees during 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 roads construction, the afforestation activity will further help in enhancing the socio-economic condition of the area and project sustainability.

1.1.1 Trees along Roads

Trees along roads are currently situated on both sides of the tracks and on the neighboring land close to roads. Tree fall hazards along roads became a safety issue. Planting trees along the roads must be encouraged, however as they help stabilize the slopes, provide shades and barrier to light etc.

1.1.2 Causes of Tree Falls

The most common cause of the tree fall are extreme winds, or glaze. These phenomena usually cover extensive areas as they are related to regional weather extremes (windstorms, heavy rains).

Tree falls predominantly affect trees of a certain height. Nyberg and Johansson (2013) suggest that trees with a height over 15 m should be used for modelling of wind-related damage. Actual tree height is however not always available in spatial data. Minor cause of tree fall are the results of non-professional cutting and the loss of stability of rotten trees due to neglected tree maintenance.

1.1.3 Importance of Tree Plantation

- Trees contribute to their environment by providing oxygen, improving air quality, climate amelioration, conserving water, preserving soil, and supporting wildlife.
- Trees control climate by moderating the effects of the sun, rain and wind. Leaves absorb and filter the sun’s radiant energy, keeping things cool in summer.
- Trees also preserve warmth by providing a screen from harsh wind.

- Trees also lower the air temperature and reduce the heat intensity of the greenhouse effect by maintaining low levels of carbon dioxide.
- Both above and below ground, trees are essential to the eco-systems in which they reside.
- Trees absorb and store rainwater which reduce runoff and sediment deposit after storms. This helps the ground water supply recharge, prevents the transport of chemicals into streams and prevents flooding.
- Trees, shrubs and turf also filter air by removing dust and absorbing other pollutants like carbon monoxide, sulfur dioxide and nitrogen dioxide.

1.1.4 Objectives

- To Restore native species
- To improve the quality of air and reduce its pollution
- To add color to the landscape and enhances the beauty of the environment
- To uplift the quality of our living environment through active planting, proper maintenance and preservation of trees together with other vegetation.
- To Protect and conserve flora and fauna of the project area.
- To attract rain which is a positive impact on the project area at all.
- To reduce sedimentation by plantation in the project area which will act as protection wall against wind born dust particles.

1.1.5 Present Status of the Site

A detailed site survey was conducted of the project area and the trees identification process was done according to the proposed design which was later verified by the design team. The present area supports a large variety of coniferous indigenous trees species having large water requirements/IIehavior. It is favored as an erosion-control plant, with its easy spreading and resilience, if protected. The natural regeneration rate is high in protected plots, some varieties of broad leaved species are also paying important role in balancing the ecosystem and watershed management.

1.1.6 Plantation Technique

Plantation of conifers and broad leaved species is to be carried out in the immediate vicinity of the project area. The project area can be afforested and vegetation cover can be improved by adopting standard afforestation technique of digging pits. The project area is suitable for plantation activities and can be managed thoroughly with care.

1.1.7 Pits

Pits should be dug in the project area at a spacing of 10’ linearly. The pits should be of 1.5 feet dia at the top and 1 feet dia at the bottom with a depth of 1-3/4” ft. The earth taken out of the pits will be deposited below each pit in a crescent shape, so as to form a ridge with a clear berm of 9 inches in front. The consecutive crescents will be joined to catch the maximum quantity of moisture. Moreover, planting should be carried out in the pits and sowing on the berms, before or immediately after the first shower of rain. The choice of species (Forest Department may change as per actual requirement and suitability *standards & Species as well) for the project area is given below.

Table 1.1: Recommended Species for Plantation of the Project Area

Sr. No.	Common Name	Scientific Name
1	Chir-Pine	*Pinus roxburghii*
2	Kail	*Pinus wallichiana*
3	Deodar	*Cedrus deodara*

1.1.8 When to plant

Planting should be completed early in the rains in as short a time as possible. The trees must be given time to become well established prior to the dry season. A good rule of thumb is to start planting when the soil is moist to a depth of 15-25 cm or to the bottom of the planting hole. Failures because planting is too late are more common than failures because of planting too early. To obtain good results and avoid labor shortage in these areas considerable preparatory planning is needed. The size of the plantation might have to be adapted to the availability of labor. If dry sites cannot be planted in time, planting should be postponed until the next season.

1.1.9 Study Area Enhancement/Rehabilitation Plan

The total length of the proposed subproject is approximately 13 Kms. Due to the construction activities, about 848 trees will be affected in RoW based on GIS and filed trothing for species identification. The reforestation is considered for the wood/non-fruit trees which numb is 12,720 for, reforestation and rehabilitation of the area. Total number of plants to be planted is approximately 12,720 for wood/non-fruit tress (standard spacing of approximately 10 feet).

If spaces for the plantation is available on both sides of the road, then the plantation will be done on both sides acquiring linearly on one side and approximately the same at the other side of the road, then same will be considered as liner plantation. Total cost on this particular plantation in the project area is approximately RS. 24.6Millions.

Note: *The provided calculations are approximate and provided on the basis of available data.*

1.1.10 Plantation Plan for Thandiani

Four (04) rows of plants will be raised along the 13Km Abbottabad-Thandiani road (Lot-I), two (02) on either side of the road. Distance from the outer boundary of the ROW and between two plants will be kept as 4 meters. Thus in one kilometer, 250 number of plants are to be raised in single row. Thus a total of 12,720 trees shall be planted in lieu of expected 848 effected plants.

*KP Forest Department may update the standards of planting and choice of species as per the requirements and suitability.

1.1.11 Cost

Break-up of Expenditure per Avenue kilometer @ Rs. 1500/- per diem: Break-up of Expenditure per Avenue kilometer or 250 plants @ Rs. 1500/- per diem:

Table 1.2: First Year Cost

Sr. No.	Item	Quantity	Rate	Amount (Rs.)
1.	Layout	1 Av.km	2 MD/Av.km	3000.00
2.	Digging of Pits 2.5 ft. each 2.5x250 = 625 cft.	625 cft.	5 MD/Av.km	7500.00
3.	Cost of Plants including	250 No.	Rs100/- plant	25,000.00
4.	Cost of planting of plants	250 No.	Rs. 25/- plant	6250.00
5.	Carriage of plants from private nursery to site including loading/unloading	250 No.	Rs. 10/- plant	2500.00
6.	Cost of Manure and Bhall (silt) including carriage	1 Av. Km		20,000.00
7.	H/watering 50 times 250x50 with water bowser, one driver and one coolie	12500 no.	5MD/per %0	100,000.00
8.	Weeding twice 250x2	500 no.	2 MD/per %	15,000.00
9.	Reopening of Pits twice (250x2)/cft/pit	500 cft.	2 MD/per %	15,000.00
10.	Unforeseen			5750.00
Total				**200,000.00**

Table1.3: Second Year Cost

Sr. No.	Item	Quantity	Rate	Amount (Rs.)
1.	Cost of Plants 20% Restocking	50 No.	Rs.100/- plant	5,000.00
2.	Cost of planting	50 No.	Rs. 25/- plant	1250.00
3.	Carriage of plants	50 No.	Rs. 10/- plant	500.00
4.	H/watering 50 times with water bowser, one driver and one coolie	12500 no.	5MD/per %0	100,000.00
5.	Reopening of Pits twice (250x2)	500 cft.	2 MD/per %	1,5000.00
6.	Weeding twice 250x2	500 no.	2 MD/per %	1,5000.00
7.	Unforeseen			1250.00
Total				**1,38,,000.00**

Table1.4: Third Year Cost

Sr. No.	Item	Quantity	Rate	Amount (Rs.)
1.	Cost of Plants 10% Restocking 25 No.	25 No.	Rs.100/- plant	2500.00
2.	Cost of planting	25 No.	Rs. 25/- plant	625.00
3.	Carriage of plants	25 No.	Rs. 10/- plant	250.00
4.	H/watering 40 times x250 no.	10,000 no.	5MD/per %0	75000.00
5.	Reopening of Pits twice (250x2)	500	5MD/per %0	3750.00
6.	Unforeseen			2875.00
Total				85,000.00

Table1.5: Fourth Year Cost

Sr. No.	Item	Quantity	Rate	Amount (Rs.)
1.	H/watering 30 times	7500 no.	5MD/per %0	56250.00
5.	Pruning and cleaning of plants	250 no.	5MD/per %0	1875.00
6.	Unforeseen			1875.00
Total				**60,000.00**

Cost for raising 1 Av. Km and Maintenance or 250 plants in single row: = **Rs.4,83,000/-**
For 4 years

Total cost for 12,720 plants and their maintenance for 4 years (two on each side) =
Rs. 24,575,040/-

Total Cost= 24.6 Millions

Note: *The above rates and calculations are approximate and tentative which will be updated according to the standard rates of concerned Forest Departments/Implementing Agency, during implantation stage.*

ANNEX-IX-CHANCE FIND PROCEDURE

ANNEX-IX

CHANCE FIND PROCEDURES

Project may involve deep excavation. Therefore, the possibility of chance find is not ignorable. In case of any chance find, the contractor will immediately report through Supervision Consultant to Directorate of Archaeology & Museums, Government of Khyber Pakhtunkhwa to take further suitable action to preserve those antique or sensitive remains. Representative of the DG will visit the site and observed the significance of the antique, artifact and cultural (religious) properties and significance of the project. The report will be prepared by representative and will be given to the DG. The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains.

In case any artifact, antiques and sensitive remains are discovered, chance find procedures should be adopted by contractor workers as follows:

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial Archeological Department
- The suggestion of the local communities and the concerned authorities will be suitably incorporated during taking the preventive measures to conserve the antique, artifact and cultural (religious) properties;
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over; and
- After stopping work, the contractor must immediately report the discovery to the Supervision Engineer.

The contact Address of Directorate of Archaeology & Museums, Government of Khyber Pakhtunkhwa, is given below:

Director General
Directorate of Archaeology & Museums,
Govt. of Khyber Pakhtunkhwa, Saddar Road,
Peshawar, opposite Governor House Peshawar & Civil Secretariat,
C/o Peshawar Museum.
Phone No. : 0092-91-9211194
Email : info@kparchaeology.com

ANNEX-X: GUIDELINES FOR COVID-19 DURING CONSTRUCTION

ANNEX-X

PRECAUTIONARY ACTION AGAINST THE POTENTIAL RISK OF NOVEL CORONAVIRUS

INTRODUCTION

On February 11, 2020 the World Health Organization announced an official name for the disease that is causing the 2019 novel coronavirus outbreak, first identified in Wuhan China. The new name of this is coronavirus disease 2019, abbreviated as COVID-19.

The risk of exposure to COVID-19 is no different for employees of Employer, Engineer, Contractor, and suppliers than for the general population. Contractor, therefore, must consider the physical well-being and safety of all the persons entitled to be on the Site and follow reasonable guidelines and recommendations of Government authorities and healthcare professionals. As experience has shown in other countries, confirmed cases of COVID-19 expand exponentially if health and safety controls are left unheeded.

Contractor should enforce all health and safety procedures at Site including sanitary protocols, proper hygiene, social distancing, use of personal protective equipment (PPE), toolbox talks on special COVID-19 requirements, and prompt reporting of health issues related to COVID-19. Contractors must put safeguards in place to keep workers exposed to COVID-19 away from Site for at least 14 days after the last potential exposure.

WHO declared the COVID-19 as a Public Health Emergency of International Concern (PHEIC) in January 2020 and afterwards announced the COVID-19 outbreak as pandemic on 11th March 2020 due to the widespread of the disease in 114 countries at that time. WHO Director General urged the countries to take action now to stop the disease.

The rapid spread of COVID-19 hits all the provinces of Pakistan Sindh, Balochistan, Punjab & Khyber Pakhtunkhwa including the Gilgit Baltistan and Azad Jammu & Kashmir. The prevailing virus creates the menacing and distressing situation when it arrived around the closed proximities of the Project Area.

Government of Pakistan has launched the National Action Plan for COVID-19 Pakistan to combat the challenge of prevailing virus, also available at https://www.nih.org.pk/wp-content/uploads/2020/03/COVID-19-NAP-V2-13-March-2020.pdf. The Government of Pakistan has launched the real-time data portal for COVID-19 http://covid.gov.pk/. These measures are mostly relating to the containment and awareness and capacity building. Besides this COVID-19 daily situation report is also available at https://www.nih.org.pk/wp-content/uploads/2020/04/COVID-19-Daily-Updated-SitRep-03-April-2020.pdf.

All the stakeholders are on board to jointly prevent/ limit/ control the spread of COVID-19. All of the staff is required to take precautionary measures as well as maintain social distances. The use of thermal guns for checking every single person body temperature, placement of relevant flyers and disinfection spray inside of all the containers are few of the measures to combat COVID-19.

OBJECTIVE

Following are the objectives of this report to jointly prevent / limit/ control the spread of COVID-19 at Site that can hamper the progress of proposed Project:

i. To enhance understanding of the evolving COVID-19;
ii. To share knowledge on COVID-19 and preparedness measures being implemented at Site;
iii. To generate recommendations for adjusting COVID-19 containment and response measures; and
iv. Outline the measures taken at Site. The advised measures will help all the stakeholders to plan their work continuity in response to the COVID-19.

Due to the evolving situation of the COVID-19, this document should be read in conjunction with the latest relevant advisories issued by WHO (especially "Getting your workplace ready for COVID-19, 3 March 2020") and Government of Pakistan.

WHAT IS CORONA VIRUS (COVID-19)

The symptoms of the COVID-19 are similar to that of regular pneumonia. Typical symptoms include;

- Fever;
- Cough;
- Difficulty in breathing;
- Pneumonia;
- Runny nose;
- Sore throat; and
- Feeling of being unwell.

MODE OF SPREAD

Infected person – person transmission; Infected people can spread COVID-19 through their respiratory secretions via droplets produced when an infected person coughs or sneezes, similar to how influenza and other respiratory pathogens spread. The spread from person-to person is most likely among close contacts (about 6 feet);

- Infected animals' dead or Alive;
- Air by coughing and sneezing;
- Close personal contact, such as touching or shaking hands;
- Touching an object or surface with a virus on it; and
- Touching your mouth nose or eyes before washing your hands.

GENERAL STANDARDIZED PRECAUTIONARY MEASURES

Following measures/recommendations are suggested as a general guidance to be followed for the protection of potential impacts of COVID-19:

Since, there is no vaccine available to protect against human Coronavirus infections. Therefore, transmission can be prevented through following measures:

- Cover your mouth while cough or sneeze;
- Avoid close contact with people who are sick;
- Avoid the use of hard soap;
- Wash your hands often with liquid soap and water for at least 20 seconds;
- All the employees should ensure sanitization of hands at appropriate time;
- Avoid touching your eyes, nose, and mouth with unwashed hands;
- If you are concerned about your symptoms you should see your health care provider at site or in office;
- Use of Personal Protective Equipment (PPE) according to risk (a surgical or N95 mask);
- Do not spit, wrap your oral and nasal secretion with tissue and throw it in a covered dustbin;
- Balance your nutrition and exercise moderately;
- Sterilization / disinfection of medical devices at Site dispensaries; and
- Do not touch, buy or eat wild animals (gamey). Try to avoid visiting markets that sell such animals.

PROJECT SITE SPECIFIC PRECAUTIONARY MEASURES

WB Guidelines for Covid-19 during Construction activities shall be followed. Measures for protecting staff and labour from exposure to, and infection with, the COVID-19 depend on the type of work being performed and exposure risk, including potential for interaction with infectious people and contamination of the work environment. Regardless of specific exposure risks, following are the main actions that have been jointly taken at Site to combat the COVID-19:

Employer's Side

Employer should issue the notification containing the precautionary measures in the light of Government of Punjab guidelines to be implemented at Site. Upon receiving the Employer notification all the mentioned precautionary measures will be communicated to Engineer staff for compliance. Employer technical staff is also complying with the Government of Punjab guidelines and Contractor suggestion to control the spread of COVID-19 at Site in the best interest of the Project and country.

Consultant's Side

Consultant's top management will issue the orders in the light of Government of Punjab guidelines containing the precautionary measures to control the spread of COVID-19 for the staff working at Site.

Consultant staff at Site will fully complying with the orders including photographic evidence. Considering the severity of the prevailing virus Engineer devised the Standard Operating

Procedure (SOP) containing precautionary action against the potential risk of novel corona virus.

Besides, above Consultant will ensure the following precautionary measures at Site.

- Adequate signage and information at all entrances and exits showing what is Corona Virus, how it spreads, what are the symptoms, standard precautions;
- The awareness session for the Contractor staff is equally important as of Consultant staff to combat the COVID-19 at Site. The Consultant will ensuring that Contractor is arranging such session at Site from time to time to reduce the potential risk of COVID-19. Further, all the newly inducted and existing staff have been given HSE training by the Consultant & Contractor.

Contractor's Side

Contractor will communicate various precautionary measures to Employer and Engineer through letters to control the spread of COVID-19 at Site. Following are the major steps to be taken by the Contractor:

- Contractor will convey the instructions and requirements of its superior unit for the prevention and control of COVID-19 epidemic at Site.
- Contractor will establish a special organization for epidemic prevention and control on the Project Site that is responsible for arranging, implementing, publicizing and supervising the epidemic prevention and control measures.
- Launch the plan for epidemic prevention and control on the project Site that includes:
    - All personnel in temporary camp are required to wear masks;
    - Contractor personnel incharge of Site to wear masks;
    - Arranged special personnel to measure and record the temperature of all personnel when entering or leaving the temporary camp;
    - If any person with fever, cold and other symptoms are found, they will be admonished to go home for isolation and asked about the development of the disease every day; and
    - Propagate and implement the epidemic prevention measures for the staffs and labours and warn them not to go outside and home as much as possible.
- All these meetings should carried out through video conference.

Contractor is not limited to the above precautionary measures but practicing and implementing the following;

- Contractor will prepare a pamphlet for the awareness of Site staff to combat the COVID-19. It will also place/posted at strategic points at Site.
- Launch awareness campaign to inform all the staff and labour about the coronavirus, to use facemask, hand hygiene, cough etiquette, and avoidance of close contact with animals and consumption of their raw products.
- Everyday awareness speech in English and Urdu in the temporary camp.
- All the employees are not allowed to go outside of the Project Area or on vacation to their homes and on daily basis visit to sites;

- Contractor will provide medical masks and antibacterial liquid hand wash to all personnel.
- Contractor will prepare the isolation facility at Site and provided three isolated rooms for such patients inside the temporary camp. Each room have three beds, oxygen cylinder, sanitizers, isolation kit, hand wash.
- Thermal scanning will be carried out continuously in the morning for everybody at the main gate of temporary camp.
- Record will be maintained for everyone that includes the temperature value of each person with their names, every morning and afternoon go to each department for scanning separately and noted down their name with temperature values.
- Contractor carry out disinfectant spray on daily basis morning and afternoon in each office and rooms and all the area of the camp.
- SSWMB and Consultant staff will also requested by Contractor to do not interact physically rather through electronically by emails or video conferencing.

RECOMMENDATIONS FOR THE CONTROL OF COVID-19 AT SITE

To Avoid Transmission

For all personnel at Site, it is always a good to practice the following precautionary measures:

- Workers to remain at least two meters apart from each other at all times (social distancing) – i.e. spread out and reduce the number of people working together in one area of the site;
- Avoid eating lunch in the form of group in available mess/canteens at Site;
- Close site canteens/ food preparation and eating areas (avoid gatherings) – workers to bring their own prepared lunch to site and eat alone e.g. in their van, car, or in an open space;
- Avoid in-person meetings if possible. In the case that an in-person meeting is unavoidable, make sure to have it in a well-ventilated area with sufficient space for attendees to distance themselves from one another. For meetings such as toolbox talks, consider breaking them up into smaller group meetings versus one large meeting;
- Introduce enhanced cleaning procedures across the Site and touch points e.g. office equipment, plant and machinery controls, taps/toilet/washing facilities, handrails;
- Stagger start times on site to avoid congestion in entrance areas;
- Reduce the number of people on site inductions at any one time and hold them outdoors if possible;
- Stop workers moving across various sites (potential for cross contamination);
- No outsiders should be at the Project Site;
- Contractor, Consultant and Employer personnel are advised to avoid travelling and in case traveling is unavoidable, prior approval from the management should be essential. In case of travelling, the above mentioned measures need to be strictly followed by the traveller;
- Prompt identification and isolation of potentially infectious individuals is a critical first step in protecting workers and other Site staff. An isolated area should be available

at Site to immediately isolate suspected person, as it is most important to stop its spread at Site.

- Rapid Response Team should be formed and be informed immediately in case of suspect and confirmed case of COVID-19.
- Medical team at Site should separate the suspected person displaying fever, cough or difficulty breathing from other personnel; and
- If a person has had close contact with an individual that has confirmed COVID-19, that person will not be allowed to return to the Site until he/she has been symptom free for 14 days.
- Clean and fumigate all the workplaces at Site on daily basis;
- Ask people to stay at home if they have fever, cough, difficulty in breathing, runny nose, sore throat as per organizational rules;
- An immediate replacement of solid soap with liquid anti-bacterial soap bottles may be appropriate.
- Provision of alcohol-based hand sanitizer need to available for all staff;
- Clean the religious places carpets and rugs. Have them washed in place over the weekend and then do regular cleaning;
- Have the cleaners/ maintenance crews regularly clean surfaces that are touched frequently by personnel with disinfectants such as in and out doors;
- Fresh medical tests of staff working should be carried out at Site;
- Dispose of all contaminated waste (gloves, paper, swab handles, etc.) into biohazard waste bags for disposal;
- Ensure that panic is not created. In fact the posters should start with statements such as do not panic and fear the virus but know and prevent; and
- Ensure proper ventilation system for all the personnel at Site.

Use of Personal Protective Equipment (PPEs)

- Necessary PPE should be available at Site all the times and are being issued to each personnel at Site;
- Practice of using masks is also being ensured by all parties at Site (a surgical or N95 masks);
- Re-usable PPE should be thoroughly cleaned after use and not shared between workers. Single use PPE should be disposed of so that it cannot be reused;

Outside Visitors

- Visitors should enter with strictly wearing visitors card;
- Ensure sanitization of hands;
- All parties should ensure that the sick persons should be wearing a surgical or N95 masks;
- Note down the complete information of outsiders before entrance;
- Proper screening should be carried out before entering the Site;

- Refrain from handshakes. Rather than shaking hands, visitors may explain why handshakes can contribute to the risk of spread;
- Attempt to maintain a general six (6) feet distance between themselves. This will be challenging to follow at all times but it is Engineer recommendation to follow;
- Refrain from and/or limit touching of workplace surfaces; and
- In addition to these on-site procedures, it is advised to follow their respective organizational instructions related to Site visits.

ANNEX-XI: TEMPLATE FORM FOR ENVIRONMENTAL AND SOCIAL MONITORING

ANNEX-XI

KHYBER PAKHTUNKHWA INTEGRATED TOURISM DEVELOPMENT PROJECT

Rehabilitation and Remolding of Thandiani Road (Length: 24.4 Km)

TEMPLATE FORM FOR ENVIRONMENTAL AND SOCIAL MONITORING

Date:_____ **Time:**_____

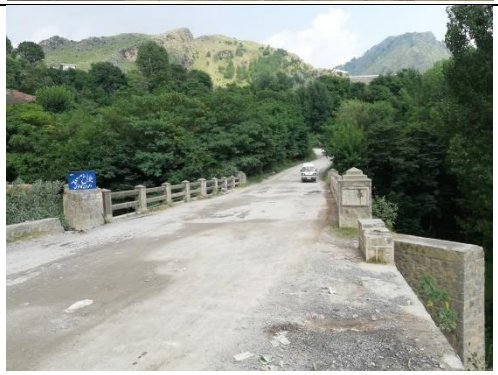
Sr. No.	Receptor	Monitoring Parameters	Locations	Monitoring Mechanism	Monitoring and Reporting Frequency				Remarks
					Daily	Monthly	Bi-Annual	Annual	
1	Water Quality								
2	Soil Contamination								
3	Land Resources								
4	Dust Emissions								
5	Noise Pollution								
6	Fumes and gases								
7	Ecological Resources								
8	Houses								
9	Public Infrastructure								
10	Community around the Project corridor								
11	Labour Management								
12	Labour Influx								
13	Grievances Redressal								
14	Community/occupational health & safety								
15	Gender Based Violence								
16	Training								

Name of Monitoring Person:_____ **Designation:**_____ **Signature:**_____

Photolog

Thandiani Road (Length: 24.4 Km)

Pictorial Glimpse



General Ambience of the Thandiani Road

	
	
Flora of the Project area	
	
View of Graveyards along the Road	
	

Commercial Activities along the Thandiani Road

Photographic View of Consultation Meetings with Stakeholders

Meeting with EPA-Abbottabad

Meeting with DFO-Wildlife Division, Abbottabad

Meeting with SDFO, Abbottabad

Meeting with DFO, Abbottabad

Meeting with DD-EPA, Peshawar

Meeting with Revenue Staff (Patwaries) at Abbottabad

Meeting with SDO-Irrigation, Subdivision Abbottabad

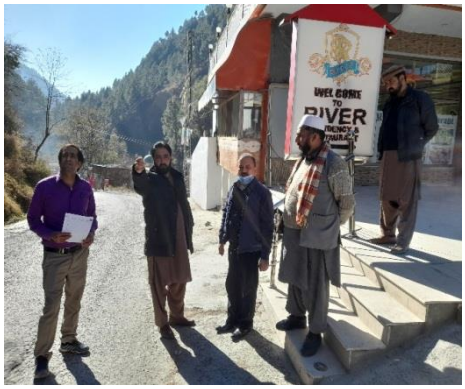
Meeting with SDO-Building Division, C&WD, Subdivision Abbottabad

Meeting with Agriculture Department

Meeting with Galiyat Development Authority

Consultation Session with Locals / Affectees

Consultation Session with Locals/Affectees



Consultation Session with Locals/Affectees

Consultation Meeting with PAPs at Kund Bazar

Consultation Meeting at Kalay Pani Bazar

Consultation Meeting with PAPs at Kund Bazar