



## LAHORE DEVELOPMENT AUTHORITY, LAHORE

### CONSTRUCTION OF STRUCTURAL PLAN ROADS:

1. NEELUM ROAD FROM PINE AVENUE TO FERROZEPUR ROAD THROUGH LDA CITY, LAHORE AND
2. CHENAB ROAD CONNECTING LDA CITY TO SUE ASAL LINK ROAD, LAHORE



## ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

APRIL, 2025



National Engineering Services Pakistan (Pvt) Limited  
1C, Block N, Model Town Ext, Lahore 54700, Pakistan  
Phone: +92-42-99090000 Ext 233 Fax: +92-42-99231950  
Email: [geotech@nespak.com.pk](mailto:geotech@nespak.com.pk) , [info@nespak.com.pk](mailto:info@nespak.com.pk)  
<http://www.nespak.com.pk>



**CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD)  
FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY,  
LAHORE**



Consultant



National Engineering Services Pakistan (Pvt) Limited  
1C, Block N, Model Town Ext, Lahore 54700, Pakistan  
**Phone:** +92-42-99090000 Ext 233 Fax: +92-42-99231950  
**Email:** geotech@nespak.com.pk, info@nespak.com.pk  
<http://www.nespak.com.pk>

Client



Lahore Development Authority (LDA)  
LDA Headquarters, Johar Town, Lahore  
Lahore, Punjab 54000  
Telephone Number: 042-111-111-532

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0	22-10-2021	Draft	Ms. Shehnila Hanif (EIA Expert) Mr. Ridha Kamran (Senior Environmental Scientist) Mr. M. Sajjad (Sr. Sociologist) Mr. Ibadullah Khan (Sr. Ecologist)		Ms. Uzma Iqbal (Team Leader/Head ERSD)		Mr. Kamran Yousaf (GM / Head GT&GE)	
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LAHORE



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CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD)  
FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY,  
LAHORE



**CONSTRUCTION OF STRUCTURAL PLAN ROADS:**

1. NEELUM ROAD FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE AND
2. CHENAB ROAD CONNECTING LDA CITY TO SUE ASAL LINK ROAD, LAHORE

**Environmental Impact Assessment (EIA)**

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## LIST OF ABBREVIATIONS

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AOI	Area of Influence
AQI	Air Quality index
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
CDM	Clean Development Mechanisms
CDA	Canal and Drainage Act
CSC	Construction Supervision Consultant
DCRs	District Census Reports
EIA	Environmental Impact Assessment
EC	Environmental Committee
ECO	Economic Cooperation Organization
EE	Environmental Expert
EMP	Environmental Management Plan
EMMM	Environmental Mitigation and Management Matrix
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
ERP	Emergency Response Plan
ESEs	Environmental and Social Experts
GoPb	Government of Punjab
HVAC	Heating, Ventilation, Air Conditioning
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
IFC	International Finance Corporation
ILO	International Labour Organization
LAA	Land Acquisition Act
LDA	Lahore Development Authority
MSL	Mean Sea Level
MBT	Main Boundary Thrust
NEQS	National Environmental Quality Standards
NCS	National Conservation Strategy
NDMA	National Disaster Management Authority
NOC	No Objection Certificate
NESPAK	National Engineering Services Pakistan
NPZs	Noise Perimeter Zones
OHSAS	Occupation Health and Safety Assessment Series
OHS	Occupational Health and Safety
O&M	Operation and Maintenance
OIC	Organization of the Islamic Conference
OD	Operational Directives
OP	Operational Policies
OMS	Operational Manual Statements
PHA	Punjab Horticulture Authority
PEQS	Punjab Environmental Quality Standards
PPE	Personnel Protective Equipment
P&D	Planning & Development
PGA	Peak Ground Acceleration



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SC	Supervisory Consultant
SSEMP	Site Specific Environmental and Management Plan
SDGs	Sustainable Development Goals
STDs	Sexually-Transmitted Disease
SOPs	Standard operating procedure
TA	Technical Assistance
UNO	United Nations Organization
UCC	Upper Chenab Canal
WASA	Water and Sanitation Agency



## EXECUTIVE SUMMARY

### ES-1 INTRODUCTION

To address growing congestion and pollution, the city of Lahore had already been working on promoting its public transport system and upgrading road infrastructure. However, boosting passenger confidence required redesigning the road infrastructure to enhance the system's image while improving security and safety.

The Lahore Development Authority (LDA) has assumed the responsibility of providing efficient, safe, and environmentally friendly road infrastructure in Lahore. To better serve the public, meet the growing demand for mobility, and improve road user convenience, the LDA is planning to develop two structural roads i.e. (i) Neelum Road, connecting Pine Avenue to Ferozepur Road through LDA City, Lahore and (ii) Chenab Road, connecting LDA City to Sue Asal Link Road, Lahore

### ES-2 LEGAL AND ADMINISTRATIVE FRAMEWORK

The EIA Study has been conducted for the subject project as a mandatory requirement of Punjab Environmental Protection Act, 1997 (Amended 2012 & 2017). Section 12 (1) of the Act states that "No proponent of a Project shall commence construction or operation unless he has filed with the Provincial Agency an Environmental Impact Assessment or, where the Project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof." Other relevant laws have also been discussed briefly in Chapter-2.

According to the Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations 2022, the proposed project falls under Category "D" (*Transport, sub-category 'Highways, Motorways, Expressways and Major roads'*) of Schedule-II This category requires an EIA study to be conducted for urban development projects to initiate the process of environmental approval.

### ES-3 DESCRIPTION OF THE PROJECT

The proposed Neelum Road connecting Pine Avenue to Ferozepur Road starts from ferozpur road and ends at block M 3 A of Lake City, Lahore. The length of the road is approximately 11.41 Km with a ROW of 150 ft. The length of the underpass is approximately 2100ft with a ROW of 98 ft. Whilst, the Chenab Road, connecting LDA City to Sue Asal Link Road starts from block H of LDA City and ends at Safari Garden, Lahore. The length of the road is approximately 4.4 Km with a ROW of 200 ft.

It is expected to be completed in approximately six (06) months. The Project's estimated cost is around PKR 9,725.125 Million, including PKR 4,667.39 Million earmarked for construction works of Neelum Road and PKR 1,392.64 Million for Chenab Road. The details of other infrastructure e.g. water consumption, sewerage, etc. are provided in Chapter-3.



## ES-4 DESCRIPTION OF THE ENVIRONMENT

The baseline profile regarding physical, ecological and socioeconomic environment has been developed through primary and secondary sources.

### a) Physical Environment

The proposed Project falls under administrative jurisdiction of District Lahore. Lahore is generally flat and slopes towards south and south-west, city lies on the alluvial plain called Bari Doab. The Project area has moderate to extreme climate conditions, with hot summers and cold winters.

As per Building Code of Pakistan (BCP), 2007 (Seismic Provisions), the proposed Project falls entirely in the Zone-2A with Peak Ground Acceleration (PGA) 0.08 to 0.16 g. Major sensitive receptors includes health facilities, educational institutions, and religious places (mosques) recorded based on site survey and by using the GIS tool for the proposed Project.

### b) Ecological Environment

The study area has a variety of trees. But there is probably little natural vegetation left in the tract. The natural vegetation of the area, which consisted of tropical thorn forest, has long ago been replaced/damaged completely by humans. The trees raised like Kikar (*Acacia Arabica*), Shisham or Tahli (*Delbergia sissoo*), Beri (*Zizyphus jujube*), eucalyptus camaldunesis Toot (*Morus alba*), Sharin (*Albizzia lebbek*), Dherek (*Melia azedarach*), Pipal (*Ficus religiosa*) and Bohr (*Ficus bengalensis*)

The Study Area is agricultural land and not very rich in wildlife mammals. However, common mammals are Squirrels (*Funambulus*), Rats (*Mus musculus*), and Mongooses (*Herpestes auropunctatus*). These mammals are also reported in the area, but their number has been reduced to a bare minimum as a result of extensive hunting and shooting.

### c) Socio-Economic Environment

According to census of the 2023, the population of Lahore district is 13,004,135<sup>1</sup> with an average household size of 6.46. The increase in population was observed with the 2.65 growth rate with respect to census of 2017. The population of the district is predominantly Muslims. There is no declared heritage site in the Project area.

## ES-5 STAKEHOLDER CONSULTATION

A series of public consultations were conducted to get the feedback/ concerns of the different category of stakeholders including provincial departments i.e. LDA, Environment Department,

<sup>1</sup> <https://www.pbs.gov.pk/sites/default/files/population/2023/Punjab.pdf>



Wildlife Department, Punjab Horticulture Authority (PHA), etc., local community and other general public residing near the Study Area. Consultation process included focus group discussion, semi-structured interviews, one to one meeting and interviews with the government, private and civil society institutions. Basic concerns of the stakeholders were related to construction phase impacts and implementation of mitigation measures.

## ES-6 ANTICIPATED PROJECT IMPACTS AND MITIGATION MEASURES

Significant efforts were made to identify the main environmental (physical, ecological, social, and cultural) issues related to the design, construction and operation of the proposed Project. The significant adverse impacts and their mitigations during the construction and operation phases are here under:

- The air & noise pollution will be produced due to the operation of construction machinery and equipment. Noise and vibration are perceived as one of the most undesirable consequences of construction activities. There are a variety of ways by which construction equipment and worksite noise can be controlled that includes use of Quieter Equipment, Modification of Existing Old Equipment, Barrier Protection, change in Work Activity Schedule and Maintenance of vehicle/equipment.
- Wastewater will be generated at the construction camps and from construction activities. If the generated wastewater is not properly treated or disposed of, this may contaminate the surface water sources such as drains. The wastewater generation is estimated to be 4,800 liters/day; and sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit;
- A total of about 90 kg of solid waste will be generated from construction camps on daily basis. All the solid waste from the camps will be properly collected at source by placing containers and disposed of through proper solid waste management system;
- Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions from batching / asphalt plants can be controlled efficiently by the installation of cyclone / scrubbers. 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;
- The project will involve clearing of vegetation during construction of the project. A tree plantation program has been formulated with the recommendations of planting of 1,000 trees for area enhancement of similar floral function at the available spaces in/around the Project area;
- Due to the construction camps, number of impacts may arise that include waste, soil pollution, groundwater pollution, dust, etc. The construction activities and vehicular movement at construction sites may result in road side accidents particularly inflicting local communities who are not familiar with presence of heavy equipment. Institutions along the route may also suffer during construction period due to air, noise and road accidents. 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. Contractor will ensure the proper control on construction activities. Contractor will also 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.



## **ES-7 INSTITUTIONAL ARRANGEMENTS AND MONITORING PLAN**

The Environmental Monitoring Plan (EMP) of the proposed project mainly comprises institutional requirements; environmental mitigation and management matrix; environmental monitoring plan; plantation plan; Training and Capacity Building; Communication & Documentation; Management Plans; and EMP Cost. Contractor in coordination with Supervision Consultant and LDA will be responsible for implementation of EMP of the proposed Project during construction phase. The total cost required to effectively implement the mitigation measures is approximately PKR 12.48 Million, which includes cost of training, environmental monitoring, tree plantation and Health and Safety etc. during construction and operational phases. The EMP will be part of the contract document with the Contractor.

## **ES-8 CONCLUSION AND RECOMMENDATIONS**

Results of the EIA Study have shown that the impacts of the Project activities on the physical, ecological and social environment will be low to moderate significant. These impacts could be reduced by proper management and well-planned meticulous design of the proposed roads and underpass and by implementing an appropriate tree plantation plan. An EMP for both the phases (construction and operation) has been developed as part of the report, which provides a detailed mitigation matrix that covers impacts, mitigation measures roles and responsibilities and timings to avoid, minimize or mitigate the adverse impacts of the Project. EMP of the Project needs to be implemented in true letter and spirit.



## 1 INTRODUCTION

### 1.1 PROJECT BACKGROUND

Lahore, the capital of the Punjab Province is rapidly urbanized and has become regional urban center of key commercial activities, financial, industrial and socio-economic significance. The current population of Lahore City is estimated at around 11.3 million (2017 Census Report). Currently, the city is facing the phenomena of urban sprawl and in absence of adequate planning; there is expansion of urban areas outwards with continuous increase in boundary of the city. A projection is that by year 2025, there will be almost 15 million people living in the city. The unplanned expansion of the city, competing land use and exponential population growth with the rate up to 3.72% had put the burden on existing infrastructure of Lahore causing traffic congestion and pollution. With continuous increase in urban growth along the outstretch region of Lahore, there is a need for up-gradation and dualization of existing road as well as construction of new roads.

The Lahore Development Authority (LDA) intends to develop and embellish urban areas of Lahore into sustainable, livable and well-managed engines of economic growth to tackle the growing urban requirements of Lahore City. Therefore, the Lahore Development Authority (LDA), intend to plan and develop two structural roads i.e. (i) Neelum Road connecting Pine Avenue to Ferozpur road through LDA City and (ii) Chenab Road connecting LDA City to Sue Asal Link Road.

Lahore Development Authority (LDA) has engaged National Engineering Services Pakistan (NESPAK) Limited to provide Consultancy Services for the preparation of an Environmental Impact Assessment (EIA) study of the proposed Project, to fulfill the requirements of the Punjab Environmental Protection and Climate Change Department (Punjab-EP&CCD). This document presents the findings of the Environmental Impact Assessment (EIA) of the Construction of Structural Plan Roads (Neelum Road and Chenab Road) connecting to LDA City, Lahore.

### 1.2 NEED FOR ENVIRONMENTAL STUDY OF THE PROPOSED PROJECT

The Proposed Project is located in Punjab Province, therefore the Punjab Environmental Protection Act, 1997 (Amended 2012 & 2017) is the core environmental law for the Proposed Project. As per Punjab Environmental Protection Act (Amendment) 2017, under Section 12 (1) IEE/EIA is mandatory which states that:

*“No proponent of a project of public and private sector shall commence construction or operation unless he has filed an Initial Environmental Examination / Environmental Impact Assessment with the Punjab Environmental Protection Agency, as the case may be, or, where the project is likely to cause adverse environmental effects; an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof”.*



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According to the Punjab Environmental Protection Agency (Review of IEE and EIA) Regulations 2022, the proposed project falls under Category “D” (Transport, sub-category ‘Highways, Motorways, Expressways and Major roads’) of Schedule-II, which requires an EIA before commencement of construction.

### 1.3 NATURE, SIZE AND LOCATION OF THE PROJECT

The proposed Project involves construction of two (02) structural roads connecting to LDA i.e. (i) Neelum Road connecting Pine Avenue to Ferozepur Road starts from Block-A of LDA City and ends at Block M-3-A of Lake City, Lahore. The length of the road is approximately 9.71 Km with a ROW of 150 ft. An underpass is also going to be constructed at railway line. The length of the underpass is approximately 2100ft with a ROW of 98ft. Whilst, the Chenab Road, connecting LDA City to Sue Asal Link Road, starts from Block-H of LDA City and ends at B-Block, Safari Garden, Lahore. The length of the road is approximately 4.4 Km with a ROW of 200 ft. The Proposed Project connects various colonies with LDA City on the southern side of Lahore City. **Figure 1-1** shows the location map of the proposed Project.

### 1.4 SCOPE OF STUDY

The scope of this EIA Study aims at collection and scrutinizing of data related to physical, biological and socio-economic environment of the Project area and to prepare the baseline environmental profile. It also aims the identification, prediction and evaluation of the possible environmental impacts of the proposed Project on its immediate surroundings on both short and long-term bases in pre-construction, construction and operational phases. Based on the nature and scale of those impacts, appropriate mitigation and monitoring measures are proposed in this EIA Report.

### 1.5 OBJECTIVE OF EIA

The prime objective of the EIA study is to fully meet the statutory requirements set forth by the Punjab Environmental Protection Act, 1997 (Amended 2012 & 2017) to facilitate decision making by the Punjab-EPA regarding grant of No Objection Certificate (NOC)/ Environmental Approval for the Proposed Project.

The overall objective of this EIA is to elucidate the anticipated aspects of the proposed intervention and to propose necessary mitigation measures to prevent/minimize adverse impacts on surrounding environment and community. To achieve this objective, an assessment of the existing environmental conditions of the Project’s Corridor of Impact (COI) is a prerequisite. Therefore, baseline data of major environmental attributes has been acquired from primary and secondary sources. This EIA have been prepared to ensure adequate environmental and social management during pre-construction, construction and implementation stages of the proposed Project. It provides mechanisms to ensure that potentially significant environmental and social impacts of the proposed Project are identified, assessed and mitigated as appropriate.



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Specific objectives of this EIA report are to:

- Facilitate proponents of the Project in ensuring environmental and social sustainability of the Project;
- Establish a baseline of existing social and environmental conditions prior to Project initiation by collecting secondary data/ information on physical, biological and socio-economic environment of the Project area;
- Identify potentially significant environmental and social impacts (both positive and negative) during all stages of the Project;
- Avoid, minimize, and suggest mitigation measures for significant adverse impacts;
- Conduct, record and report and ensure consultations with major stakeholders; and
- Provide an Environmental Monitoring Plan and institutional arrangements for the proposed Project as a tool for the implementation of the suggested measure and evaluation mechanism with adequate resources including implementing agencies capacity building.

## 1.6 THE PROPONENT AND CONSULTANT

The Proponent and executing agency of the proposed Project is Lahore Development Authority (LDA), Government of Punjab, whereas National Engineering Services Pakistan (NESPAK) Private Limited is a consultant for the proposed Project. The contact address details are given as under:

### a) Proponent Contact Address

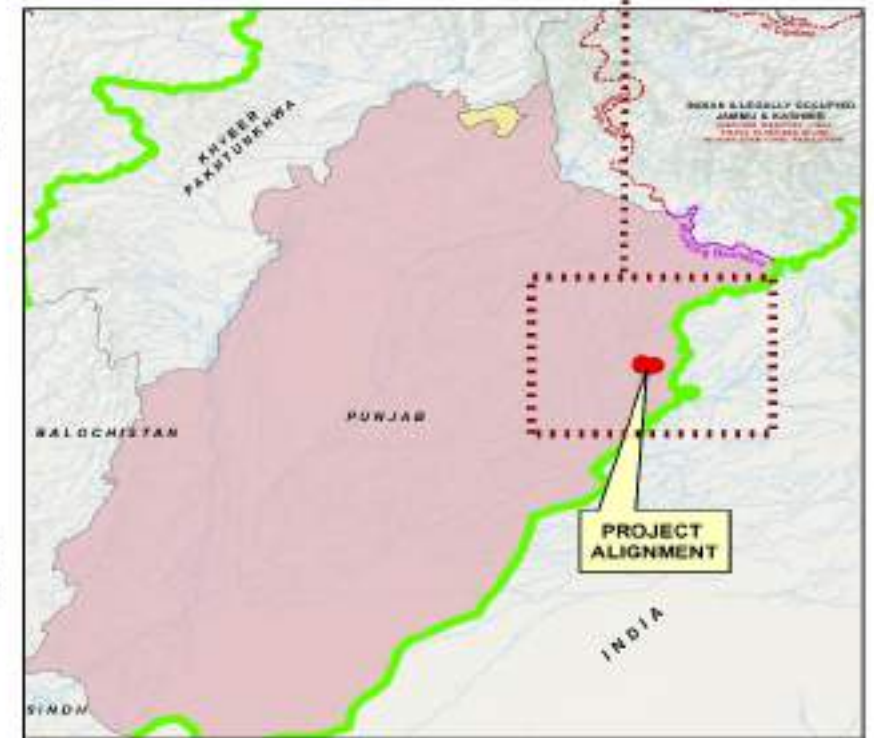
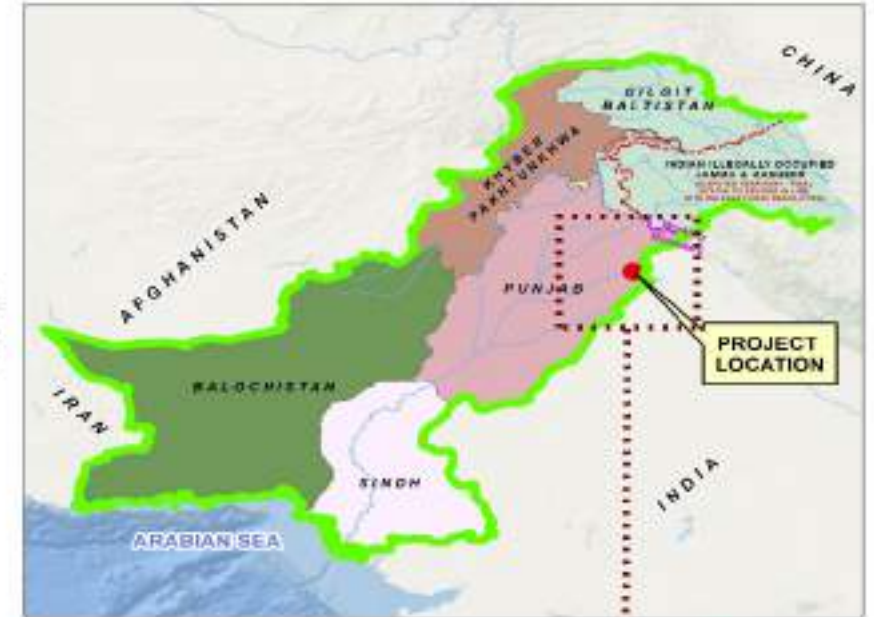
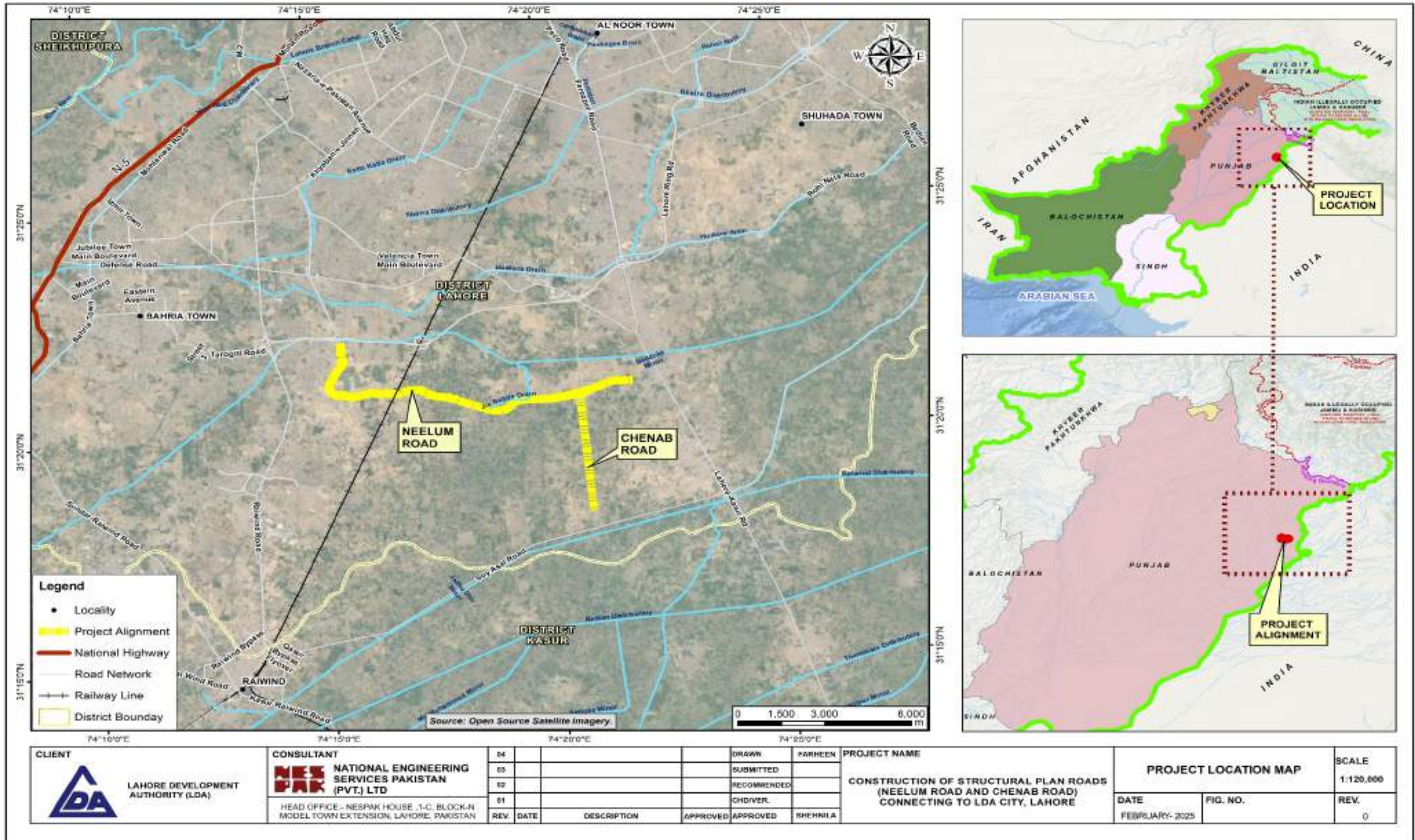
Lahore Development Authority (LDA), Government of Punjab  
467-DII Johar Town Lahore, Pakistan  
Telephone: + 92-42-992262244

### b) The Consultant

National Engineering Services Pakistan Private Limited (NESPAK),  
1-C, Block – N, Model Town Extension, Lahore.  
Tel: 042-99090000 Ext. 299



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<b>CLIENT</b> LAHORE DEVELOPMENT AUTHORITY (LDA)	<b>CONSULTANT</b> NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD HEAD OFFICE:- NESPAK HOUSE, 1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04			DRAWN	FARHEEN	<b>PROJECT NAME</b> CONSTRUCTION OF STRUCTURAL PLAN ROADS (NEELUM ROAD AND CHENAB ROAD) CONNECTING TO LDA CITY, LAHORE	<b>PROJECT LOCATION MAP</b>		SCALE
		05			SUBMITTED			1:120,000		
		02			RECOMMENDED		DATE	FIG. NO.	REV.	
		01			CHDIVER.		FEBRUARY-2025		0	
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED				



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**Figure 1-1: Location Map of the Proposed Project**



## 1.7 EIA TEAM COMPOSITION

Based on the requirements of the study, NESPAK formed a team of experts comprising a team leader (Environmental Specialist) with professional support from the Environmentalists, Sociologist and Ecologist. The professional staff was involved in analyzing the data, impact assessment and mitigation measures and report compilation. In addition, the EIA team worked in close coordination with the design team and several inputs were provided by the design specialists to the EIA team. Detail of EIA team is given in **Table 1.1** below:

**Table 1-1: Team Composition for the EIA Study**

Sr. No.	Name of Expert	Designation
1.	Mrs. Uzma Iqbal	Team Leader / Section Head
2.	Ms. Shehnila Hanif	Senior Environmental Scientist
3.	Ms. Ridha Kamran	Senior Environmental Scientist
4.	Ms. Ibadullah Khan	Senior Ecologist
5.	Mr. Akhtar Saleem	Senior Sociologist

## 1.8 APPROACH & METHODOLOGY

The following approach and methodology were adopted for carrying out the EIA study of the proposed Project:

### 1.8.1 Orientation

Meetings and discussions were held among the members of the EIA Consulting Team. This activity was aimed at achieving a common ground of understanding of various issues of the study. Subsequent to the concept clarification and understanding, a detailed data acquisition plan was developed for the internal use of the EIA consulting team. The plan identified specific data requirements and their sources; determined time schedules and responsibilities for their collection; and indicated the logistics and facilitation needs for the execution of the data acquisition plan.

### 1.8.2 Desktop Studies

Prior to mobilization, the consultants conducted a desktop study through collection and review of guidelines, data and reports related to the proposed project, that included (a) review of National Environmental Legislations; (b) Google Earth Satellite Imagery; (c) Relevant District Census Reports (DCR) and other relevant documents/drawings; and (d) Data available in previously conducted studies; Census Survey by Pakistan Bureau of Statistics, 1998 and 2017 for socio-economic data; and other design data provided by the Client.

### 1.8.3 Review of Environmental Laws and Institutional Requirements



All applicable national and international laws, legislations, guidelines along with relevant international protocols were reviewed relevant to the proposed Project components.

#### **1.8.4 Delineation of Study Area / Corridor of Impact (COI)**

For an EIA Study, a clear delineation of the Study Area / Corridor of Impact (COI) is required. Therefore, COI for the proposed Project was taken as 25 m on each side from the ROW of the proposed roads. Study Area / COI is the area within which the potentially significant impacts of the proposed Project activities (direct or indirect) are envisaged. In this report, the Study Area / COI is the area where the Project impacts has been accessed on the environment due to the proposed Project activities.

#### **1.8.5 Survey of COI**

A team of Environmentalists, Ecologist and Sociologist carried out the environmental and social survey of the COI to familiarize themselves with the local conditions and the environmental settings. During the survey, the information regarding the topography, soils, surface water, groundwater, flora & fauna, affected infrastructure, social settings and major settlements along the COI were observed.

#### **1.8.6 Environmental Baseline Survey of the Project**

Detailed environmental and social survey was carried out within the COI as mentioned before. For data collection, formal meetings were held and data was collected through visual observations, interviews with the local residents and officials. In order to collect the relevant published information, government offices were also visited.

Prior to the start of field activities comprehensive checklists, forms and maps were developed to collect the information related to following parameters:

#### **Physical Environment**

The information acquired for the establishment of physical environment baseline included the following main parameters:

- Land resources (including land use pattern, soil composition, contamination of soil and soil erosion etc.);
- Water resources (including available surface and groundwater resources and natural streams, hydrology, spring water, water supply, water contamination etc.);
- Climate data (including temperature, rainfall, humidity, wind speed and direction etc.);
- Wastewater, Drinking water, Surface water, Ambient air quality and noise level monitoring data;
- Existing solid waste management and effluents disposal practices and storm water drainage;



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- Buildings and infrastructure details, including residential, commercial and animal shed for complete/partial relocation;
- Religious, cultural and heritage information (mosques, shrines, graveyards);
- Archaeological monuments; and
- Other private/public infrastructures such as roads, telephone poles, hand pumps, tube wells etc.

### **Ecological Environment**

The status of the flora and fauna of the study area were determined by a review of literature of the area, and an assessment of both terrestrial and aquatic environments.

#### **a) Flora**

The vegetative communities were identified and classified into community types. Identification was carried out of dominant tree species, assessment of stage of growth (mature or sapling), etc.

#### **b) Fauna**

Information on fauna was gathered from existing literature on reported species as well as from observations in the field.

#### **c) Endangered Species**

Data/ information of endangered species (both flora and fauna, if any) was collected.

### **Socio-Cultural Environment**

The consultants utilized a combination of literature, field investigations, census report, meetings through public consultation and interviews to describe the existing social environment and assessment of the potential impact of the construction of the proposed Project. Data was gathered on the following aspects of the social environment:

- Land use and Municipal Status;
- Demographics;
- Livelihoods;
- Community Facilities;
- Solid Waste Management;
- Proposed Developments;
- Archaeological and Cultural Heritage; and
- Identification and Evaluation of Environmental Impacts.

#### **1.8.7 Stakeholder Consultations**

The Consultant identified Project stakeholders and held meetings with them during the surveys to receive feedback on the expected environmental issues related to the Project and



suggested mitigation measures. Meetings were carried out with the local public, relevant departments including Punjab-EP&CCD, PHA, Wildlife & Parks Department, Agriculture Department, Pakistan Railways, etc. to discuss the issues/constraints and get their views and feedback to mitigate the potential environmental as well as social impacts associated with the implementation and operation of the Project.

#### **1.8.8 Screening of Potential Environmental Impacts and Mitigation Measures**

Based on the generally established baseline conditions in the adjacent as well as in the Project Area, potential physical, ecological and social impacts of the proposed Project were identified, evaluated and quantified, wherever possible. A logical and systematic approach was adopted for impact identification and assessment by utilizing a combination of the secondary data, satellite imagery, environmental checklists, socioeconomic survey forms, field observations and discussion with the local residents of the Project Area. To mitigate the significant adverse impacts, adequate mitigation measures and implementation framework is proposed so that the proponent can incorporate them beforehand in the design phase.

#### **1.8.9 Institutional Arrangements and Environmental Monitoring Plan (EMP)**

An Environmental Monitoring Plan (EMP) has been prepared to ensure the adequacy and effectiveness of the suggested mitigation measures by clearly identifying the roles and responsibilities of the agencies, monitoring mechanism, monitoring plan for environmental and social parameters with their frequency, existing and suggested framework, necessary approvals and the required further studies. Similarly, costs for environmental monitoring and social component/social mitigation measures were also estimated.

#### **1.8.10 Conclusion and Recommendations**

Based on the baseline conditions, identified impacts & suggested mitigation measures and proposed environmental cost, conclusions have been developed along with recommendations regarding the future plan of action and outcome of the EIA report.

### **1.9 STRUCTURE OF THE REPORT**

This report has been structured into following sections;

Section 1 “**Introduction**” briefly presents the Project background, scope, methodology and need of the IEE study.

Section 2 “**Policy, Legal and Administrative Framework**” provides a brief about national environmental policies, statutory obligations and roles of institutions concerning EIA study of the proposed Project.

Section 3 “**Project Description**” furnishes information about the location of the proposed Project, cost and size of the Project and its major components.



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Section 4 “**Description of the Environment**” establishes baseline conditions for physical, biological and socio-economic conditions prevalent in the Project area.

Section 5 “**Stakeholder Consultation**” identifies the main stakeholders and their concerns raised through scoping sessions, and presents the measures to mitigate the social impacts.

Section 6 “**Anticipated Environmental Impacts and Mitigation Measures**” identifies, predicts and evaluates impacts of the Project activities during the construction and operation stages of the Project and recommends the measures to mitigate potential environmental impacts of the proposed Project.

Section 7 “**Environmental Management Plan**” provides an overall approach for managing and monitoring the environment related issues and describes the institutional framework and resource allocations to implement the EMP along with the environmental monitoring plan.

Section 8: **Conclusions and Recommendations** present the outcome of the study and major observations of EIA and suggestions for environmental management and pollution control.



## 2 LEGAL AND ADMINISTRATIVE FRAMEWORK

### 2.1 GENERAL

This section provides an overview of the policy framework and legislation that applies to control the environmental consequences as a result of proposed project implementation and operation. The project needs to comply with all the applicable environmental policies, laws, guidelines, acts and legislations of Government of Pakistan and Provincial Government.

### 2.2 SUMMARY OF RELEVANT STRATEGIES, POLICIES, ACTS AND LEGISLATION

The summary of major relevant strategies, policies, acts and legislation from environmental perspective are briefly described in **Table 2-1** & **Table 2-2** below:

**Table 2-1: Main Policies Related to Environment and their Relevance to the Project**

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
1.	National Conservation Strategy, 1992	Pakistan National Conservation Strategy (NCS), which was approved by the federal cabinet in March 1992, is the principal policy document on environmental issues in the Country. 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.	The core areas that are relevant in the context of the proposed Project are pollution prevention during construction, conserving biodiversity and supporting forestry and plantation.
2.	National Environmental Policy, 2005	In March 2005, GoP launched its National Environmental Policy, which provides a framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It also provides broad guidelines to the Federal Government, Provincial Governments, Federally Administered Territories and Local Governments to address their environmental concerns and to ensure effective management of their environmental resources.	Clause (b) of sub-section 5.1 states that Environmental Assessment related provisions in Environmental Protection Act, 1997, would be diligently enforced for all developmental projects.
3.	National Climate Change Policy, 2012	The National Climate Change Policy provides a framework for addressing the issues that Pakistan faces or will face in future due to the changing climate. In view of Pakistan's high vulnerability to the adverse impacts of climate change, in particular extreme events, adaptation effort is the focus of this policy	This policy document is a 'living' document and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change.



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Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		<p>document. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out.</p> <p>The policy covers measures to address issues in various sectors such as water, agriculture, forestry, coastal areas, biodiversity and other vulnerable ecosystems. Notwithstanding the fact that Pakistan's contribution to global Greenhouse Gas (GHG) emissions is very small, its role as a responsible member of the global community in combating climate change has been highlighted by giving due importance to mitigation efforts in sectors such as energy, forestry, agriculture and livestock.</p> <p>Furthermore, appropriate measures relating to disaster preparedness, capacity building, institutional strengthening; technology transfer; introduction of the climate change issue in higher education curricula; ensuring environmental compliance through IEE and EIA in the development process; addressing the issue of deforestation and illegal trade in timber; promoting Clean Development Mechanisms (CDM); and raising Pakistan's stance regarding climate change at various international forums, have also been incorporated as important components of the policy.</p> <p>The policy thus provides a comprehensive framework for the development of Action Plans for national efforts on adaptation and mitigation.</p>	<p>This policy will accelerate due to the possible emissions from the construction machinery and equipment.</p>
4.	Punjab Climate Change Policy & Action Plan 2024	<p>The Punjab Climate Change Policy and Action Plan address the region-specific impacts of climate change in alignment with Pakistan's National Climate Change Policy (NCCP). Its aim is to mainstream climate resilience and adaptation in development planning across vulnerable economic and social sectors.</p> <p>The policy and action plan highlights the challenges faced by Punjab due to its varied agro-ecological zones and extreme weather events like floods, droughts, and rising temperatures. It outlines strategies for low-carbon development and climate resilience by focusing on sustainable urban development, improved agricultural practices, and disaster risk reduction.</p>	<p>This policy and action plan document is a 'living' document and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change.</p> <p>This policy and action plan will accelerate due to the possible emissions from the construction machinery and equipment.</p>



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Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
		<p>A significant component of the policy and action plan is the "Triple Win" strategy, which emphasizes low carbon emissions, climate resilience, and co-benefits that strengthen the water-energy-food nexus. This strategy is aiming for sustainable economic growth by prioritizing sectors like agriculture, energy, and industry while addressing climate risks.</p> <p>The policy and action plan also stresses the need for financial resources, technology transfer, and capacity building to achieve its objectives. It recommends creating a provincial climate change trust fund, enhancing public and private sector cooperation, and engaging in international climate finance mechanisms.</p>	
5.	National Drinking Water Policy, 2009	The National Drinking Water Policy provides a framework for addressing the key issues and challenges facing Pakistan in the provision of safe drinking water to the people. Drinking water is the constitutional responsibility of the provincial governments and the specific provision function has been devolved to specially created agencies in cities and Town and Tehsil Municipal Administrations under the Local Government Ordinance 2001.	This policy is applicable for the proposed Project during construction phase in terms of regular water quality monitoring.
6.	National Water Policy, 2018	The National Water Policy aims at efficient management and conservation of existing water resources, optimal development of potential water resources, steps to minimize time and cost overruns in completion of water sector projects, improving urban water management by increasing system efficiency and reducing non-revenue water through adequate investments to address drinking water demand, sewage disposal, handling of wastewater and industrial effluents; equitable water distribution in various areas and canal commands, measures to reverse rapidly declining groundwater levels in low-recharge areas, increased groundwater exploitation in high-recharge areas, effective drainage interventions to maximize crop production, improved flood control and protective measures, steps to ensure acceptable and safe quality of water, minimization of salt build-up and other environmental hazards in irrigated areas, institutional reforms to make the managing organizations more dynamic and responsive.	The core areas that are relevant in the context of the proposed Project are drinking water demand, sewage disposal, and handling of wastewater.



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Sr. No.	Policy/Strategy	Brief Coverage	Relevance to Project
7.	National Forest Policy, 2015	<p>The goal of this policy is to expansion, protection and sustainable use of national forests, protected areas, natural habitats and watersheds for restoring ecological functions, improving livelihoods and human health in line with the national priorities and international agreements.</p> <p>In line with the Federal functions of national policy, planning and implementation of international agreements, specific objectives of the National Forest Policy include:</p> <ol style="list-style-type: none"> <li>a) Promoting ecological, social and cultural functions of forests through sustainable management and use of forest produce including wood and non-wood forest products;</li> <li>b) Implementing a national level mass afforestation programme to expand and maintain optimum forest cover;</li> <li>c) Maximizing forest areas by investing in available communal lands/ shamlat, and Guzara forests and urban forestry;</li> <li>d) Facilitating and harmonizing inter-provincial movement, trade and commerce of wood and non-wood forest products through the Federal Forestry Board;</li> <li>e) Inter-linking natural forests, protected areas, wetlands and wildlife habitats to reduce fragmentation;</li> <li>f) Enhancing role and contribution of forests in reducing carbon emissions and enhancing forest carbon pools;</li> <li>g) Facilitating implementation of international conventions and agreements related to Forestry, Wetlands, Biodiversity and Climate Change; and</li> <li>h) Promoting standardized and harmonized scientific forest planning, research and education including for community-based management.</li> </ol>	<p>The proposed Project does not involve any national forests, protected areas, natural habitats and watersheds within its ROW. However, urban forestry triggers the Policy.</p>
8.	Pakistan Labour Policy, 2010	<p>The main objective of the Labour Policy, 2010 is the social and economic well-being of the labour of Pakistan. The Labour Policy, 2010 has following 4 parts:</p> <ul style="list-style-type: none"> <li>• Legal Framework;</li> <li>• Advocacy: rights of workers and employers;</li> <li>• Skill development and employment; and</li> <li>• Manpower export.</li> </ul>	<p>The labour force will be employed for the construction of the proposed Project. The provision of policy will apply to all the employed laborers.</p>
9.	National Disaster Risk Reduction Policy, 2013	<p>NDMA, being the lead focal agency for disaster preparedness and management, has therefore, embarked upon formulation of</p>	<p>This policy will be elicited if any unforeseen natural and man-made disaster occurs</p>



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		<p>a comprehensive National Disaster Risk Reduction Policy through wider consultations with all stakeholders including all provinces, state of AJ&amp;K and regions.</p> <p>This policy covers disasters risk reduction in a more holistic way and introduces a proactive and anticipatory approach by laying special emphasis on risk assessment and prevention.</p>	during the construction and operational phase.

**Table 2-2: Main Legislation/Acts Related to Environment and their Relevance to the Project**

Sr. No.	Act	Brief Coverage	Relevance to Project
1.	Punjab Environmental Protection Act, 1997 (as Amended up to 2017)	<p>The Punjab Environmental Protection Act, 1997 (as Amended up to 2017) is comprehensive legislation and provides the legislative framework for protection, conservation, rehabilitation and improvement of the environment. The 'environment' has been defined in the Act as: (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the interrelationships between any of the factors specified in sub-clauses 'a' to 'f'.</p> <p>The notable points of the law are:</p> <ul style="list-style-type: none"> <li>• No proponent of a project shall commence construction or operation unless he has filed an IEE/EIA with the Provincial Agency designated by the Provincial EPAs an EIA, and has obtained an approval;</li> <li>• Establishment and formation of the Punjab Environmental Protection Council (PEPC);</li> <li>• Prohibition of certain discharges or emissions;</li> <li>• Punjab Environmental Quality Standards (PEQS) for wastewater, air emissions and noise; and</li> <li>• Provincial Government can issue notices and enforce them to protect the environment.</li> </ul> <p>In the recent amendment of 2012, legislatives powers related to environment and ecology are given to provincial governments from the Federal government. The provinces are required to enact their own legislation for environmental protection.</p>	<p>The provision of the Act is applicable to proposed Project for conducting an EIA according to section 12 and to obtain environmental approval from the EP&amp;CCD.</p> <p>The section 11 of the Act is applicable in terms of compliance with Punjab Environmental Quality Standards (PEQS). Similarly, section 13 of the act prohibits the import of hazardous waste. The provisions of section 16 are also applicable to comply with the discharge or emission of any effluent, waste, air pollutant or noise or disposal of waste or handling of hazardous substance. Under section 17, penalties will apply if anyone fails to comply with the provisions of section 11, 12, 13 and 16.</p>



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Sr. No.	Act	Brief Coverage	Relevance to Project
		<p>Other amendments include increasing the penalties for violations.</p> <p>For the proposed Project, Environmental Protection and Climate Change Department (EP&amp;CCD)/Environmental Protection Agency (EPA), Government of the Punjab (GoPb) is the concerned authority. The capability of regulatory institutions for environmental management is ultimately responsible for the success of environmental assessments and that development projects are environmentally sound and sustainable.</p>	
2.	<p>Punjab Environmental Protection Agency, (Review of IEE and EIA) Regulations, 2022</p>	<p>These regulations set out:</p> <ul style="list-style-type: none"> <li>• Key policy and procedural requirements for filing an EIA;</li> <li>• The purpose of environmental assessment;</li> <li>• The goals of sustainable development;</li> <li>• The requirement that environmental assessment be integrated with feasibility studies;</li> <li>• The jurisdiction of the Federal and Provincial EPA's and Planning &amp; Development (P&amp;D) Departments;</li> <li>• The responsibilities of proponents;</li> <li>• Duties of responsible authorities;</li> <li>• Provides schedules of proposals that the project requires either IEE or an EIA;</li> <li>• The environmental screening process of the projects under schedule I, II and III; and</li> <li>• The procedure for the environmental approval for filing the case with the concerned EPA for the granting of the NOC.</li> </ul>	<p>The provisions of these regulations are applicable for environmental screening of the Project, which implies that an EIA is required for the proposed Project. The process described in the regulation will be useful for LDA to follow the procedure to file an EIA with Punjab EP&amp;CCD and to understand its review process along with timelines to be followed.</p>
3.	<p>Punjab Environmental Quality Standards (PEQS), 2016</p>	<p>PEQS promulgated recently in 2016. Specified standards under PEQS are for:</p> <ul style="list-style-type: none"> <li>• Drinking Water;</li> <li>• Ambient Air;</li> <li>• Noise;</li> <li>• Industrial Gaseous Emissions;</li> <li>• Municipal and Liquid Industrial Effluents;</li> <li>• Motor vehicle exhaust and noise; and</li> <li>• Treatment of Liquid and Bio-Medical Waste.</li> </ul>	<p>All projects to be implemented in Punjab must conform to PEQS during all the phases i.e., construction and operation.</p>
4.	<p>Guidelines for the Preparation and Review of Environmental Reports, 1997</p>	<p>These guidelines describe the format and content of IEE/EIA reports to be submitted to PEPA for obtaining NOC/approval. The guidelines present:</p> <ul style="list-style-type: none"> <li>• The environmental assessment report format;</li> <li>• Assessing impacts;</li> </ul>	<p>The guidelines are applicable for the preparation of the EIA.</p>



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Sr. No.	Act	Brief Coverage	Relevance to Project
		<ul style="list-style-type: none"> <li>• Mitigation and impact management and preparing an environmental management plan;</li> <li>• Reporting;</li> <li>• Review and decision making;</li> <li>• Monitoring and auditing; and</li> <li>• Project Management.</li> </ul>	
5.	Guidelines for Environmental Assessment	<p>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.</p> <ul style="list-style-type: none"> <li>• Guidelines for the Preparation and Review of Environmental Reports, Pakistan Environmental Protection Agency, 1997;</li> <li>• Guidelines for Public Consultation, Pakistan Environmental Protection Agency, May, 1997; and</li> <li>• Sectoral Guidelines: Pakistan Environmental Assessment Procedures, Pakistan Environmental Protection Agency, October 1997.</li> </ul>	The guidelines are applicable for the preparation of the EIA.
6.	Pakistan Climate Change Act, 2017	This Act aims to meet obligations under international conventions relating to climate change and to provide for adoption of comprehensive adaptation and mitigation policies, plans, programmes, projects and other measures required to address the effects of climate change and for matters connected herewith and ancillary thereto.	This Act will accelerate due to the anticipated emissions from the construction machinery.
7.	Land Acquisition Act (LAA), 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. The principles laid down for the determination of compensation, as clarified by judicial pronouncements made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately. The land needed for the construction of development projects will be acquired under normal conditions based on prevailing market prices or negotiated prices between client and the owners of land. Section 17(4) of the LAA will not be used in the absence of an emergency. Instead, the land will be purchased under willing-seller willing-buyer deal at agreed upon market rates and the	This Act is applicable as land acquisition is required in this proposed Project.



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Sr. No.	Act	Brief Coverage	Relevance to Project
		seller will have the option not to sell the land, in case an acceptable deal for both the parties is not reached.	
8.	Punjab Wildlife Act, 1974	The Punjab Wildlife Act (1974) is developed for the regulation of activities relating to protection, conservation and management of wildlife in Punjab.	The proposed Project involves the cutting of trees where unavoidable, which will be managed through extensive tree plantation, therefore, the provisions of this law will be helpful.
9.	Punjab Plantation and Maintenance of Trees Act, 1974	The Punjab Plantation and Maintenance of Trees Act, (1974) regulates tree plantations and enforces measures for their protection.	The requirements of this Act are applicable in terms of planting new trees and their maintenance as proposed in this Project.
10.	Land Acquisition Act (LLA), 1894 including Later Amendments	The Land Acquisition Act, 1894, is a “law for the acquisition of land needed for public purposes and for construction 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. The principles laid down for the determination of compensation, as clarified by judicial pronouncements made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately. The land needed for the construction of development projects will be acquired under normal conditions based on prevailing market prices or negotiated prices between Package Limited and the owners of land. Section 17(4) of the LAA will not be used in the absence of an emergency. Instead, the land will be purchased under willing-seller willing-buyer deal at agreed upon market rates and the seller will have the option not to sell the land, in case an acceptable deal for both the parties is not reached.	This act will be elicited as proposed Project involve acquisition of land in the Project area for the construction of roads.
11.	Pakistan Antiquities Act 1975 & Punjab Antiquities Amendment Act 2012	The Punjab Antiquities Amendment Act, 2012 is adopted from the Pakistan Antiquities Act of 1975 with a few minor changes. The Antiquities Act, 1975 (amended in 1990) states the following: <ul style="list-style-type: none"> <li>• “Ancient” is any object that is at least 75 years old;</li> <li>• All accidental discoveries of artefacts must be reported to the Federal Department of Archaeology;</li> <li>• The Government is the owner of all buried antiquities discovered on any site, whether protected or otherwise;</li> </ul>	The law will be applicable to the project mainly due to its two provisions: <ul style="list-style-type: none"> <li>▪ According to the law, any construction activity within 61 m or 200 ft. of protected antiquities, are prohibited.</li> </ul> <p>The provisions of this Act would also be applicable, if any accidental archaeological discoveries may occur during the excavation works for the</p>



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Sr. No.	Act	Brief Coverage	Relevance to Project
		<ul style="list-style-type: none"> <li>All new construction within a distance of 200 feet from protected antiquities is forbidden;</li> <li>No changes or repairs can be made to a protected monument, even if it is owned privately, without approval of the responsible authorities; and</li> <li>The cultural heritage laws of Pakistan are uniformly applicable to all categories of sites regardless of their state of preservation and classification as monuments of national or world heritage.</li> </ul>	construction of proposed Project.
12.	The Punjab Special Premises (Preservation), Ordinance, 1985	The Punjab Special Premises (Preservation), Ordinance (1985) provides the legal framework for preservation of premises of historical, cultural, archaeological, and architectural value in the Punjab province. This legislation empowers the provincial government to notify heritage sites and sites of cultural and archaeological importance and to prohibit implementation of developmental schemes or new constructions within the notified areas around the special premises. So far 246 sites stand notified under the Punjab Ordinance.	The provision of the ordinance is applicable for protection and conservation of special premises declared by department of Youth Affairs, Sports, Archeology & Tourism, Punjab. The ordinance is applicable in terms of land acquisition, entrance, exploitation and destruction of special premises near site.
13.	Labour Laws as part of Constitution of Pakistan 1973	<p>The Constitution of Pakistan contains a range of provisions with regards to labour rights, in particular:</p> <ul style="list-style-type: none"> <li>Article 11 of the Constitution prohibits all forms of slavery, forced labour and child labour;</li> <li>Article 17 provides a fundamental right to exercise the freedom of association and the right to form unions;</li> <li>Article 25 lays down the right to equality before the law and prohibition of discrimination on the grounds of sex alone; and</li> <li>Article 37(e) makes provision for securing just and human conditions of work, ensuring that children and women are not employed in vocations unsuited to their age or sex, and for maternity benefits for women in employment.</li> </ul> <p>Labour law is controlled at both provincial and national levels with compulsory employment agreements containing the terms set out by the labour laws. The labour laws are a comprehensive set of laws in Pakistan dealing with the following aspects:</p> <ul style="list-style-type: none"> <li>Contract of Employment;</li> <li>Termination of Contract;</li> <li>Working Time and Rest Time;</li> <li>Working hours;</li> </ul>	The labour laws will be relevant, as it would deal with employment of labour for the construction of proposed Project.



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Sr. No.	Act	Brief Coverage	Relevance to Project
		<ul style="list-style-type: none"> <li>• Paid Leave;</li> <li>• Maternity Leave and Maternity Protection;</li> <li>• Other Leave Entitlements;</li> <li>• Minimum Age and Protection of Young Workers;</li> <li>• Equality</li> <li>• Pay Issues;</li> <li>• Workers' Representation in the Enterprise;</li> <li>• Trade Union and Employers Association Regulation; and</li> <li>• Other Laws.</li> </ul>	
14.	Punjab Municipal Water Act, 2014	The basic aim of the Act is to recognize, regulate and manage present and future municipal water supply and sanitation services and to establish rights of access to basic water supply and basic sanitation, and to ensure conservation of water resources in the province. This Act is in draft stage.	This Act will elicit if there is misappropriation of water supply during construction activities.
15.	The Punjab Water Act, 2019	This act ensures comprehensive management and regulation of water resources in the Punjab in the interest of conservation and sustainability.	This Act will be triggered for sustainable use of water required for construction purposes.
16.	Hazardous Substance Rules, 2018	The rule describes the procedure of handling, transportation and disposal of hazardous substances and hazardous waste. Inter alia, general safety precautions for handling hazardous substances as well as safety precautions for workers, and notification requirements in the event of an accident are described in these rules. Requirements for project waste management plans are also defined. These include a requirement for updating the plan every three years, the need to provide for management of hazardous waste in a manner that will prevent adverse environmental impacts and to ensure that hazardous and non-hazardous waste are not mixed.	This rule is applicable to the proposed Project which will guide on hazardous waste handling, use and disposal during the construction stage.
17.	Punjab Environmental Protection (Motor Vehicles) Rules, 2013	Subject to the provisions of this act, and the rules and regulations, no person shall operate a motor vehicle from which air pollutants and noise are being emitted in an amount, concentration or level which is in excess of the Punjab Environmental Quality Standards (PEQS), or where applicable the standards established under clause (g) of subsection (1) of section 6 of the act.	This Act will be elicited during construction and operational phase due to use of motor vehicles and associated generation of air pollutants and noise.
18.	The Punjab Occupational Safety and Health Act, 2019	This Act entails provision of occupational safety and health of the workers at workplace and to protect them against risks arising out of the occupational hazards; to promote safe	The Act will safeguard health and safety of the workers at workplace associated with the Project activities during



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Sr. No.	Act	Brief Coverage	Relevance to Project
		and healthy working environment catering to the physiological and psychological needs of the employees at workplace.	construction and operational phase to ensure health and safety of workers.
19.	Punjab Restriction on Employment of Children Act, 2016	According to the sub-section 11(a) of this Act, an occupier who employs or permits a child (person under the age of 15 years) to work in an establishment shall be liable to punishment with imprisonment for a term which may extend to six months, but which shall not be less than seven days, and a mandatory fine between 10,000 and 50,000 rupees.	This Act will restrict the contractor to hire skilled and unskilled labour under age 15.
20.	Punjab Protection of Women against Violence Act, 2016	The act is administered by federal government which provides guidelines for the provision of disaster management plans, offer necessary technical assistance to the Provincial Governments and Provincial Authorities as well for preparing their disaster management plans in case of any mishap.	This Act is valid to the subject Project in case of any unseen situation and will ensure protection of women against any violence and harassment.
21.	The Parks and Horticulture Authority Act, 2012	This act entails regulation, development, and maintenance of public parks, green belts and green areas in the Punjab; regulation of billboards, sky signs and outdoor advertisements; to promote open and unrestricted views of the Punjab.	This act will be triggered if green belts along the proposed Project boundary will be affected during construction phase due to the construction of the contractor camps.
22.	Cutting of Trees (Prohibition) Act, 1975	The Act was enforced in 1975 to place restrictions on cutting of trees in order to restrain unchecked trend of tree felling without replacement plantations.	This Act will be applicable to the subject project if the cutting of tree will be involved.
23.	Punjab Forest Act (Amended), 2016	The act empowers the provincial forest departments to declare any forest area as reserved or protected. It empowers the provincial forest departments to prohibit the clearing of forest for cultivation, grazing, hunting, removing forest produce, quarrying and felling, lopping and topping of trees, branches in reserved and protected forests.	The provisions of this act triggers if the proposed Project involve any disturbance to nearby reserved forests in the Project area.
24.	The Punjab Protected Areas Act, 2020	The Act provides provisions for the protection, preservation, conservation and management of ecologically important areas such as National parks, Nature reserves, Wildlife sanctuaries, Wilderness areas, Buffer zone, Wetlands, etc.	This Act will not be triggered, as there is no protected area in and around the study area.
25.	The Punjab Heritage Foundation Act, 2005	This act entails preservation, conservation, maintenance and rehabilitation of the Punjab Heritage through various means, including technical or financial assistance and to create awareness among the people for preservation of the Punjab Heritage.	This Act will not be elicited as no heritage sites is present within the proposed Project routes.
26.	The Punjab Emergency Services Act, 2006	It deals with the establishment of emergency service for a purpose of maintaining a state of preparedness to deal with emergencies, to provide timely response, rescue and emergency medical treatment to the affected	This Act will be helpful to the proposed Project to provide timely response, rescue and emergency medical treatment to the affected persons during



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Sr. No.	Act	Brief Coverage	Relevance to Project
		persons and recommending measures to be taken by related organizations to avoid any emergency situation. It describes procedures to establish emergency service, emergency board, emergency fund, emergency ambulance and rescue vehicles, offence and punishment, etc.	construction and operational phase of Project.
27.	National Disaster Management Act, 2010	National Disaster Management Act, 2010 was passed by Parliament of Pakistan in 2010. The Act applies to whole Pakistan. The Act was passed in backdrop of 2010 Floods in Pakistan and strengthens Disaster Management system.	This Act will address flood protection. The proposed Project will require special consideration to disasters and risk management strategies as per the Act.
28.	Seismic Building Code of Pakistan 2007	This code stipulates the minimum requirements for seismic safety of building and structures and the provisions of the Building Code of Pakistan (Seismic Provisions-2007) shall apply for engineering design of buildings, like structures and related components. Construction of buildings shall be considered as violation of professional engineering work specified under clause (XXV) of section 2 of the Act.	This Code is applicable to the proposed Project as it involves the construction of structures (culverts).
29.	Punjab Irrigation, Drainage and Rivers Act, 2023	This Act states that all-natural waters in Punjab vest to the Government of Punjab. This Act defines the rights of the riparian owners, rights to water accessed by public road etc. and abstraction rights to ground water sources owners for all-natural waters including those of rivers, canals, lakes, dams and drains etc. This Act also promulgates the requirements for the irrigation and reclamation schemes. This Act promotes sustainable water practices in the Punjab Province. It provides for better and sustainable irrigation, drainage, and control and management of rivers, streams, lakes, ground water and navigation in Punjab. The Act establishes minimum standards for irrigation and drainage services, which Canal Officers are required to maintain. An independent unit is maintained to measure the quality of services against these standards. It requires the preparation of village irrigation plans for each outlet, involving owners and occupiers of lands in the irrigation area. The Act empowers the government to draw up schemes for drainage works necessary for improvement, proper cultivation or irrigation of lands, or protection from floods. The cost of such schemes can be charged to the owners of benefited lands. Obstruction removal and drainage works	This Act is not applicable to the proposed Project since there is no planned construction along any natural water source.



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Sr. No.	Act	Brief Coverage	Relevance to Project
		carried out under the Act may require compensation to be paid to affected parties.	
30.	Punjab Environmental Protection (Smog Prevention and Control) Rules 2023	The rules define smog as a type of air pollution caused by the presence of high levels of particulate matter (PM), nitrogen dioxide (NO <sub>2</sub> ), and ozone (O <sub>3</sub> ) in the air. The rules identify the main sources of smog, including: Industrial activities, Vehicle emissions, Agricultural burning, Construction activities and Waste disposal. The rules require the establishment of a monitoring system to track smog levels and report on the data. These rules have also defined the standards for air quality (which are referred to PEQS), smog control measures and penalties to ensure the compliance.	During the proposed Project implementation, it shall be made sure that vehicle and construction activities do not generate air pollutants exceeding the limits set by PEQS 2016.
31.	Punjab Climate Change Policy, 2024	<p>The Punjab Climate Change Policy (PCCP) address the region-specific impacts of climate change in alignment with Pakistan's National Climate Change Policy (NCCP). Its aim is to mainstream climate resilience and adaptation in development planning across vulnerable economic and social sectors.</p> <p>The policy highlights the challenges faced by Punjab due to its varied agro-ecological zones and extreme weather events like floods, droughts, and rising temperatures. It outlines strategies for low-carbon development and climate resilience by focusing on sustainable urban development, improved agricultural practices, and disaster risk reduction.</p> <p>A significant component of the policy is the "Triple Win" strategy, which emphasizes low carbon emissions, climate resilience, and co-benefits that strengthen the water-energy-food nexus. This strategy is aiming for sustainable economic growth by prioritizing sectors like agriculture, energy, and industry while addressing climate risks.</p> <p>The PCCP also stresses the need for financial resources, technology transfer, and capacity building to achieve its objectives. It recommends creating a provincial climate change trust fund, enhancing public and private sector cooperation, and engaging in international climate finance mechanisms.</p>	<p>This policy document is a 'living' document and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change.</p> <p>This policy will accelerate due to the possible emissions from the construction machinery and equipment.</p>

### 2.3 INTERNATIONAL PROTOCOL / CONVENTIONS



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As Pakistan is member of a number of international organizations such as United Nations Organization (UNO), Organization of the Islamic Conference (OIC), South Asian Association for Regional Cooperation (SAARC) and Economic Cooperation Organization (ECO) etc., so it has to follow the international protocols and obligations related to the environment. The major protocols, ratification dates by Pakistan and obligations related to the proposed project are provided in the **Table 2-3** below.

**Table 2-3: International Agreements/Conventions Relevant to the Project**

Sr. No.	Name of International Convention	Aims and Objectives of the Policy and Plan	Relevancy to the Proposed Project
1.	United Nation Framework Convention on Climate Change (UNFCCC) Amended, 2015	The objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.	The implementation of the proposed Project will emit greenhouse gases (GHG) in the atmosphere due to the construction and operational activities.
2.	Kyoto Protocol (Amended), 2012	The Kyoto Protocol aimed to reduce carbon dioxide (CO <sub>2</sub> ) emissions and the presence of greenhouse gases (GHG) in the atmosphere.	The implementation of the proposed Project will emit greenhouse gases (GHG) in the atmosphere due to the construction and operational activities.
3.	UNESCO Convention on the Protection of the World's Cultural and Natural Heritage, 1972	The convention aims the protection of the natural and cultural heritages.	The convention will not be applicable as no world's cultural and natural heritage site is present in and around the Project area.
4.	Paris Agreement, 2015	The Paris Agreement's central goal is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below two degrees celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to one and half degrees celsius. Additionally, the agreement aims to increase the ability of countries to deal with the impacts of climate change, and at making finance flows consistent with a low GHG emissions and climate-resilient pathway.	The implementation of the proposed Project will emit greenhouse gases (GHG) in the atmosphere due to the construction and operational activities.
5.	The Convention on Conservation of Migratory Species of Wild Animals	The Convention requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the	There are no endangered species of plant life or animal life in the vicinity of the Project area.



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Sr. No.	Name of International Convention	Aims and Objectives of the Policy and Plan	Relevancy to the Proposed Project
		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.	
6.	Basel Convention, 1994	In 1994, Pakistan signed Basel Convention that restricts trans-boundary movements of "Hazardous Waste and their Disposal" with aim to protect human health and surrounding environment by minimizing the use of hazardous waste production.	The proposed Project will not be necessitating the endowment of this convention.
7.	International Union for Conservation of Nature and Natural Resources Red List, 2000	This enlists wildlife species experiencing various levels of threats internationally. Some of the species indicated in the IUCN red list are also present in the wetlands of Pakistan.	No wildlife species experiencing various levels of threats are present in and around the surroundings of the Project area.
8.	Ramsar Convention on Wetlands of International Importance, 1971	The Ramsar Convention is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources. The convention is an international treaty for the conservation and sustainable utilization of wetlands. It is the only global environmental treaty that deals with a particular ecosystem.	No Ramsar Site is present in and around the proposed Project area.
9.	Sustainable Development Goals (SDGs)	<p>At the Sustainable Development Summit on 25<sup>th</sup> September 2015, UN Member States adopted the 2030 Agenda for Sustainable Development, which includes a set of 17 SDGs to end poverty, fight inequality and injustice, and tackle climate change by 2030.</p> <p>Pakistan has displayed commendable commitment to the 2030 Agenda for Sustainable Development as it was one of the first countries to endorse it globally in 2015. On 16<sup>th</sup> February 2016, the Parliament unanimously approved the SDGs as the national development agenda.</p>	<p>The MDGs that will prevail for the proposed Project are as follows:</p> <ul style="list-style-type: none"> <li>• Promote Gender Equality and Empower Women: The contractor and LDA during construction phase will be responsible to hire women for construction activities to elude gender discrimination and to promote women empowerment.</li> <li>• Combat HIV/AIDS Malaria and Other Diseases: Contractor and LDA will be responsible to conduct medical surveillance of the workers before hiring to combat HIV/AIDS Malaria</li> </ul>



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD)  
FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY,  
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Sr. No.	Name of International Convention	Aims and Objectives of the Policy and Plan	Relevancy to the Proposed Project
			and other diseases. • Ensure Environmental Sustainability: Contractor and LDA will be responsible to ensure environmental sustainability of the proposed Project area by ensuring implementation of EMP to mitigate adverse environmental impacts from construction and operational activities during implementation stage.

## 2.4 ADMINISTRATIVE FRAMEWORK

### 2.4.1 Lahore Development Authority (LDA)

LDA is responsible for ensuring that the Project complies with the laws and regulations and mitigations measures suggested in EIA of the proposed Project for controlling the environmental and social concerns during pre-construction, construction and operation phase, and all pre-construction requisites, such as permits and clearances are met.

### 2.4.2 Environmental Protection and Climate Change Department, Punjab

Pakistan Environmental Protection Agency is meant for the enforcement of environmental laws in Pakistan. They have delegated powers to provincial environmental protection agencies for review, approval and monitoring of environmental examination/assessment projects. As the proposed Project falls in Lahore District of Punjab Province, therefore, Punjab-EP&CCD will be responsible for reviewing the report, issuing environmental approval and overall/broad based monitoring of the proposed Project activities



### 3 DESCRIPTION OF THE PROJECT

#### 3.1 GENERAL

This Chapter presents the detailed Project description along with Project cost, land requirements, implementation schedule, workforce and water requirements, etc.

#### 3.2 OBJECTIVES OF THE PROJECT

The primary goal of the proposed Project is to improve urban mobility and accessibility by developing a well-designed and strategically planned structural roads (Neelum Road and Chenab Road) connecting to LDA City with the capacity to handle future traffic growth. Additional objectives of the Project include:

- Establishing a direct link between Pine Avenue, Ferozepur Road and Sue Asal Link Road to reduce travel time and facilitate smooth movement between urban areas;
- Providing convenient and efficient routes to healthcare, education, and other essential services to the residents of housing societies such as LDA City, Safari Garden, Etihad Town Phase-2, Soul City, Mid-City, Khyaban-e-Amin, and Lake City by minimizing travel time;
- Providing better access to employment centers and commercial zones to stimulate local economic activity;
- Landscaping along the connecting road to improve air quality, provide recreational areas, and enhance the visual appeal of the area;
- Installing solar-powered street lighting along the connecting road to provide a sustainable source of energy, reducing reliance on non-renewable resources;
- Promoting sustainable housing and infrastructure development through a strengthened transportation network; and
- To develop efficient and smooth-flowing urban transportation, which will segregate different traffic streams, reduce the burden on the existing roads (Defence Road and Kahna Kacha Road), and facilitate faster vehicle movement.

#### 3.3 PROJECT ADMINISTRATIVE JURISDICTION

The proposed Project lies in Raiwind Tehsil and Cantonment Tehsil of District Lahore, Punjab.

#### 3.4 PROJECT ACCESSIBILITY

Neelum Road and Chenab Road passes through several areas, connecting key locations in Lahore. Therefore, it is accessible through Ferozepur Road, Halloki Ring Road Interchange, Pine Avenue, Kahna Kacha Road, Lahore Ring Road, Defence Road, Lahore-Kasur Road, Rani Nala Road and Raiwinid Road. The map showing the accessibility to the Project Area is shown in **Figure 3-1**.



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD)  
FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY,  
LAHORE





CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE

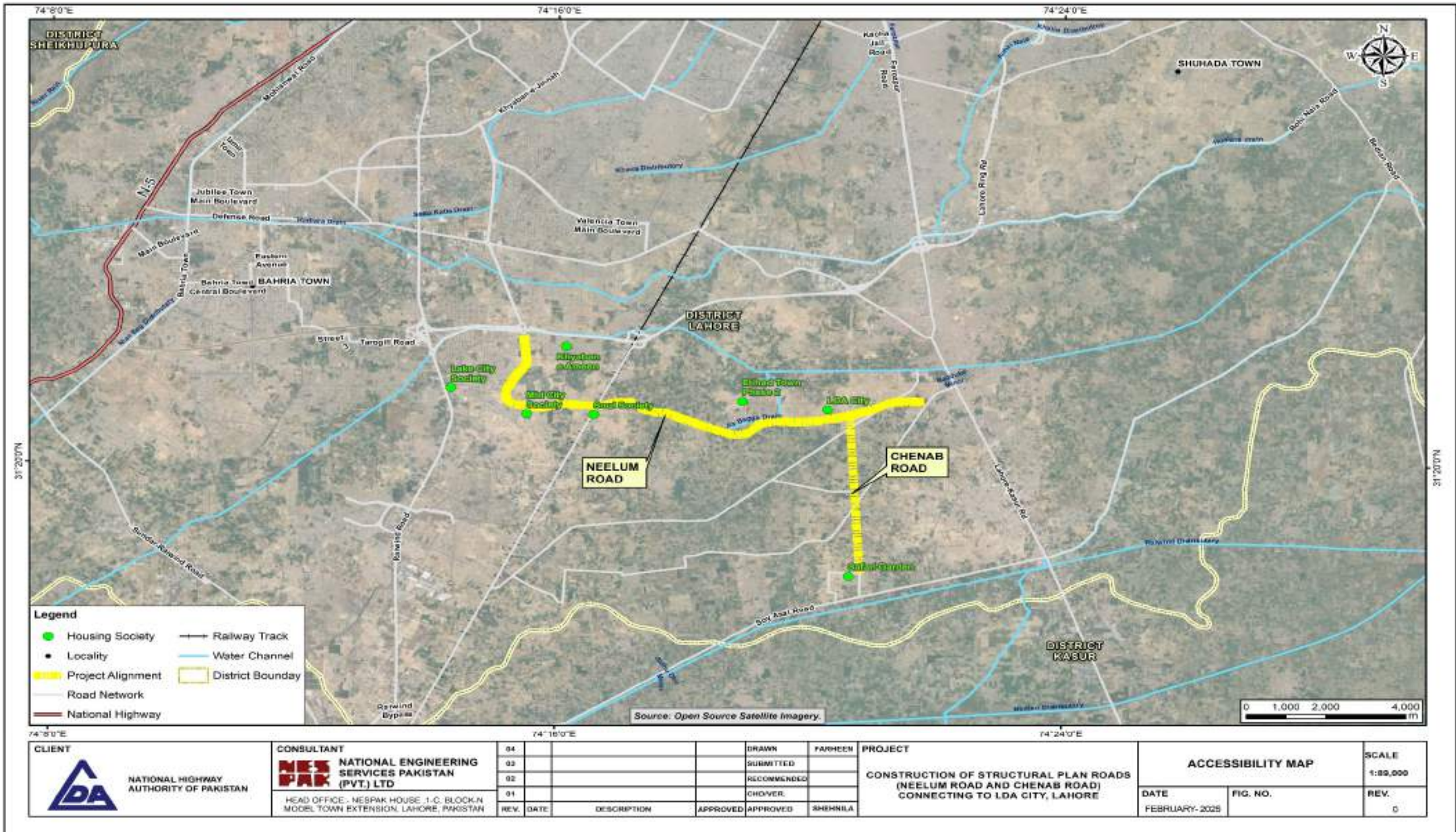


Figure 3-1: Accessibility Map of the Project Area



### 3.5 PROJECT IMPLEMENTATION SCHEDULE

The tentative implementation period for proposed Project is six (06) months.

### 3.6 COST OF THE PROJECT

The proposed Project's estimated cost is around PKR 9,725.12 Million, including PKR 4,667.39 Million earmarked for construction works of Neelum Road and PKR 1,392.64 Million for Chenab Road.

### 3.7 LAND ACQUISITION

The proposed structured Neelum Road, spanning 9.71 km including a 0.64 km (2,100 ft) underpass and Chenab Road spanning 4.4 km are part of the Lahore Master Plan 2050. Of the total alignment of Neelum Road, 2.58 km is owned by the Lahore Development Authority (LDA), while a 3.9 km section passing through Etihad Town Phase-2, Soul City, Mid-City, Khyaban-e-Amin, and Lake City<sup>2</sup> has been voluntarily donated by these housing societies. LDA is in the process of acquiring the remaining 4.8 km private land for Neelum Road and 4.4km for construction of Chenab Road.

### 3.8 SALIENT FEATURES OF THE PROJECT

#### NEELUM ROAD

The proposed Neelum Road connecting Pine Avenue to Ferozepur Road, starts from Block-A of LDA City and ends at Block M-3-A of Lake City, Lahore. The length of the road is approximately 9.71 km with ROW of 150 ft. The length of the underpass is approximately 0.6 km with ROW of 98 ft.

The design parameters of the proposed Project are provided in detail in **Table 3.1**.

**Table 3-1: Design Parameters**

Sr. No	Description	Length/width
<b>Road Works</b>		
1	Length of Road (approximately)	11.41 km
2	Number of Lanes	2+2 Lanes
3	ROW	150 ft
4	Sub-Base	8 inches
5	Water Bound Macadam (WBM)	8 inches
6	Asphalt Base Course (ABC)	3 inches

<sup>2</sup> During consultations with these societies, their representatives informed that a 150 ft ROW for the road has already been allocated in their Master Plan. They also expressed their support for the Project, noting that it will enhance the value of their land by linking all the societies through this structured road and reduce the travel time for residents who currently use Defence Road and Ferozepur Road, which are very busy roads.



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD)  
FROM PINE AVENUE TO FERAZI ROAD THROUGH LDA CITY,  
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Sr. No	Description	Length/width
7	Asphalt Bearing Course (ABC)	2 inches
<b>Underpass</b>		
8	Length of Road (approximately)	2100 ft
9	ROW	98 ft
10	Number of Lanes	3 + 3 Lanes
11	Concrete Strength	4000 psi
<b>RCC Culvert</b>		
12	Length of Culvert (approximately)	950 ft

### CHENAB ROAD

The proposed Chenab Road connecting LDA City to Sue Asal Link Road starts from Block-H of LDA City and ends at B-Block, Safari Garden, Lahore. The length of the road is approximately 4.4 Km with ROW of 200 ft.

The design parameters of the proposed Project are provided in detail in **Table 3.2**.

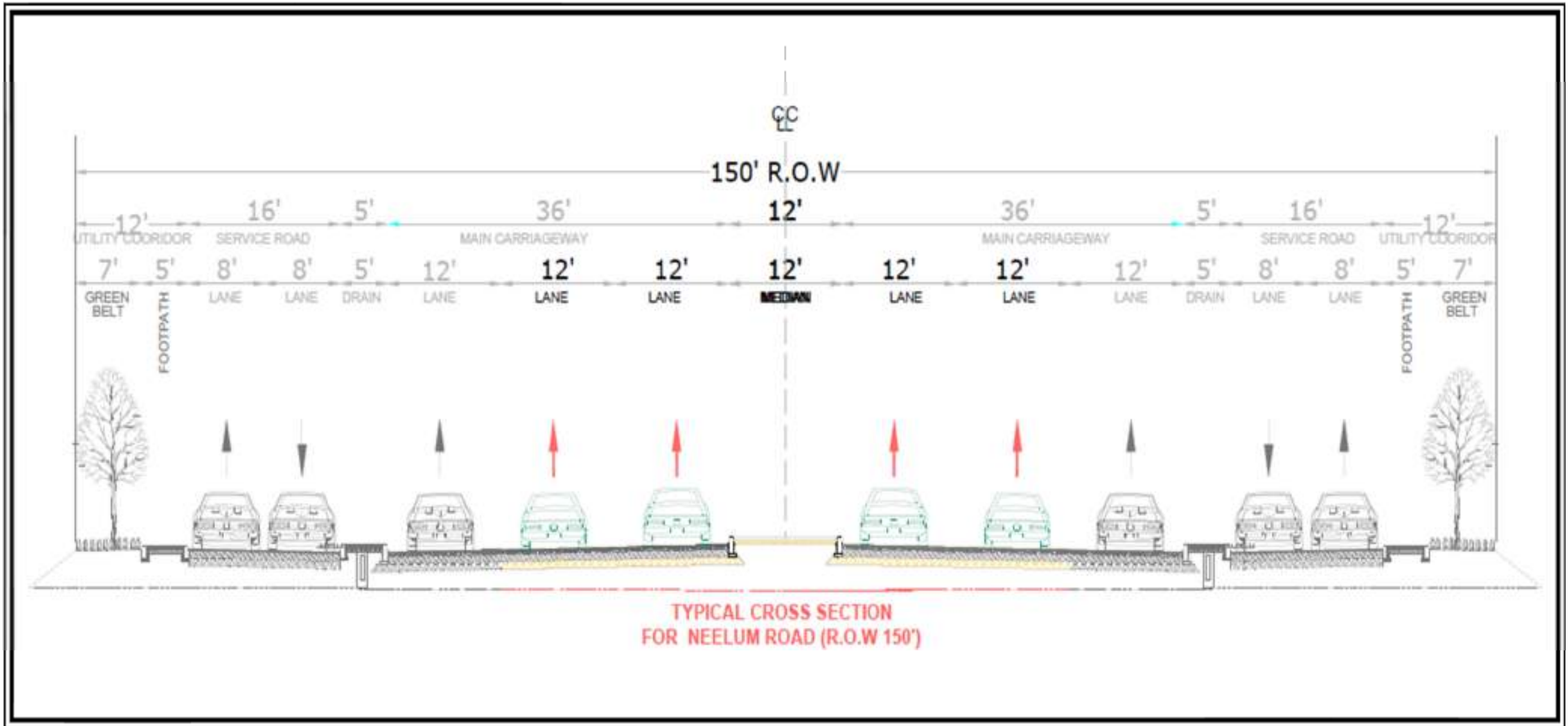
**Table 3-2: Design Parameters**

Sr. No	Description	Length/width
<b>Road Works</b>		
1	Length of Road (approximately)	4.4 km
2	Number of Lanes	2+2 Lanes
3	ROW	200 ft
4	Sub-Base	8 inches
5	Water Bound Macadam (WBM)	8 inches
6	Asphalt Base Course (Stage-I)	3 inches
7	Asphalt Bearing Course (ABC)	2 inches
<b>RCC Culvert</b>		
8	Length of Culvert (approximately)	328 ft

**Figures 3-2 (a), 3-2 (b), 3-2 (c) and 3-2 (d)** show typical cross-section plans of road works and **Figure 3-3** shows the proposed Project's concept plan.



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERROZPUR ROAD THROUGH LDA CITY, LAHORE





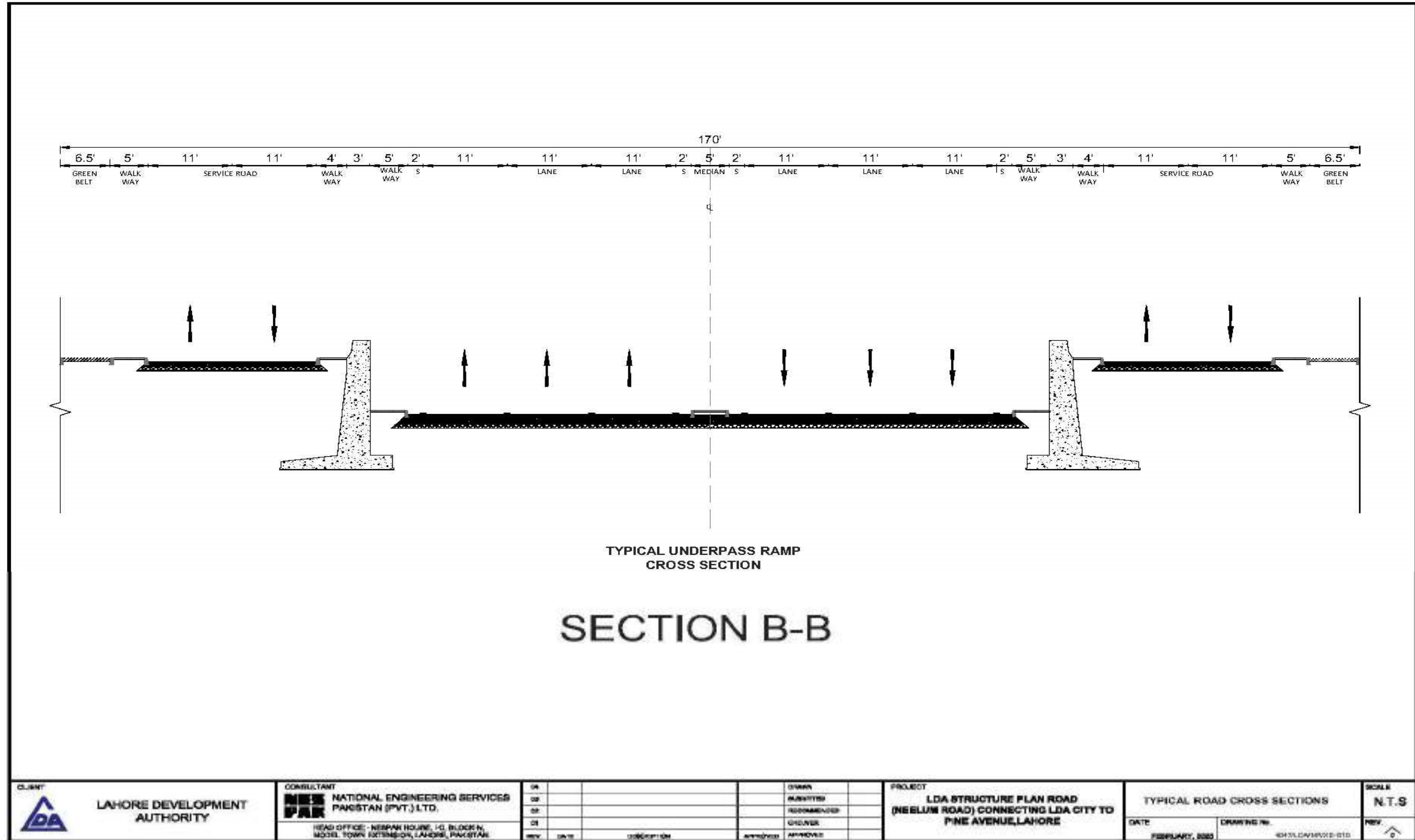
CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERROZPUR ROAD THROUGH LDA CITY,  
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**Figure 3-2 (a): Typical Cross Section A-A of the Neelum Road**



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE





**Figure 3-2 (b): Typical Cross Section B-B of the Underpass Ramp of the Neelum Road**



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE

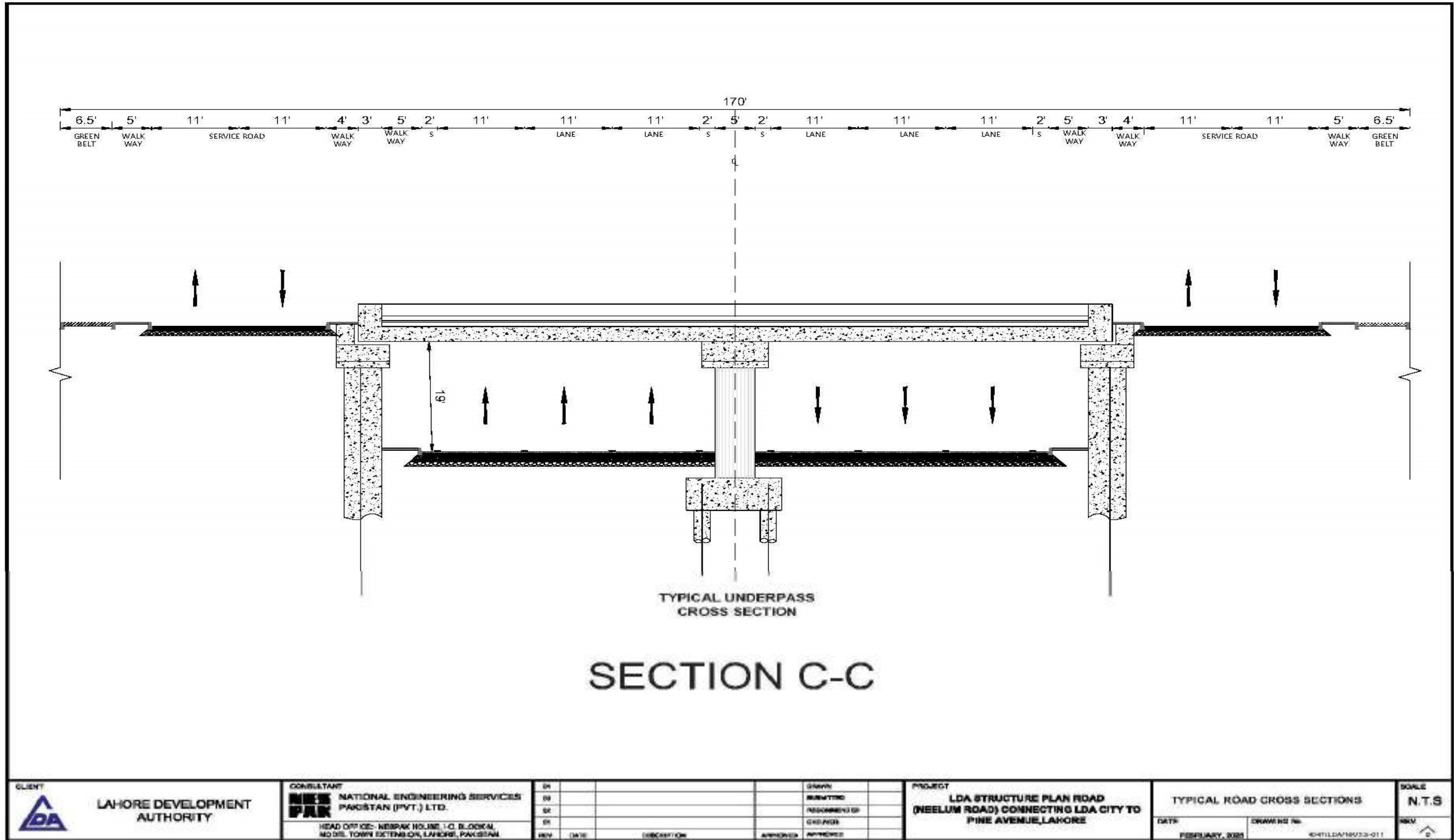


Figure 3-2 (c): Typical Cross Section C-C of the Underpass of the Neelum Road



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE

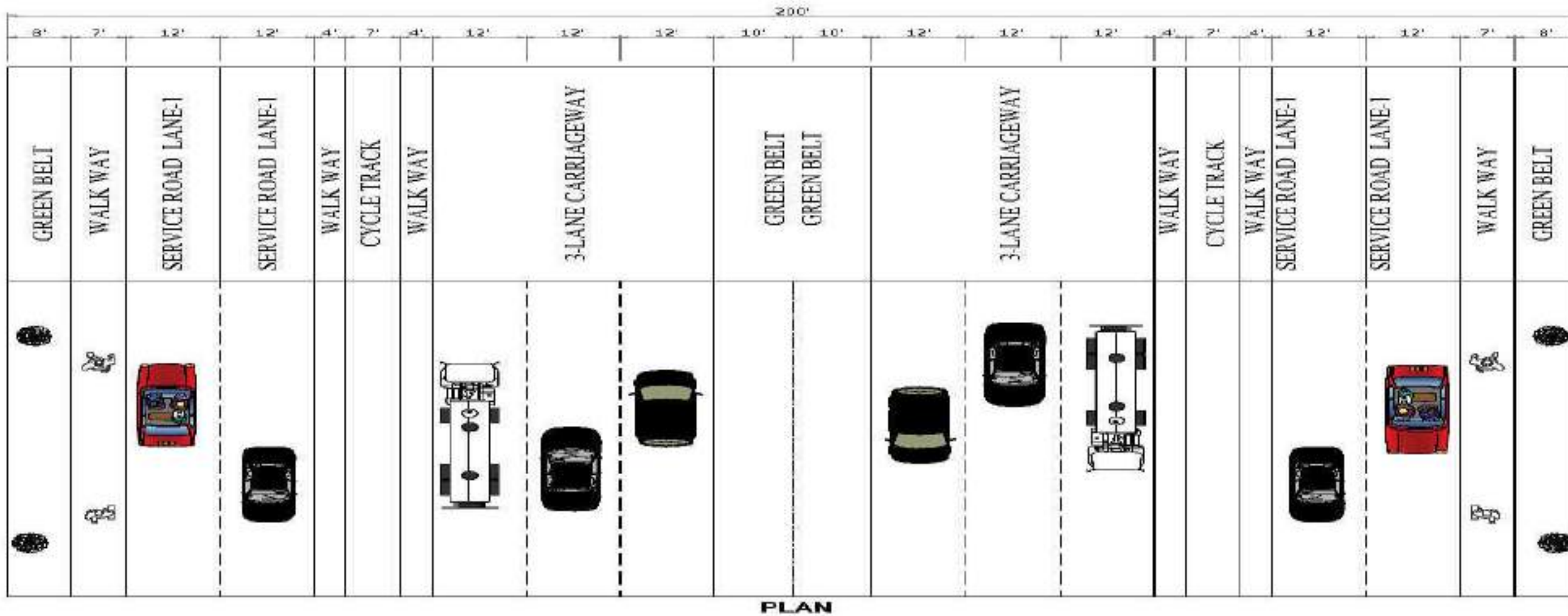
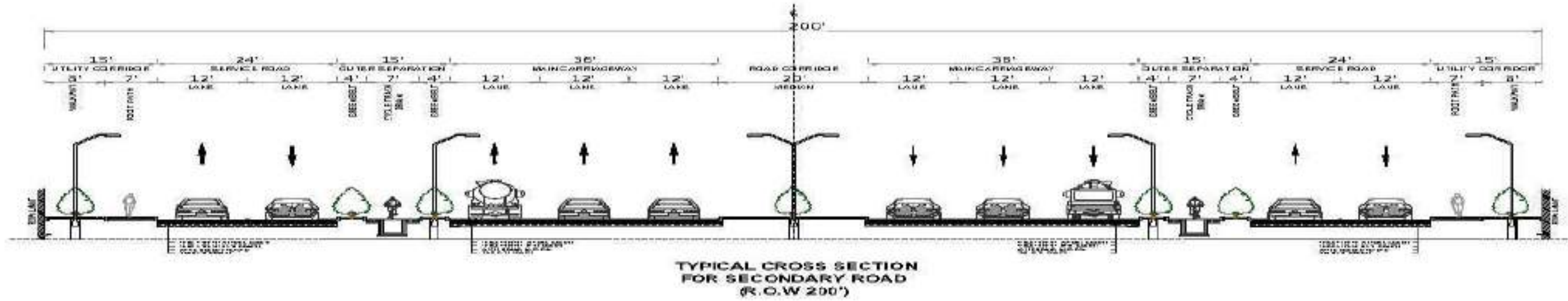


Figure 3-3 (d): Typical Cross Section of the Chenab Road



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE





CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY,  
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**Figure 3-4: 3D View of the proposed Concept Plan of Structural Roads**



### 3.9 CONSTRUCTION MATERIAL

The materials used in construction of the proposed Project would include following but not limited to: cement, sand, aggregates, stones, reinforced cement concrete frame (RCC Frame), brick infill, brick cladding coarse aggregates (crush), fine aggregates (sand), water, asphalt, reinforcement cement and steel.

- a) Crushed Aggregate of required specifications will be utilized by the contractor from available sources nearby the Project area.
- b) Good quality natural fine aggregate or sand of acceptable gradation will be obtained from nearby licensed or approved entities dealing with fine aggregates.
- c) Asphalt, reinforcement and cement material will be transported from the nearby factories or approved dealers for construction purposes.

### 3.10 EXPECTED EQUIPMENT'S FOR CONSTRUCTION

The list of the machinery and the equipment expected to be used for the proposed Project are provided in **Table 3-3**.

**Table 3-3: Machinery and Equipment Requirement for the Proposed Project**

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

### 3.11 CONSTRUCTION CAMPS

Construction camps for the construction of proposed Project components will be located within the premises of proposed Project.

However, if construction camp is to be located outside the Project boundary, following criteria shall be adopted by the Contractor to identify and for the establishment of the construction camp sites before the start of the construction:

- There should be no or minimum resettlement issues for the location of the camps;
- Camp site should be located at a distance of 1 to 2 kilometers away from the residential areas/settlements and sensitive receptors;
- Selection of sites for construction camps shall be near the Project area having proper access to the nearby main/link road;



- The camps must be located in a place where the drainage from and through the camps will not threaten any domestic or public water supply;
- Camp site must be adequate in size to prevent overcrowding of necessary structures;
- The camp site should consider avoiding any damage of property, vegetation, irrigation, and drinking water supply systems;
- The camp site must not be subject to periodic flooding; and
- There should not be any ecological sensitive areas e.g. wildlife sanctuaries, game reserves, national parks, forest areas, etc. near to the construction camp site.

### 3.12 WORKFORCE REQUIREMENTS

Manpower demand estimation is an essential component to facilitate deployment of manpower. Tentative workforce required for proposed Project during construction phase will be about 150 workers/employees. Unskilled labor should be hired locally.

### 3.13 SOURCE OF WATER

Contractor will be responsible to arrange water for construction works. However, it is supposed that water bowsers will be used by the contractor on the site for construction activities.

### 3.14 WATER REQUIREMENT

The water consumption for construction phase is estimated to be 6,000<sup>3</sup> liters/day for 150 workers during construction phase of the proposed Project.

### 3.15 WASTEWATER GENERATION AND TREATMENT MECHANISM

The wastewater generation is estimated to be 4,800 liters/day for 150 construction workers during construction phase of the proposed Project<sup>4</sup>. Temporary toilets with cesspit will be adequately installed and treated periodically, and after the completion of work, the ground will be restored.

### 3.16 SOLID WASTE

Due to construction activities, waste will be generated at construction site and contractor's camp. The contractor will provide the estimated quantity of excavation material during the construction phase. These wastes will be generated due to the construction activities and up to the extent possible the excavated materials will be reused, where applicable, for construction purposes. Solid waste generated during construction and camp sites shall be safely disposed at demarcated waste disposal sites.

<sup>3</sup> Water consumption per capita= 40 liters/capita/day. For 150 workers water consumption= 40 liters/capita/day\*150 persons= 6000 liters/day.

<sup>4</sup> Design Criteria of Public Health Engineering for Water Supply, Sewerage and Storm Water Drain (Domestic sewage generation = 80% of water consumed/day)



The solid waste generation is estimated to be 90 kg/day for 150 construction workers during the construction phase of the proposed Project<sup>5</sup>.

### 3.17 POWER REQUIREMENT / POWER SOURCE

The main source of electricity/electric power during the construction phase will be diesel generators for construction camps.

### 3.18 ALTERNATIVE ASSESSMENT

This section deals with an analytical overview of the different alternatives that have been considered for the proposed Project. The analysis has been carried out critically to justify the need for the Project and the selected option. Besides the economic viability, environmental sustainability and social soundness have also been considered for analyzing alternatives considered for the proposed Project.

The proposed Project aims to construct Neelum Road, connecting Pine Avenue to Ferozepur Road through LDA City and Chenab Road connecting LDA City to Sue Asal Link Road. In this context, the following alternatives have been considered and evaluated as part of the study:

- Alternative I: No-Project Option (NPO);
- Alternative II: A four-lane road with an underpass near the railway track; and
- Alternative III: A four-lane road with a flyover near the railway track.

#### 3.18.1 Alternative I: No Project Option (NPO)

Currently, there is no dedicated road connecting housing societies such as LDA City, Etihad Town Phase-2, Soul City, Mid-City, Khyaban-e-Amin, Safari Garden and Lake City. As a result, residents and road users from these societies rely on existing routes, including Defence Road, Halloki Ring Road Interchange, Kahna Kacha Road, and Ferozepur Road, to reach their destinations. These roads already experience significant traffic congestion during peak hours, which is further exacerbated by the increasing number of vehicles generated from these housing developments.

Additionally, Defence Road, Raiwind Road, Kahna Kacha Road, and Ferozepur Road serve as critical junctions connecting business, health, and educational centers to major routes. Without the proposed Project, these roads will remain the primary transportation corridors in the area, leading to worsening traffic conditions over time, as highlighted by traffic projection surveys. The rise in vehicular emissions is also contributing to air pollution, negatively impacting the environmental quality of the Project area.

Given these prevailing challenges, the “No Project Option” is considered impractical and unsustainable.

<sup>5</sup> Source: Estimated solid waste generation rate in the study area is about 0.6 kg/person/day (<https://www.lwmc.com.pk/uc-plan.php>).



### 3.18.2 Alternative II: A Four-Lane Road with an Underpass near the Railway Track

Alternative-II considers the construction of Neelum Road and Chenab Road connecting to LDA City including an underpass near the railway track.

The advantages and disadvantages of the option are as follows:

#### **Advantages:**

- Provide signal-free access from Pine Avenue to Ferozepur Road and LDA City to Sue Asal Link Road.
- Minimize travel time for residents and commuters of LDA City, Safari Garden, Etihad Town Phase-2, Soul City, Mid-City, Khyaban-e-Amin, and Lake City.
- Enhance road safety by reducing congestion and minimizing the risk of accidents.
- Promote economic growth by improving connectivity to commercial and residential areas.
- Increase property values in surrounding localities due to better accessibility.
- Reduce environmental impacts through decreased fuel consumption and lower vehicle emissions.
- Support urban development and improve the quality of life for residents.
- Reduce vehicle operating costs through improved traffic flow.
- Create job opportunities for both skilled and unskilled labor.

#### **Disadvantages:**

- Excavation and construction activities may cause vibrations, potentially affecting the stability of the railway track foundation or nearby structures.
- It may disrupt natural drainage patterns, raising the risk of flooding or waterlogging during heavy rains.
- Dewatering during construction could alter local groundwater levels, impacting the water table or nearby wells.
- Higher capital costs may be required to ensure rail track stability and prevent subsidence or misalignment during excavation.
- Construction may necessitate temporary rail line closures for safety, affecting rail service schedules and operations.
- Additional investment may be needed for drainage systems to manage water accumulation during heavy rains and prevent seepage into the underpass.

### 3.18.3 Alternative II: A Four-Lane Road with a Flyover near the Railway Track

Alternative III considers the construction of Neelum Road and Chenab Road connecting to LDA City including a Flyover near the railway track.

#### **Advantages:**

- Provide signal-free access from Pine Avenue to Ferozepur Road and LDA City to Sue Asal Link Road.
- Minimize travel time for residents and commuters of LDA City, Safari Garden, Etihad Town Phase 2, Soul City, Mid-City, Khyaban-e-Amin, and Lake City.
- Enhance road safety by reducing congestion and minimizing the risk of accidents.



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- Promote economic growth by improving connectivity to commercial and residential areas.
- Increase property values in surrounding localities due to better accessibility.
- Reduce environmental impacts through decreased fuel consumption and lower vehicle emissions.
- Support urban development and improve the quality of life for residents.
- Reduce vehicle operating costs through improved traffic flow.
- Create job opportunities for both skilled and unskilled labour.

**Disadvantages:**

- The flyover could significantly alter the landscape's visual character, impacting the aesthetic appeal of the surrounding area.
- The elevated structure will create a sense of physical and social division within the community.
- Light pollution from flyover illumination may affect nocturnal wildlife behavior.
- The elevated structure will alter natural drainage patterns, increasing the risk of flooding in adjacent areas during heavy rainfall.
- Impervious surfaces on the flyover will lead to increased stormwater runoff, potentially affecting local water bodies' quality and quantity.
- The construction process involves substantial energy consumption and greenhouse gas emissions from heavy machinery and the transportation of materials.
- The large impervious area of the flyover may reduce groundwater recharge by limiting the natural percolation of rainwater.
- Construction may necessitate temporary rail line closures for safety, affecting rail service schedules and operations.
- Additional capital investment may be required for constructing drainage systems to effectively manage water accumulation during heavy rains and to prevent flooding under or around the flyover.

After evaluating alternatives, Alternative II (Underpass) is selected as the most feasible option for accommodating high traffic volumes. The underpass provides uninterrupted traffic flow and enhances safety by eliminating at-grade crossings with the railway track. It also minimizes congestion during both the construction and operational phases. Although the underpass requires strategic planning to address potential drainage and groundwater impacts, its design can be optimized to ensure rail track stability and maintain environmental integrity. Additionally, its location below the railway track preserves the area's visual landscape, unlike the flyover. By effectively addressing traffic management, safety, and environmental concerns, the underpass emerges as a more sustainable and practical solution for the proposed road network.



## 4 DESCRIPTION OF ENVIRONMENT

### 4.1 GENERAL

For any development project, the prevailing environmental conditions need to be assessed prior to the stages of planning, designing and execution of the project. Identification of physical, ecological and social aspects of environment and collection of relevant data is essentially important for the evaluation of impacts as well as for the suggestion of adequate mitigation measures, which forms the basis for the implementation of the proposed Project in terms of prevailing environmental and social conditions in the study area.

The existing environmental conditions of the proposed Project have been considered within the COI as shown in **Figure 4.1** with respect to physical, biological and socio-economic aspects. The Study Area is selected on the basis of the Project's potential environmental and social impacts on the local resources. Information has been collected from variety of sources, including published literature, DCRs, field observations and surveys, conducted specifically for this Project have been analyzed for this study. Consultations were also held with the general public and stakeholders of the Project area in order to seek the public opinion on the implementation of the proposed Project.

### 4.2 PHYSICAL RESOURCES

The following section provides an overview of the information on physical environment of the proposed Project study area collected from primary as well as secondary sources. The major parameters covered include Physiographic and Topography, Geology, Soil, Seismicity, Climate and Meteorology, Ambient Air & Noise, Water Resources, Solid Waste, and Land Use.

#### 4.2.1 Topography

Lahore is generally flat and slopes towards south and south-west at an average gradient of 1:3000. The general height varies from 150 to 200 meters above the mean sea level (MSL). It is divided into two parts i.e. the low-lying area along River Ravi and the comparatively upland area in the east, away from Ravi. The low lands are generally inundated by the river water during intense rainfall events.

The project site is located within an alluvial plain, naturally flat and level having no hills and valleys with height varying from 201 to 216 meters above MSL. **Figure 4.2** represents the topography of the study area of the proposed Project.



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE

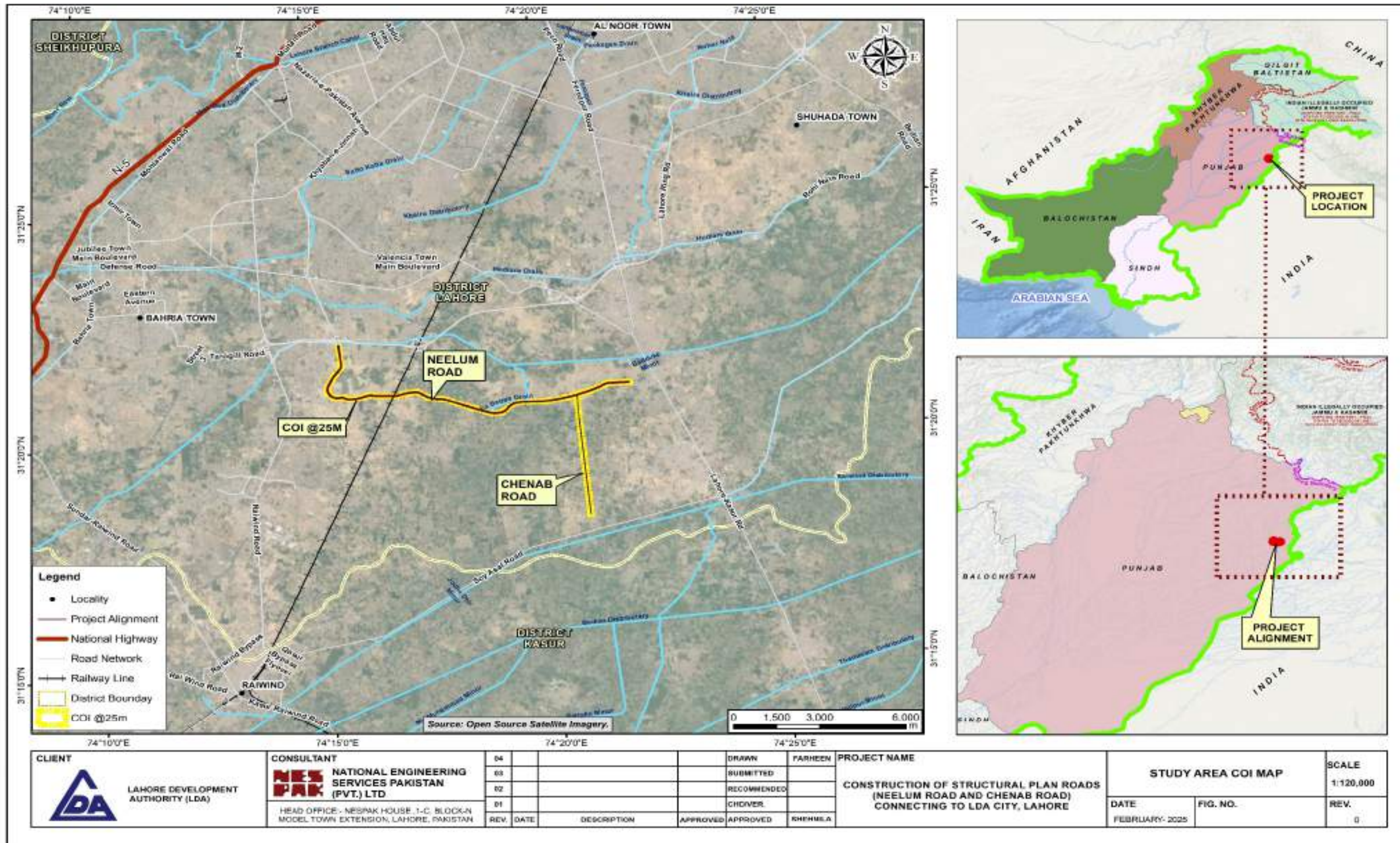


Figure 4.1: COI Map of the Study Area



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE

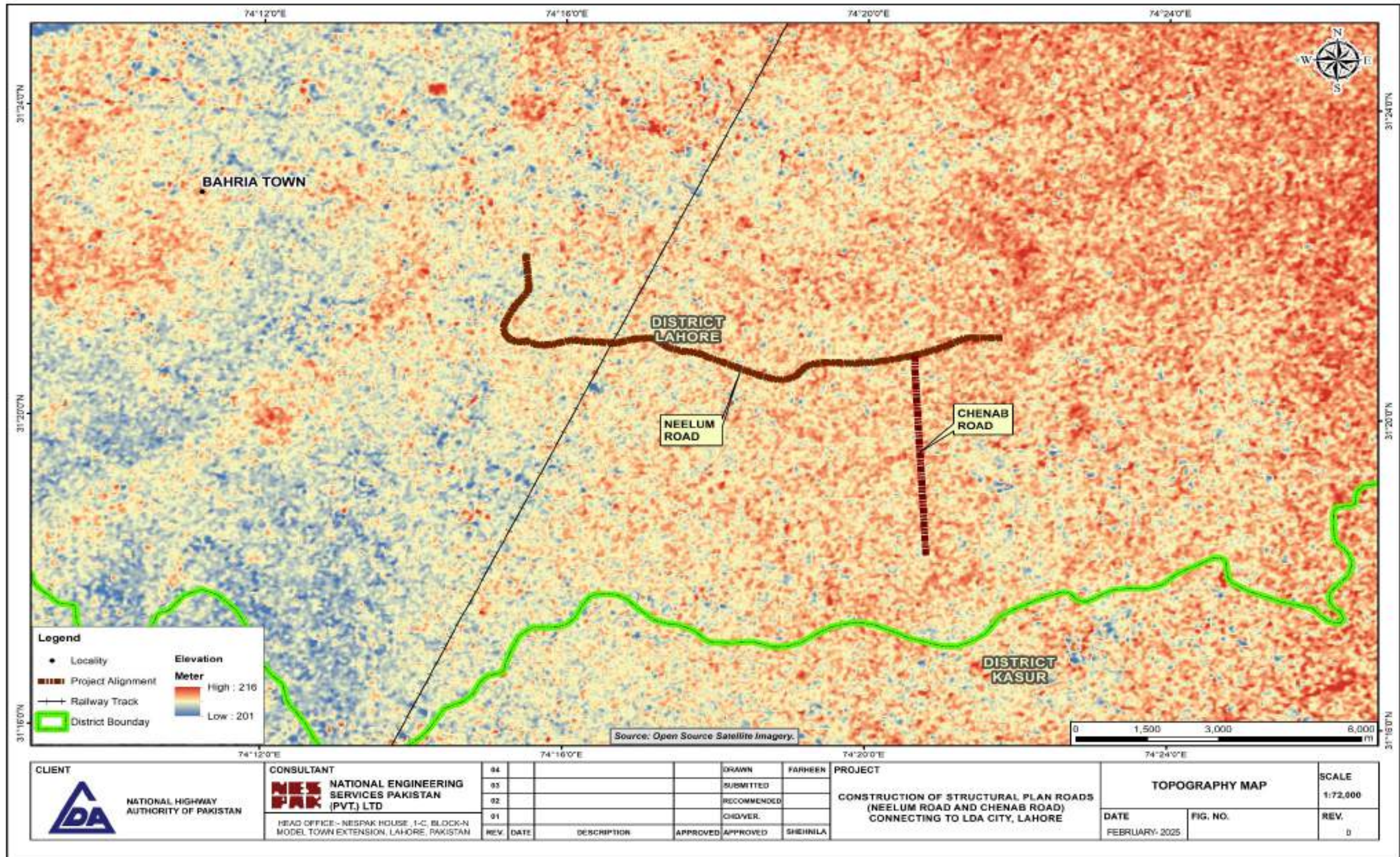


Figure 4.2: Topography Map of the Study Area



#### 4.2.2 Geology

Lahore city lies on the alluvial plain called Bari Doab<sup>6</sup>. Doab is a local word for area between rivers. Bari Doab is a part of the Indo-Gangatic alluvial plain formed by the Indus River and its tributaries. It is bounded by Ravi and Chenab rivers in the northwest and west, and Sutlej River in the Southeast. A northeastern boundary of Doab lies near the foothills of the Himalayan Ranges.

The Bari Doab is covered by quaternary alluvium which overlies semi-consolidated tertiary rocks or metamorphic and igneous rocks of Precambrian age. Except for a small area in the northeastern part of Doab where basement rock was encountered no information is available at present regarding the distribution of tertiary and Precambrian rocks in the Doab.

The thickness of alluvial deposits in Lahore is reported to be more than 300 meter. These alluvial deposits are underlain by the basement rocks of the Indian shield. The alluvial deposits mainly consist of sands, with intercalation of silt and clay layers of varying thickness. Project site is located in meander belt deposits.

The project area does not have any valuable minerals. Although, scientific in depth, investigations haven't been carried out, yet the surveys conducted have failed to discover any minerals worth the name till to-date.

The only minerals worth to value are kallar and kankar<sup>7</sup> in the district Lahore. Kallar is the grey powdery substance collected and taken out from the old village sites and other deserted abodes in the district. It is used for the manufacture of crude saltpeter and also as manure for the top dressing of young cotton and tobacco plants (no longer in the line of extensive cultivation). With the passage of time the demand for Kallar diminished and its use as a trading commodity is on the decline. Kankar is used for metaling Roads and its smaller particulars are burnt for lime. It is a kind of limestone gravel and is found, after being dug out at a depth varying from one to eight feet, in many parts of the district particularly the uplands. However; the project area does not have any valuable minerals.

The geology of the proposed Project area is Qc i.e. Older terrace deposits Chung formation. **Figure 4.3** shows the regional geological map of the study area.

#### 4.2.3 Soil

The soil in the Project area is cohesion less and is of alluvial type deposited by Ravi River. The types of soil layers that are present below the ground level includes: silt, silty clay, silty sand, poorly graded sand with silt and lean clay. The soil map of the study area is shown in **Figure 4.4**.

<sup>6</sup> Kadwai, S.U. and Siraj, A. (1964), "The Geology of Bari Doab, West Pakistan", WAPDA Water and Soil Investigation Division (Bulletin No. 8)

<sup>7</sup> Malik, A. (2015). Geotechnical statistical evaluation of Lahore Site Data and Deep Excavation Design



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FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY,  
LAHORE





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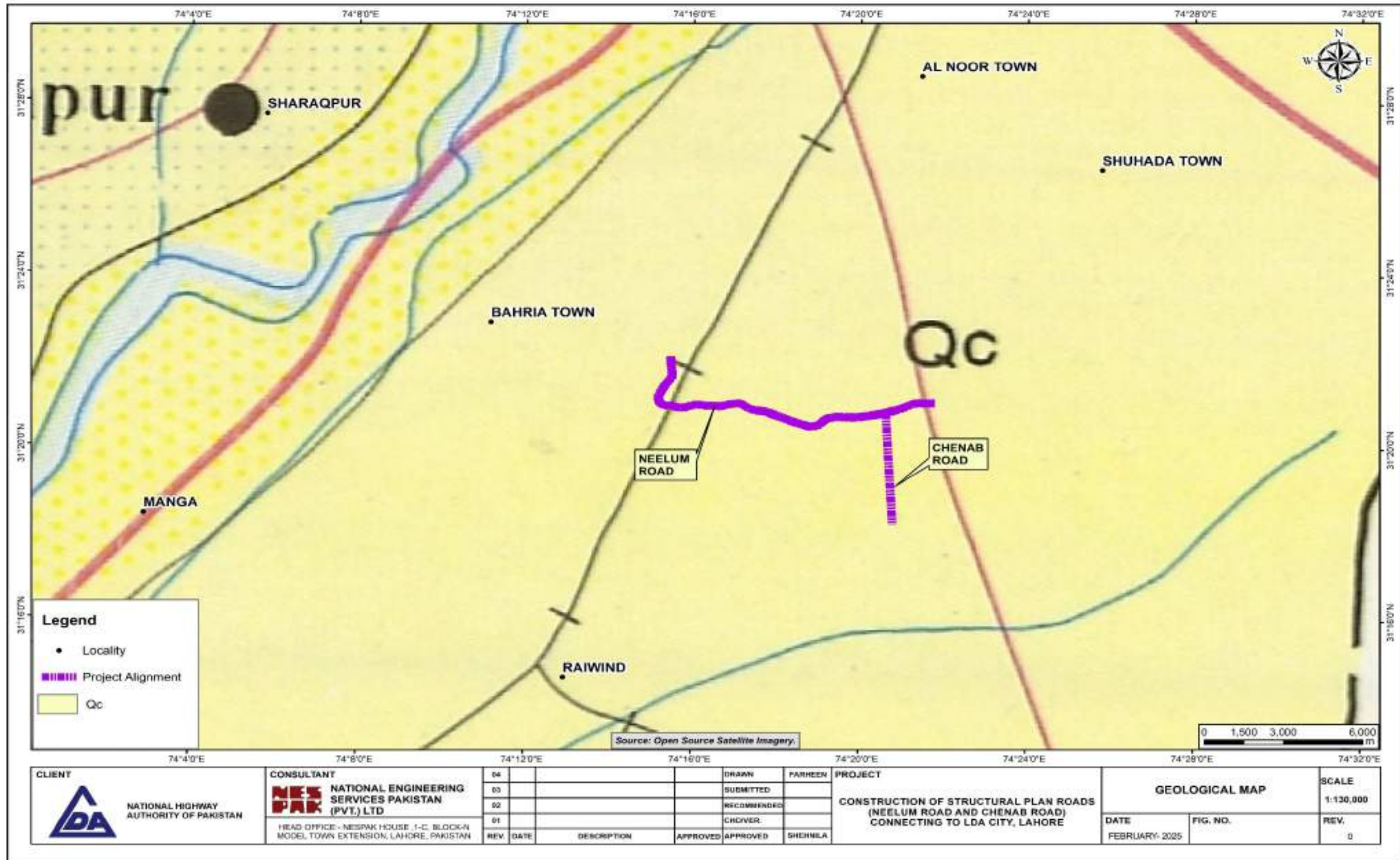
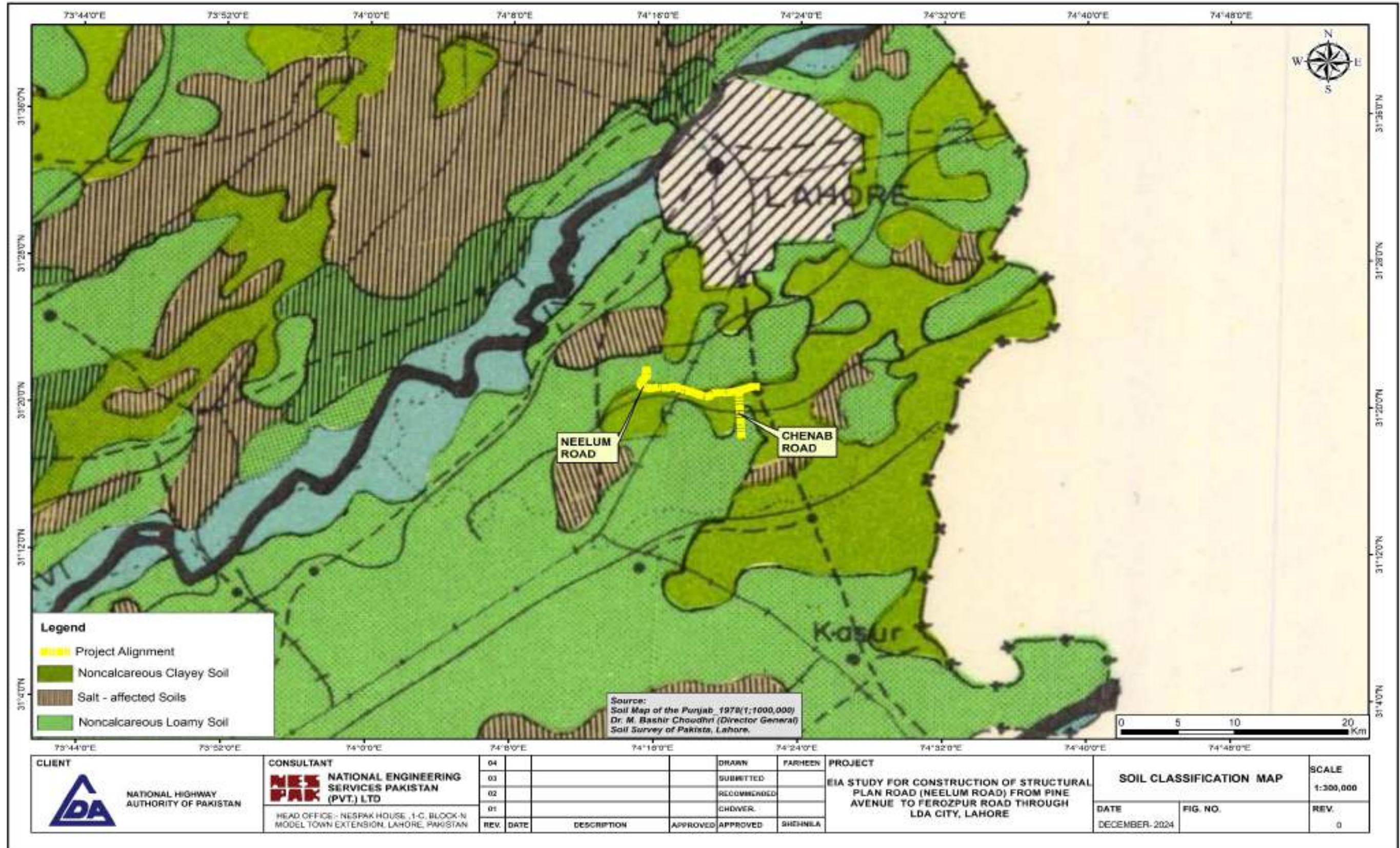


Figure 4.3: Regional Geological Map of the Study Area



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERROZPUR ROAD THROUGH LDA CITY, LAHORE





**Figure 4.4: Soil Map of the Study Area**



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD)  
FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY,  
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#### 4.2.4 Seismology

The Project site falls in the Punjab plain, which has low to moderate level of seismicity. The Project region has been subjected to severe shaking in the past due to earthquakes in the Himalayas. The known main active fault of the Himalayas is the Main Boundary Thrust (MBT). The epicenters of low to moderate magnitude earthquakes, recorded in the Punjab plain are associated with the subsurface fractures in the basement rocks, which are concealed by thick alluvial deposits.

According to Building code of Pakistan 2007, the Project area falls in Seismic Zone 2A of Pakistan (low to moderate damage) with peak ground acceleration (PGA) from 0.08 to 0.16 g. **Figure 4.5** shows the seismic zoning map of the study area.



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE

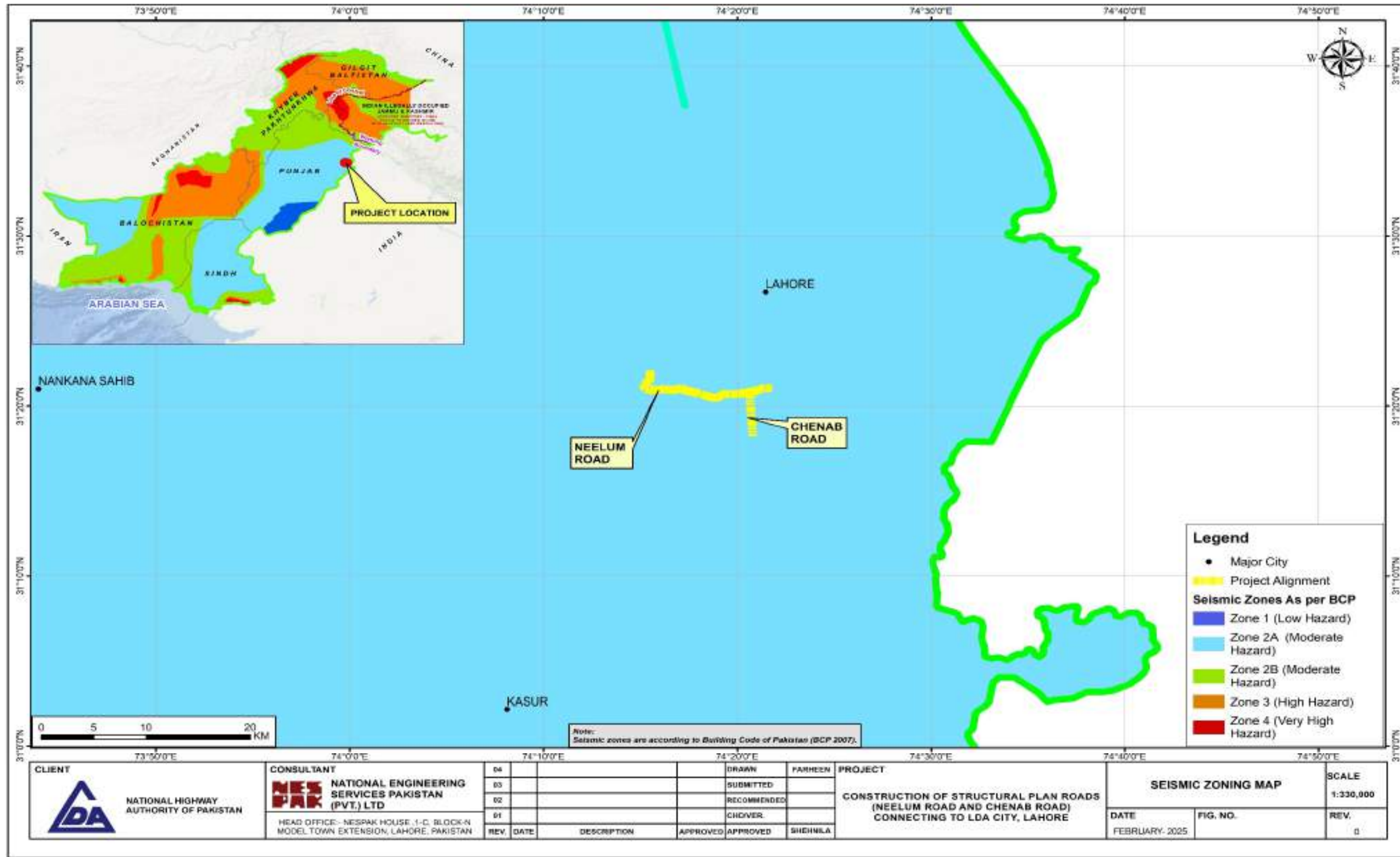


Figure 4.5: Seismic Zoning Map of the Study Area



#### 4.2.5 Climate and Meteorology

The seasonal climatic conditions must be considered for the design and execution of the developmental projects. The climate including air, temperature, precipitation, humidity and evaporation are an influencing factor, affecting the construction of engineering structures. However, to determine the overall effect of the climatic stresses, daily and seasonal temperature changes, site altitude, direct solar radiation, and precipitation must be considered.

The Project area has moderate to extreme climate conditions, with hot summers and cold winters. The summer starts from April and lasts till September, with mean minimum and maximum temperature ranges from 27°C to 47°C. The winter seasons lasts from November to March, with mean minimum and mean maximum temperature ranges from 2°C to 18 °C.<sup>8</sup>

The project area receives rains in all the seasons but monsoon rain is pronounced and constitutes a definite rainy season between the month of July and September. The average rainfall is about 1,172 mm per year.

Temperature, precipitation, relative humidity, evaporation, wind speed and wind direction of the study area (District Lahore) is discussed below.

##### Temperature

**Tables 4.1 and 4.2** shows mean minimal and maximal temperatures observed for each month between year 2011 to 2023 in the study area. The highest temperature measured is 47°C in June, 2014, and the lowest temperature was observed in December, 2021 and January, 2023 i.e. 7°C. Moreover, **Figure 4.6** shows the graphical presentation of mean temperatures in the Study Area for the year 2011-2023.

**Table 4-1: Mean Maximum Temperatures (°C) between 2011 and 2023<sup>9</sup>**

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2011	22	23	31	37	44	44	40	36	35	34	30	25
2012	19	20	29	35	42	46	45	38	37	36	30	24
2013	22	22	31	37	44	46	43	38	40	36	29	25
2014	22	23	28	36	41	47	44	42	36	35	29	22
2015	22	26	28	6	43	42	39	39	38	36	30	24
2016	24	28	31	37	43	45	41	40	40	39	32	28
2017	21	27	31	40	44	43	41	41	41	39	30	26
2018	25	27	33	38	43	44	40	40	39	36	30	24
2019	20	22	27	38	41	45	41	39	39	36	28	22

<sup>8</sup>Meteorological Data for Lahore (1981-2010), Pakistan Meteorological Department.

<sup>9</sup> Meteorological Data for Lahore (2011-2023)



**CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM  
PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE**



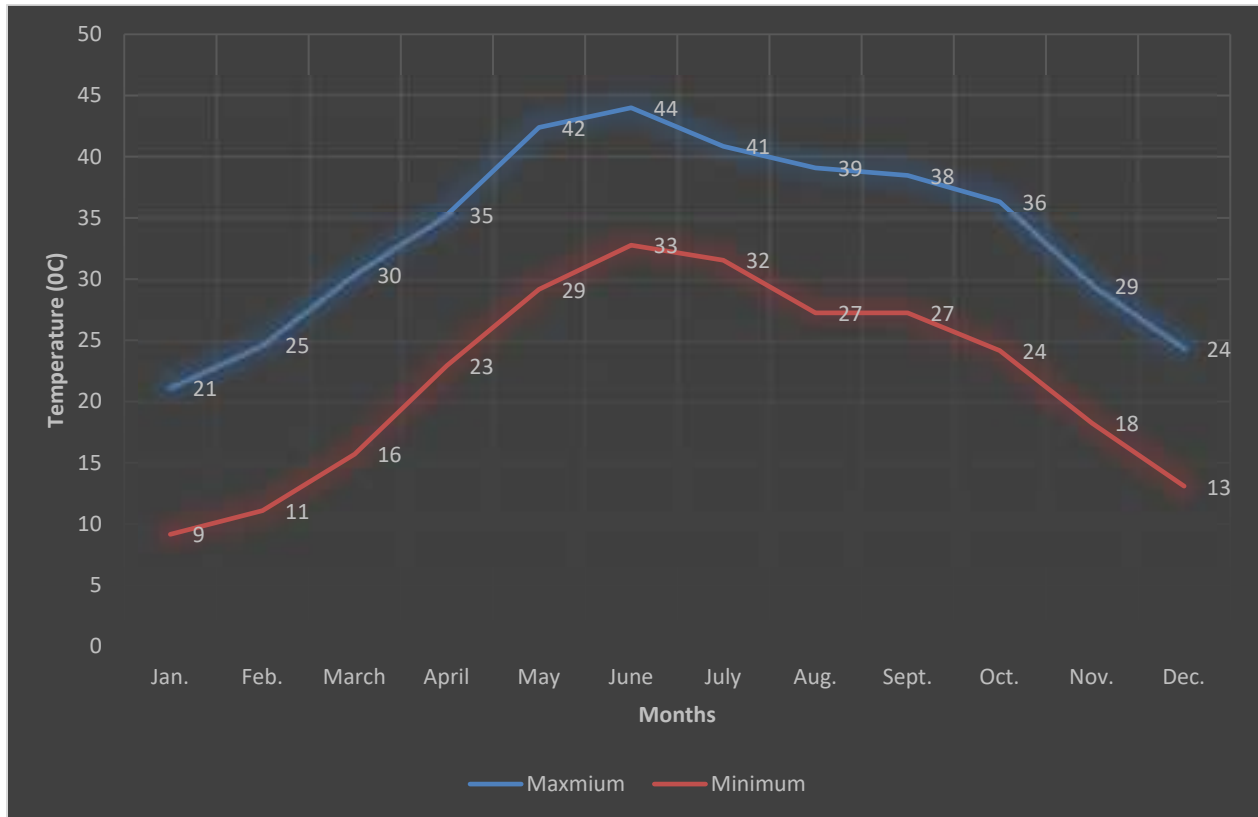
Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2020	18	25	27	36	41	45	44	40	41	38	28	23
2021	22	27	31	41	44	43	42	42	40	39	31	26
2022	18	22	34	42	43	42	35	35	36	34	28	23
2023	20	28	34	35	38	40	36	38	38	34	28	24

**Table 4-2: Mean Minimal Temperatures (°C) between 2011 and 2023**

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2011	8	10	15	20	29	32	31	27	26	23	19	13
2012	7	8	14	22	28	33	33	29	26	23	18	13
2013	9	11	15	22	30	34	33	28	27	25	17	13
2014	9	9	14	22	28	34	32	3	26	23	17	10
2015	9	12	15	23	30	33	31	30	26	25	18	13
2016	10	12	16	23	31	34	32	30	28	24	18	14
2017	9	11	15	24	30	32	32	31	29	26	20	16
2018	13	14	19	25	31	35	32	31	28	25	20	14
2019	11	12	16	26	30	34	31	29	27	24	19	13
2020	10	13	16	24	30	35	34	31	30	26	18	14
2021	8	11	16	24	30	33	33	30	29	27	20	15
2022	9	9	17	23	28	29	28	27	26	21	15	10
2023	7	12	16	20	24	28	28	28	26	22	18	12



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



**Figure 4.6: Mean Maximum and Minimum Temperature in the Study Area (2011-2023)**  
Precipitation (Rainfall)

**Table 4.3** shows mean monthly precipitation observed in the study area from 2011 to 2023 with an annual average rainfall of 765.41 mm. **Figure 4.7** shows the mean monthly precipitation in the study area for the year 2011-2023.

**Table 4-3: Mean Monthly Precipitation (2011-2023)<sup>10</sup>**

Month	Precipitation (millimeters)
January	23.8
February	31.3
March	35.6
April	50.85
May	86.675
June	86.9
July	218.5
August	49.925
September	72.04

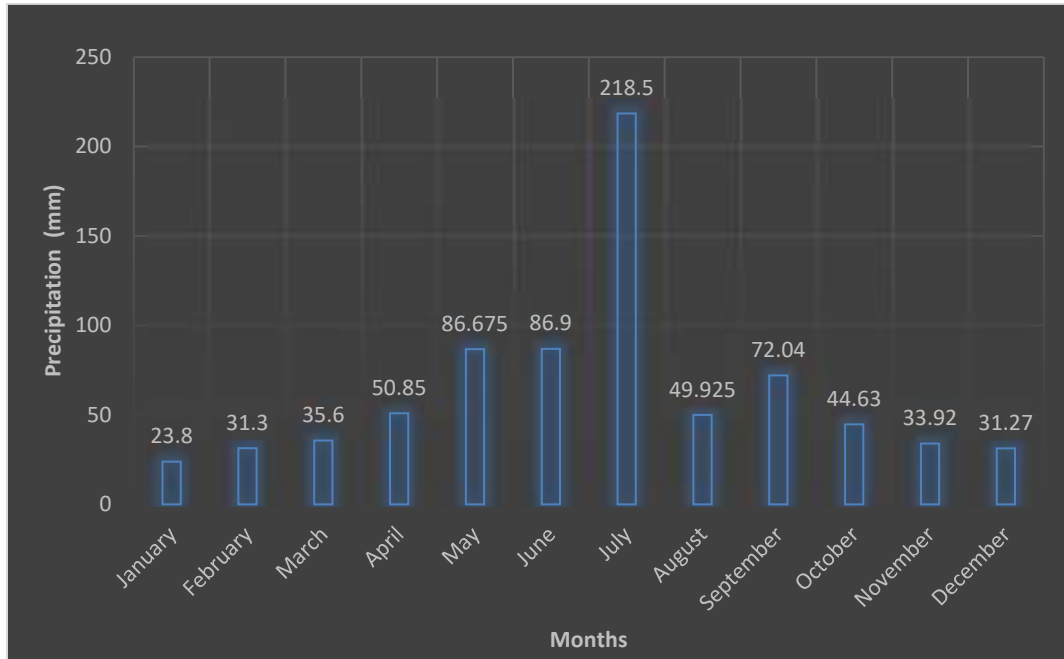
<sup>10</sup> Meteorological Data for Lahore (2011-2023)



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



Month	Precipitation (millimeters)
October	44.63
November	33.92
December	31.27
<b>Annual</b>	<b>765.41</b>



**Figure 4.7: Average Precipitation in the Study Area (2011-2023)**

Relative Humidity

A mean daily data of humidity on a monthly basis from 2011 to 2023 is shown in **Table 4.4** and **Figure 4.8**.

**Table 4-4: Mean Relative Humidity (%) in the Study Area (2011-2023)<sup>11</sup>**

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2011	50	64	49	34	25	34	47	68	68	41	36	32
2012	59	59	51	39	20	17	35	58	54	32	27	40
2013	47	68	52	26	16	25	38	59	45	39	27	36
2014	51	61	52	31	24	20	34	40	58	38	27	33
2015	48	47	53	33	16	24	44	49	39	30	26	29
2016	43	37	42	23	21	25	42	44	35	21	19	27
2017	53	45	36	21	20	29	40	39	30	18	24	27

<sup>11</sup> Meteorological Data for Lahore (2011-2023)



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2018	32	38	30	25	17	28	43	47	45	25	25	27
2019	45	63	51	27	19	20	46	54	51	34	41	39
2020	59	47	57	33	24	22	34	53	38	16	24	35
2021	59	47	56	34	20	21	34	52	36	15	24	32
2022	62	56	29	12	14	23	57	62	56	40	32	27
2023	41	30	38	31	30	34	58	51	50	34	31	29

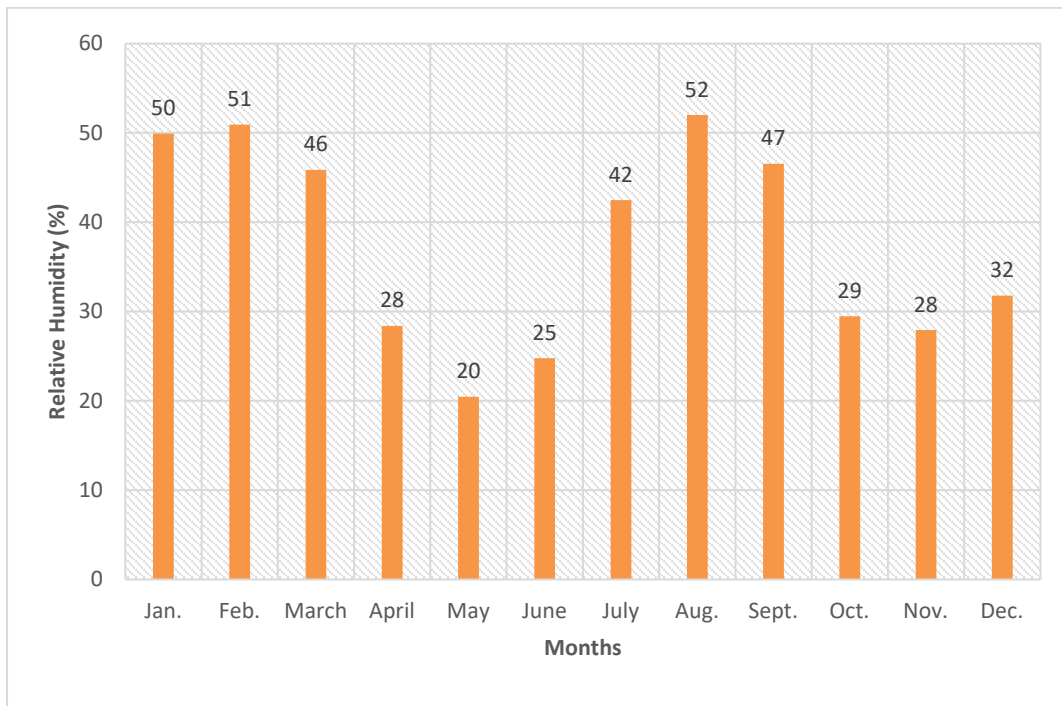


Figure 4.8: Mean Relative Humidity in the Study Area (2011-2023)

Wind Speed

Table 4.5 and Figure 4.9 depicts average wind speed on a monthly basis in the study area from year 2011 to 2023.

Table 4-5: Mean Wind Speed (Km/h) in the Study Area (2011-2023)<sup>12</sup>

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2011	7.2	8.3	8.2	8.3	8.2	8.4	6.8	6.9	5.1	5.6	6.1	6.3
2012	7.3	9.5	8.9	8	8.6	7.2	6.8	6.4	5.4	5.5	7	8.4
2013	7.4	9.2	8	8.4	8.6	7	7.3	6.6	5.4	5.1	7.4	7.4
2014	7.4	7.3	8.8	8.9	7.8	7.5	6.6	5.8	5.6	5.8	7.6	7
2015	7.3	9.5	8.7	9.7	9.2	8.9	9.8	8.2	7.3	6.7	7.6	7.4

<sup>12</sup> Meteorological Data for Lahore (2011-2023)



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
2016	6.5	8.2	9.9	10.9	10.3	9.4	7.7	6.8	7	5.6	6.9	6.3
2017	7.4	8.1	8.1	10.3	8.6	8.7	7.9	7.4	5.3	5	4.7	6.2
2018	5.9	6.9	7.9	9.2	10	9.4	8.3	8.5	7.5	5.8	6.9	5.2
2019	6.6	7.2	8.1	9.3	9.2	10.3	11.9	9.9	11.4	7.5	6.9	4.9
2020	6.7	7.7	9.8	9.8	11.8	10.6	9.9	10.3	7.4	6.1	7	7.1
2021	6.5	7.5	9.4	9.2	11.5	10.2	6.7	10.1	7.5	5.8	6.9	7.0
2022	7.1	8.4	9.6	8.9	10.4	10.1	9.6	8.7	8.1	7.8	8	6.4
2023	7.8	9.5	8.7	8.6	10.5	9.5	10.2	9.1	9.4	7.9	6.3	5.6

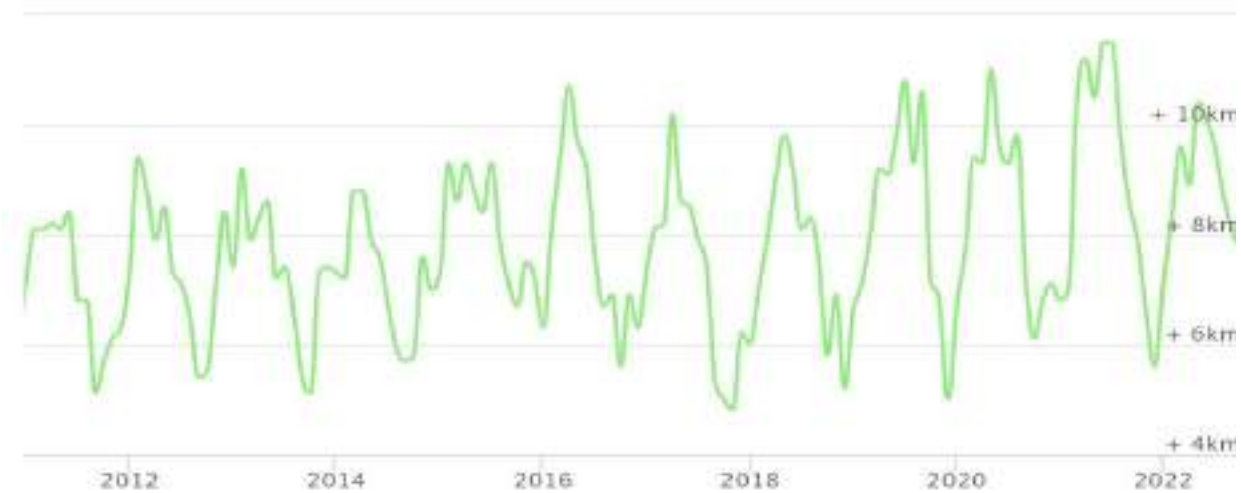


Figure 4.9: Average Wind Speed in the Study Area from 2011 to 2023

#### 4.2.6 Ground Water

Presently main clean water source in Lahore is ground water that meets all the requirements including domestic, industrial and commercial, which is being extracted through tube wells installed in the city at about 600 ft. depth.

Water and Sanitation Agency (WASA) is the competent authority for the planning, designing, development and maintenance of water supply, sewerage and drainage system in the study area. WASA is responsible for:

- Rehabilitation and augmentation of the existing system.
- Operation and maintenance of water supply, sewerage & drainage system.
- Undertaking bulk production, filtration/treatment, transmission and retail distribution of purifying water.
- Collection, pumping, treatment & disposal of sewage & industrial waste.
- Enforcement against defaulters and unauthorized connections etc.
- Short term and long term planning for tapping additional water sources & its implementation to meet water supply and sewerage demand projected.



WASA Lahore maintains a wide network of about 3,200 Km pipelines for water supply providing water to the residents of Lahore city including Project Area. WASA have installed 316 tubewells in the city for provision of pure and hygienic water to the residents. Average daily water supply to the Lahore city is about 329 MGD through 610,000 water connections.<sup>13</sup>

Besides WASA Lahore, a number of players, including Cantonment Board, Defence Housing Authority (DHA), and a host of private housing schemes are currently managing water and sanitation services in the areas of their respective jurisdictions.

#### 4.2.7 Surface Water Hydrology

The main surface water resources in the Lahore city are Ravi River, Lahore Branch Canal, Khaira Distributary and the Bambawali Ravi Bedian Depalpur (BRBD) canal.

##### 4.2.7.1 Ravi River

The Ravi River is a trans-boundary river crossing north western India and eastern Pakistan. It is one of six rivers of the Indus system in Punjab region. The Ravi River having a total length of about 720 kilometers flows across the city of Lahore. However, besides monsoon season the river is mostly dry due to the fact that water is diverted in India for irrigation and domestic purposes. In the past, River Ravi was the main source for recharge of groundwater aquifer, but due to increasing water demand and diversion of its water in India, it can no longer meet the required aquifer recharge of Lahore city. The quality of water of Ravi River has a direct impact on quality of water present in the adjacent aquifer.

##### 4.2.7.2 BRBD Canal

BRBD canal flows in the east of Lahore, from North to South. It crosses Grand Trunk Road, at a distance of about 6 kilometers; from Lahore Ring Road. The Canal takes off from Upper Chenab Canal (UCC) at Bambanwala, itself off takes from Marala Barrage with full discharge. The BRBD is about 175-kilometers long. It is an earthen channel except a short lined central segment. Although design capacity at head is 7,260 cusecs, the maximum discharge is around 4,600 cusecs. Among others, one of the reasons of limiting discharge to 4,600 cusecs is the limited design capacity of Syphon for crossing of River Ravi. The Canal is brick lined from RD 260 to RD 373 and crosses the River Ravi and GT road at RDs 281 and 325<sup>14</sup> respectively.

##### 4.2.7.3 Lahore Branch Canal

<sup>13</sup> [https://wasa.punjab.gov.pk/infodesk\\_watersupply](https://wasa.punjab.gov.pk/infodesk_watersupply)

<sup>14</sup> Final Feasibility Study Report on Lahore Water and Wastewater Management Project-February, 2019



The other surface water source is the Lahore Branch Canal (LBC), which takes off from BRBD canal at about RD 230. LBC flows near the project area which is an open channel with lining at both sides. Due to its limited discharge of about 400 cusecs, this canal cannot be considered as surface water source for Lahore, even to draw 100 cusec discharge.

#### 4.2.7.4 Khaira Distributary

This water source lies in the south of Lahore and it also takes off from BRBD canal, and flows from east to west, its flow is even less than the Lahore Branch Canal.

**Figure 4.10** shows the Surface Water Resources Map of the study area.

#### 4.2.8 Drainage

There are total eight (08) major drains in the Lahore city i.e. Sattu Kattla drain, Lakshami Drain, Suk Nehar Drain, Upper Chota Ravi Drain, Lower Chota Ravi Drain, Siddique Pura Drain, Cantonment/Hudiara Drain and Shahdara Drain along with 76 minor drains which finally fall into aforementioned major drains. At present, all these drains collect wastewater from different areas of Lahore and finally fall into River Ravi and greatly deteriorated the quality of river water.

The nearest drain close to the Project area is the Jia Bagga drain. **Figure 4.10** shows the major drains in the study area.

#### 4.2.9 Solid Waste

Lahore Waste Management Company (LWMC) is responsible to ensure efficient collection, transportation, recovery, treatment and disposal of solid waste generated in the study area. LWMC renders following sanitation services throughout the Lahore city including study area:

- Collection of waste by placement of containers & bins and through door to door collection;
- Collection and removal of waste to the approved disposal sites;
- Manual / Mechanical sweeping of main and arterial roads, streets and squares with vacuumed vehicles; and
- Mechanical washing.

LWMC has placed waste storage containers at different points near the study area, waste collected by pickup from these containers and unloaded into nearby compactor or transfer station. Estimated solid waste generation rate in the study area is about 0.6 kg/person/day<sup>15</sup>.

<sup>15</sup> <https://www.lwmc.com.pk/uc-plan.php>



### 4.3 ENVIRONMENTAL MONITORING

The environmental monitoring of parameters like ambient air quality, noise level, surface water and groundwater help us to analyze the prevailing environment conditions in and around the study area, and to protect it from any adverse activities due to the proposed project implementation. The monitoring of environmental parameters is in progress. **Figure 4.11** shows the monitoring location map of the proposed Project.

#### 4.3.1 Air Quality

The ambient air quality monitoring for Nitrogen Dioxide (NO<sub>2</sub>), Nitrogen Oxide (NO), Sulfur Dioxide (SO<sub>2</sub>), Carbon Monoxide (CO), Ozone (O<sub>3</sub>), Particulate Matter (PM<sub>2.5</sub>), Particulate Matter (PM<sub>10</sub>) and Suspended Particulate Matter (SPM) were carried at the two locations. The sampling was conducted for 24 hours' duration for NO<sub>2</sub>, NO, SO<sub>2</sub>, PM<sub>2.5</sub>, PM<sub>10</sub> and SPM one hour for O<sub>3</sub> and 8 hours for CO.

The detailed results of ambient air quality monitoring have been attached in **Annexure-I**, while the average concentrations of ambient air pollutants are given in **Table 4-6**. A pictorial view of ambient air monitoring is shown in **Plate 4-1**.



Ambient Air Monitoring at Irha Petroleum Pump (Point-1)



Ambient Air Monitoring at near Madrasah Sayyadna Farooq-e-Azam (Point-2)

**Plate 4-1: A view of Ambient Air Monitoring**



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZI ROAD THROUGH LDA CITY, LAHORE

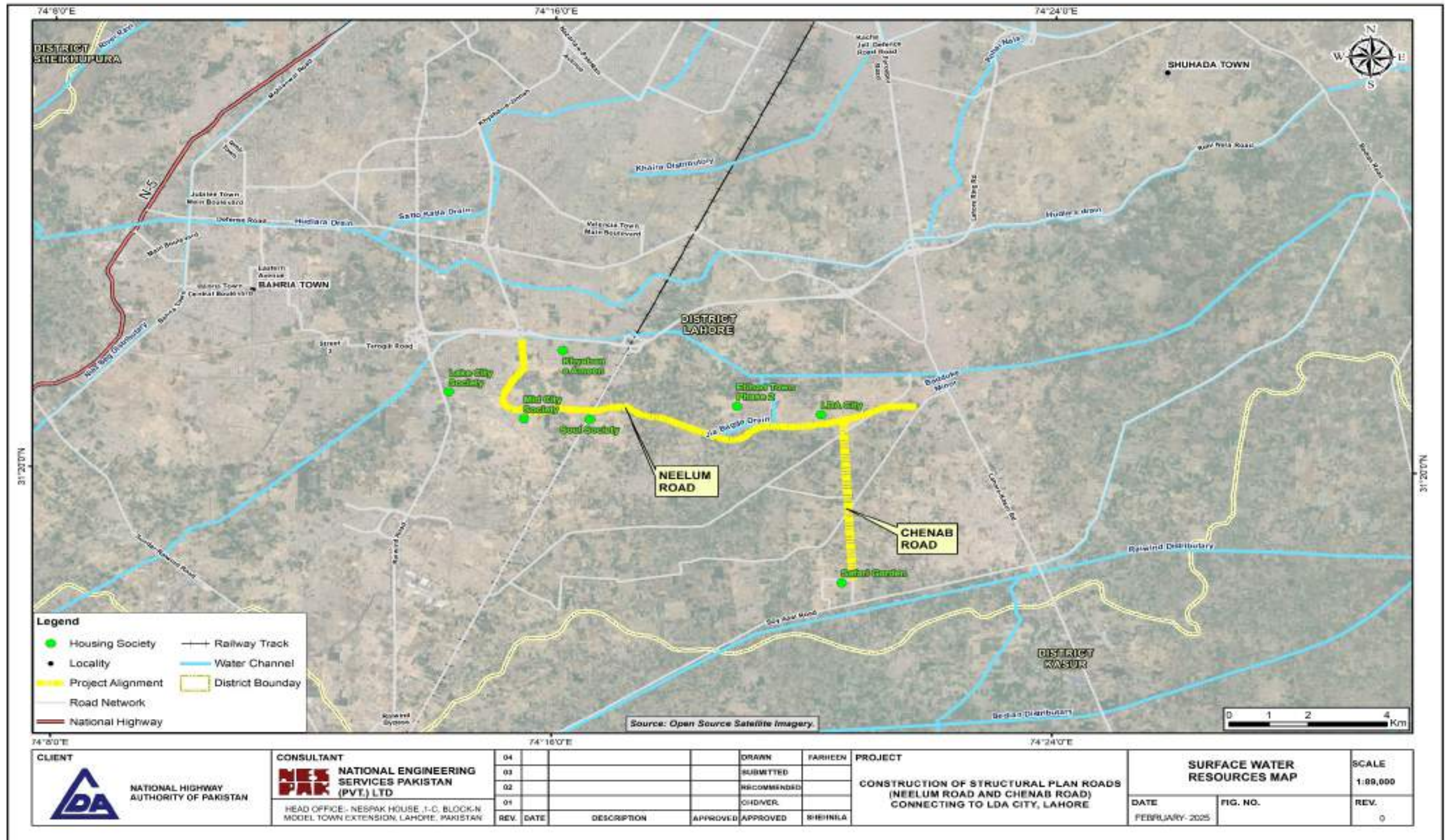
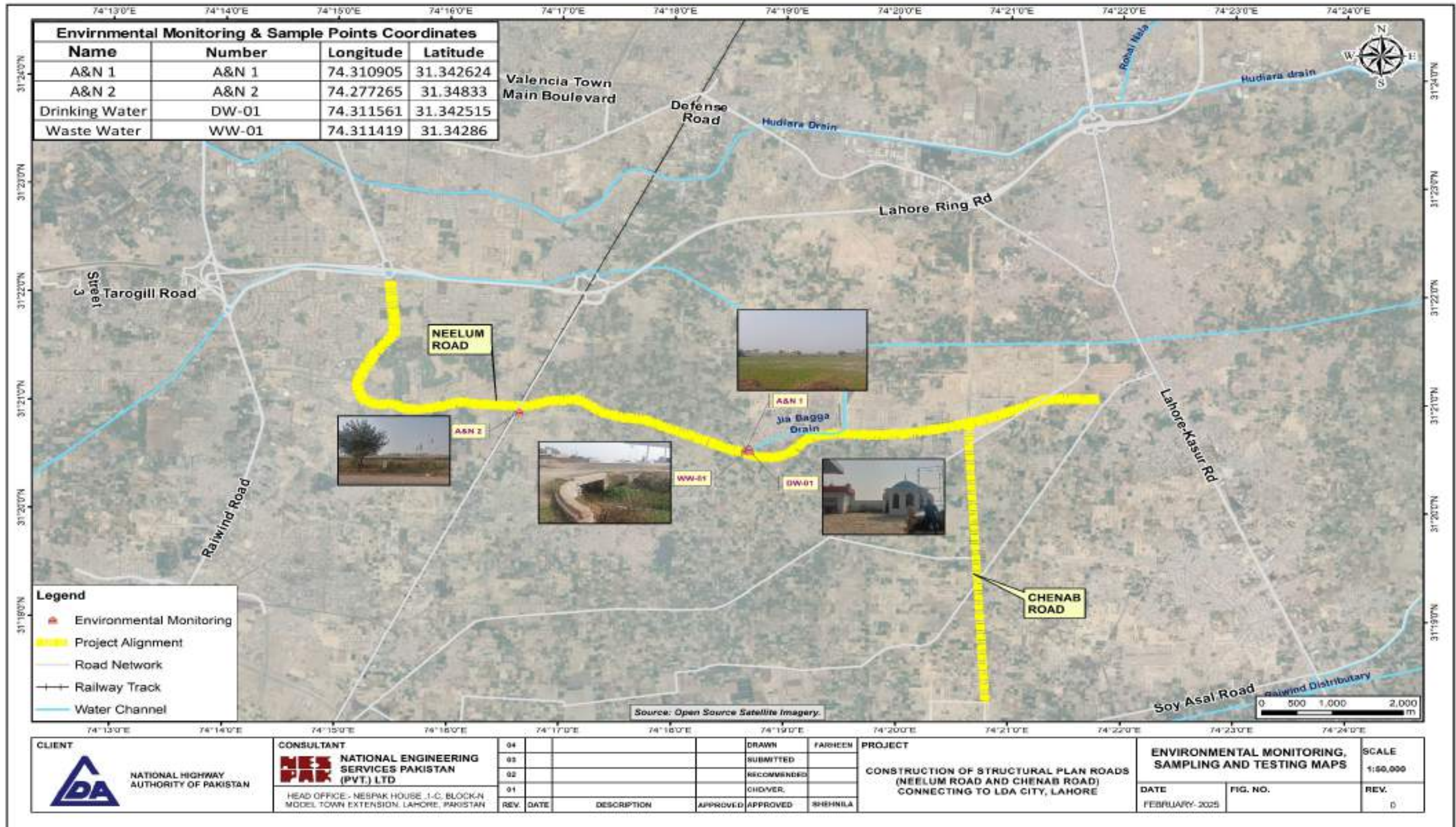


Figure 4.10: Surface Water Resources Map of the Study Area



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE





**Figure 4.11: Environmental Monitoring Map of the Study Area**



**Table 4-6: Average Concentration of Ambient Air Pollutants**

Sr. No.	Parameter	Unit	Monitoring Duration	Average Concentration of Pollutants at Point 1 (Irha Petroleum Pump)	Average Concentration of Pollutants at Point 2 (Near Madrasah Sayyadna Farooq-e-Azam)	Limits as Per PEQS, 2016
1.	Nitrogen Dioxide (NO <sub>2</sub> )	µg/m <sup>3</sup>	24 Hours	24.0	26.4	80 µg/m <sup>3</sup>
2.	Nitrogen Oxide (NO)	µg/m <sup>3</sup>	24 Hours	11.1	16.0	40 µg/m <sup>3</sup>
3.	Sulfur Dioxide (SO <sub>2</sub> )	µg/m <sup>3</sup>	24 Hours	11.6	11.1	120 µg/m <sup>3</sup>
4.	Carbon Monoxide (CO)	mg/m <sup>3</sup>	08 Hours	1.3	1.3	5.0 µg/m <sup>3</sup>
5.	Ozone (O <sub>3</sub> )	µg/m <sup>3</sup>	01 Hours	36.9	30.7	130 µg/m <sup>3</sup>
6.	Particulate Matter (PM <sub>2.5</sub> )	µg/m <sup>3</sup>	24 Hours	<b>143</b>	<b>175</b>	35 µg/m <sup>3</sup>
7.	Particulate Matter (PM <sub>10</sub> )	µg/m <sup>3</sup>	24 Hours	<b>248</b>	<b>328</b>	150 µg/m <sup>3</sup>
8.	Suspended Particulates Matter (SPM)	µg/m <sup>3</sup>	24 Hours	<b>539</b>	<b>639</b>	500 µg/m <sup>3</sup>
9.	Lead	µg/m <sup>3</sup>	24 Hours	0.2	0.1	1.5 µg/m <sup>3</sup>

µg/m<sup>3</sup>: micrograms per cubic meter

PEQS: Punjab Environmental Quality Standards

**Table 4-6** indicates that all parameters are well within the permissible limits of Punjab Environmental Quality Standards (PEQS), 2016 at both locations except for PM<sub>2.5</sub>, PM<sub>10</sub> and SPM because of vehicular emissions, construction works of housing societies, wind erosion, and burning of crop residues.

#### 4.3.2 Noise Level

Noise level measured at two (02) different locations in the study area. The detailed results of noise monitoring have been attached in **Annexure-I**, while the average concentrations of noise level are given in **Table 4-7**. A pictorial view of noise level monitoring is shown in **Plate 4-2**.

**Table 4-7: Average Concentration of Noise Level**

Averaging Time	PEQS, 2016 (Commercial)	Unit	Average Value in dB (A)	
			Average Concentration of Noise Level at Point 1 (Irha Petroleum Pump)	Average Concentration of Noise Level at Point 2 (Near Madrasah Sayyadna Farooq-e-Azam)
Day-time	65	db(A)	<b>79</b>	<b>82</b>
Night-time	55		<b>61</b>	<b>65</b>

The above results show that the average noise values at day and night time are exceeding the permissible limit set forth in PEQS for Noise Level due to the movement of vehicular traffic, train trips and commercial activities in and around the study area.



Noise Level Monitoring at Irha Petroleum PumpAli (Point-1)



Noise Level Monitoring at Near Madrasah Sayyadna Farooq-e-Azam (Point-2)

**Plate 4-2: A view of Noise Level Monitoring**

#### 4.3.3 Drinking / Groundwater Quality

Groundwater sample was taken from the electric water cooler installed in Irha Petroleum Pump and was analyzed for physical, chemical and microbiological parameters. **Table 4-8** shows the results of groundwater analysis. A pictorial view of drinking water sample collection is shown in **Plate 4-3**.

**Table 4-8: Results of Ground Water Analysis**

Sr. No.	Parameters	Units	PEQS, 2016	Results
1.	pH	--	6.5-8.5	8.1
2.	Temperature	°C	----	16.1
3.	Taste	--	Non Objectionable	Acceptable
4.	Odor	--		
5.	Color	TCU	<15	ND
6.	Turbidity	NTU	<5	3.4
7.	Total Dissolved Solids	mg/L	<1000	572
8.	Total Hardness as CaCO <sub>3</sub>	mg/L	<500	290
9.	Nitrate (NO <sub>3</sub> )	mg/L	≤50	ND
10.	Nitrite (NO <sub>2</sub> )	mg/L	≤3	ND
11.	Arsenic (As)	mg/L	≤0.05	ND
12.	Nickel (Ni)	mg/L	≤0.02	ND
13.	Antimony (Sb)	mg/L	<0.005	ND
14.	Chloride (Cl)	mg/L	<250	4.0
15.	Residual Chlorine	mg/L	0.2-0.5	ND
16.	Lead (Pb)	mg/L	≤0.05	ND



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Parameters	Units	PEQS, 2016	Results
17.	Fluoride	mg/L	≤1.5	0.8
18.	Aluminum	mg/L	≤0.2	ND
19.	Manganese (Mn)	mg/L	≤0.5	ND
20.	Cadmium (Cd)	mg/L	0.01	ND
21.	Barium (Ba)	mg/L	0.7	ND
22.	Mercury (Hg)	mg/L	≤0.001	ND
23.	Copper (Cu)	mg/L	2	ND
24.	Zinc (Zn)	mg/L	5	0.4
25.	Boron (B)	mg/L	0.3	ND
26.	Chromium (Cr)	mg/L	≤0.05	ND
27.	Selenium (Se)	mg/L	0.01	ND
28.	Cyanide (CN)	mg/L	≤0.05	ND
29.	Phenolic Compounds (as Phenols)	mg/L	NGVS	ND
30.	Pesticides	ND	0.15	ND
31.	E-Coli	Number/100 mL	0 Number/100 mL	Absent
32.	Total Coliform		0 Number/100 mL	
33.	Fecal Coliform Bacteria		0 Number/100 mL	

**mg/l:** Milligram per Liter    **ND:** Not Detectable    **NGVS** = No Guideline Value Set  
**MU** = Measurement Uncertainty    **NTU** = Nephelometric Turbidity Unit    **TCU** = True Color Unit

The above table illustrates that all physical, chemical and microbiological parameters are well within the permissible limits of PEQS for Drinking Water Quality, 2016.



**Plate 4-3: A view of Drinking Water Sampling**

#### 4.3.4 Wastewater Quality

A wastewater sample was collected from the Jia Bagga Drain flowing near the Project area. The sample was analyzed for the parameters specified in PEQS, 2016 for the Into Sewage System. The detailed wastewater results are given in **Table 4-9**. A pictorial view of wastewater sample collection is shown in **Plate 4-4**.



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM  
PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



**Table 4-9: Wastewater Quality Monitoring**

Sr. No	Parameters	Units	Into Sewage PEQS	Results
1.	Temperature	°C	--	18.3
2.	pH	--	6-9	7.6
3.	Chemical Oxygen Demand (COD)	mg/l	400	152
4.	Biological Oxygen Demand (BOD <sub>5</sub> )	mg/l	250	90
5.	Total Dissolved Solids (TDS)	mg/l	3500	51
6.	Total Suspended Solids (TSS)	mg/l	400	632
8.	Oil & Grease	mg/l	10	ND
9.	Chromium	mg/l	1.0	ND
10.	Total Iron	mg/l	8.0	1.1
11.	Chloride	mg/l	1000	37
12.	Fluoride	mg/l	10	0.2
13.	Ammonia	mg/l	40	28.0
14.	Cadmium	mg/l	0.1	ND
15.	Lead	mg/l	0.5	ND
16.	Arsenic	mg/l	1.0	ND
17.	Copper	mg/l	1.0	ND
18.	Barium	mg/l	1.5	ND
19.	Selenium	mg/l	0.5	ND
20.	Silver	mg/l	1.0	ND
21.	Manganese	mg/l	1.5	0.3
22.	Zinc	mg/l	5.0	ND
23.	Nickel	mg/l	1.0	ND
24.	Boron	mg/l	6.0	ND
25.	Mercury	mg/l	0.01	ND
26.	Sulphide	mg/l	1.0	ND
27.	Sulphate	mg/l	1000	25.0
28.	An Ionic Detergent (as MBAS)	mg/l	20	ND
29.	Phenolic Compound (as Phenol)	mg/l	0.3	ND
30.	Cyanide (as CN) total	mg/l	1.0	ND
31.	Pesticides	mg/l	0.15	ND
32.	Total Toxic Metals	mg/l	2.0	ND

mg/l: Milligram per Liter    **ND**: Not Detectable    **MU** = Measurement Uncertainty  
**N.A.** = Not Available

The above table illustrates that all physical, chemical and microbiological parameters are well within permissible limits of PEQS for Into Sewage Quality, 2016.



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



Plate 4-4: A view of Wastewater Sampling

4.4 LAND USE PATTERN

The land use of the study area is mainly barren/open area and cultivated land. The Project site is surrounded by urban settlement comprising housing societies, offices, commercial area, health and educational institutions, residential area and religious places. **Table 4.10** depicts land use cover of the study area. The land use index map of the proposed Project site is shown in **Figure 4.11** and detailed maps are attached as **Annexure-II**. Pictorial views of current land use are provided in **Plate 4-5**.

Table 4-10: Land Use Type

Land Use Type	Area (Acres) Neelum Road ROW	Area (Acres) Chenab Road ROW
Agriculture	40.85	44.05
Builtup	1.38	3.52
Green Belt	2.13	--
Railway	0.47	--
Road	36.43	6.52
Vacant	66.05	4.20
Waterbody	0.17	0.12
Total	147.48	58.82



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Agricultural Land



Jia Bagga Drain



Railway Track



Residential Area of Lake View City



Masjid



Graveyard

**Plate 4-5: Current Land Use of the Project Area**

#### 4.5 ENVIRONMENTAL SENSITIVE RECEPTORS

Sensitive receptors are mainly people or other organisms that may have a significantly increased sensitivity and exposure to the pollutants and social disturbance, due to the developmental



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projects. Thus, sensitive receptors are necessary to be identified, to evaluate the potential impacts of the proposed project on public health and the surrounding environment.

The sensitive receptor present in or near the Project area are given in the **Table 4-11** and are shown in **Figure 4.13**. They are prone to sensitivity during construction phase, due to emission of air pollutants, noise and vibration, traffic jam, temporary edifice of construction camps and mobilization issues.

**Table 4-11 Sensitive Receptor in the Study Area**

<b>Sr. No.</b>	<b>Sensitive Receptor</b>
1.	Grand Masjid Lake City
2.	Zahra Public School
3.	Irah Masjid (Petrol Pump)
4.	Graveyard
5.	Local Masjid near LDA City



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE

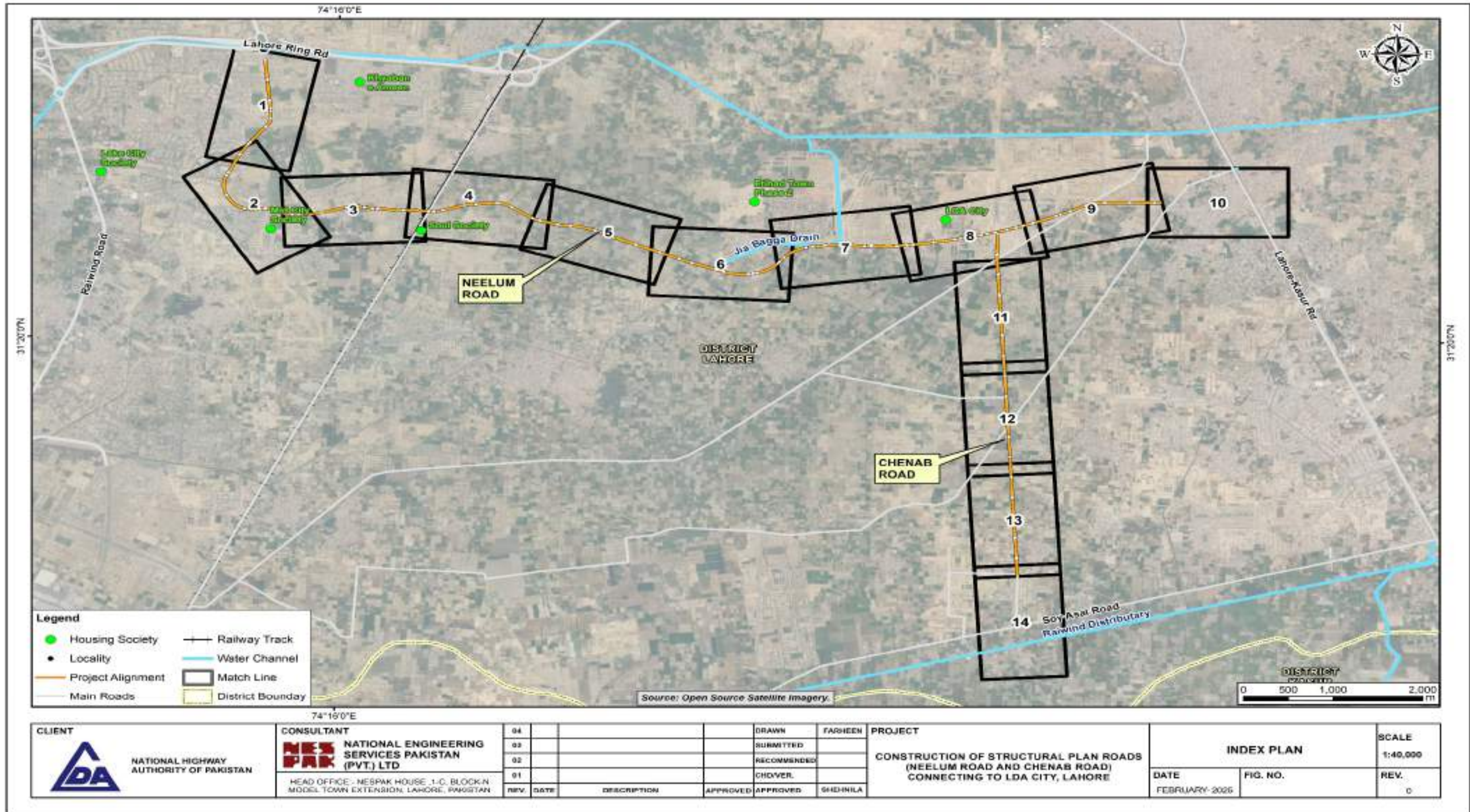


Figure 4.12: Land Use Map of the Study Area



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE

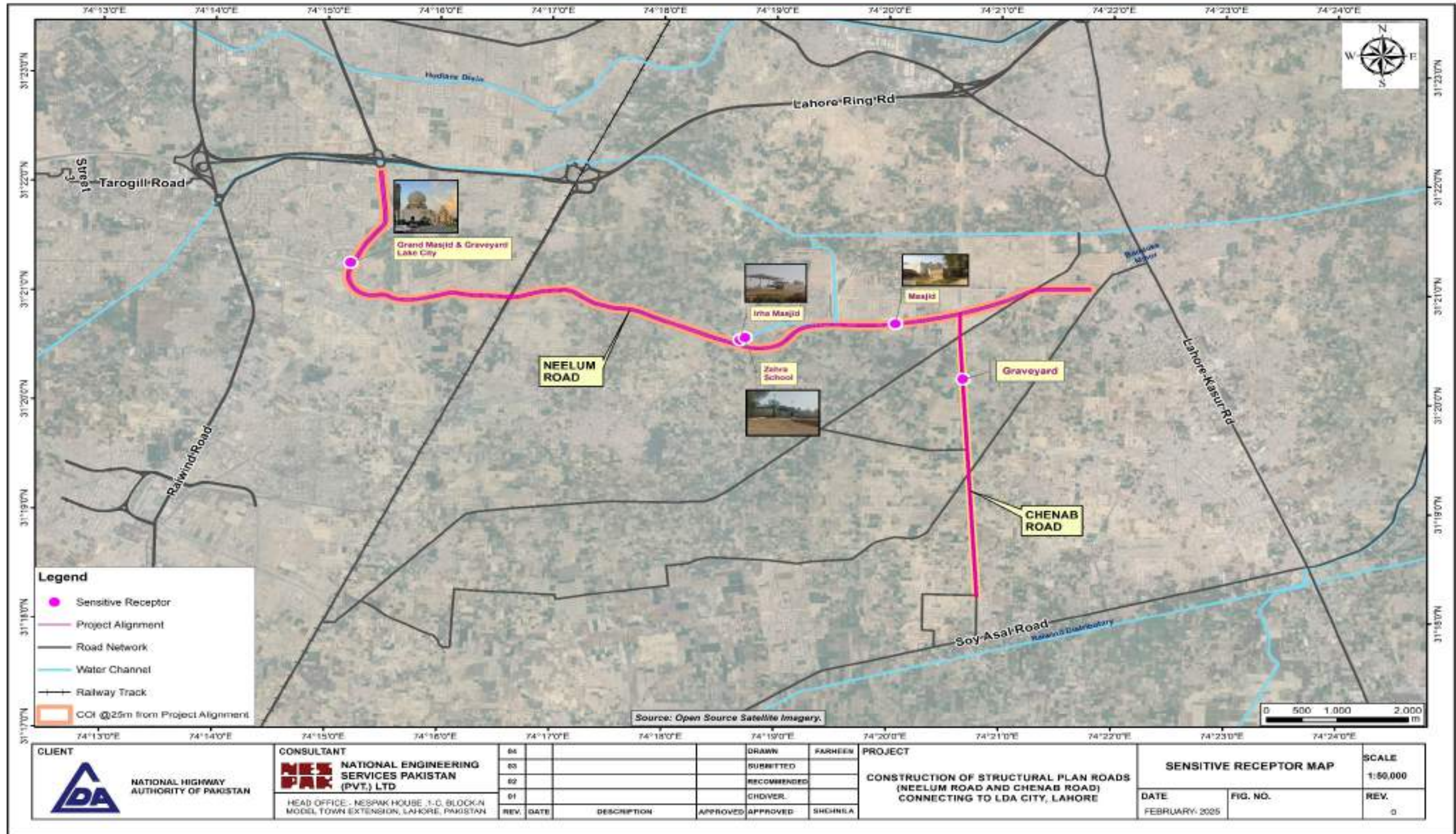


Figure 4.13: Sensitive Receptor Map of the Study Area



## 4.6 ECOLOGICAL RESOURCES

An ecological study of the area has been conducted using standard ecological assessment techniques based on primary and secondary information and inclusion of additional information collected during site visits, departmental consultations, discussions, and meetings with groups of communities/public living in and around the Project Area coupled with expert visual observations. Following is the description of the baseline ecological environment of the area.

### 4.6.1 Flora

The Project area is dominated by barren and agricultural land use, in combination with trees, where vegetables are also grown by locals. The soil of the Project area shows it is suitable for the agriculture and plantation of native species.

#### a) Trees

The Project area did not witness any designated forest or vegetated area during field visits. No compact plantation or woodlots exist in the Project area, but scattered trees are growing on the roadside, in farmlands, and in linear patterns consisting of Kikar, Shisham, Eucalyptus, etc. Common trees found in the area are given in **Table 4-12**.

**Table 4-12: Major Flora of the Region**

S. No.	Common Name	Scientific Name
1.	Kikar	<i>Acacia nilotica</i>
2.	Shisham	<i>Dalbergia sissoo</i>
3.	Ber	<i>Zizyphus sp.</i>
4.	Safeda	<i>Eucalyptus camaldulensis</i>
5.	Mulberry	<i>Morus alba</i>
6.	Neem	<i>Azadirachta indica</i>
7.	Dherek	<i>Melia azedarach</i>
8.	Pipal	<i>Ficus religiosa</i>

#### b) Shrubs and Herbs

Shrubs and herbs which are commonly found in the study area are Jawan (*Alhaji maurorum*), Bhakra (*Tribulus terrestris*) and AaK (*Calatropis procera*).

#### c) Grasses

The overall condition of the study area may fall in the modified/degraded habitat category. The original flora of the tract is almost in deteriorated condition and lost its virginity and originality as well. The most common grass of the tract is Khabbal (*Cynodon dactylon*). It is a useful fodder grass. Kana (*Saccharum munja*) and Dib (*Typha angustata*) are found along the water courses or in moist places.



The pictorial view of the flora of the study area is shown in **Plate 4-6**.



**Plate 4-6: Pictorial View of Flora in the Project Area**

#### 4.6.2 Fauna

##### a) Mammals

The Study Area falls in barren and agricultural land use and is not very rich in wildlife mammals. However, common mammals (in & around the Project area) found are Squirrel (*Funambulus*), Rats (*Mus musculus*) and Mongoose (*Herpestes auropunctatus*). Wild Boar (*Sus scrofa*) is also reported in the area, but its number has been reduced to a bare minimum as a result of extensive hunting and shooting. Porcupine (*Hystrix indica*) is also reported in region. The above and the species given in the **Table 4-12**, are away from the Project location but are found regionally.

Domestic animals include goats, cows, dogs and buffaloes. Another important domestic draught animal of the area is donkey, which is used for pulling carts



**Table 4-13: Mammals in the Study Area**

S. No.	Common Name	Scientific Name	Status
1.	Porcupine	<i>Hystrix indica</i>	Least Concern
2.	Squirrel	<i>Sciuridae</i>	----
3.	Mouse	<i>Funambulus pennanti</i>	----
4.	Mongoose	<i>Herpestes javanicus</i>	Least Concern

**b) Birds – Avifauna**

The Project area was reported degraded in terms of avifauna habitats. Waterfowls are seen in plenty during Kharif season, along agricultural fields. These include little and medium sized Egrets and Mallard (*Anas platyrhynchos*). The common bird species found in the tract are the Common Crow, Common Mynah, House Sparrow and Common Teal, which are abundant in the area and are frequently sighted. Bulbul and Koel were also noticed in the the study area during field visits. Birds seen and reported in the tract are given in **Table 4.14**.

**Table 4-14 Common Birds**

Sr. #	Common Name	Scientific Name	Status
1.	Mynah	<i>Acridotheres tristis</i>	<i>Least Concern</i>
2.	House Crow	<i>Corvus splendens</i>	<i>Least Concern</i>
3.	House sparrow	<i>Passer domesticus</i>	<i>Least Concern</i>
4.	Koel	<i>Eudynamys scolopacea</i>	<i>Least Concern</i>
5.	Quil	<i>Coturnix coturnix</i>	<i>Least Concern</i>

**4.6.3 Endangered Species**

No endangered flora and fauna were found in the track. The original diversity of the track consisted of trees like Acacia species and some other wild species was cleared for raising crops, housing societies and buildings in the region.

**4.6.4 Protected Areas**

As per field visits and consultations with wildlife and forest departments, the proposed Project area does not fall in any protected area i.e. Game Reserves, National Parks, Wildlife Sanctuaries, Forest areas, etc.

**4.7 SOCIO-ECONOMIC INFORMATION AND PROFILE**

This section deals with the socio-economic environment of the Project Area. A socio-economic survey is regarded as one of the most important sources of statistical data to collect baseline data on household expenditure and income as well as other data on the status of housing, individual and household characteristics, living conditions, asset ownership, incidence, depth and severity of poverty, and associated social characteristics.



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To document the socio-economic conditions of the population settled in the Project Area, a social survey of the sampled Households (HHs) was carried out. The purpose of the baseline survey was to collect data on the socioeconomic attributes of the households and population to estimate living standard indicators. This section analyzes the data collected through a baseline survey in the Project area in December, 2024 and January, 2025. Moreover, available reports/documents comprising information on the proposed Project were also comprehensively studied during the desk study.

The subsequent sections discuss the methodology concerning the survey design, sample framework, survey instrument (questionnaire), and analysis.

#### 4.7.1 Methodology

The survey mainly used quantitative methods and included supplementary qualitative information and analysis, wherever possible. The design of the assessment was limited to measuring the overall socioeconomic condition of the population living in the proposed Project area. **Table 4.15** presents a summary of the objectives, key indicators, tools, and survey methods used for data collection.

**Table 4-15: Survey Objectives, Key Indicators, and Methods**

Sr. No.	Objectives	Key Indicators	Method	Tools
1.	<ul style="list-style-type: none"> <li>Demographic Profile</li> <li>Occupation</li> <li>Income of the respondents</li> <li>Source of income</li> <li>Expenditures</li> <li>Asset ownership</li> </ul>	<ul style="list-style-type: none"> <li>Demographic information (age, education status, health status, work status of household members)</li> <li>Income levels and sources</li> <li>Expenditure level</li> <li>Assets – quantity, value, and ownership</li> <li>Liabilities-loan amount and sources</li> <li>Available social amenities (electricity, sewerage, telephone, Sui gas, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Sample household interviews</li> </ul>	<ul style="list-style-type: none"> <li>Socioeconomic Proforma</li> </ul>
2.	<ul style="list-style-type: none"> <li>Availability of Social Amenities (access to and use of public services, such as water and sanitation, education, health, etc.)</li> <li>Perception about the proposed Project.</li> </ul>	<ul style="list-style-type: none"> <li>Availability, use, and sources of household facilities (water, sanitation, fuel, etc.)</li> <li>Availability, access, and use of public facilities (education, health, sanitation, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>Sample household interviews</li> <li>Community Discussions</li> <li>Gender Discussions</li> </ul>	<ul style="list-style-type: none"> <li>Sample household interviews, and</li> <li>General Discussions with local community members</li> </ul>

#### 4.7.2 Sample Framework



#### 4.7.2.1 Sample Size Determination

The sample size calculation was followed for the determination/establishment of socioeconomic baseline and evaluation objectives. The intention was to develop the socioeconomic baseline on the basis of the representative sample size. The size of a sample influences two statistical properties: (i) the precision of our estimates; and (ii) the power of the study to draw conclusions.

#### 4.7.2.2 Sample Selection Process

The entire population residing along the proposed roads including old settlements likewise Jia Bagga, Jhedu, Jhandin, Kahna Kuhna and housing societies (Safari Garden, Etihad Town Phase 2, Soul City, Mid-City, Khyaban-e-Amin, and Lake City). A field survey was conducted using simple random sampling to interview respondents.

The settlement map of the study area is given in **Figure 4.14**.

#### 4.7.2.3 Survey Instrument - HH Questionnaire

To achieve the objectives of the survey, the questionnaire was used comprised of two distinct segments:

**Segment I - Household Income and Poverty:** Structured questionnaires containing sections on various socio-economic characteristics of the sample households were used. This module of the questionnaire included the following sections:

- Age, education, and profession of the respondents;
- Demographic composition of household (age and gender distribution);
- Work status of household members;
- Educational achievement of adults including any technical/vocational skills training;
- Schooling of children;
- Health status of household members;
- Household income with the sources of income;
- Household expenditure on different needs
- Loans taken from informal and formal sources and use of loans for different purposes (production, consumption, etc.)

**Segment II - Availability, Accessibility and Use of Public Sector Social & Economic Services:** The following sections were included in this segment:

- Housing facilities (structure, drinking water, and sources, drainage, electricity, fuel, etc.);
- Availability, access to education facilities and satisfaction level of the education facility users;
- Availability, access, health facility and satisfaction level of the health facility users;
- Identification of pressing needs and remarks of the respondent about the Project to perceive the public perception of the Project.



#### 4.7.3 Data Processing and Analysis

The following steps were taken for data processing and analysis:

- The collected data/information from the field survey was computerized;
- A tabulation plan was prepared;
- Data was processed according to a separate category of the indicators for analysis; and,
- The analyzed data was properly tabulated for interpretation and deriving conclusions and recommendations.

#### 4.7.4 Lahore City and the Project Area at a Glance

The location of Lahore City is bounded on the North and West by Sheikhpura District, on the east by India, and on the south Kasur District. River Ravi flows on the northern side of Lahore. The Shalimar Garden is located next to the Grand Trunk Road, about 5 kilometers (3.1 mi) east of the Delhi Gate of the Walled City of Lahore. The proposed Project site falls in Rawind and Cantonment Tehsils of Lahore District.

#### 4.7.5 Administrative and Political Settings

Lahore District is composed of Tehsils and is governed by the Deputy Commissioner (DC). Like other districts of Punjab, the local government system of Lahore comprise UCs consisting of members directly elected by people through an open competition, which is also from the Electoral College for the selection of the members for the next higher tier.

Lahore comprises five tehsils i.e. Lahore city and Lahore Cantt, Model Town, Raiwind Tehsil and Shalimar Tehsil. While these tehsils are further divided into nine towns i.e. (i) Nishtar Town; (ii). Gulberg Town; (iii). Aziz Bhatti Town; (iv) Allama Iqbal Town; (v) Ravi Town; (vi) Shalamar Town; (vii) Samanabad Town; (viii) Wahgah Town; and (ix) Data Gunj Bakhsh Town.

#### 4.7.6 Demographic Characteristics of Lahore District

The total area of the district is 1,772 square kilometers which gives a population density of 6,300 (16,000/sq mi) persons per square kilometer as against 2,000 persons observed in 1981 indicating a fast growth rate of the district.

According to census of the 2023, the population of Lahore district is 13,004,135<sup>16</sup> with an average household size of 6.46. The increase in population was observed with the 2.65 growth rate with respect to census of 2017. However, the complete district census report 2023 is yet to be published, therefore the respective report is compiled on the basis of the census of 2017. The results of the 2017 census determined the population to be at 11,126,285<sup>17</sup>, with an annual growth rate of 3% since 1998. Gender-wise, 52.35% of the population are male,

<sup>16</sup> <https://www.pbs.gov.pk/sites/default/files/population/2023/Punjab.pdf>

<sup>17</sup> [https://www.citypopulation.de/en/pakistan/distr/admin/716\\_\\_lahore/](https://www.citypopulation.de/en/pakistan/distr/admin/716__lahore/)



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47.64% are female, and 0.01% are transgender. The sex ratio is an important demographic indicator, which is defined as the “number of males per hundred females”. According to the census 2017, the Sex ratio is measured as 109.87 percent. Lahore is a young city with over 40% of its inhabitants below the age of 15. **Table 4.16** gives Households, Population Increase, Sex Ratio, and Growth Rates of Lahore District, for the year 2017.

**Table 4-16: Households, Population Increase, Sex Ratio and Growth Rates in Lahore**

Households	Population-2017				Population 1998	Sex Ratio 2017	1998-2017 Average Annual Growth Rate
	Male	Female	Transgender	All Sexes			
1,757,691	5,824,131	5,300,931	1,223	11,126,285	6,340,114	109.87	4.07

*Source: Pakistan Bureau of Statistics (Census 2017)*



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE

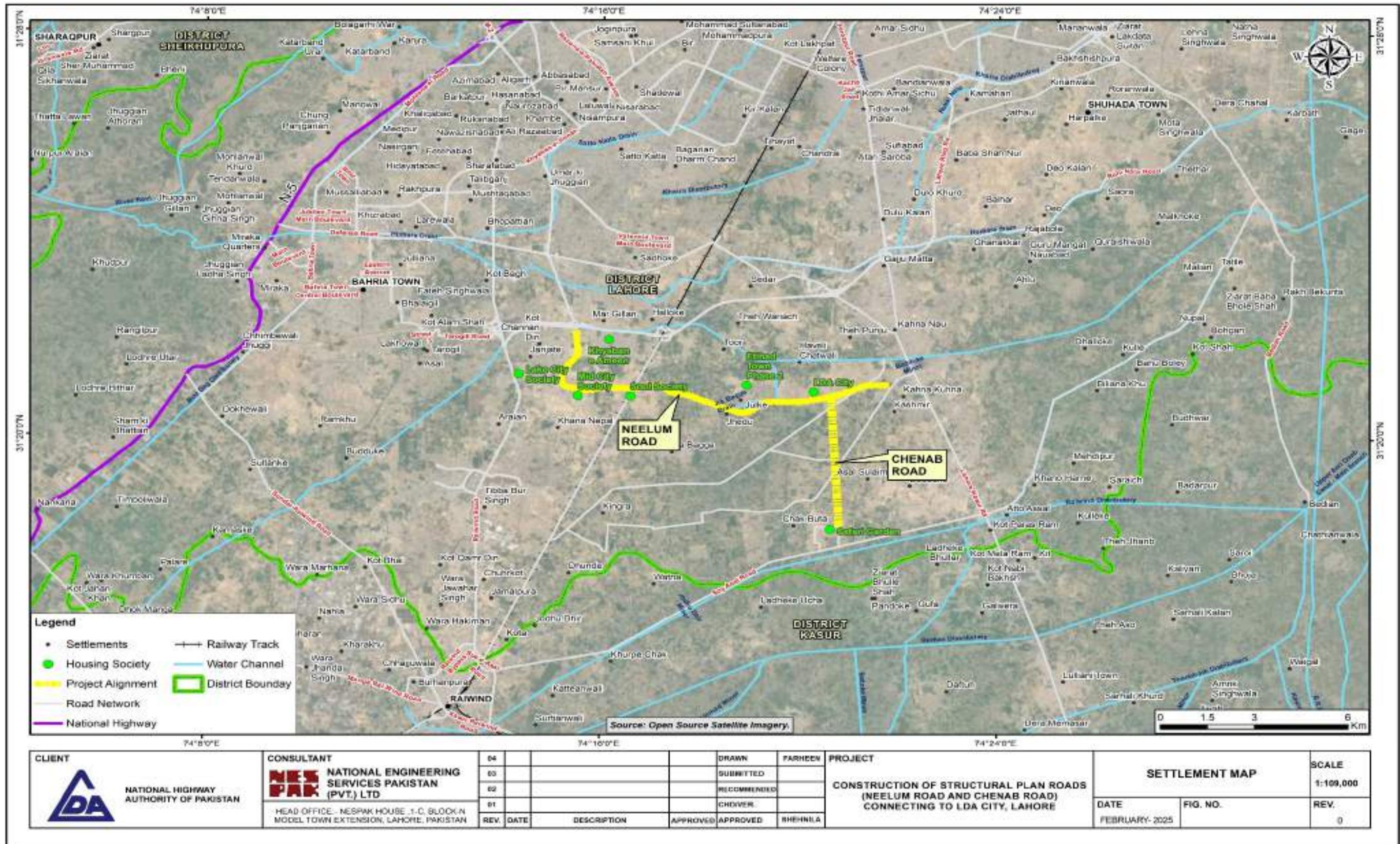


Figure 4.14: Settlement Map of the Study Area



#### **4.7.7 Rural and Urban Distributions**

According to Census of 2017, the district Lahore falls 100% in the urban area with 1,757,691 number of households.

#### **4.7.8 Religion**

The population of the district is predominantly Muslim i.e. 93.9 percent. The next higher percentage is of Christians with 5.8 percent followed by Ahmadis at 0.2 percent. While other minorities like Hindus etc. are in minimal number.

#### **4.7.9 Mother Tongue**

The mother tongue refers to the language used for communication between parents and their children in any household. Punjabi is the predominant language being spoken by the majority (86.2 percent) of the population of the district followed by Urdu, Pushto and Siraiki were spoken by 10.2, 1.9, and 0.4 percent respectively. Sindhi is spoken by 0.1 percent.

#### **4.7.10 Ethnic Structure**

The main castes and groups of the Lahore District are Jatt, Rajput, Malik, Butt, Pathan, Mughal, Sheikh, Gujjar, Kombh, and Arain. Besides, there are also village artisans, which include Lohars (blacksmiths), Tarkhan (carpenter), Kumhars (potters), Mochis (cobblers), Machhis (water-carries), barbers, weavers, etc.

#### **4.7.11 Economic Conditions**

The economy of Lahore has a diversified base spanning from telecommunication, information technology, the manufacturing industry, engineering, pharmaceuticals, steel, chemicals, and construction material.

##### **4.7.11.1 Gross Domestic Product**

As of 2019, Lahore had an estimated GDP of \$84 billion. As of 2008, the city's gross domestic product (GDP) by purchasing power parity (PPP) was estimated at \$40 billion (projected to be \$102 billion by the year 2025, with a slightly higher growth rate of 5.6% per annum, as compared to Karachi's 5.5%). The contribution of Lahore to the national economy is estimated to be 11.5% and 19% to the provincial economy of Punjab. As a whole Punjab has a \$115 billion economy making it the first and to date only Pakistani Subdivision of economy with more than \$100 billion at the rank 144.

##### **4.7.11.2 Industry, Trade and Trade Centers**



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Lahore is the second largest financial hub of Pakistan and has industrial areas including Kot Lakhpat and the new Sundar Industrial Estate (near Raiwind). A major industrial hub with about 9,000 industrial units. Lahore has shifted in recent decades from manufacturing to service industries. Some 42% of its workforce is employed in finance, banking, real estate, community, cultural, and social services. The city is the country's largest software producing center and hosts a growing computer-assembly industry.

There are many large industrial units in the district. These units manufacture cotton, woolen, and silk cloths, carpets, and rugs, textile products, leather and rubber foot wears, wearing apparel, pharmaceutical goods, soap, iron and steel products, heating, plumbing, and lighting equipment, hardware, miscellaneous fabricated products, agriculture machinery, engines and turbines, textile machinery, printing machinery, metal working machinery, pumps and compressors, household machinery, water generators, motor generators, transformers, electric fans, communication equipment, cycles, and rickshaws. There are also a good number of printing and publishing units and bodybuilding workshops. Besides, there are units of canning and preservation of food, edible oils, beverages, metal and wood furniture, rubber products, chemicals, glass products, repair of railway equipment, toys and stationary, etc.

The Lahore Expo Centre is one of the biggest projects in the history of the city and was inaugurated on 22 May 2010 and there are various business centers and hubs of commercial activities, i.e. Emporium Mall, Packages Mall, Mall of Lahore, and other markets where customers from all over the country visit.

#### 4.7.12 Educational Facilities

Lahore is an old first-class place of learning in Pakistan. The world-famous and the oldest university of Pakistan i.e. University of the Punjab is located in this city. The pioneer University of Engineering and Technology (JET) is also in Lahore. There has been a significant development in the educational sector of this district. The University of the Punjab has been extended and its new campuses are constructed along the Lahore branch of Upper Bari Doab canal. This provides an ideal environment for teachers taught in the green lush area surrounded by New Muslim Town, Wahdat Colony, PCSIR Colony, Faisal Town, and Garden Town.

##### Project Area:

In the Project area, not many private and government educational institutions were present. There were only two Schools were along the COI: (i) Government Girls' Middle School, Jhedu and (ii) Zahra Primary School.

Besides, above mentioned government and private educational schools, the khayaban-e-Amin society has allocated land for Khayaban-e- Amin University.

#### 4.7.13 HEALTH FACILITIES



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Ample medical and health facilities are available in the Lahore Metropolitan Corporation area and its suburbs. Shaukat Khanum Hospital is the latest addition to the medical care facilities in Lahore for Cancer, the most dangerous disease in the country. There are also other hospitals established by the voluntary organizations which provide health coverage to the general public. King Zaid Bin Sultan Hospital is also a very advanced addition to the medical care for Lahore. Among the prominent hospitals are Lahore General Hospital, Lady Willingdon Hospital, Mayo Hospital, Fatima Jinnah Hospital, The Children Hospital, Services Hospital, Ganga Ram Hospital, etc. Besides, a number of private hospitals and medical practitioners, Hakims, and homeopathic doctors are also practicing in the city.

Project Area:

The health institutions that are working near the proposed Project area are: Khajwa Hospital, Indus Hospital and Khana Nau Hospital. Besides these, many other private medical facilities are also available in the surrounding Project area. The people of the local communities get their treatment from both governments as well as private hospitals.

#### 4.7.14 Transportation

Lahore is the provincial capital of Punjab and has higher and better transportation facilities as compared to other areas of Punjab. Lahore's main public transportation system is operated by the Lahore Transport Company (LTC) and Punjab Mass Transit Authority (PMTA). The backbone of its public transport network is the PMTA's Lahore Metro bus and Orange Line train of the Lahore Metro. LTC and PMTA also operate an extensive network of buses, providing bus service to many parts of the city and acting as a feeder system for the Metro bus. Auto rickshaws and Cabs also play an important role of public transport in Lahore as a common means of domestic travel.

Project Area:

In the Project area, there are many access roads that link the residential as well as commercial places. The common mean of transportation in the Project area are private and local buses, cabs and rickshaws, private cars, and motorbikes.

#### 4.7.15 Railways

The Pakistan Railways headquarters is located in Lahore. Pakistan Railways provides an important mode of transportation for commuters and connects distant parts of the country with Lahore for business freight, sight-seeing, pilgrimage and education. The Lahore Central Railway Station was built in during the British colonial era. It is located in the heart of the city. The railway track is also passing through the study area.

#### 4.7.16 Archeological and Cultural Property/ Places of Interest



Lahore's modern city space consists of the historic walled city of Lahore in the northern part of the city, which contains world and national heritage sites. The most common places of interest in Lahore city are Royal Fort Lahore, Minar-e-Pakistan, Badshahi Mosque, Wazir Khan Mosque, Grand Jamia Mosque Bahria Town, Shrine of Data Ganj Bakhsh, Shrine of Madhu Lal Hussain, Lahore Museum, Shalimar Garden, Jallo Park, Lahore Zoo, Tomb of Allama Iqbal, Tomb of Anarkali, Tomb of Nur Jahan and Jahangir's Tomb and Wagah Border.

#### 4.7.17 Findings of the Socio-Economic Survey

##### A) Gender Composition of Household Population

The socio-economic survey was carried out to understand the demographic and socio-economic characteristics of the population in the Project area. According to the survey of sampled households, the male population was high as compared to the female population in the Project area. On average the male population was 52% compared to the 48% female population among the sampled families. As per the survey, the household size was 6.18 persons per household. Whereas, the sex ration is 109. The detail of the population of sampled households is given in **Table 4.17**.

**Table 4-17: Gender Compositions of Household Population**

Total Respondents	Population and Family Size				Total Population	Average Household Size	Sex Ratio
	Male	%	Female	%			
44	142	52	130	48	272	6.18	109

Source: Socio-economic Survey

##### B) Age Group of the Respondents

Age is another important demographic characteristic that has a bearing on employment and mobility. A study of the distribution of members of households by age will throw some light on the type of strategies that may be helpful in raising their income and employment.

About 18% of the respondents were between 18 to 25 years of age, while 23% were between 26 to 35 years of age & 27% of the respondents were between 36 to 45 years of age group and 32% were above 45 years of age group respectively which were engaged in various kind of activities to earn their livelihood like agriculture, shopkeepers, running hotel, business, mechanic, private jobs, business, and daily wages labor. The data regarding the distribution of respondents by age categories are presented in **Table 4.18**.

**Table 4-18: Age Group of Respondents**

Age Composition of Respondents			
Sr. No.	Frequency Distribution	Number	Percentage (%)
1	18-25	08	18
2	26-35	10	23
3	36-45	12	27
4	Above 45	14	32
<b>Total</b>		<b>44</b>	<b>100</b>



### C) Educational Status of Respondents

A person could read a newspaper or a journal of the same standard and could write a simple letter in any language defined as literate in the Census of 1998. Whereas, this definition was expended by adding enumerating skill. According to new definition, *“Ability to read and understand simple text in any language from a newspaper or magazine, write a simple letter and perform basic mathematical calculation (i.e. counting and addition/subtraction).”* Education is one of the key factors in assessing the socio-economic condition of any area and is a more contributing factor than income for uplifting the living standards in society. The literacy rate is a barrier to limited educational infrastructures.

Based on the sample survey (**Table 4.19**), 36% of the respondent population was illiterate and 64% were literate. In terms of education distribution, out of the literate population, 10% of the respondents got their education till primary level (five years of schooling), 14% of the respondents have an education up to middle level (8 years of schooling), and 10% & 14% of the respondents were matriculated and intermediate respectively. However, 5% and 4% of the respondents were graduates and post-graduate holders respectively. There were 5% of the respondents that were able to read the Quran and 2% had other qualifications like engineer, doctor and lawyer.

**Table 4-19: Educational Status of the Respondents**

Educational Status of Respondents			
Sr. No.	Educational Status	Number	Percentage (%)
1	Primary	20	10
2	Middle	29	14
3	Matric	20	10
4	Intermediate	27	14
5	Graduation	11	5
6	Post Graduate	8	4
10	Can read Quran	10	5
11	Illiterate	71	36
12	Others	3	2
<b>Total</b>		<b>199*</b>	<b>100</b>

\*Include the education status of the respondent's family members.

### D) Mother Tongue of the Respondents

The term "mother tongue" refers to a person's native language that is, a language learned from birth. Also called a first language, dominant language, home language, and native tongue.

The dominant language in the project area was Punjabi. Based on the sample survey, 95% of the respondents were Punjabi speaking, while 05% of the respondents were Urdu speaking as shown in **Table 4.20**.

**Table 4-20: Mother Tongue of Respondents**



Mother Tongue of Respondents			
Sr. No.	Mother Tongue	Number	Percentage (%)
1	Punjabi	42	95
2	Urdu	02	05
Total		44	100

**E) Ethnic Respondents**

Structure of

Relating to large groups of people classed according to common racial, national, tribal, religious, linguistic, or cultural origin or background ethnic minorities ethnic enclaves. The survey findings revealed that Rajput and Jutt were the major ethnic groups residing in the Project area with a ratio of 41% and 11% respectively. While Bhatti, were 9% and Malik, Joiya, Arain with the ratio of 7% each and Khan with a ratio of 5% were residing in the area. The other casts (Butt, Raja, Muslim Sheikh, Par and Sakay) with almost equal proportions were also present in the study area. **Table 4.21** depicts the ethnic structure of the sampled households in the proposed Project area.

**Table 4-21: Ethnic Structure of Respondents**

Cast of Respondents			
Sr. No.	Mother Tongue	Number	Percentage (%)
1	Rajput	18	41
2	Jutt	5	11
3	Bhatti	4	9
4	Malik	3	7
5	Joiya	3	7
6	Arain	3	7
7	Khan	2	5
9	Others	6	14
Total		44	100

**F) Professional Status of Respondents**

Household income could be the best indicator to assess the actual socio-economic situation of the target communities. The majority of the respondents living nearby the Project area were associated with the profession of shop keeping, some of them were doing business, private jobs, hotel jobs, and daily wage labor to earn their livelihood.

The occupations have been categorized based on the primary source of income. The sample survey revealed that the majority of the respondents i.e. 30% were belonging to agriculture, followed by 25% and 14% associated with Private jobs and business respectively, while 8% were doing work related to livestock in the area. Moreover, 5% of each category respondents were shopkeepers, housewives and labor. While 2% of each category of respondents were associated with different professions likewise driver, mechanic, barber and government jobs. **Table 4.22** below show the occupation of the respondents.

**Table 4-22: Professional Status of the Respondents**

Professional Status of Respondents			
Sr. No.	Professional Status	Number	Percentage (%)



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1	Agriculture	13	30
2	Private Job	11	25
3	Business	6	14
4	Livestock	4	8
5	Shopkeeper	2	5
6	Housewives	2	5
7	Labor	2	5
8	Mechanic	1	2
<b>Sr. No.</b>	<b>Professional Status</b>	<b>Number</b>	<b>Percentage (%)</b>
9	Barber	1	2
10	Government job	1	2
11	Driver	1	2
<b>Total</b>		<b>44</b>	<b>100</b>

### G) Average Monthly Income

During the socioeconomic survey of the households, it was observed that the household income of 16% of respondents was up to 25,000 per month, whereas 07% were earning between the ranges of 25,001 to 35,000 per month and 09% of respondents were earning between 35,001 to 45,000 per month. However, 25% of the respondents were earning between 45,001 to 55,000 per month. It is paramount that 43 % of the respondents' earning was above to 55,000 per month. The **Table 4.23** shows the average monthly household income of the surveyed respondents.

**Table 4-23: Average Household Monthly Income**

Average Monthly Income of Respondents			
Sr. No.	Distribution	Number	Percentage (%)
1	Up to 25,000	07	16
2	25,001 to 35,000	03	07
3	35,001 to 45,000	04	09
4	45,001 to 55,000	11	25
5	Above 55,000	19	43
<b>Total</b>		<b>44</b>	<b>100</b>

### H) Average Household Monthly Expenditures

Household expenditure depends on the earnings of the households. 16% of respondents reported their monthly household expenditure as up to 25,000, due to their low income. However, 09% of the respondents reported their expenses within the range of 25,001 to 35,000 per month. Whereas, 20% of respondents reported their monthly expenditures between the ranges of 35,001 to 45,000 in order to fulfill their family needs, while 14% of the respondents were expensing between 45,001 to 55,000 and 41% of the surveyed respondents spend above 55,000 in order to fulfill their monthly outlays. The information relating to the household expenditure in respect of the sample population is shown in **Table 4.24** shows the average monthly expenditures of the surveyed respondents.

**Table 4-24: Average Household Monthly Expenditures**

Average Monthly Expenditures of Respondents			
Sr. No.	Distribution	Number	Percentage (%)



1	Up to 25,000	07	16
2	25,001 to 35,000	04	09
3	35,001 to 45,000	09	20
4	45,001 to 55,000	06	14
5	Above 55,000	18	41
<b>Total</b>		<b>44</b>	<b>100</b>

### I) Family System of Respondents

A family is a social institution organized to meet certain essential societal needs. It is a group consisting of parents, with or without children and relatives, united by bonds of love and affection and sharing common social activities. The joint family consists of people of three or more generations including at least, grandparents, parents, and children. A nuclear family is one that consists of the husband, wife, and unmarried children.

During the socioeconomic survey of the respondents, it was observed that the majority of the respondent i.e. 55% were living within a joint family system, while 45% of the respondents were living in a nuclear family system. The information relating to the family system in respect of the sample population is shown in **Table 4.25**

**Table 4-25: Family System of the Respondents**

Family System of the Respondents			
Sr. No.	Type	Number	Percentage
1	Joint	24	55
2	Nuclear	20	45
<b>Total</b>		<b>44</b>	<b>100</b>

### J) Ownership Status of Houses

Housing is a major element of people's material living standards. It is essential to meet basic needs, such as shelter from harsh weather conditions, and to offer a sense of personal security, privacy, and personal space. Good housing conditions are also essential for people's health and affect childhood development. Further, housing costs make up a large share of the household budget and constitute the main component of household wealth.

Regarding the ownership of the houses, findings of the study indicated that 80% of the surveyed respondents owned their houses, whereas 16% were living in rented houses and 04% living as tenants with agricultural land owners. Detail for the ownership of the houses is given in **Table 4.26**

**Table 4-26: Ownership Status of Houses**

Ownership Status of Houses/Shops			
Sr. No.	Status	Number	Percentage
1	Self-Owned	35	80
2	Rented	07	16
2	Tenant	02	04
<b>Total</b>		<b>4</b>	<b>100</b>



### K) Construction Type of the Houses

The Housing conditions of the respondents have been analyzed according to the construction type of houses in which they were residing. These are categorized as Pacca houses, Semi-Pacca houses, and Kacha houses. The house or building constructed with concrete and/or bricks falls in the Pacca category. House or building constructed with burnt bricks and mud comes under the Semi-Pacca category, whereas houses constructed with un-burnt bricks and mud, or temporary wooden poles are categorized as the Kacha category.

In the respondent's survey, it was found that 66% of the respondents were living in their Pacca houses, while 34% of the respondents were living in Semi – Pacca houses. It is noteworthy that none of the respondent was living in Kacha houses. Detail of housing condition is given in **Table 4.27**.

**Table 4-27: Construction Type of the Houses**

Nature of Construction of Houses of Respondents			
Sr. No.	Type	Number	Percentage
1	Pacca	29	66
2	Semi-Pacca	15	34
<b>Total</b>		<b>44</b>	<b>100</b>

### L) Access to Social Amenities

Social infrastructure and amenities are key indicators for the sustainability of communities. This assessment sets the spaciousness of a household's dwelling, household amenities like availability of electricity and modern appliances, nature of access to water, fuel for cooking, and type of sanitation facilities available as primary indicators for assessing the standard of living.

The result of the survey revealed that 93% of the households had the facility of electricity, 66% had access to school, while 18% availing hospital, 27% gas, 23% waters supply, 55% sewerage, and 36% telephone facility. Whereas, 32% of respondents had access to water filtration plant, 20% to college and 18% to university. The religious institution was available to 77% and 93% of the respondents were enjoying road facilities. The information with respect to access to social amenities is given in **Table 3.12**

**Table 4-28: Access to Social Amenities**

Access to Social Amenities			
Sr. No.	Facilities	Number	Percentage
1	Electricity	41	93
2	School	29	66
3	Hospital	8	18
4	Gas	12	27
5	Water Supply	10	23
6	Sewerage	24	55
7	Telephone	16	36
8	Water Filtration Plant	14	32
9	College	9	20



10	University	8	18
11	Religious Institution	34	77
12	Road	41	93

\*Multiple Responses

#### M) Source of Drinking Water in the Project Area

Access to a safe drinking water supply is not only a basic need and a precondition for a healthy life but is also a basic human right. The quality of water is directly linked to the quality of health. The amount of drinking water required to maintain good health varies, and depends on physical activity level, age, health-related issues, and environmental conditions. The findings of the survey indicated that 09% of the households had the facility of the drinking water inside their home in the shape of a public water supply, 41% and 32% of the respondents used hand pumps/electric motor and boreholes respectively. While the 18% fetch drinking water outside of their homes from water filtration plants. The detail of the facility of drinking water is given in **Table 4.29**.

**Table 4-29: Source of Drinking Water in Project Area**

Source of Drinking Water in the Project Area			
Sr. No.	Source of Water	Number	Percentage
1	Public Water Supply	04	09
2	Hand Pumps/Electric Motor	18	41
3	Borehole	14	32
3	Filtration plant	8	18
<b>Total</b>		<b>44</b>	<b>100</b>

#### N) Satisfaction Level with Quality of Drinking Water

The findings of the survey revealed that 55% of the respondents were satisfied with the drinking water quality, while 45% of the respondents were not satisfied with the water quality level. A detail of the satisfaction level of the respondents with the water quality is given in **Table 4.30**.

**Table 4-30: Satisfaction Level with Water Quality**

Satisfaction Level with Water Quality			
Sr. No.	Opinion	Number	Percentage
1	Yes	24	55
2	No	20	45
<b>Total</b>		<b>44</b>	<b>100</b>

#### O) Credit Utilization of The Respondents

The findings of the survey revealed that only 18% of the respondents availed the facility of credit for their personal use, while 82% of the respondents did not take loans from any formal or informal source. Detail of credit utilization is given in **Table 4.31**.

**Table 4-31: Credit Utilization of Respondents**

Credit Utilization of the Respondents
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Sr. No.	Obtained Credit	Number	Percentage
1	Yes	08	18
2	No	36	82
<b>Total</b>		<b>44</b>	<b>100</b>

**P) Availability of NGO of The Proposed Project**

The finding of the survey revealed that no NGO (Non-government Origination) was reported by the respondents working in proposed Project area.

**Q) Perception of Respondents for Action Associated with the Proposed Project**

The public perception about the Project plays an important role for the success of the Project. If the local community is against a certain Project. The public start protests or create problems in the implementation of the Project. The success of the Project is associated with its acceptance by the local community.

The survey results indicate that the proposed road Project is widely perceived as beneficial, with 95% of respondents expecting increased employment opportunities and 98% foreseeing improved mobility. Industrial development (82%), income-generating activities (86%), and enhanced living standards (91%) are also anticipated, alongside significant improvements in transport infrastructure (93%). Additionally, 75% believe unemployment will decrease due to new economic opportunities. However, concerns arise regarding physical displacement, with 93% fearing relocation impacts. While a small percentage remains uncertain about industrial growth (7%) and unemployment trends (2%), the overall sentiment is positive. Addressing displacement concerns through fair compensation, livelihood restoration, and community engagement will be crucial for ensuring equitable Project benefits. Detail public perception about the Project is given in **Table 4.32**.

**Table 4-32: Perception of Respondents about the Proposed Project**

Sr. No	Impact	Increase %	Decrease %	Don't Know %
1	Employment opportunities	95	5	-
2	Industrial Development Opportunities	82	11	7
3	Living standard	91	9	-
4	Unemployment	23	75	2
5	Income generating activities	86	14	-
6	Improvement in transport	93	7	-
7	Mobility	98	2	-
8	Physical Displacement	93	7	-

*\*Multiple Responses*

**R) Common Diseases in the Study Area**

Infectious diseases are disorders that are caused by organisms, usually microscopic in size, such as bacteria, viruses, fungi, or parasites that are passed, directly or indirectly, from one



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person to another. Humans can also become infected following exposure to an infected animal that harbors a pathogenic organism that is capable of infecting humans. Some diseases are waterborne like diarrhea and hepatitis.

The social team asked the respondent about the common diseases in the area. The respondents identified diabetes, blood pressure, fever, dengue, malaria, hepatitis and pulmonary diseases like cough, chest infection as common diseases.

### **S) Pressing Needs**

Many of the respondents complained about the non-availability of basic civic facilities and demanded for the availability of roads, schools, hospitals, landline internet, gas, sewerage, clean drinking water, security, lighting and plantation for greenery in the area.

### **T) General Views of the Respondents**

In general remarks, the respondents welcomed the proposed Project and said it good for the people and prosperity of the area. The construction of road will facilitate the locals in their mobility and increase economic activities in the area. With the positive views, some of the respondents showed their reservations that agriculture/residential lands of local's ae coming under impact. The road is being constructed for the development of societies. It will pass through the societies. The locals have no benefits with the construction of these roads. The local landowners demanded for fair compensation for their Project affected lands.



## 5 PUBLIC CONSULTATIONS

### 5.1 GENERAL

Timely and broad-based stakeholder involvement is an essential element for an effective environmental assessment, as it is linked with project Planning, appraisal and development in general. Public involvement during EIA has a tendency to improve Project design environmental soundness and social acceptability.

Public involvement, undertaken in a positive manner and supported by a real desire to use the information gained to improve the Project design, will lead to better outcomes and lay the basis for ongoing positive relationships between the stakeholders. It gives the feeling of ownership to the local population. Public involvement is necessary for the smooth implementation of the Project especially the local community whose support is also required for the success of the Project.

The Project management and implementation authorities are committed to undertaking public consultation at the Provincial and local levels as a part of Project planning/design for getting necessary environmental permissions.

This Chapter presents the objectives, process, and outcome of the consultations carried out with the key stakeholders of the Project during the present EIA study. A consultation framework, describing the consultations to be carried out during the subsequent phases of the Project implementation ensuring ongoing and inclusive dialogues with key stakeholders is also provided in this chapter.

### 5.2 OBJECTIVES

The objectives of stakeholder consultation were to contribute to openness, transparency and dialogue. Special efforts were made to ensure that communication with the public should be efficient and well-balanced. The concerned stakeholder groups were identified to participate in the assessment process. Specific tasks and purposes of consultations with stakeholders have been given in the **Table 5-1**.

**Table 5-1: Tasks and Purposes of Consultations**

Task	Purpose of Consultation with Stakeholders
Why consultation with the stakeholders?	<ul style="list-style-type: none"> <li>To build trust to ensure sustained support for the Project and build resilience in times of crisis.</li> <li>To learn about public concerns that need to be addressed and taken into account in designing the Project concept and in formulating mitigation measures and programs.</li> <li>To learn about the strengths, skills and organizations that the stakeholders can bring to support Project planning and implementation.</li> </ul>
Modes and benefits of consultation	<ul style="list-style-type: none"> <li>Listening and dialogue with stakeholders to keep the Project in tune with public concerns early, and to pre-empt breakdowns in public</li> </ul>



Task	Purpose of Consultation with Stakeholders
	confidence. • Engaging the public as advocates for the Project construction and supporting the implementation of social, resettlement, and environmental and health programs.

Other objectives of public involvement include:

- Informing the stakeholders about the proposed Project;
- Providing an opportunity to those who remained unable to present their views and values, therefore allowing more sensitive consideration of mitigation measures and trade-offs;
- Providing those involved with planning the proposal with an opportunity to ensure that the benefits of the proposal are maximized and that no major impacts have been overlooked;
- Providing an opportunity for the public to influence the Project design in a positive manner;
- Increasing public confidence in front of the Proponent, reviewers and decision-makers;
- Providing better transparency and accountability in decision-making;
- Reducing conflict through the early identification of contentious issues, and working through these to find acceptable solutions;
- Creating a sense of ownership of the proposal in the minds of the stakeholders; and
- Developing the Project which is truly sustainable.

### 5.3 IDENTIFICATION OF STAKEHOLDERS

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

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

#### 5.3.1 Primary Stakeholders

Primary stakeholders are those who are directly concerned with the Project or directly affected both positively and negatively by the Project interventions. The primary stakeholders of this Project include landowners, housing societies, and local residents. Apart from this, the beneficiaries of the Project and the implementing agency are also primary stakeholders in the proposed Project.

#### 5.3.2 Secondary Stakeholders

Secondary stakeholders are people or groups that are indirectly affected by the Project activities or have an interest in the proposed Project such as Punjab-EP&CCD, PHA, Wildlife & Parks Department, Agriculture Department, Pakistan Railways and other line agencies/departments of GoP.



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Details regarding roles and responsibilities of the concerned agencies and departments are given below **Table 5-2**.

**Table 5-2: Role of Concerned Agencies/Departments**

<b>Project Stakeholders</b>	<b>Roles and Responsibilities</b>
Punjab Environmental Protection and Climate Change Department	<ul style="list-style-type: none"> <li>• Punjab-EP&amp;CCD is the regulatory authority and is mainly responsible for the development and implementation of environmental policies and strategies to integrate the environmental issues and sustainable development approaches into the legal and regulatory frameworks as per the Punjab Environmental Protection Act, 2012 (Amended 2017).</li> <li>• Responsible for the issuance of environmental approval/NOC for the proposed Project.</li> <li>• Ensuring adherence to mitigation measures outlined in Environmental Management Plans (EMPs) and in environmental approvals during construction and operation phases.</li> </ul>
Lahore Development Authority (LDA)	<p>LDA is responsible for the planning, development, and management of urban infrastructure and services in Lahore. Its main roles include:</p> <ul style="list-style-type: none"> <li>• Preparing and implementing master plans and zoning regulations to guide the city's development.</li> <li>• Planning, designing, and constructing roads, bridges, underpasses, and other urban infrastructure projects.</li> <li>• Improving public facilities such as water supply, drainage systems, and transportation networks.</li> <li>• Monitoring and taking action against unauthorized constructions and land encroachments.</li> <li>• Developing and managing government and private housing schemes to meet the city's residential needs.</li> <li>• Promoting sustainable urban transport systems, including public transport projects.</li> </ul>
Pakistan Railways	<p>Pakistan Railways is responsible for the development, operation, and maintenance of railway infrastructure and services across Pakistan. Its key roles include:</p> <ul style="list-style-type: none"> <li>• Providing affordable and efficient rail services for the public, connecting cities, towns, and remote areas.</li> <li>• Facilitating the movement of goods and cargo, supporting trade and industrial supply chains.</li> <li>• Constructing, maintaining, and upgrading railway tracks, bridges, stations, and other related infrastructure.</li> <li>• Promoting environmentally sustainable transportation by offering a lower-carbon alternative to road and air travel.</li> <li>• Responsible for the issuance of NOC for the construction of the flyover over the rail track.</li> </ul>
Parks and Horticulture Authority (PHA) Lahore	<p>PHA is primarily responsible for the planning, development, and maintenance of parks, green spaces, and horticultural projects in Lahore. Their main roles include:</p>



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Project Stakeholders	Roles and Responsibilities
	<ul style="list-style-type: none"> <li>• Urban Beautification: Enhancing the aesthetic appeal of the city through landscaping, tree planting, and the installation of decorative features.</li> <li>• Park Development and Maintenance: Establishing and maintaining public parks, recreational areas, and green belts to promote environmental sustainability and provide leisure spaces for residents.</li> <li>• Horticulture Promotion: Organizing flower shows, tree plantation drives, and awareness campaigns to encourage community involvement in greenery and environmental conservation.</li> <li>• Environmental Improvement: Contributing to air quality improvement and urban cooling by increasing green cover and reducing urban heat islands.</li> <li>• Infrastructure Enhancement: Developing pathways, benches, lighting, and other infrastructure in parks and public spaces for better utility and accessibility.</li> </ul>
Wildlife & Parks Department	<ul style="list-style-type: none"> <li>• Protection, conservation, preservation and management of wildlife resources.</li> <li>• Management of protected areas, wildlife parks, safaris &amp; zoos.</li> <li>• Preparation of development projects for ex-situ and in-situ conservation of threatened wildlife species.</li> <li>• Provide legal avenues of hunting as a mode of conservation.</li> <li>• Research, survey and training activities.</li> </ul>
Agricultural Department	<ul style="list-style-type: none"> <li>• Developing and implementing policies aimed at improving agricultural productivity, sustainability, and food security.</li> <li>• Advising the government on agricultural issues and creating strategies to address challenges such as climate change, land degradation, and water scarcity.</li> <li>• Promoting the adoption of modern farming techniques, better crop varieties, improved livestock farming and efficient irrigation systems to enhance food production.</li> <li>• Providing extension services to disseminate information and knowledge to farmers about new farming techniques, government schemes, and market trends.</li> <li>• Promoting resilient agricultural practices and providing disaster relief to minimize the impact on food production.</li> </ul>

Considering the importance of the Project, consultations were carried out at all possible levels i.e., departmental and local level. The process of consultation is an ongoing process which continues during the Project life cycle and even after the submission of this report and so on. Stakeholders were identified, categorized and consulted at departments and community level.

During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Key stakeholders of the Project include government departments such as the Environmental Protection Agency, Irrigation Department, Agricultural Department, PHA, Wildlife & Parks Department, Housing Societies (Etihad Town Phase 2, Soul City, Mid-City, Khyaban-e-Amin, and Lake City) and local communities including PAPs.



#### 5.4 APPROACH FOR THE CONSULTATION AND INFORMATION DISSEMINATION

A series of public consultations were conducted to gather feedback and address concerns from various stakeholders, including provincial and district-level departments, potential project-affected persons (PAPs), local communities, housing societies and the general public residing within the Project area.

The consultation process involved meetings with identified potential Project-Affected Persons (PAPs), community gatherings, semi-structured interviews, and one-on-one discussions with government, private, and civil society organizations. During these consultations, stakeholders were informed about the Project's objectives and scope, and their concerns and suggestions were carefully documented.

Consultations were conducted at three levels:

- Institutions/Departments Level
- Housing Societies
- Community level

##### 5.4.1 Consultations with Departments

The stakeholder consultations were held with officials of the relevant departments. Details of department officials contacted are given in **Table 5-3**.

**Table 5-3: List of Government Officials Consulted**

Sr. No.	Department/Venue	Name/Designation	Date
1.	Punjab Environmental Protection and Climate Change Department	Mr. Talha Hanif, Assistant Director – EIA	11-12-2024
2.	Lahore Development Authority (LDA)	Mr. Zohaib Malik, Deputy Director Engineering	11-12-2024
3.	Pakistan Railways	Mr. Muhammad Anjum, Divisional Engineer-III	13-12-2024
4.	Parks and Horticulture Authority (PHA) Lahore	Mr. Shafiq Raza, Director Horticulture Zone C	12-12-2024
5.	Wildlife & Parks Department	Mr. Mudassar Hassan, Deputy Director	12-12-2024
6.	Agriculture Department	Mr. Zahid Iqbal, Senior Agricultural Officer	12-12-2024

The **Table 5-4** indicates the details of issues raised/discussed and suggestions given during the consultation. **Plate 5-1** shows the pictorial view of department consultations.



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**Table 5-4: Detail of Issues/Points Raised/Discussed during Departmental Consultations**

Sr. No.	Department/ Organization	Suggestions
1.	Punjab-EP&CCD	<ul style="list-style-type: none"> <li>• It was suggested that all the relevant Acts, laws, regulations, and guidelines especially the Punjab Environmental Protection Act, 2017 and Smog Regulations should be followed during the preparation of EIA report;</li> <li>• Stakeholder Consultations with all the relevant departments should be carried out;</li> <li>• Environmental Monitoring at all environmentally sensitive areas in the Project area should be considered;</li> <li>• Green Land should not be utilized for construction purposes;</li> <li>• Ensure continuous sprinkling of water on daily basis in the Project area to reduce emission of dust particles;</li> <li>• Health and Safety Management Plan shall be prepared and implemented to avoid health and safety issues occurring during the construction period of the Project;</li> <li>• Solid waste produced shall be properly managed and disposed of in identified designated areas;</li> <li>• Construction material will be removed as early as possible on the construction sites;</li> <li>• Alternate routes shall be provided in consultation with Traffic Police to the residents, educational institutions and road users for their movement and to avoid the chaotic situation of traffic at this bottleneck;</li> <li>• Proper barricading shall be provided along excavation sites to avoid accidents and casualties; and</li> <li>• If tree cutting is involved then it should be avoided as much as possible and trees should be replanted and Tree Plantation Plan shall be provided.</li> </ul>
2.	Lahore Development Authority (LDA)	<ul style="list-style-type: none"> <li>• The NESPAK team visited the subject office and following details were shared by the Project Management Team:               <ul style="list-style-type: none"> <li>▪ The proposed structured road, spanning 9.71 km and including a 0.64 km (2,100 ft) underpass, is part of the Lahore Master Plan 2050. The proposed Project is initiated to alleviate traffic congestion on existing roads, such as Defence Road and Kahna Kacha Road, and ensure smoother vehicle movement between housing societies.</li> <li>▪ To facilitate the construction of the underpass beneath the railway tracks, documentation is being processed in accordance with the requirements of the Railway authorities to secure the necessary NOC.</li> <li>▪ For private land acquisition, the process is nearing completion. Two approaches have been adopted: (i) Compensation based</li> </ul> </li> </ul>



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Sr. No.	Department/ Organization	Suggestions
		on prevailing market rates, and (ii) Commercialization of their remaining land.
3.	Pakistan Railways	<ul style="list-style-type: none"> <li>• The consultants briefed the official about the project scope, components and its benefits; and</li> <li>• Department shared the information mentioned below: <ul style="list-style-type: none"> <li>▪ The NOC must be acquired from Railways following our established guidelines and procedures.</li> <li>▪ The underpass should be designed with a vertical clearance height of 21.3 ft.</li> <li>▪ Before construction begins, a formal letter should be sent to initiate legal proceedings with Pakistan Railways, along with the Gutter Chart Plan, as 19 trains pass daily in both directions at 2-hour intervals on the existing track.</li> <li>▪ The Project must be completed within the designated timeframe of six (06) months.</li> </ul> </li> </ul>
4.	Wildlife & Parks Department	<ul style="list-style-type: none"> <li>• The NESPAK team visited the subject office to brief the officials regarding the Project and share details; and</li> <li>• They appreciated the proposed Project and shared the information mentioned below: <ul style="list-style-type: none"> <li>▪ No Wildlife protected area falls under the proposed Project area;</li> <li>▪ They also suggested avoiding negative impacts on local biodiversity and green cover, if any;</li> <li>▪ Loss of trees will be discouraged to keep the ecosystem balanced and to protect the habitat of wildlife of the region; and</li> <li>▪ Required details of the faunal species of the region were also provided.</li> </ul> </li> </ul>
5.	PHA	<ul style="list-style-type: none"> <li>• The NESPAK team visited the subject office to brief the officials regarding the Project and share details; and</li> <li>• They appreciated the proposed Project and shared the information mentioned below: <ul style="list-style-type: none"> <li>▪ Tree cutting will be avoided up to maximum level;</li> <li>▪ Pine Avenue is a prominent road in Lahore that connects key residential areas, including Lake City, Bahria Town Lahore, Valencia Town, WAPDA Town, and LDA Avenue 1. Consequently, it has been proposed to incorporate Neelum Road as an extension of this route;</li> <li>▪ Extensive plantation may be conducted to ensure Project sustainability and to enhance/conserves the local environment;</li> <li>▪ A feasible provision of budget for the tree plantation plan shall be included in the Project cost; and</li> <li>▪ Required details of the floral species of the Project area were also provided.</li> </ul> </li> </ul>
6.	Agricultural Department	<ul style="list-style-type: none"> <li>• The consultants briefed the official about the Project scope, components and its benefits.</li> <li>• Department shared the information mentioned below: <ul style="list-style-type: none"> <li>▪ Details of the crops and crop patterns in the Project area, along with their current market rates; and</li> </ul> </li> </ul>



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Sr. No.	Department/ Organization	Suggestions
		<ul style="list-style-type: none"><li>▪ Appropriate compensation should be given to farmers for any disruption to their crops.</li></ul>



Consultation with LDA



Consultation with Pakistan Railways



Consultation with PHA



Consultation with Punjab-EP&CCD



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Consultation with Wildlife & Parks  
Department



Consultation with Agricultural Department

**Plate 5-1: Pictorial View of the Departmental Consultations**

#### 5.4.2 Consultations with Housing Societies

The consultations were also held with officials of the housing societies. Details of officials contacted are given in **Table 5-5**.

**Table 5-5: List of Housing Societies Officials Consulted**

Sr. No.	Housing Society	Name/Designation	Date
1.	Etihad Town Phase 2	Mr. Ahmad Anwar, Town Planner	13-12-2024
2.	Soul City	Mr. Usma Nadeem, Town Planner	13-12-2024
3.	Mid-City	Mr. Irfan Ullah, Director	13-12-2024
4.	Khyaban-e-Amin	Ms. Mashal Sahir, Town Planner	13-12-2024
5.	Safari Garden	Mr. Sajid Ali, Head Engineering Dept.	21-02-2024

**Table 5-6** indicates the details of issues raised/discussed and suggestions given during the consultation. **Plate 5-2** shows the pictorial view of department consultations.

**Table 5-6: Detail of Issues/Points Raised/Discussed during Departmental Consultations**

Sr. No.	Housing Society	Concerns/Suggestions
1.	Etihad Town Phase 2	<ul style="list-style-type: none"> <li>The Right of Way (ROW) of 150 ft for the proposed Project has already been allocated in the Master Plan of Etihad Town Phase 2. The construction of Neelum Road is a much-needed development for the area, providing a convenient shortcut for residents who currently rely on Defence Road and Kahna Kacha Road to access society.</li> </ul>



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Sr. No.	Housing Society	Concerns/Suggestions
		<ul style="list-style-type: none"> <li>▪ The proposed Project is expected to significantly enhance the value of our land by improving accessibility and infrastructure, thereby benefiting landowners and fostering economic growth in the area.</li> <li>▪ The Project must be completed within the stipulated timeframe to ensure timely delivery of benefits and minimize disruption to the community.</li> <li>▪ To avoid inconvenience to residents during commuting, construction activities should be suspended during peak hours.</li> <li>▪ Regular sprinkling of water shall be conducted at the construction site to control dust emissions and mitigate air pollution and smog issues.</li> </ul>
2.	Khyaban-e-Amin	<ul style="list-style-type: none"> <li>▪ It is recommended to construct an underpass instead of a flyover, as a flyover could impact the aesthetic appeal of the apartment façades located near the rail track.</li> <li>▪ To minimize inconvenience to residents during their commutes, construction activities, particularly near the structured road of R Block, should be paused during peak hours.</li> <li>▪ The Project shall be completed within the designated timeframe to ensure timely delivery of its advantages and minimizing disruptions to the local community.</li> <li>▪ The proposed Project is expected to significantly enhance land value by improving accessibility and infrastructure, benefiting landowners and stimulating economic growth in the region.</li> <li>▪ Routine water sprinkling at the construction site is essential to control dust emissions and mitigate concerns related to air pollution and smog.</li> </ul>
3.	Soul City	<ul style="list-style-type: none"> <li>▪ The Right of Way (ROW) of 150 ft for the proposed Project has already been allocated in the Master Plan of Soul City. The construction of Neelum Road is a much-needed development for the area, providing a convenient shortcut for residents who currently rely on Defence Road and Kahna Kacha Road to access the society.</li> <li>▪ The proposed Project is anticipated to greatly enhance land value by improving accessibility and infrastructure, providing benefits to landowners and promoting economic growth in the area.</li> <li>▪ The Project should be completed within the specified timeframe to ensure timely realization of its benefits and to minimize disruptions to the community.</li> <li>▪ To prevent inconvenience for residents during their commutes, construction activities should be paused during peak hours.</li> <li>▪ Regular water sprinkling must be carried out at the construction site to control dust emissions and address air pollution and smog-related concerns.</li> </ul>
4.	Mid-City	<ul style="list-style-type: none"> <li>▪ The Right of Way (ROW) of 150 ft for the proposed Project has been outlined in the Master Plan of Mid-City. The construction of Neelum Road is an essential development for the area, offering a more direct and convenient route for residents who currently depend on Defence Road and Kahna Kacha Road to reach society.</li> <li>▪ The proposed Project is expected to significantly enhance land value by improving accessibility and infrastructure, benefiting landowners and stimulating economic growth in the region.</li> </ul>



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Sr. No.	Housing Society	Concerns/Suggestions
		<ul style="list-style-type: none"> <li>▪ The Project shall be completed within the designated timeframe to ensure timely delivery of its advantages and minimizing disruptions to the local community.</li> <li>▪ To avoid inconvenience to residents during their commutes, construction activities should be halted during peak hours.</li> <li>▪ Routine water sprinkling at the construction site is essential to control dust emissions and mitigate concerns related to air pollution and smog.</li> </ul>
5.	Safari Garden	<ul style="list-style-type: none"> <li>▪ The Right of Way (ROW) of 200 ft for the proposed Project has been outlined in the Master Plan of Safari Road. The construction of Chenab and Neelum Roads are an essential development for the area, offering a more direct and convenient route for residents who currently depend on Ferozpur Road, Raiwind Road, and Kahna Kacha Road to reach society.</li> <li>▪ The proposed Project is expected to significantly enhance land value by improving accessibility and infrastructure, benefiting landowners and stimulating economic growth in the region.</li> <li>▪ The Project shall be completed within the designated timeframe to ensure timely delivery of its advantages and minimizing disruptions to the local community.</li> <li>▪ To prevent inconvenience for residents during their commutes, construction activities should be paused during peak hours.</li> <li>▪ Routine water sprinkling at the construction site is essential to control dust emissions and mitigate concerns related to air pollution and smog.</li> </ul>



Consultation with Director of Khyaban-e-Amin



Consultation with Mid-City Director



Consultation with Representatives of Etihad  
Town Phase 2 and Soul City



Consultation with Head of Engineering  
Department, Safari Garden

**Plate 5-2: Pictorial View of the Consultations with Housing Societies**

## 5.5 COMMUNITY CONSULTATION AND PARTICIPATION PROCESS

For ascertaining the perceptions of different stakeholders about the Project, meetings were held with communities within the Project area. Informal group discussions were also held as an additional tool for the assessment of the perceptions of the stakeholders about the Project and potential impacts both positive and adverse likely to occur due to its implementation.

### 5.5.1 Methods of Public Consultation

The following methods were used for public consultations with Project stakeholders in order to ascertain their stakes regarding Project implementation. The views of the beneficiaries were formally recorded. People of surrounding communities (males and females) were also consulted along with general public who were residing or working in the surroundings of the proposed Project.

- Community/Public Consultations
- Individual meetings with Locals

### 5.5.2 Categories of Stakeholders Contacted

Different categories of stakeholders contacted during consultation are shown in the **Table 5-7**.

**Table 5-7: Stakeholders Contacted in the Project Area**

Sr. No.	Stakeholder Category
1.	People of the surrounding communities
2.	Local Residents
3.	Business/ shop owners
4.	Government and private Servants

## 5.6 CONSULTATIONS WITH LOCAL COMMUNITIES



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Extensive consultations were conducted with the local communities in the Project area to record their views and incorporating in the Project planning. The major categories participated in these meetings were local residents and landowners.

The participants were briefed about the proposed Project site with the help of design maps. During the consultations, participants were informed/briefed about the Project objectives and extensive question and answer sessions were conducted to clarify the Project related works and activities to resolve the environmental and social issues. They were briefed that the purpose of the consultations and discussions is to find out the possible solutions of the issues which may be faced before and during the construction of the proposed Project. The concerns and their possible solutions presented by the participants regarding proposed Project were recorded to make further possible recommendations.

The details of the locations of consultations are provided in **Table 5-8** and the summary findings of the consultations are presented in an annotated form given in **Table 5-9**.

**Table 5-8: Locations of Consultations**

Sr. No.	Settlement	No. of Participants	Tehsil	District
1.	Jia Bagga	04	Raiwind	Lahore
2.	Jhedu	08	Cantt.	Lahore
3.	Jhandin	07	Raiwind	Lahore
4.	Kahna Kuhna	04	Raiwind	Lahore

**Table 5-9: Summary of Findings of the Consultations**

Sr. No.	Concerns Raised by Participants	Mitigation Proposed by Participants	Action to be taken by Project Executors
1.	The construction of the proposed Project will result in mobility issues for the local community, restricting access to their farmland and residences and loss of livelihood due to the clearance of crops for the road construction.	The alternate route should be provided to the local communities for convenience in mobility to their settlement and their farmland. Construction activities should be halted during peak hours. Proper compensation shall be paid for the acquired land as per prevailing market rates.	The possible alternate route will be provided before the commencement of the civil work on the proposed Project. Land must be acquired from the landowners in accordance with the agreement before the commencement of construction activities.
2.	Health and safety and noise issues will arise for residents and students due to the construction activities.	Labour will be bound to work and stay in the designated area or camp sites to ensure the safety and privacy of female residents. Ensure minimum transportation of construction materials and use of	The contractor should be bound to take all protective and precautionary measures to protect



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<b>Sr. No.</b>	<b>Concerns Raised by Participants</b>	<b>Mitigation Proposed by Participants</b>	<b>Action to be taken by Project Executors</b>
		construction machinery during peak working hours and at night.	the health of the local people.
3.	Disturbance of the social amenities.	Participants were of the view that due to the construction of the proposed Project, several social amenities will be disturbed. These social amenities should be restored before the commencement of the construction work to avoid any inconvenience for the local community.	Social amenities should be restored before the execution of the civil work.
4.	Project area lacks the basic facilities i.e. proper sewerage system, filtration plants, solid waste management system, etc.	It is the need of the time for the proposed Project. LDA and Housing Societies as a Social Corporate Responsibility should implement this Project as soon as possible.	Construction of the proposed Project will be started soon.
5.	The movement of construction machinery and loaded trucks transporting materials during the construction period will lead to increased congestion on the access road.	The appropriate diversion plan will be developed to avoid traffic blockage/disruption due to the use of heavy machinery especially near sensitive receptors such as schools and mosques.	The Contractor should be bound to make a site-specific traffic management plan in consultation with the traffic police during the construction phase.
6.	Due to construction activities as well as the influx of labour, the movement of the citizens particularly of females, residing in the area will be restricted.	In order to tackle this situation, construction should be carried out in scheduled hours. So that after construction hours, the local community, particularly females can easily move in the area.	People should be aware of complete construction activity plans so that they can move in the area freely and safely.
7.	Dust emissions from construction activities such as deep excavations, transportation of construction materials and use of construction machinery.	Dust pollution will be controlled by water sprinkling regularly.	The contractor should be bound to take all protective and precautionary measures to keep safe the health and properties of the local people.
8.	Job and labour opportunities for local people.	The skilled and unskilled workforce should be hired from the local community. It will enhance the acceptability of the proposed Project among local people.	The contractor should be bound to hire skilled and unskilled workers from the local community as a priority.



Community Consultation at Jhandin



Community Consultation at Jhedu



Community Consultation at Jia Bagga



Community Consultation at Kahna Kuhna

**Plate 5-3: Pictorial View of the Community Consultations**

**5.7 PROPOSED CONSULTATIONS PROGRAM**

The stakeholder consultation and engagement are an ongoing process and will continue throughout the Project's construction as well as operation and maintenance phases. The ongoing consultation process could be scheduled on need basis with the stakeholders including but not limited to the concerned government departments, local administration, community and housing societies representatives and PAPs from the proposed Project area.

The overarching goal of consultations and community engagement is to support and facilitate the Project's design and implementation, to reduce conflicts and Project opposition, and to increase the Project's acceptability.

The consultations will be carried out during the construction and operation phases of the Project. Consultations will be undertaken in all the communities twice or more times in a year,



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depending on the number of concerns raised under each consultation. Ongoing stakeholders' engagement activities include:

- Ongoing reporting on progress on the implementation of environmental and social management measures identified during the EIA process and recording of comments on the effectiveness of these measures;
- Updating communities and other stakeholders about Project developments and recording comments on these; and
- Ongoing action of the grievance mechanism.

Efforts will be made to maximize the consultations during the Project implementation. The consultations will be carried out with the objectives of developing and maintaining communication linkages between the Project promoters and stakeholders, providing key Project information to the stakeholders, and to solicit their views on the Project and its potential or perceived impacts, and ensuring that views and concerns of the stakeholders are incorporated during the implementation with the objectives of reducing or offsetting negative impacts and enhancing benefits of the proposed Project. The framework for future consultations is elaborated in **Table 5-10**, but not limited to the following.

**Table 5-10: Proposed Consultations Framework**

Sr. No.	Stakeholders	Project Phase	Frequency of Consultation
1.	Institutions/Departments	<ul style="list-style-type: none"> <li>• Pre-Implementation</li> <li>• During the Project Implementation</li> <li>• At Closure period</li> </ul>	<ul style="list-style-type: none"> <li>• One round of consultation before the implementation of the Project.</li> <li>• Bi-annually during the operation phase.</li> <li>• Once before the closure of the Project.</li> </ul>
2.	Local Communities/ Key Persons and Housing Societies	<ul style="list-style-type: none"> <li>• Pre-Implementation</li> <li>• During the Project Implementation</li> <li>• At Closure period</li> </ul>	<ul style="list-style-type: none"> <li>• Consultation at different stages i.e., before implementation, periodic meetings during the construction phase and at the time of Project completion.</li> </ul>

During the operational phase of the Project, consultations with stakeholders are important to assess the benefits of the Project and its impacts on the local communities. A comprehensive stakeholder consultation plan shall be prepared by the contractor(s) to get feedback from the stakeholders and to resolve the issues during the construction and operational phases of the Project.



## 6 ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

### 6.1 GENERAL

This chapter identifies the beneficial as well as the potentially significant adverse / harmful 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 and provide with the appropriate mitigation and remedial measures. A project impact evaluation matrix has been developed to evaluate the potential impacts of the proposed Project. A brief qualitative description of each aspect and the affected environment in Study Area / AOI is presented below.

### 6.2 NOTION OF SIGNIFICANCE

The term “**Environmental Impact**” or simply “**Impact**” covers the negative, adverse or harmful as well as positive, desirable or beneficial impacts of the project on environmental settings. Prediction of impacts of the proposed activity is based on factual data; however, the significance of these impacts involves a value judgment technique. The nature of these impacts may be categorised in terms of:

<b>Direction</b>	-	Positive or Negative
<b>Duration</b>	-	Long or Short Term
<b>Effect</b>	-	Direct or Indirect
<b>Extent</b>	-	Wide or Local

Impact significance depends on both the nature of the impact and on the sensitivity of the receptor. The more sensitive the receptor the greater shall be the significance of impact from that activity. For this IEE, 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.



**Table 6-1 Magnitude of impacts on sensitive receptors**

Magnitude of Impact	Sensitivity of Receptors			
	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

### 6.3 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.

### 6.4 Delineation of Project Corridor of Impact (COI)

Before proceeding to the environmental analysis of the Project Area, Area of influence (COI) was delineated. COI is a limit which identifies the area where direct and indirect impacts of the Project activities are envisaged. This limit has been taken as 25 meter from the Project boundary for collection of baseline information, impacts assessment and mitigation measures of physical, ecological and socioeconomic resources.

Apart from the COI, area designated for the construction/ contractor camps, vehicle, equipment yard, material quarry areas, access tracks are also considered part of the COI for the study. As the location of Construction/Contractor camps, vehicle, equipment yard, material quarry areas and access tracks are usually finalized by construction contractor, so impacts evaluated due to these facilities in this section will be of generic nature.

### 6.5 Project Impact Evaluation Matrix

The Impact Evaluation Matrix was developed by placing project activities along one axis (i.e. Y-axis), and different environmental parameters on the other axis (i.e. X-axis) likely to be affected by the proposed Project 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,



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construction and operational phases). A Project Impact Evaluation Matrix is provided in **Table 6.2**

## 6.6 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 AOI, 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 overlay maps are used in this EIA for the quantification of the land use categories referred in Chapter 4: Description of Environment.



Table 6-2: Environmental Impacts Matrix for Construction Phase

Environmental Component \ Project Component	Physical Environment					Ecological Environment							Socio Economic Environment																		
	Soil (Erosion/ Stability/ Contamination)	Air Quality	Noise Level	Surface & Ground Water Quality	Solid Waste Generation	Aquatic Ecosystem	Terrestrial Ecosystem	Endangered Species	Migratory birds	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	
<b>A. Planning &amp; Design Phase</b>	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	31
Topographic Survey of Bypass	0	0	0	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0
Geotechnical Investigation	0	0	2	3	0	0	0	0	0	0	2	3	0	0	0	0	0	0	0	0	0	0	2	4	0	0	0	0	0	0	0
Temporary Acquisition of Land	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
Permanent Acquisition of Land	0	0	0	0	0	0	0	0	0	4	5	5	6	0	6	0	5	6	6	0	0	0	9	0	0	6	6	0	0	0	0
<b>B. Construction Phase</b>																															
RoW / Site Clearance	9	9	9	8	8	4	6	0	0	4	9	9	0	6	4	3	6	6	0	0	6	0	8	9	4	4	0	6	0	4	
Earthwork in Filling and Excavation	9	9	9	8	8	4	4	0	0	0	0	0	0	6	2	3	0	0	2	0	0	0	6	9	4	4	0	6	0	4	
Establishment of Construction Camps & Workshop	2	2	4	0	0	0	4	0	0	0	0	4	8	0	0	0	0	4	4	0	0	4	4	8	4	0	0	6	6	6	
Transportation & Storage of Construction Materials	4	6	6	2	4	0	2	0	0	0	0	4	0	4	0	0	0	0	4	0	0	0	4	6	4	0	0	4	0	0	
Use of Construction Material and Heavy Machinery	3	8	9	0	4	2	4	0	0	0	0	0	0	2	2	2	0	0	0	0	0	2	8	0	4	0	4	0	0		
Installation and operation of Batching and Asphalt Plants	4	8	8	2	4	2	2	0	0	0	0	0	2	0	0	0	0	2	0	0	0	0	6	4	0	4	4	0	0		
Spoil Disposal	3	3	0	6	6	4	6	0	0	0	4	6	0	0	0	0	0	0	2	0	0	0	4	4	6	0	0	0	0	0	
Structural & Civil Work	8	8	8	7	7	4	6	0	0	0	0	0	2	0	2	0	0	0	2	0	0	4	6	9	4	4	0	8	0	8	
Drainage Work	6	6	6	7	6	6	6	0	0	0	0	0	2	0	2	0	0	0	2	0	0	4	4	9	4	4	0	8	0	8	
Miscellaneous Work (Road Ancillaries, Traffic Signs and Signals etc.)	0	4	6	4	4	2	2	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	6	0	0	0	6	0	6		
Pavement Work	2	4	6	2	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	8	0	0	0	6	0	6	
Finishing and Commissioning	0	2	4	0	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	4	0	4		
<b>C. Operational Phase</b>																															
Operation of Road	0	2	2	0	0	0	4	0	0	0	6	0	0	6	4	8	0	0	6	4	0	0	8	6	8	4	8	6	6	6	
Inspection & Monitoring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	2	4	0	4	0	4	0	0	
Road Maintenance	0	4	4	2	0	0	2	0	0	0	4	0	4	4	4	0	0	0	0	0	0	0	6	2	0	0	4	0	0	0	
Maintenance of Miscellaneous Work	0	0	2	0		0	0	0	0	0	0	0	0	2	2	2	0	0	0	0	0	0	4	0	0	0	4	0	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



## 6.7 ANTICIPATED POTENTIAL IMPACTS DURING DESIGN PHASE

Impacts envisaged during Pre-construction/Design Phase and the recommended mitigation measures have been described under biophysical and socio-economic categories as follows.

## 6.8 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. This impact is permanent and moderate adverse 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;
- All the objectives of proposed Project mentioned in the Chapter-3 (Project Description) must also be fulfilled; and
- The proponent must review and validate all the design considering the possible impacts (as mentioned) before the start of construction of proposed Project.

## 6.9 Seismic Hazard

As per Building Code of Pakistan, Seismic Provisions, 2007, the project area is located in Seismic Zone 2A (low to moderate hazard), where 2A represents peak horizontal ground acceleration from 0.08g to 0.16g. In this Zone, designing of various types of structures should be done on the basis of PGA. A high intensity earthquake impacting the project site can adversely impact the development. This factor requires special consideration of the designers keeping in view of the recent earthquake of October 08, 2005. This will be a local and high adverse impact.

### Mitigation Measures

- The proposed structures should be designed and constructed to withstand high intensity earthquakes. For seismic hazard analysis, updated structural, geotechnical and seismic studies should be conducted; and
- To mitigate the seismic hazard, Seismic Building Code of Pakistan 2007 (SBC-07) should be adopted. This code specifies minimum requirements for seismic safety of buildings and has to be applied and used by engineers in conjunction with the necessary understanding of the concepts of structural, geotechnical and earthquake engineering.

## 6.10 Urban Flooding

The construction of proposed Project may be subjected to urban flooding as the project area has high frequency of rainfall during monsoon season. Improper design of storm water



drainage of the proposed Project may result in stagnant water on the road 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 is temporary and minor negative in nature.

### **Mitigation measures**

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

### **6.11 Construction Camps**

Location of construction camp and uncontrolled activities can lead to various social and environmental impacts which include removing of plants/trees, generation of solid waste, and discharge of sanitary effluent resulting in loss of vegetation, water pollution and health & safety issues.

If the sites are left unclear after completion of construction phase; it may cause disturbance for the proponent and local community. This impact is moderate adverse and temporary in nature.

### **Mitigation Measures**

- Camps should be designed to be self-contained to reduce demand on infrastructure and services of nearby communities and to minimize the removal of existing macro-plants; and
- Formulation of a comprehensive safety and security plan for the camps which should be comprised of a training manual, use of safety equipment, emergency preparedness and code of ethics.

### **6.12 Public Utilities**

Due to the proposed project, public utilities i.e. Electricity Polls, Power/Telephone Lines, etc. will be affected creating disruption of public services and inconvenience to the local residents. This impact is temporary and may be considered as moderately negative in nature.

### **Mitigation Measures**



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- The provision in the design and budget for the relocation of the existing utility infrastructures wherever required shall be finalized in consultation with the concerned department; and
- All public utilities (e.g. electric lines, water pipes, power/ telephone lines, etc.) likely to be affected by the proposed project will be relocated well ahead of time before the actual commencement of the construction works and protection of underground utilities should be ensured.

### **6.13 Ecological Environment**

#### **6.13.1.1 Flora**

During the pre-construction phase, activities such as the installation of construction camps, construction of temporary roads, and mobility of construction staff may damage the local vegetation/trees. 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 and Medium Significant and needs to be encountered prior to the start of the construction stage.

#### **Mitigation Measures**

- The camps, mobility of machinery, and construction of temporary roads should be properly planned and well designed to avoid any loss to local green cover;
- It is recommended to establish construction camps where minimum or no vegetation exists.
- Similarly, alternate routes for roads and points for camps are recommended where no loss of vegetation is expected; and
- The location of the construction camp should be selected so, as to have limited environmental impact during construction phase and to reduce the cost and land requirement.

#### **6.13.1.2 Fauna**

As movement and installation 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. Temporary roads may also affect the habitat of locally available fauna. This impact is site-specific and low significant.

#### **Mitigation Measures**

- The standard measures must be adopted to minimize noise due to machinery movements and installations;
- The alternate routes and points are recommended to avoid any damage to locally available fauna;
- The camps shall be properly fenced and gated to check the entry of animals in search of eatable goods; and



- Similarly, wastes from the camps shall be properly disposed of to prevent it from being eaten by animals, as it may be hazardous to them.

#### 6.14 ANTICIPATED IMPACTS DURING CONSTRUCTION PHASE

Anticipated Impacts during Construction Phase and the recommended mitigation measures have been described under biophysical and socio-economic categories as follows.

#### 6.15 Soil Erosion and Contamination

Due to the proposed construction activities, soil erosion and contamination may occur. Soil erosion may occur on roadside and at contractors' camps as a result of uncontrolled run-off from equipment washing yards and excavation of earth/cutting operations whereas contamination of soil may be caused by oil and chemical spills at asphalt plant sites, equipment washing yards, camp sites and temporary construction site office. This impact is, however, temporary and low adverse in nature.

##### Mitigation:

- Confining excavations to the specified spots as per the approved engineering drawings. Unnecessary excavations need to be avoided;
- Excess spoil should be reused where possible and residual spoil can be disposed of at designated site to prevent erosion;
- Loss of topsoil can be avoided by stripping and storing topsoil prior to construction, then re-using it to cover the completed cell;
- Oil separators should be installed at equipment or machinery washing yards to prevent soil contamination from oily water;
- Septic tanks of adequate capacities should be constructed for receiving and treating wastewater from all temporary worksite toilets and construction camps to avoid soil contamination;
- Regular inspection of the wastewater disposal from construction camps;
- Jute erosion protection mats can be applied in areas where erosion is noticed during inspections;
- Construction work should be scheduled to be completed before monsoon season to avoid the soil erosion through surface run-off.

#### 6.16 Air Quality and Dust

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. 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<sub>10</sub>) 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 deteriorated ambient air quality may cause health hazards to the residents of nearby residential colonies including sensitive receptors e.g. Hospitals, educational institutes, mosques, etc.

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 construction phase impacts 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 PEQS 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;
- PEQS 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 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 the formulated environmental monitoring plan (given in EMP).

#### **6.17 Noise and Vibration**

The noise and vibration will be produced due to the operation of construction machinery equipment. 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 noise and vibration may cause health hazards to the residents of nearby residential areas and sensitive receptors e.g. hospitals, educational institutes and mosques etc.

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
- 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.

This impact is negative, local, medium and short term.

#### **Mitigation Measures**

There are a variety of ways by which construction equipment and worksite noise can be controlled. The following is a list of ways to control noise level at the worksite of the proposed Project:

**Quieter Equipment:** A cost-effective way to reduce noise at a construction worksite is to buy quiet equipment. In addition, equipment in use should be the most suitable for the job. Avoid using equipment that is over-powered and, conversely, avoid using under powered equipment. Whenever possible the quietest equipment alternative should be used. In general, electronic powered equipment is quieter than diesel powered equipment and hydraulically powered equipment is quieter than pneumatic power.



**Modifying Existing Old Equipment:** The most common way to reduce the noise levels of common construction equipment is through worksite modifications. Some common worksite modifications consist of retro-fitting existing equipment with damping materials and mufflers.

**Barrier Protection:** An effective way of reducing noise is to locate noisy equipment behind purpose-built barriers. The barriers can be constructed on the work site from common construction building material (plywood, block, stacks or spoils) or the barriers can be constructed from commercial panels which are lined with sound absorbing material to achieve the maximum shielding effect possible. To be effective, the length of the barrier should be greater than its height. The noise source should not be visible and barrier should be located as close as possible to either the noise source or the receiver.

**Work Activity Scheduling:** Work activity scheduling are administrative means to control noise exposure. Planning how noise sources are sited and organized on a work site can reduce noise hazards. Jobs can be rotated so that exposure time is limited. Transferring workers from a high exposure task to a lower exposure task could make the employee's daily noise exposure acceptable. Administrative controls include activity planning, for example, scheduling pavement breaking operations so as to reduce the number of work site workers exposed. In addition, noisy equipment should not be run for periods longer than necessary and should be switched off when not in use.

**Maintenance:** Increased attention to maintenance of tools and equipment will reduce worksite noise levels. Maintaining plant and equipment in good order not only increases its life, but makes it safer to use and quieter. Loose and worn parts should be fixed as soon as possible. Ideally, the worksite should have a system in place for checking and servicing the various machines and power tools.

**Noise Perimeter Zones (NPZs):** The NPZs are another administrative control to limit exposure to noisy processes or equipment to as few workers as possible. NPZs are areas where noise levels of 90 dB (A) or more are roped off and marked to keep out all workers who don't have to be there. NPZs can be set up using a sound level meter to find the safe distance from the source (90 dB (A)) and the NPZs can be set up at that distance. Noise does not radiate from the source at the same level in all directions. Noise from machinery can be higher in one direction than another because the noise can also be either absorbed or reflected from surfaces it contacts, such as the ground or a wall. Therefore, measurements should be taken at several points in an area where people might be working. Once noise levels that are 90 dB (A) or more are determined, rope off this area as the Noise Perimeter Zone. Exclude all workers who do not need to be in that zone. All workers who need to work within the zone must wear hearing protection.

## 6.18 Impacts on Surface Water Body

A small drain is exist in near vicinity of the project area. During construction phase the drain may get clogged due to silting and will result in the overflow of the drain. As an open water channel it carries sewage flow from communities around the drain. If it overflows it will result



in unhygienic conditions. Also the increased impervious soil from the project area will lead to increase in the surface flow that may alter the flow regime of the drain.

**Mitigations:**

- Install silt fence, sediment trap and sediment basin to capture sediments before it reaches the drain
- Construct temporary storm water retention basins to reduce the runoff to the drain and use permeable material for temporary roads.

**6.19 Operation of Construction Camps / Camp Sites**

Due to the construction camps, loss of vegetation and dis-satisfaction of rehabilitation measures during and after completion of construction phase may occur. These impacts may include waste, soil pollution, groundwater pollution, dust, etc. However, the impact will be temporary and moderate adverse in nature. For these impacts, mitigation measures have been developed to minimize the likelihood, extent or duration of their occurrence and any associated adverse effects. Table 6.2 summarizes potential impacts and proposed mitigation measures associated with construction camps.

**Table 6.2: Summary of Workers Camp Impacts & Mitigation Measures**

Potential Impact	Proposed Avoidance and Mitigation Measures
<p><b>Environmental</b></p> <ul style="list-style-type: none"> <li>• Temporary habitat loss or disturbance</li> <li>• Temporary visual intrusion</li> <li>• Noise emissions at a single location</li> <li>• Waste generation</li> <li>• Discharge of sanitary effluents and rainwater run-off to nearby water bodies</li> </ul>	<p><b>Environmental</b></p> <ul style="list-style-type: none"> <li>• Reinstate any temporary facilities to preexisting conditions in ecologically sensitive areas.</li> <li>• Implement landscaping plan for all facilities in areas where high landscape value and visual vulnerability to the proposed activities warrants site-specific landscape restoration measures.</li> <li>• Operate equipment in a manner sympathetic to the ambient noise environment. Do not leave equipment idling unnecessary.</li> <li>• Provide adequate warnings of impending works to all potential receptors within a 1 km corridor surrounding the RoW via public notices and local news.</li> </ul>



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<p><b>Social</b></p> <ul style="list-style-type: none"> <li>• Worker camp site: consultation surrounding potential construction camp sites revealed concerns regarding the location of proposed sites for Worker Camps.</li> </ul>	<p><b>Social</b></p> <p>State land will be a second preference for worker camp locations, followed by land where there is a willing lessee.</p> <p>Employment policies which aim to maximize job opportunities for local people will help to minimize tensions caused by different socio-cultural values.</p> <p>Training will be provided to all staff on camp management rules and overall discipline and cultural awareness. This will include, in appropriate languages.</p> <ul style="list-style-type: none"> <li>• A briefing on camp rules</li> <li>• A community relations orientation to increase awareness about the local area, cultural sensitivities and the project Code of Conduct</li> <li>• Awareness-raising on health considerations, including sexually transmitted diseases (STDs).</li> </ul> <p>The construction contractor is required to develop a Construction Camp Management Plan to address:</p> <ul style="list-style-type: none"> <li>• Discipline;</li> <li>• Community liaison;</li> <li>• Ethnic tensions and;</li> <li>• Communicable diseases.</li> </ul> <p>A Code of Conduct and Camp Rules will be required within the Construction Camp Management Plan, which provides policies and a disciplinary framework with respect to worker behavior.</p>
<p><b>Camp Location</b></p> <p>The final location will be determined by the construction contractors and agreed with the LDA.</p>	<p><b>Camp Location</b></p> <p>The construction contractor will be required to assess the environmental/social sensitivity of any additional or alternative sites prior to their approval for adoption.</p>

**6.20 Resource Conservation**

Resources involved in the construction of proposed project would include construction materials, water and fuel. Construction material to be used for construction includes coarse aggregates, fine aggregates, asphalt, cementitious materials, reinforced and structural steel etc. Almost all the materials to be used in the construction of proposed project are non-renewable and therefore their sustainable use is necessary for the future use. Excessive water consumption for drinking and washing purposes by the construction staff may pressurize



water resources in the Project Area and in certain cases may disturb the existing water supplies in the Project Area.

Fuel will be used to operate construction machinery, asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use but also to reduce air emissions. The overall impact is considered to be permanent and high adverse in nature.

#### **Mitigation:**

- Use potable water bowsers for construction works and mineral water bottles/ filtered or treated 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;
- 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;
- Ensure adequate insulation to reduce heat loss through batching plants;
- Regularly monitor CO and CO<sub>2</sub> content of the flue gases to verify that combustion systems are using practical excess air volumes;
- Use of solar panels at construction camps may be considered and plan for use of solar panels at operational phase may also be considered; and
- 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 levels.
- Resource Conservation Plan is attached as **Annex-III**

#### **6.21 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. The wastewater generation is estimated to be 4,800 liters/day<sup>18</sup> for 150 construction workers during construction phase of the proposed Project. This impact can be categorized as moderate negative, site-specific, temporary and reversible.

#### **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 6.1**);

<sup>18</sup> Design Criteria of Public Health Engineering for Water Supply, Sewerage and Storm Water Drain (Domestic sewage generation = 80% of water consumed/day)



- Proper monitoring to check the compliance of PEQS 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.

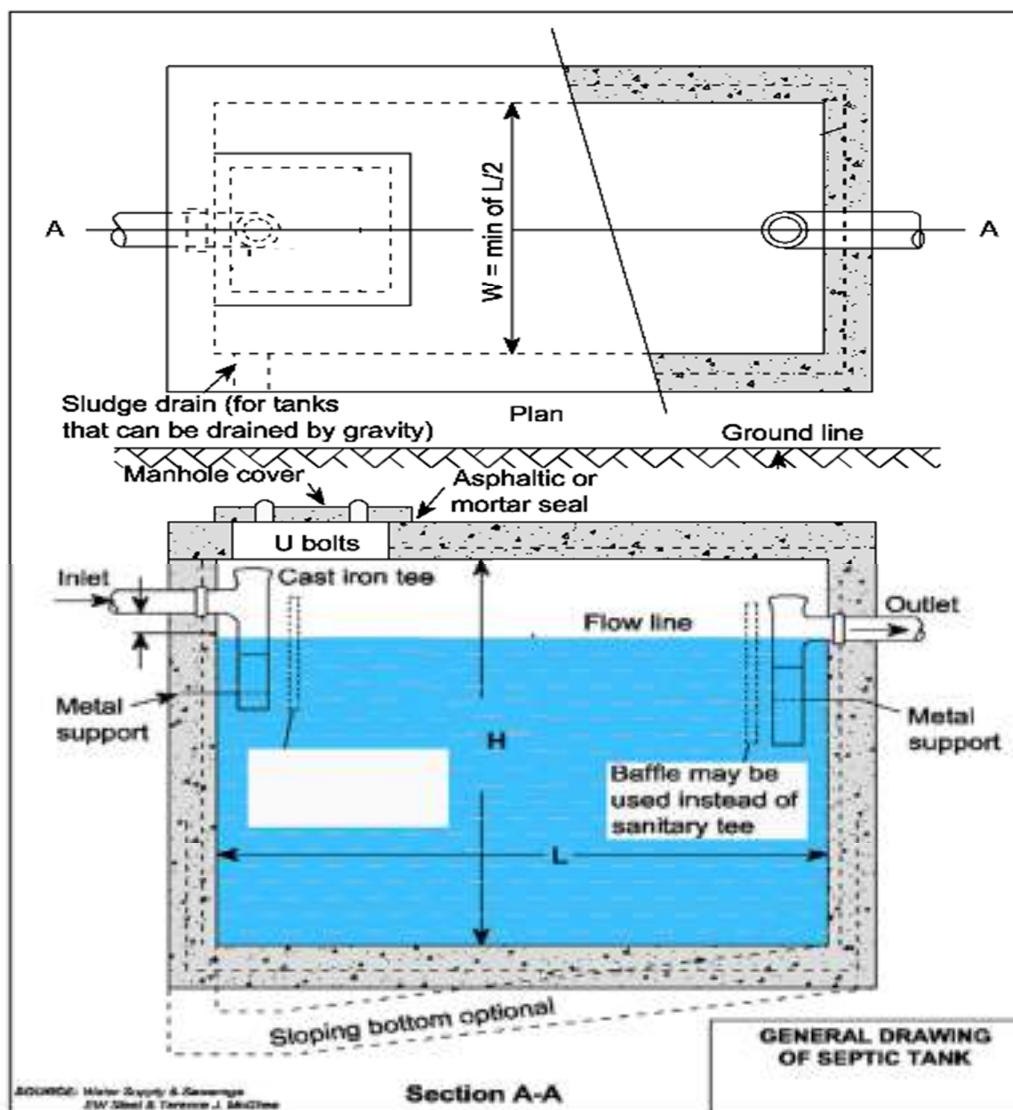


Figure 6.1: General Drawing of Septic Tank

## 6.22 Solid Waste Generation at Construction Camps

The solid waste generation is estimated to be 90 kg/day for 150 construction workers during construction phase of the proposed Project. Different type of waste is likely to be generated during the construction phase of the proposed Project. The municipal waste will be in the form of food, cans, paper and wastewater from construction camps toilets and washing yards.



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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 minor negative in nature.

### **Mitigation Measures**

- 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;
- 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;
- Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub grade/shoulders;
- Waste Management Plan (refer **Annex-IV**) will be implemented to ensure safe handling, storage, collection and disposal of construction wastes and the training of employees who handle waste;
- Construction waste such as waste wood can be recovered and recycled into wood for new building projects, and cement, bricks, and plaster can be crushed and reused in other construction and building projects; and
- The contractor should ensure implementation of proposed Construction Waste Management Plan and it must be reviewed during the entire construction phase in the light of changing weather conditions.

### **6.23 Occupational Health and Safety**

Health risks and work safety problems may result at the workplace/camps if the working conditions provide unsafe and/or unfavorable working environment due to storage, handling and transport of construction materials. The health and safety issues are also associated with



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the malfunctioning in operation of construction machinery and equipment which may cause minor to severe injuries to workers. This impact is permanent and high adverse in nature.

**Mitigation:**

- Obligatory insurance against accidents for laborers/workers;
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
- Preparing layout plan for camp site, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- Work safety measures and good workmanship practices should be followed by the contractor;
- Ear muffs should be provided to the workers doing job in the vicinity of high noise generating machinery or equipment;
- Provision of adequate sanitation, washing, cooking and dormitory facilities in the camps;
- Provision of Personal Protective Equipment (PPEs) including protective clothing for laborers handling hazardous materials, e.g. helmet, masks, adequate footwear for bituminous pavement works, protective goggles and gloves;
- Ensuring strict use of protective clothing and equipment during construction activities;
- Elaboration of a contingency plan in case of major accidents;
- Ensuring availability of adequate signage, lightning devices, barriers and marking tape during the entire construction phase to manage traffic at construction sites and access roads;
- All potable drinking water supplies to be tested regularly on monthly basis during the entire construction phase;
- Provision of first aid facility and ensuring its cleanliness and disinfection; and
- Ensuring the availability of a dispenser at the active construction site throughout the construction period to provide emergency treatment.

The Occupational Health and Safety Plan is attached as **Annex-V**.

#### **6.24 Community Health and Safety**

The construction activities and vehicular movement at construction sites and access service roads may also result in accidents along road side as the local communities may not be familiar with the presence of heavy equipment and machinery. This is a permanent and high adverse impact. Quality of ground water and surface water resources available in the nearby local communities may get contaminated due to the construction activities, oil spillage and leakage, roadside accidents etc. The laborers with different transmittable diseases may cause spread out of those diseases in the local residents. Dengue may also break through due to stagnant water at the construction sites. There is a chance of spreading of epidemic of Coronavirus disease (COVID-19) due to close interaction of the labor force during construction not only among the workers but also in the area.

**Mitigation:**



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- There should be proper control on construction activities and particularly oil spillage/leakage of vehicles, machinery and equipment;
- All labour must be medically checked so that if they interface with the local communities, undesirable transmittable disease does not spread;
- Only those laborers with different transmittable diseases should be restricted to the construction site;
- Efforts should be made to create awareness about road safety among the drivers operating construction vehicles;
- Timely public notification of planned construction works;
- Provision of proper safety and diversion signage at sensitive/accident-prone spots;
- Setting up speed limits in the construction areas in close consultation with the local stakeholders;
- Keeping out of non-working persons, particularly children, off work sites;
- The communicable disease of most concern during construction phase, like sexually-transmitted disease (STDs) such as HIV/AIDS, should be prevented by successful initiative typically involving health awareness; education initiatives; training health workers in disease treatment; immunization program and providing health service;
- SOPs related to the construction industry to control spreading of COVID-19, should be implemented by the contractor and should be strictly monitored.
- Efforts should be made to prevent the spread of vector borne diseases 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.

## 6.25 Traffic Management

Due to the proposed project construction activities and movement of heavy project vehicles for construction material supply, traffic problems may arise. The problems will include traffic jams and inconvenience to the public passing by 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 is moderate adverse and temporary in nature.

### 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;
- 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;



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- 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; and
- Traffic Management Plan (refer **Annex-VI**) will be prepared by the contractor and implemented to avoid traffic accidents, jams/public inconvenience.

### 6.26 Greenhouse Gas Abatement

The main sources of greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub> etc.) during the construction activities of the proposed project will include both mobile and stationary sources. The mobile sources 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;
- Alternative energy resources shall be considered where possible;
- Efficient construction machinery shall be used onsite during construction phase and when the machinery is not in use, it will be turned off;
- Using optimized transport routes and transportation of materials in bulk will lower the emissions;
- Efficient and low carbon footprint materials will be used in the construction;
- Preserving land and trees as much as possible and ensuring replantation will lower the GHG emissions;
- Training and awareness will be given to the workers in order to create awareness about the GHG emissions and climate change;
- PEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery shall be enforced during construction works.

### 6.27 Issues of Smog



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Construction activities related to proposed project can significantly contribute to smog issues in the Punjab, primarily due to various pollutants released during the construction phase. Some of the key elements contributing to smog during construction include:

- **Particulate Matter (PM):** Construction activities generate dust and particulate matter, especially from excavation, demolition, material handling, and transportation of construction materials. These fine particles can remain suspended in the air for long periods, contributing to smog formulation and enhancement of existing smog issue.
- **Vehicular Emissions:** Construction sites often involve heavy machinery and trucks for transportation of materials. These vehicles emit pollutants such as nitrogen oxides (NO<sub>x</sub>), volatile organic compounds (VOCs), and particulate matter that will contribute to smog formation in reaction with sunlight and other pollutants in the atmosphere.
- **Incomplete Combustion:** Inefficient combustion of fuels, often used in construction equipment, can release pollutants like sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and particulate matter, which contribute to smog formation.
- **Lack of Dust Control Measures:** Inadequate measures to control dust and particulate matter at construction sites, such as un-covered construction materials, lack of water sprinkling, or absence of dust barriers, can significantly contribute to increased airborne particles.

#### **Mitigation Measures:**

To mitigate or reduce smog issues and impacts of construction activities on smog formation, following measures can be taken:

- Implement robust air quality monitoring systems to track pollution levels and take necessary actions accordingly.
- Implement and enforce regulations regarding air emissions as per PEQS, dust control measures, and the use of cleaner technologies in construction machinery and vehicles.
- Encourage the use of electric or hybrid machinery and vehicles to reduce air emissions.
- Employ effective dust control measures, such as water sprinkling, covering materials, and using dust barriers, to minimize the release of particulate matter.
- Educate construction workers and the public about the importance of adopting eco-friendly practices to reduce smog formation.
- Vehicle Inspection & Certification System (VICS) should be implemented in true letter & spirit to reduce environmental pollution caused by unfit motorized vehicles.

#### **6.28 Emergency Response to Natural and Man-made Disasters**

Natural Disasters such as earthquakes & flooding and other disasters triggered by humans such as act of terror etc. may occur, and must be considered to avoid or for minimize their impacts. This impact will be permanent and moderate in nature

#### **Mitigations:**



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- An Emergency Response Plan attached as Annexure-VII for earthquakes and manmade disasters should be developed by contractor in coordination with SC and LDA should be implemented in close consultation with the RESCUE Services and other concerned departments;
- Training of the Contractor and LDA staff and employees regarding the emergency procedures and plans should be regularly conducted;
- Emergency numbers should be clearly posted at active construction sites; and
- Minor incidents and near misses should be reported, and preventive measures should be formulated accordingly by the LDA management.

### 6.29 Discovery of Heritage Sites/ Structures during Excavation

During excavation, there is a chance of finding artifacts. In case of finding any artifact, the contractor shall immediately report through Supervision Consultant to Directorate General (DG) of Archeological Department, Government of Pakistan to take further suitable action to preserve those antiques or sensitive remains. Chance finds procedure (**Annex-VIII**) shall be adopted in case of any accidental discovery of cultural heritage.

### 6.30 Ecological Environment

#### 6.30.1.1 Flora

The project may involve risk to vegetation in construction areas which will be developed over time. Moreover, the limited number of trees of small and medium sizes may be removed (at the current stage of the project impact on trees is not final) due to the layout of the project for which compensation shall be made to concerned parties.

Exhaust of noxious gases from the movement of heavy machinery and dust will pollute the 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 firewood to fulfill the camps requirements). This impact is site-specific, temporary and high significant.

#### Mitigation Measures

- Cutting and / or disturbance of trees shall be avoided, as far as possible, and select the barren/less vegetated zones as the impact on the local ecosystem (especially trees) is expected. So, the negative effects on the process of natural regeneration of species are minimized and possible mitigation measures must be considered for the proposed project, in which minimum ecological and environmental losses are expected;
- A tree plantation program shall be implemented with the recommendations and technical support of PHA or Forest Department;
- As a principal, ten trees shall be planted in place/lieu of the felling of one tree in consideration of mortality. At this stage, 500 trees are recommended for tree plantation for the purpose of environmental enhancement.
- It is pertinent to mention that trees should be relocated/transplanted/replanted (where possible) instead of cutting and may be replanted within the project COI. The tree compensation will be done at 1:10 for each felled tree;



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- The compensatory plantation shall be carried out in the project area (in the available space) or in the vicinity of project areas like associated roads and nearby parks / green areas, etc. to reduce the negative impacts of the tree cutting in the immediate project area and overall;
- The proponent shall implement the program with the help of PHA and Forest Department and with the consultation of the concerned consultant ecologist;
- 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 green 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;
- Construction vehicles, machinery, and equipment will remain confined within their designated areas of movement;
- The Contractor's staff and labor shall be strictly directed not to damage any vegetation such as trees or bushes; and
- Contractor shall provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel shall be strictly prohibited.

#### 6.30.1.2 Fauna

During the construction phase, the existing population of birds, mammals, and reptiles in the construction areas may be affected due to disturbances arising from construction activities involving excavation, movement of machinery and vehicular traffic, movement of labor, camping, etc. The existing fauna (insignificant) 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 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 machinery, particularly during the night hours will even scare the wildlife residing in habitats located at some distance from the construction areas. Food and refuse at the Contractor's camps may attract animals that might in turn be hunted by the workers. This impact is site-specific and medium significant.

#### Mitigation Measures

- Care shall be taken during construction activities to avoid purposely or chance killing of animals;
- If any wild species and habitat is found during construction, it must be dealt with care and local wildlife department officials should be informed;
- Hunting, poaching, and harassing of wild animals shall be strictly prohibited, and the Contractor shall be required to instruct and supervise its labor force accordingly and clear orders should be given in this regard;



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- The Contractor must be held responsible for instructing his workforce 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;
- Noise-generating activities shall not be carried out during the night by the workforce;
- Wastes of the camps shall be properly disposed of to prevent it being eaten by animals, as it may be hazardous to them; and
- Noise produced due to construction activities may be kept to acceptable level.

### 6.31 Social/ Cultural Conflicts

During the construction phase of the project, conflicts may arise between labor force and Local communities near the project area. Use of local resources (existing infrastructure and utilities) by the construction workers can generate stress on the local resources. Furthermore, difference in cultural values may also cause discomfort to local residents. This impact is temporary and moderate adverse in nature.

#### Mitigation Measures

- Local labor should be preferably employed for the construction works;
- Careful planning and training of work force to minimize disturbance to the local people; and
- Public notification through print or electronic media during the entire construction phase to avoid any inconvenience in accessibility to the locals.

### 6.32 Economic Activity

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. Local construction companies will be engaged and therefore will bring more business and experience to their work. Moreover, purchase of goods and material from the local markets will also be economically beneficial for the area. This is a moderate positive impact.

### 6.33 ANTICIPATED IMPACTS DURING OPERATION PHASE

Anticipated impacts during Operational Phase and the recommended mitigation measures have been described under biophysical and socio-economic categories as follows.

#### 6.33.1 Air Quality

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 may lead to higher values of emissions. The impact is permanent. It is positive in case of improvement of road conditions; and minor negative, when traffic volume increases.



### **Mitigation Measures**

Following mitigating measures are needed to be suggested:

- LDA with the help of PEPA may set up system to monitor air quality along project area at important intersections/sensitive receptors in accordance with PEQS for a specific period to record the quality of air during the operation phase. This may help in comparing the baseline conditions with the operation phase of the project;
- Setting up to system to monitor air quality along the project area in accordance with acceptable International Standards; Monitoring emissions of vehicle as per PEQS;
- Helping the owners and occupants of the affected premises/settlements to identify and implement special measure such as hedges and vegetation to reduce air pollution; and
- Increasing vegetation in the form of greenbelt is one of the preferred methods to mitigate air pollution. Plants generate oxygen, serve as a sink for pollutants, reduce the flow of dust and reduce the noise pollution too alongside the proposed project.

#### **6.33.2 Noise and Vibration**

The movement of vehicles and usage of horns will create noise which will be a hazard for the nearby residents/built-up areas. Impact of noise generated from the vehicles moving on the proposed road will be permanent and moderate adverse in nature.

### **Mitigation Measures**

- Provision of adequate noise barriers such as hedges and indigenous tree species will reduce the noise. Further Improvement can be made by enforcing the laws and getting the vehicles tested, regularly after a specific time period, by some reputable vehicle testing laboratory and obtaining a certificate. Noise measurements should be carried out at locations with respect to the schedule specified in the Environmental Monitoring Plan (EMMP) to ensure the effectiveness of mitigation measures;
- Use of horn should be strictly prohibited in the close proximity of the built-up areas;
- Proper signboards should be installed to ensure reduce noise levels in the project area;
- Enforcement and penalties against traffic rules violators; and
- Noise barriers may be installed/constructed near the built-up areas.

#### **6.33.3 Road Safety**

Enhanced vehicular movement and speed in the long run may result in road safety issues like traffic 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 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), should be ensured for the smooth flow of traffic moving from major road crossings. Enforcement of penalties for the violators will reduce the significance of this impact.

#### **6.33.4 Road Maintenance**

During the operation phase, related road maintenance works will be conducted time to time which may lead to social and environmental issues like traffic management, inconvenience to local residents, public safety, vehicular emissions, dust and increase in noise. This is a temporary and moderate negative impact.

### **Mitigation Measures**

- Best Management Practices should be used for all the maintenance works;
- Timely completion of all the maintenance works according to the agreed schedule;
- Traffic management plan should be devised and implemented; and
- HSE protocols should be strictly followed and implemented to avoid any incident/accident.

#### **6.33.5 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 surface 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 along the road alignment.

#### **6.33.6 Impact on 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 vegetation due to the Operational and Maintenance activities. This impact is site-specific, temporary, irreversible and low significant.

### **Mitigations Measures:**



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- The landscape plan should be devised and implemented;
- The implementation of plantation plan recommend in compensation for cutting of trees should start during operational stage, to ensure the ecological balance and to avoid any impact on local Environment;
- Large scale plantation of seedlings/ saplings of suitable indigenous tree species, shrubs and ornamental plants in the form of tree groves, should 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 of above mentioned activities is highly recommended. Plantations raised must be maintained according to the Silvicultural practices which include proper irrigation, cleaning, pruning and thinning at prescribed intensity, silt clearance and trench-opening; and
- Maintenance and security of the plantation should be done for at-least five years.

### 6.33.7 Socio-economic Impacts

#### Improved Economy

Better communication and building infrastructure will facilitate the locals and will provide better business, trade and development opportunities to the locals resulting in uplift in economy. The proposed Project will also generate new job opportunities in different sectors. This is positive impact.

#### Improved life style

With improved economy and development, the locals will be benefitted and will bring a positive change and uplift in their lifestyle and development of economic activities that boost the living standards of locals.



## 7 ENVIRONMENTAL MANAGEMENT PLAN

### 7.1 GENERAL

Environmental Management Plan (EMP) is a tool for the implementation of the all the suggested measures to make the project environmentally sustainable. It provides an overall approach for managing and monitoring the environmental, ecological and socio-economic issues of the proposed Project, and describes the institutional framework and reporting mechanism to implement EMP for the proposed Project.

This chapter provides brief description of environmental issues, mitigation measures to eliminate or reduce environmental and social impacts to an acceptable level, institutional framework for the implementation of the mitigation measures and environmental monitoring plan for air quality, water quality, and noise pollution parameters during construction and operational phases. A budgetary plan is also developed, indicating estimated costs to be incurred to mitigate potential adverse impacts of the proposed Project.

### 7.2 OBJECTIVES OF EMP

The main objectives of the EMP are to:

- Provide the details of the Project impacts along with the proposed mitigation measures, and the corresponding implementation activities;
- To ensure that all necessary corrective actions are carried out and monitored in time to counter any adverse environmental impact under a systematic monitoring approach;
- Provide a procedure for timely action in the face of unanticipated environmental situation;
- Define the role and responsibilities of the Project Proponent (Lahore Development Authority), Contractor(s), Supervisory Consultant(s) and other key players in order to effectively communicate environmental and social issues among them;
- Define a monitoring mechanism, reporting frequency and identify monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented;
- Design the training and capacity building plan for enhancing the capacities of the Project Proponent (Lahore Development Authority), Contractor(s), Supervisory Consultant(s) on environmental and social management;
- Identify the resources required to implement the EMP and outline the corresponding financing arrangements; and
- Define the requirements necessary for documenting compliance with EMP and communicating it to all the concerned regulatory agencies.

### 7.3 INSTITUTIONAL REQUIREMENTS

The institutional requirements for the Construction and Operation & Maintenance (O&M) phases of the proposed Project are provided in below sections.



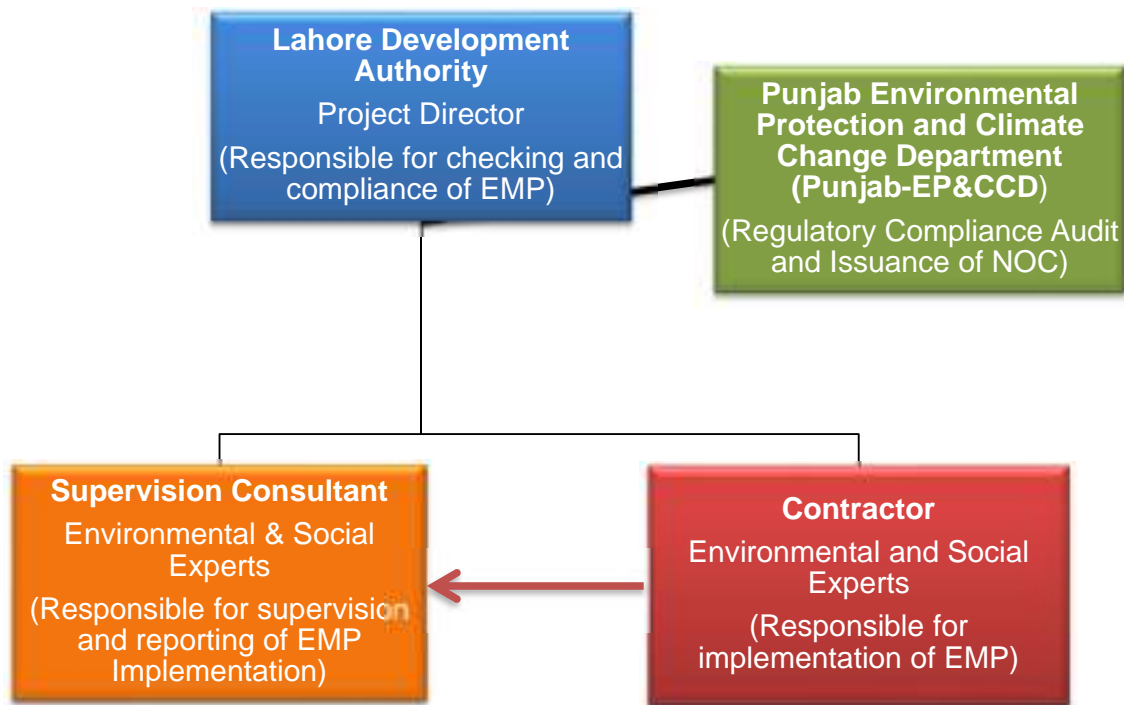
### 7.3.1 Institutional Setup for Implementation and Management of EMP

The key players involved during construction phase of the proposed Project are the Lahore Development Authority as employer/proponent, Punjab-EP&CCD, the Supervisory Consultant (SC) and the Contractor. The roles and responsibilities of these organizations are outlined below.

The following staff will be involved in the implementation of EMP:

- Lahore Development Authority /Proponent/Employer;
- SC's; and
- Contractor's Environmental Manager.

The employer/ proponent (Lahore Development Authority) will make a Contractor bond through contract documents to implement the EIA including EMP and other terms and conditions of the Environmental Permit. The EMP will be included as a clause of the contract documents. Construction camps will be established after necessary approvals and submission of Site-Specific EMP(s) to be developed in the light of the relevant agency's requirements, before the commencement of construction works. The organizational setup for the implementation of EMP during the construction phase is provided in **Figure 7.1**.



**Figure 7.1: Organizational Setup for the Implementation of EMP at Construction Phase**



### 7.3.2 Overall Oversight Arrangements

A Project Steering Committee comprising of Project Director and Environmental & Social Safeguard Expert of Lahore Development Authority (LDA), Government of Punjab will provide overall guidance and oversight and will be responsible for ensuring effective implementation of the Project.

### 7.3.3 Roles and Responsibilities for EMP Implementation during Construction Phase

#### a. Lahore Development Authority / Employer Concerned Staff

The specific responsibilities are as follows:

- Setting up systems for environmental management;
- Ensuring that the Contractor(s) develop and carry out environmental implementation plans that are consistent with the EMP;
- Liaising between the Project staff and the Supervisory Consultant's staff to monitor environmental and social compliance during construction phase;
- Ensuring that the required environmental and social training is provided to the concerned staff;
- Responsible for carrying out random site visits to the construction site(s) to review the environmental performance of the contractors;
- Monitoring the progress of environment and social related activities;
- Make sure that the contractor is implementing the additional measures, suggested by the Supervisory Consultant in monthly environmental monitoring reports;
- Assessment of the trees, valuation of property (if any), public utilities and negotiation with the affectees for fixation of compensation to be paid for temporary acquisition of the land if required for the construction of contractor camps;
- To assist Contractor for obtaining necessary approvals from the concerned departments;
- Maintaining interface with the other lined departments/stakeholders; and
- Reporting through Contractor to the Punjab-EP&CCD on status of EMP implementation.

#### b. Supervision Consultant (SC)

A professional consulting firm will be hired by Lahore Development Authority and responsible for Contract Administration and Construction Supervision. The firm will be fully empowered as the 'Engineer' in accordance with International Federation of Consulting Engineers (FIDIC) stipulations. The Consultant will administer the civil works contracts, make engineering decisions, be responsible for quality assurance, provide general guidance and furnish timely responses to the Contractors in all matters relating to the civil works, and ensure that all clauses of the Contract Agreement including environmental and social clauses between the civil works Contractors' and Lahore Development Authority are respected. Two separate



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experts, one for environment and one for social aspects, will be hired. The environmental and social specialists of SC will also develop training modules, conduct environmental and social trainings for the contractor's staff, and ensure social issues are properly addressed and mitigated during the Project life.

Environmental and Social Experts (ESEs) of SC will oversee the performance of contractor to make sure that the contractor is carrying out the work in accordance with EMP as mentioned in the contract documents. She/he will provide guidance to the contractor's ESEs for implementing each of the activity as given in EMP. ESEs will be responsible for record keeping, providing instruction through the Resident Engineer (RE) for corrective actions and will ensure the compliance of various statutory and legislative requirements.

However, overall responsibilities of ESEs are as follows:

- To oversee the performance of the Contractor to make sure that the Contractor is complying with EMP;
- Discussing various environmental and social issues and environmental mitigation, enhancement and monitoring actions with all concerned personnel's;
- Inspect, supervise and monitor all the construction and allied activities related to the EMP for the Project and oversee the performance of the Contractor to make sure that the Contractor is complying with EMP;
- Visiting construction site(s) including incomplete construction work site(s), where there are no contractor's activities, active construction work sites, completed areas of work sites as well as ancillary sites such as borrow areas, quarries, asphalt and crusher sites, hot mix plant sites, construction camps and work shop areas to ensure contractors compliance with EMP stipulations and conditions of statutory bodies;
- Assisting contractor in all matters related to public contacts including public consultation pertaining to environmental and community issues;
- To organize periodic environmental training programs and workshops for the consultant's and contractor's staff;
- Periodic reporting as mentioned in EMP; and
- Suggest any additional mitigation measures (if required).

### c. Responsibilities of Contractor

Contractor will be bound through contract documents to appoint the Site Environmental and Social Experts with relevant educational background and experience. The experts of contractor will carry out the implementation of the mitigation measures at construction site(s). The responsibilities of ESEs of Contractor are as follows:

- Responsible for Implementation of the mitigation measures at construction site;
- Preparation of Site Specific Environmental and Management Plan (SSEMP) including Evacuation Plan, HSE Management Plan, Material Transportation Plan, Traffic Management Plan, Emergency Response Plan, Monitoring Plan, and Asphalt and Batching Plant Area Plans, and will submit all the plans to the SC.
- Implementation of EMP and to take effective measures against corrective actions plan;



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- Prepare the monthly compliance and monitoring reports as per schedule and will submit it to the SC;
- Provision of proper Personal Protective Equipment's (PPEs) to the workers and train them for their proper use;
- ESEs will conduct the environmental, health and safety trainings for the staff and labors; and
- The Contractor shall submit the Code of Conduct that will apply to all of the contractor's staff. The contractor shall submit an outline of how the Code of Conduct will be implemented. The aspects to be addressed include:
  - Ensure compliance with applicable environment, health and safety standards and procedures associated with risks of Project activities;
  - Ensure compliance with all acquired approvals, applicable to the proposed Project;
  - Ensure protection of local community (including vulnerable and disable assemblies), and the Contractor's staff, sub-contractors and daily wage workers;
  - Ensure employment of fulltime security guards, and necessary security measures and instruments (CCTV) at site;
  - Ensure provision of adequately stocked first aid kit at site for dealing with accidental injuries, and natural hazards;
  - Prohibit use of illegal items such as weapons, alcohol and drugs at site;
  - Ensure that Project property is protected against vandalism, theft, and noxious activity;
  - Ensure that positive attitude of respect and warmth is given to staff and community members;
  - Ensure good housekeeping practices shall be adopted at site;
  - Ensure that employment decisions are not made on the basis of personal characteristics unrelated to inherent job requirements, including race, gender, nationality, religion or belief, disability, age, sexual orientation, or ethnic, social and indigenous origin;
  - Ensure establishment and strictly enforcement of "No Sexual Harassment Policy";
  - Ensure provision of necessary sanitation requirements for site workers (both for men and women);
  - Ensure workers only use specified sanitary facilities provided by their employer and not in open areas;
  - Restriction on burning solid waste;
  - Restriction on dumping solid and liquid waste into nearby water bodies;
  - Prohibition for cutting trees, and clearing vegetative areas for construction camps, and for cooking purpose as a source of fuel; and
  - Prohibition on illegal hunting of local fauna.

The Code of Conduct should be written in local and simple language (Urdu and English) and signed by each site staff to specify that they have received a copy of the code; code explained and clarified to them; acknowledged adherence to this Code of Conduct as a condition of employment; and understood that violations of the Code can result in serious consequences. A copy of the code shall be displayed at strategic location of the site, and mainly in the contractor's site office.



#### **d. Punjab Environmental Protection & Climate Change Department (Punjab-EP&CCD)**

Punjab-EP&CCD is the regulatory authority for issuance of NOC for the proposed Project. As part of its mandate, protection of environment is their responsibility. Therefore, the agency will undertake an audit (as and when required) of the activities of the Project (both phases i.e. Construction and Operation) with respect to the protocols as defined in EMP and in NOC. The specific responsibilities are as follows:

- Liaison with the Environmental Committee of Lahore Development Authority on the proposed Project to ensure compliance of measures as given in the EMP and in NOC issued by them for the construction activities of the proposed Project; and
- Environmental Audit of the activities being undertaken by the Environmental Committee of Lahore Development Authority and all other relevant stakeholders as provided in the EMP and NOC through random site visits and meetings.

#### **7.3.4 Institutional Arrangement for Implementation of EMP during O&M Phase**

The proposed Project will be administrated by the Lahore Development Authority during the O&M phase. Therefore; it is suggested that the Project Director of the proposed Project shall depute / hire Environment and Social Experts to monitor and implement EMP during operation phase.

The specific responsibilities of Environment and Social Experts are as follows:

- Coordinating with the operational staff working under the Project Director to monitor environmental compliance during operation phase;
- Advising on, and monitoring tree plantations within Project boundary as suggested in EMP;
- Reporting on the progress of environmental compliance to the Project Director and Punjab-EP&CCD;
- Assess and propose mitigation measures for unforeseen long-term environmental and social impacts of operation; and
- Sustaining a working partnership among the Lahore Development Authority, Punjab-EP&CCD, PHA, and Wildlife departments of Lahore District to ensure compliance of EMP during operation phase.

#### **7.4 ENVIRONMENTAL MITIGATION AND MANAGEMENT MATRIX**

Environmental Mitigation and Management Matrix (EMMM) is considered as one of the main elements of EMP. The EMMM provides the framework for the implementation of the mitigating measures against each identified potential adverse impacts, and management and monitoring of the same during the design, construction and operation phases of the proposed Project. **Table 7.1** provides information about all impacts to be raised due to project activities during different phases of the Project i.e. pre-construction, construction and operation.



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The Contractor(s) will be responsible for the preparation of Site Specific EMP (SSEMP) along with the site-specific plans based on the guidelines provided in this Chapter.



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**Table 7-1: Environmental Mitigation Matrix**

Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
<b>Preconstruction / Design Phase</b>					
1.	<p><b>Technical Design and Layout Planning</b></p> <p>Incompatible layout plan and engineering design of the project's structures i.e. underpass, u-turns and allied structures will 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 impact is permanent and moderate adverse in nature.</p>	<ul style="list-style-type: none"> <li>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;</li> <li>All the objectives of proposed Project mentioned in the Chapter-3 (Project Description) must also be fulfilled; and</li> <li>The proponent must review and validate all the design considering the possible impacts (as mentioned) before the start of construction of proposed Project.</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation of design incorporation.</li> <li>Audits and Checks</li> </ul>	Design Consultant	Proponent
2.	<p><b>Seismic Hazard</b></p> <p>As per Building Code of Pakistan, Seismic Provisions, 2007, the project area is located in Seismic Zone 2A (low to moderate hazard), where 2A represents peak horizontal ground acceleration from 0.08g to 0.16g. In this Zone, designing of various types of structures should be done on the basis of PGA. A high intensity earthquake</p>	<ul style="list-style-type: none"> <li>The proposed structures should be designed and constructed to withstand high intensity earthquakes. For seismic hazard analysis, updated structural, geotechnical and seismic studies should be conducted; and</li> <li>To mitigate the seismic hazard, Seismic Building Code of Pakistan 2007 (SBC-07) should be adopted. This code specifies minimum requirements for seismic safety of buildings and has to be applied and</li> </ul>	<ul style="list-style-type: none"> <li>Confirmation of design incorporation.</li> <li>Audits and Checks</li> </ul>	Design Consultant	Proponent



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Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	impacting the project site can adversely impact the development. This factor requires special consideration of the designers keeping in view of the recent earthquake of October 08, 2005. This will be a local and high adverse impact.	used by engineers in conjunction with the necessary understanding of the concepts of structural, geotechnical and earthquake engineering.			
3.	<p><b>Urban Flooding</b></p> <p>The construction of proposed Project may be subjected to urban flooding as the project area has high frequency of rainfall during monsoon season. Improper design of storm water drainage of the proposed Project may result in stagnant water on the road due to which following impacts are expected to arise:</p> <ul style="list-style-type: none"> <li>• Deterioration of road surface and reduction of its bearing capacity;</li> <li>• Inconvenience for commuters/pedestrians;</li> <li>• Stagnant water may provide the breeding ground for disease vector; and</li> <li>• Foul odour may be generated.</li> </ul>	<ul style="list-style-type: none"> <li>• An efficient storm water drainage system with adequate capacity should be designed according to National Plumbing Code, U.S.A and Building Code of Pakistan</li> <li>• Proper maintenance of drainage and sanitation system shall be carried out. All the surface drains should be cleaned periodically by the management.</li> </ul>	<ul style="list-style-type: none"> <li>• Confirmation of design incorporation.</li> <li>• Audits and Checks</li> </ul>	Design Consultant	Proponent
4.	<p><b>Public Utilities</b></p> <p>Due to the proposed project, public utilities i.e. Electricity Polls, Power/Telephone Lines, etc. will be</p>	<ul style="list-style-type: none"> <li>• The provision in the design and budget for the relocation of the existing utility infrastructures wherever required shall be finalized</li> </ul>	<ul style="list-style-type: none"> <li>• Confirmation of design incorporation.</li> <li>• Audits and Checks</li> </ul>	Design Consultant	Proponent



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO  
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Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
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	affected creating disruption of public services and inconvenience to the local residents. This impact is temporary and may be considered as moderately negative in nature.	<p>in consultation with the concerned department; and</p> <ul style="list-style-type: none"> <li>All public utilities (e.g. electric lines, water pipes, power/ telephone lines, etc.) likely to be affected by the proposed project will be relocated well ahead of time before the actual commencement of the construction works and protection of underground utilities should be ensured.</li> </ul>			
5.	<p><b>Flora</b></p> <p>During the pre-construction phase, activities such as installation of construction camps, construction of temporary roads &amp; mobility of construction staff may damage the local vegetation/trees. 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, and Medium Significant and needs to be encountered prior to the start of the construction stage.</p>	<ul style="list-style-type: none"> <li>The camps, mobility of machinery, and construction of temporary roads should be properly planned and well designed to avoid any loss to local green cover;</li> <li>It is recommended to establish construction camps where minimum or no vegetation exists.</li> <li>Similarly, alternate routes for roads and points for camps are recommended where no loss of vegetation is expected; and</li> <li>The location of the construction camp should be selected so, as to have limited environmental impact during construction phase and to reduce the cost and land requirement.</li> </ul>	<ul style="list-style-type: none"> <li>Audits and Checks</li> </ul>	Design Consultant	Proponent
6.	<p><b>Fauna</b></p> <p>As movement and installation of machinery and vehicles will take place so noise and habitat loss is expected.</p>	<ul style="list-style-type: none"> <li>The standard measures must be adopted to minimize noise due to machinery movements and installations;</li> </ul>	<ul style="list-style-type: none"> <li>Audits and Checks</li> </ul>	Design Consultant	Proponent



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO  
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	The routes of the available wildlife and other habitats may be affected due to camp set-up and machinery movements and installations. Temporary roads may also affect the habitat of locally available fauna. This impact is Site-specific, Temporary, Irreversible, Possible, and Low Significant.	<ul style="list-style-type: none"> <li>Wildlife movements and routes must be considered during activities and should be avoided to their maximum level; if any the the subject phase</li> <li>The alternate routes and points are recommended to avoid any damage to locally available fauna;</li> <li>The camps shall be properly fenced and gated to check the entry of animals in search of eatable goods; and</li> <li>Similarly, wastes from the camps shall be properly disposed of to prevent it from being eaten by animals, as it may be hazardous to them.</li> </ul>			
<b>Construction Phase</b>					
7.	<b>Soil Erosion and Contamination</b> Due to the proposed construction activities, soil erosion and contamination may occur. Soil erosion may occur on roadside and at contractors' camps as a result of uncontrolled run-off from equipment washing yards and excavation of earth/cutting operations whereas contamination of soil may be caused by oil and chemical spills at asphalt plant sites, equipment washing yards, camp sites and temporary construction	<ul style="list-style-type: none"> <li>Confining excavations to the specified spots as per the approved engineering drawings. Unnecessary excavations need to be avoided;</li> <li>Excess spoil should be reused where possible and residual spoil can be disposed of at designated site to prevent erosion;</li> <li>Loss of topsoil can be avoided by stripping and storing topsoil prior to construction, then re-using it to cover the completed cell;</li> <li>Oil separators should be installed at equipment or machinery washing</li> </ul>	<ul style="list-style-type: none"> <li>Visual observation and photographic record</li> <li>Site restoration and rehabilitation plan implementation</li> </ul>	Construction Contractor	Proponent, SC



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	site office. This impact is, however, temporary and low adverse in nature.	yards to prevent soil contamination from oily water; <ul style="list-style-type: none"> <li>• Septic tanks of adequate capacities should be constructed for receiving and treating wastewater from all temporary worksite toilets and construction camps to avoid soil contamination;</li> <li>• Regular inspection of the wastewater disposal from construction camps;</li> <li>• Jute erosion protection mats can be applied in areas where erosion is noticed during inspections;</li> <li>• Construction work should be scheduled to be completed before monsoon season to avoid the soil erosion through surface run-off..</li> </ul>			
8.	<b>Air Quality and Dust</b> 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	The construction phase impacts of the proposed Project could be effectively mitigated by the implementation of simple procedures by the Contractor including but not limited to the following: <ul style="list-style-type: none"> <li>• 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;</li> </ul>	<ul style="list-style-type: none"> <li>• Visual observation</li> <li>• Regular environmental monitoring, sampling and testing reports</li> <li>• Vehicle maintenance records</li> <li>• Water sprinkling records.</li> </ul>	Construction Contractor	Proponent, SC



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	<p>airborne dust. 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<sub>10</sub>) 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 deteriorated ambient air quality may cause health hazards to the residents of nearby residential colonies including sensitive receptors e.g. Hospitals, educational institutes, mosques, etc.</p> <p>The overall impact on the quality of air during the construction phase will be high adverse, however, it will be</p>	<ul style="list-style-type: none"> <li>• Open burning of solid waste from the Contractor's camps and at construction site should be strictly banned;</li> <li>• Preventive measures against dust should be adopted for on-site mixing and unloading operations;</li> <li>• 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 PEQS for carbon emissions and noise;</li> <li>• Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s);</li> <li>• 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;</li> <li>• 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</li> </ul>			



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	temporary and limited to the project's implementation phase only.	<p>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;</p> <ul style="list-style-type: none"> <li>• 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;</li> <li>• PEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works;</li> <li>• Service roads (used for earthmoving equipment and general transport) should be regularly sprayed with water during dry weather;</li> <li>• All excavation work should be sprinkled with water;</li> <li>• Construction workers should be provided with masks for protection against the inhalation of dust;</li> <li>• Vehicles used for construction should be tuned properly and</li> </ul>			



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		<p>regularly to control emission of exhaust gases;</p> <ul style="list-style-type: none"> <li>• 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</li> <li>• Regular monitoring of air quality in accordance with the formulated environmental monitoring plan (given in EMP).</li> </ul>			
9.	<p><b>Noise and Vibration</b> The noise and vibration will be produced due to the operation of construction machinery equipment. 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 noise</p>	<p>There are a variety of ways by which construction equipment and worksite noise can be controlled. The following is a list of ways to control noise level at the worksite of the proposed Project:</p> <p><b>Quieter Equipment:</b> A cost-effective way to reduce noise at a construction worksite is to buy quiet equipment. In addition, equipment in use should be the most suitable for the job. Avoid using equipment that is over-powered and, conversely, avoid using under powered equipment. Whenever possible the quietest equipment alternative should be used. In general, electronic powered</p>	<ul style="list-style-type: none"> <li>• Physical observation</li> <li>• Regular environmental monitoring, sampling and testing reports</li> <li>• Vehicle maintenance records</li> </ul>	Construction Contractor	Proponent, SC



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	<p>and vibration may cause health hazards to the residents of nearby residential areas and sensitive receptors e.g. hospitals, educational institutes and mosques etc.</p> <p>The likely impacts due to noise are:</p> <ul style="list-style-type: none"> <li>• Psychological effects of distraction of attention, irritation and short temperedness in the exposed persons due to persistently higher noise levels;</li> <li>• 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;</li> <li>• Potential impact from vibration during the construction period consists of damage to buildings from heavy earthmoving equipment; and</li> <li>• 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.</li> </ul>	<p>equipment is quieter than diesel powered equipment and hydraulically powered equipment is quieter than pneumatic power.</p> <p><b>Modifying Existing Old Equipment:</b> The most common way to reduce the noise levels of common construction equipment is through worksite modifications. Some common worksite modifications consist of retro-fitting existing equipment with damping materials and mufflers.</p> <p><b>Barrier Protection:</b> An effective way of reducing noise is to locate noisy equipment behind purpose-built barriers. The barriers can be constructed on the work site from common construction building material (plywood, block, stacks or spoils) or the barriers can be constructed from commercial panels which are lined with sound absorbing material to achieve the maximum shielding effect possible. To be effective, the length of the barrier should be greater than its height. The noise source should not be visible and barrier should</p>			



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		<p>be located as close as possible to either the noise source or the receiver.</p> <p><b>Work Activity Scheduling:</b> Work activity scheduling are administrative means to control noise exposure. Planning how noise sources are sited and organized on a work site can reduce noise hazards. Jobs can be rotated so that exposure time is limited. Transferring workers from a high exposure task to a lower exposure task could make the employee's daily noise exposure acceptable. Administrative controls include activity planning, for example, scheduling pavement breaking operations so as to reduce the number of work site workers exposed. In addition, noisy equipment should not be run for periods longer than necessary and should be switched off when not in use.</p> <p><b>Maintenance:</b> Increased attention to maintenance of tools and equipment will reduce worksite noise levels. Maintaining plant and equipment in good order not only increases its life, but makes it safer to use and quieter. Loose and worn parts should be fixed as soon</p>			



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		<p>as possible. Ideally, the worksite should have a system in place for checking and servicing the various machines and power tools.</p> <p><b>Noise Perimeter Zones (NPZs):</b> The NPZs are another administrative control to limit exposure to noisy processes or equipment to as few workers as possible. NPZs are areas where noise levels of 90 dB (A) or more are roped off and marked to keep out all workers who don't have to be there. NPZs can be set up using a sound level meter to find the safe distance from the source (90 dB (A)) and the NPZs can be set up at that distance. Noise does not radiate from the source at the same level in all directions. Noise from machinery can be higher in one direction than another because the noise can also be either absorbed or reflected from surfaces it contacts, such as the ground or a wall. Therefore, measurements should be taken at several points in an area where people might be working. Once noise levels that are 90 dB (A) or more are determined, rope off this area as the Noise Perimeter Zone. Exclude all workers who do not</p>			



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		need to be in that zone. All workers who need to work within the zone must wear hearing protection.			
10.	<b>Impacts on Surface Water Body</b> A small drain exist in near vicinity of the AOI and during construction phase the drain may get clogged due to silting and will result in the overflow of the drain. As an open water channel it carries sewage flow from communities around the drain. If it overflows it will result in unhygienic conditions. Also the increased impervious soil from the project area will lead to increase in the surface flow that may alter the flow regime of the drain.	<ul style="list-style-type: none"><li>• Install silt fence, sediment trap and sediment basin to capture sediments before it reaches the drain</li><li>• Construct temporary storm water retention basins to reduce the runoff to the drain and use permeable material for temporary roads.</li></ul>	<ul style="list-style-type: none"><li>• Visual observation</li><li>• Regular environmental monitoring, sampling and testing reports</li></ul>	Construction Contractor	Proponent, SC



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11.	<p><b>Resource Conservation</b> Resources involved in the construction of proposed project would include construction materials, water and fuel. Construction material to be used for construction includes coarse aggregates, fine aggregates, asphalt, cementitious materials, reinforced and structural steel etc. Almost all the materials to be used in the construction of proposed project are non-renewable and therefore their sustainable use is necessary for the future use. Excessive water consumption for drinking and washing purposes by the construction staff may pressurize water resources in the Project Area and in certain cases may disturb the existing water supplies in the Project Area.</p> <p>Fuel will be used to operate construction machinery, asphalt and batching plants. Sustainable use of energy resources is very important not only to continue future use but also to reduce air emissions.</p>	<ul style="list-style-type: none"> <li>Wastage of water should be reduced by training the workers involved in water use;</li> <li>Water jets and sprays should be used for watering surfaces rather than using overflow system;</li> <li>Source of water should be carefully selected. Water use should not disturb the existing community water supplies;</li> <li>Ensure adequate insulation to reduce heat loss through batching and asphalt plants;</li> <li>Schedule regular monitoring of CO and CO2 content of the flue gases to verify that combustion systems are using practical excess air volumes</li> <li>Reuse of construction waste materials;</li> <li>Unnecessary equipment washings should be avoided;</li> <li>Use minimum amount of bitumen for road surfacing;</li> <li>A good camp design and an efficient worksite management plan can help the contractor to reduce the water demand to the lowest levels; and</li> <li>Resource conservation plan (attached as Annex III) should be followed.</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> <li>Conservation Plan implementation</li> </ul>	Construction Contractor	Proponent, SC



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12.	<p><b>Construction Camps/Camp Sites</b></p> <p>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 in the vicinity settlements. 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.</p>	<ul style="list-style-type: none"> <li>• The project will seek to avoid sitting camps where their presence might contribute to any conflicts with locals;</li> <li>• Employment policies which aim to maximize job opportunities for local people will help to minimize tensions caused by different socio-cultural values;</li> <li>• Camps will be designed to be self-contained to reduce demand on infrastructure and services of nearby communities;</li> <li>• A comprehensive safety and security plan for the camp will be prepared which will comprise of a training manual, use of safety equipment and emergency preparedness;</li> <li>• Training will be provided to all staff on camp management rules and overall discipline and cultural awareness;</li> <li>• Waste Management Plan (refer Annex-IV) will be implemented to ensure safe handling, storage, collection and disposal of construction wastes and the training of employees who handle waste;</li> <li>• Site for construction camp will be selected to minimize the removal of existing macro-plants at camp sites;</li> <li>• Photographical and botanical inventory of vegetation before clearing the site;</li> </ul>	<ul style="list-style-type: none"> <li>• Visual observation and photographic record.</li> <li>• Waste Management plan implementation</li> </ul>	Construction Contractor	Proponent, SC



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		<ul style="list-style-type: none"> <li>Compensatory plantation to be done when construction work near ends; and</li> <li>The contractor(s) shall ensure removal and rehabilitation of site upon completion.</li> </ul>			
13.	<p><b>Wastewater Generation at Construction Camps</b></p> <p>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 wastewater generation is estimated to be 4,800 liters/day for 150 construction workers during construction phase of the proposed Project.</p>	<p>To dispose the liquid waste generated from the construction activities, the following steps will be taken by the Contractor:</p> <ul style="list-style-type: none"> <li>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 6.1);</li> <li>Proper monitoring to check the compliance of PEQS will be carried out;</li> <li>Sewage from construction camps will be disposed of after proper pre-treatment and processes such as soakage pit; and</li> <li>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.</li> </ul>	<ul style="list-style-type: none"> <li>Visual observation and photographic record.</li> <li>Waste Management plan implementation</li> </ul>	Construction Contractor	Proponent, SC



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14.	<p><b>Solid Waste Generation at Construction Camps</b></p> <p>The solid waste generation is estimated to be 90 kg/day for 100 construction workers during construction phase of the proposed Project. Different type of waste is likely to be generated during the construction phase of the proposed 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.</p> <p>Insecure and unhygienic disposal of the solid wastes particularly garbage and trash may cause degradation of soil and land. Insecurely disposed off</p>	<ul style="list-style-type: none"> <li>• 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;</li> <li>• 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;</li> <li>• Waste disposal plan must be reviewed during the entire construction phase in the light of changing weather conditions;</li> <li>• Emergency response plan shall be prepared to address the accidental spillage of fuels and hazardous goods;</li> <li>• Immediate collection of spilled oils/fuels/lubricants by collection of contaminated soils and skipping oils from surface water by applying appropriate technologies;</li> <li>• Reusing bitumen spillage; and disposing non-usable bitumen spills in a deep trench providing clay linings</li> </ul>	<ul style="list-style-type: none"> <li>• Visual observation and photographic record.</li> <li>• Waste Management plan implementation</li> </ul>	Construction Contractor	Proponent, SC



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	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 minor negative in nature.	<p>at bottom and filled with soil at the top (for at-least 0.5 m);</p> <ul style="list-style-type: none"><li>• 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;</li><li>• Segregating and stockpiling scarified/ milled bituminous material and reusing this material in sub grade/shoulders;</li><li>• Construction waste such as waste wood can be recovered and recycled into wood for new building projects, and cement, bricks, and plaster can be crushed and reused in other construction and building projects; and</li><li>• The contractor should ensure implementation of proposed Construction Waste Management Plan (attached as Annex-IV) and it must be reviewed during the entire construction phase in the light of changing weather conditions.</li></ul>			



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15.	<p><b>Discovery of Heritage Sites/ Structures during Excavation</b></p> <p>During excavation, there is a chance of finding artifacts. In case of finding any artifact, the contractor shall immediately report through Supervision Consultant to Directorate General (DG) of Archeology, Government of Punjab to take further suitable action to preserve those antiques or sensitive remains.</p>	<ul style="list-style-type: none"> <li>Chance finds procedure (Attached as Annex-VII) shall be adopted in case of any accidental discovery of cultural heritage.</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of chance find procedure</li> </ul>	Construction Contractor	Proponent, SC
16.	<p><b>Occupational Health and Safety</b></p> <p>Health risks and work safety problems may result at the workplace/camps if the working conditions provide unsafe and/or unfavorable working environment due to storage, handling and transport of construction materials. The health and safety issues are also associated with the malfunctioning in operation of construction machinery and equipment which may cause minor to severe injuries to workers. This impact is permanent and high adverse in nature.</p>	<ul style="list-style-type: none"> <li>Obligatory insurance against accidents for laborers/workers;</li> <li>Providing basic medical training to specified work staff and basic medical service and supplies to workers;</li> <li>Preparing layout plan for camp site, indicating safety measures taken by the contractor, e.g. firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;</li> <li>Work safety measures and good workmanship practices should be followed by the contractor;</li> <li>Ear muffs should be provided to the workers doing job in the vicinity of</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of HSE Plan</li> <li>Use of PPEs</li> <li>Training Records</li> <li>Work permits</li> <li>Implementation of Emergency response plan and disaster management plan in case of natural disaster occurrence</li> </ul>	Construction Contractor in association with PHA	Proponent



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				Implementation	Monitoring
		<p>high noise generating machinery or equipment;</p> <ul style="list-style-type: none"><li>• Provision of adequate sanitation, washing, cooking and dormitory facilities in the camps;</li><li>• Provision of Personal Protective Equipment (PPEs) including protective clothing for laborers handling hazardous materials, e.g. helmet, masks, adequate footwear for bituminous pavement works, protective goggles and gloves;</li><li>• Ensuring strict use of protective clothing and equipment during construction activities;</li><li>• Elaboration of a contingency plan in case of major accidents;</li><li>• Ensuring availability of adequate signage, lightning devices, barriers and marking tape during the entire construction phase to manage traffic at construction sites and access roads;</li><li>• All potable drinking water supplies to be tested regularly on monthly basis during the entire construction phase;</li><li>• Provision of first aid facility and ensuring its cleanliness and disinfection; and</li><li>• Ensuring the availability of a dispenser at the active construction site throughout the construction</li></ul>			



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		period to provide emergency treatment.			
17.	<p><b>Community Health and Safety</b></p> <p>The construction activities and vehicular movement at construction sites and access service roads may also result in accidents along road side as the local communities may not be familiar with the presence of heavy equipment and machinery. This is a permanent and high adverse impact. Quality of ground water and surface water resources available in the nearby local communities may get contaminated due to the construction activities, oil spillage and leakage, roadside accidents etc. The laborers with different transmittable diseases may cause spread out of those diseases in the local residents. Dengue may also break through due to stagnant water at the construction sites. There is a chance of spreading of epidemic of Coronavirus disease (COVID-19) due to close interaction of the labor force during construction not</p>	<ul style="list-style-type: none"> <li>• There should be proper control on construction activities and particularly oil spillage/ leakage of vehicles, machinery and equipment;</li> <li>• All labour must be medically checked so that if they interface with the local communities, undesirable transmittable disease does not spread;</li> <li>• Only those laborers with different transmittable diseases should be restricted to the construction site;</li> <li>• Efforts should be made to create awareness about road safety among the drivers operating construction vehicles;</li> <li>• Timely public notification of planned construction works;</li> <li>• Provision of proper safety and diversion signage at sensitive/accident-prone spots;</li> <li>• Setting up speed limits in the construction areas in close consultation with the local stakeholders;</li> <li>• Keeping out of non-working persons, particularly children, off work sites;</li> <li>• The communicable disease of most concern during construction phase, like sexually-transmitted disease</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of HSE Plan</li> <li>• Use of PPEs</li> <li>• Community concerns record</li> <li>• Medical reports of worker</li> </ul>	Construction Contractor	Proponent, SC



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERROZPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	only among the workers but also in the area.	<p>(STDs) such as HIV/AIDS, should be prevented by successful initiative typically involving health awareness; education initiatives; training health workers in disease treatment; immunization program and providing health service;</p> <ul style="list-style-type: none"> <li>• SOPs related to the construction industry to control spreading of COVID-19, should be implemented by the contractor and should be strictly monitored.</li> <li>• Efforts should be made to prevent the spread of vector borne diseases 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.</li> </ul>			
18.	<p><b>Emergency Response to Natural and Man-made Disasters</b></p> <p>Natural Disasters such as earthquakes &amp; flooding and other disasters triggered by humans such as act of terror etc. may occur, and must be</p>	Emergency Response Plan attached as Annexure-VIII should be implemented in close consultation with the District Rescue Service, fire-fighting department, bomb disposal squad and paramedics. In addition, training of the staff/employees regarding the	<ul style="list-style-type: none"> <li>• Trainings, drills, record keeping</li> <li>• ERP implementation</li> <li>• Visual observation and photographic record.</li> <li>•</li> </ul>	Construction Contractor	Proponent, SC



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO  
FEROZPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	considered to avoid or for minimize their impacts. This impact will be permanent and moderate in nature	emergency procedures/plans should be regularly conducted			
19.	<p><b>Traffic Management</b></p> <p>Due to the proposed project construction activities and movement of heavy project vehicles for construction material supply, traffic problems may arise. The problems will include traffic jams and inconvenience to the public passing by 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 is moderate adverse</p>	<ul style="list-style-type: none"> <li>• Movement of vehicles carrying construction materials and equipment/machinery will be restricted during the peak times to reduce traffic load and inconvenience to the local population;</li> <li>• Construction vehicles, machinery and equipment will be parked at designated areas (at construction camps site) to avoid un-necessary congestions along the major roads;</li> <li>• Damages of roads due to construction vehicles will be instantly repaired and/or compensated after the completion of work;</li> <li>• Proper sign boards will be provided for smooth flow of traffic;</li> <li>• Period of construction and area / location of construction site shall be informed to public in general and specifically to local residents;</li> <li>• Any closure of the roads (especially main roads) and deviations / diversions proposed should be informed to the riders through standard signs and displays; and</li> <li>• Traffic Management Plan (refer Annex-VI) will be prepared by the</li> </ul>	<ul style="list-style-type: none"> <li>• Visual observations</li> <li>• Regular monitoring, audit and checks</li> </ul>	Construction Contractor	Proponent, SC



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		contractor and implemented to avoid traffic accidents, jams/public inconvenience.			
20.	<p><b>Greenhouse Gas Abatement</b></p> <p>The main sources of greenhouse gases (CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub> etc.) during the construction activities of the proposed project will include both mobile and stationary sources. The mobile sources 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:</p> <ul style="list-style-type: none"> <li>• Extended summer season and absence of snow falls;</li> <li>• 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</li> <li>• Increased natural hazards such as landslides and debris flows,</li> </ul>	<ul style="list-style-type: none"> <li>• Efficient construction machinery shall be used onsite during construction phase and when the machinery is not in use, it will be turned off;</li> <li>• Using optimized transport routes and transportation of materials in bulk will lower the emissions.</li> <li>• Efficient and low carbon footprint materials will be used in the construction.</li> <li>• Preserving land and trees as much as possible and ensuring replantation will lower the GHG emissions.</li> <li>• Training and awareness will be given to the workers in order to create awareness about the GHG emissions and climate change.</li> </ul>	<ul style="list-style-type: none"> <li>• Visual observations</li> <li>• Regular environmental monitoring, sampling and testing reports</li> <li>• Vehicle inspection record</li> <li>•</li> </ul>	Construction Contractor	Proponent, SC



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO  
FEROZPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	<p>extreme/unpredictable rainfall events, wind storms, droughts and wildfire.</p> <ul style="list-style-type: none"><li>• 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</li><li>• Increased damages to transportation infrastructure from extreme events, causing difficulties for access and emergency evacuation, and involves higher maintenance costs.</li></ul>				



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO  
FEROZPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
21.	<p><b>Social/ Cultural Conflicts</b></p> <p>During the construction phase of the project, conflicts may arise between labor force and local community. Use of local resources and products by the construction workers can generate stress on the local biophysical resources. Furthermore, difference in cultural values may also cause discomfort to local residents. This impact is temporary and moderate adverse in nature.</p>	<ul style="list-style-type: none"> <li>Local labor should be preferably employed for the construction works;</li> <li>Careful planning and training of work force to minimize disturbance to the local people;</li> <li>Public notification through media during the entire construction phase to avoid any inconvenience in accessibility to the locals.</li> </ul>	<ul style="list-style-type: none"> <li>Visual observations</li> <li>Regular monitoring, audit and checks</li> </ul>	Construction Contractor	Proponent, SC
22.	<p><b>Flora</b></p> <p>The project may involve risk to vegetation in construction areas. Total 100 number of trees of small and medium sizes may be removed (at the current stage of the project impact on trees is not final) due to the layout of the project for which compensation shall be made to concerned parties. 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</p>	<ul style="list-style-type: none"> <li>Cutting and / or disturbance of trees shall be avoided, as far as possible, and select the barren/less vegetated zones as the impact on the local ecosystem (especially trees) is expected. So, the negative effects on the process of natural regeneration of species are minimized and possible mitigation measures must be considered for the proposed project, in which minimum ecological and environmental losses are expected;</li> <li>A tree plantation program shall be implemented with the recommendations and technical support of PHA or Forest Department;</li> </ul>	<ul style="list-style-type: none"> <li>Visual Observations</li> </ul>	Construction Contractor	Proponent, SC



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO  
FEROZPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	workers may damage the vegetation and trees (for use as firewood to fulfill the camps requirements).	<ul style="list-style-type: none"> <li>As a principal, ten trees shall be planted in place/lieu of the felling of one tree in consideration of mortality. At this stage, 1,000 trees are recommended for tree plantation for the purpose of environmental enhancement.</li> <li>It is pertinent to mention that trees should be relocated/transplanted/replanted (where possible) instead of cutting and may be replanted within the project boundary or 500 meters' radius of their original location;</li> <li>The tree compensation will be done at 1:10 for each felled tree.</li> <li>The compensatory plantation shall be carried out in the project area (in the available space) or in the vicinity of project areas like associated roads and nearby parks / green areas, etc. to reduce the negative impacts of the tree cutting in the immediate project area and overall;</li> <li>The proponent shall implement the program with the help of PHA and Forest Department and with the consultation of the concerned consultant ecologist;</li> <li>Open fires should be banned in the area to avoid hazards of fire in the area;</li> </ul>			



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO  
FEROZPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
		<ul style="list-style-type: none"> <li>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 green land.</li> <li>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;</li> <li>Construction vehicles, machinery, and equipment will remain confined within their designated areas of movement;</li> <li>The Contractor's staff and labor shall be strictly directed not to damage any vegetation such as trees or bushes; and</li> <li>Contractor shall provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel shall be strictly prohibited.</li> </ul>			
23.	<p><b>Fauna</b></p> <p>During the construction phase the existing population of birds, mammals, and reptiles in the construction areas may be affected due to disturbances arising from construction activities involving excavation, movement of</p>	<ul style="list-style-type: none"> <li>Care shall be taken during construction activities for avoiding purposely or chance killing of animals;</li> <li>If any wild species and habitat is found during construction, it must be dealt with care and local wildlife</li> </ul>	<ul style="list-style-type: none"> <li>Implementation of Tree Plantation Plan</li> <li>Visual Observations</li> </ul>	Construction Contractor	Proponent, SC



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	<p>machinery and vehicular traffic, movement of labor, camping, etc. The existing fauna (insignificant) 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 mammals and reptiles will be restricted during the construction phase.</p> <p>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.</p> <p>Noise generated from machinery, particularly during the night hours will even scare the wildlife residing in habitats located at some distance from the construction 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.</p>	<p>department officials should be informed;</p> <ul style="list-style-type: none"> <li>• Hunting, poaching, and harassing of wild animals shall be strictly prohibited, and the Contractor shall be required to instruct and supervise its labor force accordingly and clear orders should be given in this regard;</li> <li>• The Contractor must be held responsible for instructing his workforce accordingly and for enforcing this restriction. In addition, this shall have to be controlled by the Wildlife Department.</li> <li>• Special measures shall be adopted to minimize impacts on the wild birds, such as avoiding noise-generating activities during the critical periods of breeding;</li> <li>• Noise generating activities shall not be carried out during the night by the workforce;</li> <li>• Wastes of the camps shall be properly disposed of to prevent it being eaten by animals, as it may be hazardous to them; and</li> <li>• Noise produced due to construction activities may be kept to acceptable level.</li> </ul>			



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FEROZPUR ROAD THROUGH LDA CITY, LAHORE



Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
<b>O&amp;M Phase</b>					
24.	<p><b>Air Quality</b></p> <p>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 may lead to higher values of emissions.</p>	<ul style="list-style-type: none"> <li>LDA with the help of PEPA may set up system to monitor air quality along project area at important intersections/sensitive receptors in accordance with PEQS for a specific period to record the quality of air during the operation phase. This may help in comparing the baseline conditions with the operation phase of the project;</li> <li>Setting up to system to monitor air quality along the project area in accordance with acceptable International Standards; Monitoring emissions of vehicle as per PEQS;</li> <li>Helping the owners and occupants of the affected premises/settlements to identify and implement special measure such as hedges and vegetation to reduce air pollution; and</li> <li>Increasing vegetation in the form of greenbelt is one of the preferred methods to mitigate air pollution. Plants generate oxygen, serve as a sink for pollutants, reduce the flow of dust and reduce the noise pollution too alongside the proposed project.</li> </ul>	<ul style="list-style-type: none"> <li>Visual observation</li> <li>Regular environmental monitoring, sampling and testing reports</li> <li>Vehicle maintenance records</li> </ul>	Proponent	
25.	<p><b>Noise and Vibration</b></p>	<ul style="list-style-type: none"> <li>Provision of adequate noise barriers such as hedges and indigenous tree</li> </ul>	<ul style="list-style-type: none"> <li>Physical observation</li> </ul>	Proponent	



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Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	The movement of vehicles and usage of horns will create noise which will be a hazard for the nearby residents/built-up areas.	<p>species will reduce the noise. Further Improvement can be made by enforcing the laws and getting the vehicles tested, regularly after a specific time period, by some reputable vehicle testing laboratory and obtaining a certificate. Noise measurements should be carried out at locations with respect to the schedule specified in the Environmental Monitoring Plan (EMMP) to ensure the effectiveness of mitigation measures;</p> <ul style="list-style-type: none"> <li>• Use of horn should be strictly prohibited in the close proximity of the built-up areas;</li> <li>• Proper signboards should be installed to ensure reduce noise levels in the project area;</li> <li>• Enforcement and penalties against traffic rules violators; and Noise barriers may be installed/constructed near the built-up areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Regular environmental monitoring, sampling and testing reports</li> <li>• Vehicle maintenance records</li> </ul>		
26.	<p><b>7.4.1.1 Road Safety</b></p> <p>Enhanced vehicular movement and speed in the long run may result in road safety issues like traffic accidents. This impact is permanent but moderately adverse in nature, since the frequency of accidents may be</p>	<ul style="list-style-type: none"> <li>• Strict enforcement of speed limits, installation of speed guns and channelization of traffic with respect to categories (heavy vehicle traffic and light vehicle traffic), should be ensured for the smooth flow of traffic moving from major road crossings. Enforcement of penalties for the</li> </ul>	<ul style="list-style-type: none"> <li>• Regular traffic surveillance</li> <li>•</li> </ul>		Traffic Police



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Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	lowered, but their intensity may be quite severe due to enhanced speeds at which vehicles will move. The impact considered permanent and high adverse in nature.	violators will reduce the significance of this impact.			
27.	<p><b>7.4.1.2 Road Maintenance</b></p> <p>During the operation phase, related road maintenance works will be conducted time to time which may lead to social and environmental issues like traffic management, inconvenience to local residents, public safety, vehicular emissions, dust and increase in noise. This is a temporary and moderate negative impact.</p>	<ul style="list-style-type: none"> <li>• Best Management Practices should be used for all the maintenance works;</li> <li>• Timely completion of all the maintenance works according to the agreed schedule;</li> <li>• Traffic management plan should be devised and implemented; and</li> <li>• HSE protocols should be strictly followed and implemented to avoid any incident/accident.</li> </ul>	<ul style="list-style-type: none"> <li>• Regular monitoring, sampling and testing</li> <li>• Regular monitoring, audit and checks</li> </ul>	Proponent	
28.	<p><b>7.4.1.3 Drainage</b></p> <p>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</p>	<ul style="list-style-type: none"> <li>• The impact can be controlled/reduced by timely and continuous maintenance/ cleaning of the drainage system; and</li> <li>• Placement of sign boards instructing not to dispose of solid waste to avoid chocking of drain along the road alignment.</li> </ul>	<ul style="list-style-type: none"> <li>• Regular monitoring, sampling and testing</li> <li>• Regular monitoring, audit and checks</li> </ul>	Proponent	



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Sr. No.	Impacts	Mitigation Measure	Performance Monitoring Indicators	Responsibility	
				Implementation	Monitoring
	due to heavy rains will accumulate at the surface and can cause traffic jams. The impact may consider to be moderate adverse in nature.				
29.	<p><b>Flora</b></p> <p>During operational stage of the project, there will be minimal effect on flora or release of any significant pressure detrimental to flora. Low level impact is expected at operational phase on Flora landscape due to the operation and maintenance activities.</p>	<ul style="list-style-type: none"> <li>The implementation of plantation plan recommends compensation for cutting of trees and work should be started during operational phase to ensure the ecological balance and to avoid any impact on local environment;</li> <li>Large scale planting with suitable indigenous trees, shrubs and ornamental plants in the form of tree groves, 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;</li> <li>Proper check and balance for above activities is highly recommended. Plantations so raised must be maintained according to the silvicultural practices which includes proper irrigation, cleaning, pruning, thinning at prescribed intensity, silt clearance and trench-opening, etc.;</li> <li>Maintenance and security of the plantation should be done for at-least four years (in consultation with the PHA and forest department). Measures such as fencing, watch</li> </ul>	<ul style="list-style-type: none"> <li>Regular monitoring, audit and checks</li> </ul>	Proponent	



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				Implementation	Monitoring
		<p>guards and fire protection should be considered; and</p> <ul style="list-style-type: none"><li>All activities must be done under the technical supervision of PHA and forest department.</li></ul>			
30.	<p><b>Fauna</b></p> <p>There is no protected area, game reserve, game sanctuary or national park in the project area so no major impact on wildlife and livestock in the area is expected through noise, vibration and any type of normal activity in the project area.</p>	<ul style="list-style-type: none"><li>Strict control must be exercised for stoppage of killing/poaching of available wildlife species by enhancing protection practices; and</li><li>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.</li></ul>	<ul style="list-style-type: none"><li>Regular monitoring, audit and checks</li></ul>		Proponent



## 7.5 ENVIRONMENTAL MONITORING PLAN

Environmental monitoring provides timely and useful information to the Project management and implementation agencies. It helps in timely identification/analysis and removal of the bottlenecks and expedites actions. Environmental monitoring will be undertaken during both the construction and operational phases, to ensure the effectiveness of the proposed mitigation measures against identified adverse environmental impacts in this EIA report.

The main objectives of the construction phase monitoring plan will be to:

- Monitor the actual impact of the works on the Project site physical, biological and socio-economic receptors and evaluate the effectiveness of the mitigation measures proposed in the EMP against the actual impact and recommend improvements in EMP, if required;
- Recommend mitigation measures for any unexpected impact or where the impact level exceeds the anticipated impact;
- Ensure compliance with legal and community obligations including safety during construction and O&M phases;
- Ensure the safe disposal of excess construction materials, solid waste, water and wastewater and gaseous emissions;
- Monitor the rehabilitation of borrow areas and the restoration of construction campsites as described in the EMP; and
- Compile periodic incidents/accidents data to support analyses that will help to minimize future risks.

The main objectives of monitoring during the operational phase will be to:

- Appraise the adequacy of the EIA with respect to the Project's predicted long-term impacts of operation on the physical, biological and socio-economic environment;
- Evaluate the effectiveness of the mitigation measures proposed in the EMP and recommend improvements, if and when necessary; and
- Compile periodic Environmental Monitoring reports on the basis of recommendations in EMP.

### 7.5.1 Monitoring Strategy

Under the proposed monitoring strategy, it is recommended that Lahore Development Authority will be responsible for all the monitoring activities. All the findings and results in the form of monitoring report will be finally shared with Punjab-EP&CCD. The monitoring program has been designed carefully considering the identified impacts mentioned in Chapter-6. **Table 7.2** provides environmental monitoring schedule for construction and operations stages of the proposed Project.

### 7.5.2 Responsibilities for Environmental Testing and Reporting



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The Contractor will be responsible for environmental monitoring and reporting throughout the construction phase under the supervision of Supervision Consultant (SC); in coordination with Project Director, Lahore Development Authority. During construction phase, environmental testing reports will be prepared one time and one comprehensive report will be prepared at the end of the construction phase and will be submitted to Lahore Development Authority for its submission to Punjab-EP&CCD.

During the first year of the Project operation, Lahore Development Authority will be responsible to conduct environmental testing and monitoring through Punjab-EP&CCD certified laboratory. The reports will be prepared biannually and one comprehensive report will be prepared annually and submitted to the Punjab-EP&CCD. Contents of the final report will include results of environmental monitoring in comparison to the standards for the various parameters, location and sampling time along with recommendations for the future environmental testing and monitoring.

### 7.5.3 Budget Estimate for Environmental Monitoring and Compliance

Budget Estimate for Environmental Monitoring and Compliance during the Construction and Operation Phase has been summarized in **Table 7.3**.



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**Table 7-2: Environmental Monitoring Schedule**

Sr. No.	Receptors	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
1.	Water Resources/ Water Quality	Monitoring of Physical, Chemical and Biological parameters and its compliance with PEQS, 2016 for surface water and drinking water.	<ul style="list-style-type: none"> <li>Major receptors are and commercial / residential areas within the COI of the proposed Project.</li> <li>Other proposed effluent discharge points are: <ul style="list-style-type: none"> <li>Contractors camps;</li> <li>Concrete preparation plants;</li> <li>Fuel (Petrol. Oil and Grease) products storages; and</li> <li>Vehicle and machines repairing and servicing yards.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Visual checks of laboratory activities; and</li> <li>Discrete grab sampling and laboratory testing of water samples by EP-&amp;CCD Punjab Certified Laboratory for monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Once before the start of construction activities;</li> <li>Once during the construction phase;</li> <li>Bi-annually for at least one year during O&amp;M phase; and</li> <li>Visual inspection daily.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> <li>Contractor</li> <li>Lahore Development Authority</li> </ul>
2.	Soil Contamination	Soil contamination due to effluent / surface runoff and uncontrolled solid waste disposal activities at sites.	<ul style="list-style-type: none"> <li>Along Access Roads (proposed Project); and</li> <li>Other proposed sampling sites are: <ul style="list-style-type: none"> <li>Construction camps;</li> <li>Equipment washing yards; and</li> <li>Spillage points of fuel, chemicals and lubricants.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Visual observations and checking of laboratory activities; and</li> <li>Sampling and laboratory testing for soil samples.</li> </ul>	<ul style="list-style-type: none"> <li>Once before the start of construction activities;</li> <li>Once during the construction phase;</li> <li>Bi-annually for at least one year during O&amp;M phase; and</li> <li>Visual inspection daily.</li> </ul>	<ul style="list-style-type: none"> <li>Contractor</li> <li>Contractor</li> <li>Lahore Development Authority</li> </ul>



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Sr. No.	Receptors	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
3.	Dust Emissions	Monitoring of PM <sub>10</sub> and PM <sub>2.5</sub> and its compliance with PEQS, 2016 for Ambient Air.	Sensitive receptors (residential areas, religious places and construction camps) within the COI of the proposed Project. However; estimated sampling points are two (02) which will be verified during construction stage.	<ul style="list-style-type: none"> <li>• Visual checks of laboratory activities;</li> <li>• Onsite Ambient Air Monitoring Equipment; and</li> <li>• Daily visual monitoring of dust emissions at construction route.</li> </ul>	<ul style="list-style-type: none"> <li>• Once before the start of construction activities;</li> <li>• Once during the construction phase; and</li> <li>• Bi-annually for at least one year during O&amp;M phase.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> <li>• Contractor</li> <li>• Lahore Development Authority</li> </ul>
4.	Noise Pollution	Monitoring of Noise Level and its compliance with PEQS 2016 for Noise.	Sensitive receptors (residential area, religious places and construction camps) within the COI of the proposed Project. However; estimated sampling points are two (02) which will be verified during construction stage.	<ul style="list-style-type: none"> <li>• Visual checks of laboratory activities; and</li> <li>• Onsite Noise Monitoring using Sound Meter.</li> </ul>	<ul style="list-style-type: none"> <li>• Once before the start of construction activities;</li> <li>• Once during the construction phase; and</li> <li>• Bi-annually for at least one year during O&amp;M phase.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> <li>• Contractor</li> <li>• Lahore Development Authority</li> </ul>
5.	Fumes and gases	Monitoring of CO, CO <sub>2</sub> , SO <sub>x</sub> , NO <sub>x</sub> , Lead and PM <sub>2.5</sub> PM <sub>10</sub> , Vehicular emissions and its compliance with PEQS 2016.	Sensitive receptors (concrete plants, construction camps and vehicular emissions) within the COI of the proposed Project. However; estimated sampling points are two (02) which will be verified during construction stage.	<ul style="list-style-type: none"> <li>• Visual checks of laboratory activities;</li> <li>• Onsite Ambient Air Monitoring Equipment; and</li> <li>• Daily visual monitoring of gaseous emissions at construction route.</li> </ul>	<ul style="list-style-type: none"> <li>• Once before the start of construction activities;</li> <li>• Once during the construction phase; and</li> <li>• Bi-annually for at least one year during O&amp;M phase.</li> </ul>	<ul style="list-style-type: none"> <li>• Contractor</li> <li>• Contractor</li> <li>• Lahore Development Authority</li> </ul>



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Sr. No.	Receptors	Monitoring Parameters / Performance Indicator	Location	Monitoring Mechanism	Monitoring and Reporting Frequency	Responsibility
6.	Ecological Resources	Disturbance to natural habitat and uncontrolled floral cutting which can be avoidable.	Natural habitats within the COI of the proposed Project and construction camps.	<ul style="list-style-type: none"><li>• Visual checks to ensure that only marked trees are cut (if any) within the Project corridor; and</li><li>• Monitoring of Wildlife / birds hunting.</li></ul>	<ul style="list-style-type: none"><li>• Once before the start of construction activities;</li><li>• Visual inspection daily / weekly during construction phase; and</li><li>• Visual inspection weekly for at least one year during O&amp;M.</li></ul>	<ul style="list-style-type: none"><li>• Contractor</li><li>• Contractor</li><li>• Lahore Development Authority</li></ul>
7.	Safety of workers	Medical record of workers.	Construction site.	<ul style="list-style-type: none"><li>• Checking of accident/ near miss records; and</li><li>• Medical surveillance of Construction workers</li></ul>	<ul style="list-style-type: none"><li>• On monthly basis during the construction phase.</li></ul>	<ul style="list-style-type: none"><li>• Contractor</li></ul>
8.	Restoration of work sites	Site cleared and no solid and construction waste in the study area.	Construction site and camp sites.	<ul style="list-style-type: none"><li>• Visual inspection</li></ul>	<ul style="list-style-type: none"><li>• After completion of construction work</li></ul>	<ul style="list-style-type: none"><li>• Contractor</li><li>• Lahore Development Authority</li></ul>



CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO  
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**Table 7-3: Budget Estimate for Environmental Monitoring and Compliance during the Construction and Operation Phases**

Components	Parameters	Quantity (No. of samples x No. of Locations x Frequency)	Frequency	Responsibility	Duration	Cost (Rs.)
<b>A) Construction Phase (06 Months)</b>						
<b>Ambient Air Quality</b>	CO, NO <sub>2</sub> , SO <sub>2</sub> , Lead, SPM, PM <sub>2.5</sub> and PM <sub>10</sub>	1x3x1= 3	One time @ Rs. 40,000 per sample	CC and SC	24 hours	120,000/-
<b>Noise Level</b>	Day and night time levels on dB (A) Scale (min-max)	1x3x1= 3	One time @ Rs. 2,000 per point	CC and SC	24 hours	6,000/-
<b>Drinking Water Quality</b>	<b>Physical Parameters:</b> Color, pH, Taste, Odour, Turbidity, Total Hardness as Calcium Carbonate and Total Dissolved Solids <b>Biological Parameters:</b> E. Coliform, Fecal Coliform and Total Coliform <b>Chemical Parameters:</b> Aluminum, Antimony, Arsenic, Barium, Cadmium, Chloride, Chromium, Copper, Cyanide, Fluoride, Lead, Manganese, Mercury, Nickel, Nitrate, Nitrite, Selenium, Residual Chlorine, Zinc and Phenolic Compounds	1x1x1= 1	One time @ Rs. 20,000 per sample	CC and SC	-	20,000/-
<b>Wastewater Quality</b>	<b>Physical Parameters:</b>	1x1x1= 1	One time @ Rs. 20,000 per sample	CC and SC	-	20,000/-



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Components	Parameters	Quantity (No. of samples x No. of Locations x Frequency)	Frequency	Responsibility	Duration	Cost (Rs.)
	Temperature, pH, Color, Total Dissolved Solids, and Total Suspended Solids <b>Biological Parameters:</b> Biochemical Oxygen Demand and Chemical Oxygen Demand <b>Chemical Parameters:</b> Grease and Oil, Lead, Phenolic compounds, Cyanide, Chloride, Fluoride, Anionic Detergents, Sulphate, Sulphide, Ammonia, Calcium, Cadmium, Chromium, Copper, Mercury, Selenium, Nickel, Silver, Zinc, Arsenic, Barium, Iron, Manganese, Boron and Total chloride					
<b>TOTAL (A) =</b>						<b>166,000/-</b>
<b>B) Operation Phase (12 Months)</b>						
<b>Ambient Air Quality</b>	CO, NO <sub>2</sub> , SO <sub>2</sub> , Lead, SPM, PM <sub>2.5</sub> and PM <sub>10</sub>	1x3x2 = 6	Biannually @ Rs. 40,000 per sample	Lahore Development Authority (LDA)	24 hours	240,000/-
<b>Noise Level</b>	Day and night time levels on dB (A) Scale (min-max)	1x3x2 = 6	Biannually @ Rs. 2,000 per point	LDA	24 hours	12,000/-



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Components	Parameters	Quantity (No. of samples x No. of Locations x Frequency)	Frequency	Responsibility	Duration	Cost (Rs.)
Drinking Water Quality	<b>Physical Parameters:</b> Color, pH, Taste, Odour, Turbidity, Total Hardness as Calcium Carbonate and Total Dissolved Solids <b>Biological Parameters:</b> E. Coliform, Fecal Coliform and Total Coliform <b>Chemical Parameters:</b> Aluminum, Antimony, Arsenic, Barium, Cadmium, Chloride, Chromium, Copper, Cyanide, Fluoride, Lead, Manganese, Mercury, Nickel, Nitrate, Nitrite, Selenium, Residual Chlorine, Zinc and Phenolic Compounds	1x1x2 = 2	Biannually @ Rs. 20,000 per point	LDA	-	40,000/-
Wastewater Quality	<b>Physical Parameters:</b> Temperature, pH, Color, Total Dissolved Solids, and Total Suspended Solids <b>Biological Parameters:</b> Biochemical Oxygen Demand, Chemical Oxygen Demand, and Fecal Coli <b>Chemical Parameters:</b>	1x1x2 = 2	Biannually @ Rs. 20,000 per point	LDA	-	40,000/-



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Components	Parameters	Quantity (No. of samples x No. of Locations x Frequency)	Frequency	Responsibility	Duration	Cost (Rs.)
	Grease and Oil, Lead, Phenolic compounds, Cyanide, Chloride, Fluoride, Anionic Detergents, Sulphate, Sulphide, Ammonia, Calcium, Cadmium, Chromium, Copper, Mercury, Selenium, Nickel, Silver, Zinc, Arsenic, Barium, Iron, Manganese, Boron and Total chloride					
<b>TOTAL (B) =</b>						<b>332,000/-</b>
<b>GRAND TOTAL (A+B) =</b>						<b>498,000/-</b>

**KEY**

CC Construction Contractor SC Supervision Consultant  
LDA Lahore Development Authority

**Notes:**

- Provision must be given in annual budget of construction and operation phases for environmental monitoring. For this, the cost of monitoring must be considered with an annual increment of 10%.
- All the environmental parameters will be analyzed as per Punjab Environmental Quality Standards (PEQS), 2016.



## 7.6 TREE PLANTATION

To minimize the negative impacts arising due to tree cutting (100 Nos.), plantation at available spaces may be carried out especially within the Project boundary.

Plantation Plan shall be carried out by the Client in coordination with the PHA, which has the requisite expertise and experience for such tasks.

Trees recommended for planting are 1,000 for compensation and area enhancement. The tentative cost for the plantation is about PKR 1.932 Million. Detailed Tree Plantation Plan is attached as **Annex-IX**.

## 7.7 TRAINING AND CAPACITY BUILDING

An environmental and social training and technical assistance (TA) program is to be carried out before the implementation of the proposed Project as it strengthens the institutional capacity required to manage the environmental and social issues. Contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP because without appropriate environmental awareness, knowledge, and skills required for the implementation of the mitigation measures, it would be difficult for the Contractor(s) workforce to implement effective environmental protection measures.

Lahore Development Authority will be responsible to engage TA consultant to conduct environmental and social training programs. The objective of the TA will be as follows:

- To help in establishment of appropriate systems;
- To train senior Lahore Development Authority staff, Contractor and Sub-Contractor workers and Supervision Consultant employees, responsible for managing environment and social tasks and planning during construction and post construction phases; and
- Training courses on specialized areas such as air, water and noise pollution monitoring.

**Table 7.4** provides brief detail of the capacity building and training plan for the proposed Project.

**Table 7-4: Capacity Building Programs and Technical Assistance Services**

Provided by	Contents	Trainees	Duration
TA Individuals, Consultants and Organizations specializing in Environmental Management and Monitoring	Short Seminars and Courses on: <ul style="list-style-type: none"> <li>• Environmental laws and regulations;</li> <li>• Environmental Sustainability; and</li> <li>• Environmental Management and Monitoring Plan (EMMP)</li> </ul>	Environmental Staff of Contractor and SC, and LDA	3 Days



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<b>Provided by</b>	<b>Contents</b>	<b>Trainees</b>	<b>Duration</b>
TA Individuals, Consultants and Organizations specializing in Social Management and Monitoring, and Occupational Health and Safety	Short Seminars and Courses on: <ul style="list-style-type: none"> <li>• Occupational Health and Safety Plan (OHS);</li> <li>• Basic First Aid;</li> <li>• Occupational and Community Health and Safety Management;</li> <li>• Labour Camp Management;</li> <li>• Traffic Management;</li> <li>• Use and Importance of Personal Protective Equipment's (PPEs); and</li> <li>• Fire Safety and Emergency Response Measures.</li> </ul>	Environmental Staff of Contractor and SC, and LDA	3 Days
TA Individuals, Consultants and Organizations specializing in Environmental and Social Management and Monitoring	Short Seminars and Courses on: <ul style="list-style-type: none"> <li>• Environmental Management Plan (EMP);</li> <li>• Environment Health and Safety Management;</li> <li>• Occupational Health and Safety;</li> <li>• Basic First Aid;</li> <li>• Waste Management;</li> <li>• Fire Safety and Emergency Response Measures;</li> <li>• Electrical Safety; and</li> <li>• Use and Importance of Personal Protective Equipment's (PPEs).</li> </ul>	Operation and Maintenance Staff of LDA	3 Days

## **7.8 COMMUNICATION & DOCUMENTATION**

Communication and documentation are an essential feature of EMP. The key features of such mechanism are:

### **7.8.1 Data Recording and Maintenance**

All forms to be used for recording information during the environmental monitoring will follow a standard format which will correspond to the data base in to which all the gathered information will be placed. Checkboxes will be used as much as possible to facilitate data entry. The tracking system will be developed for each form.

### **7.8.2 Database**

The database may include the following information:

- Training programs;
- Staff deployment;
- Non-compliances;



- Corrective actions;
- List of environmental data; and
- List of environmental data to be maintained:
  - Soil and land pollution;
  - Disposal of waste;
  - Water resources;
  - Fuel oil and chemical spills;
  - Vegetation record;
  - Noise pollution;
  - Air and dust pollution;
  - Socio-economic data; and
  - Ecological sensitivities.

### 7.8.3 Meetings and Reporting

Monthly meetings will be held at site during the construction phase. The purpose of these meetings will be to discuss the routine activities, non-compliances and their remedial measures. Various reports will also be produced at periodic time intervals, as provided in **Table 7.5** along with information regarding persons responsible for report preparation and review process. Additionally, minutes of meetings will also be submitted as part of routine environmental reports.

**Table 7-5: Periodic Reporting Mechanism**

Sr. No.	Report Category	Prepared by	Reviewed by
1	Monthly	Contractors' environmental staff	LDA / SC
2	Quarterly	Contractors' environmental staff	LDA / SC
3	Completion Report	Contractors' environmental staff	LDA / SC

### 7.8.4 Social Complaint Register

The Contractor will maintain a register of complaints records from local communities and measures taken to mitigate these concerns.

### 7.8.5 Photographic Records

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

### 7.8.6 Non-Compliance of the EMP

The implementation of the proposed EMP involves inputs from various functionaries. The Contractor will be primarily responsible for ensuring implementation of the mitigation measures proposed in the EMP, which will be part of the contract documents. The provision of the environmental mitigation cost will be made in the total cost of Project, for which the Contractor will be paid on the basis of monthly compliance reports. However, if the Contractor fails to comply with the implementation of EMP and submission of the monthly compliance



reports, deductions will be made from the payments to the Contractor claimed under the heads of environmental components.

#### 7.8.7 Review of Recorded Data

All the data and communication recorded and maintained by the Contractor will be periodically reviewed and checked by SC and LDA and necessary action will be recommended to Contractor to improve the recording and documentation.

#### 7.8.8 Management Plans

Various site-specific management plans will be prepared by Contractor as a part of EMP for the better management and implementation of EMP during all phases of the proposed Project. However, approval of these site-specific plans from LDA should be sought before start of construction activities. These site-specific plans are listed below but not limited to these:

- Tree Plantation / Reforestation Plan;
- Health, Safety and Environment (HSE) Management Plan;
- Emergency Preparedness and Response Plan;
- Site Restoration and Rehabilitation Plan;
- Waste Management Plan;
- Disaster Management Plan;
- Drinking Water Supply and Sanitation Plan;
- Solid Waste Management Plan;
- Traffic Management Plan;
- Change Management Plan; and
- Resource Conservation Plan.

#### 7.9 EMP COST

The contractor will be responsible for implementation of mitigation measures and environmental monitoring during construction phase, whereas LDA will be responsible for implementation of mitigation measures and environmental monitoring during operation phase. For an effective implementation of environmental mitigation measures during construction and operational phases, it is very important to provide sufficient funds for the implementation of environmental and social mitigation measures, monitoring and training. The estimated cost of environmental and social mitigation measures, monitoring and training is given in the **Table 7.6**.

The cost for EMP will be part of the contract document with the Contractor. The same may also be included in the total Project cost for the implementation of EMP. It must be noted that environmental cost will not be a separate entity because all of its components will be addressed in the bidding document under various heads of account.



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**Table 7-6: Environmental and Social Testing, Mitigation and Training Cost**

Sr. No.	Activity	Description	Cost (Rs.)	Rationale
1.	Medical screening for workers	PKR 7,000 per person for 150 employees <i>At time of deployment:</i> $150 \times 7,000 \times 1 = 1,050,000$	1,050,000/-	Medical screening of the workers before deployment on site.
2.	Material Storage, handling and use	Includes cost of Four Number of tarpaulins (Rs. 30,000 each) and storage at separate area and installment of barricading. $4 \times 30,000 = 120,000$ Lump sum = 150,000	270,000/-	Four tarpaulins are proposed during the whole construction phase for the protection of material and dust control.
3.	Water Sprinkling	Sprinkling of water to control dust at site on alternate day @ 50,000 per month $6 \times 50,000 = 300,000$	300,000/-	Sprinkling of water to control dust emissions at site during whole construction period.
4.	Handling of solid waste	Includes the cost of collection, segregation, transportation, disposal and management of domestic, commercial and construction wastes	300,000/-	PKR 50,000 per month for 6 months to collect construction waste from all the active sites on daily basis.
5.	Health and Safety of Workers	For 150 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi Vis) and provision of dust bins, warning tap, safety cones and safety sign boards.	2,427,000/-	For detail, please refer to <b>Annexure-X</b> .
6.	Environmental and Social Expert	Environmental and Social Experts to monitor / conduct all HSE related activities e.g. TBTs, PPEs, housekeeping, safety signage, emergency preparedness, etc. during construction and operational phase <i>Construction Phase:</i> $1 \times 6 \times 200,000 = 1,200,000$ <i>Operational Phase:</i> $1 \times 12 \times 200,000 = 2,400,000$	3,600,000/-	Cost for hiring Environmental and Social Experts along with their monthly logistics during construction and operational phases.
7.	Environmental Testing Cost	Ambient air, drinking water, surface water and noise	498,000/-	Refer to <b>Table 7.3</b> for detailed schedule and cost of environmental testing during construction and operation phases.
8.	Cost of environmental and social training	Short Seminars, Courses, Trainings and Lectures on Environment, Social and Occupational, Health and Safety constituents and components (PKR 300,000/- per session two times during construction phase). $2 \times 300,000 = 600,000$	600,000/-	Refer to <b>Table 7.4</b> for details.



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Sr. No.	Activity	Description	Cost (Rs.)	Rationale
9.	Environmental Audit	Environmental Auditing through third party one time during construction phase and twice during operational phase <i>Construction Phase: 500,000/-</i> <i>Operational Phase</i> $500,000 \times 2 = 1,000,000$	1,500,000/-	Cost for at least two auditors along with logistics, travels and accommodation charges.
10.	Tree Plantation	100 Trees may be cut down during construction phase. Therefore, Compensatory planting of ten trees against each fallen tree of similar floral function will be planned to enhance the landscape of the Project area. Plantation at available spaces may be carried out.	1,932,000/-	For detail, please refer to <b>Annexure-IX</b>
<b>Total =</b>			<b>12,477,000/-</b>	

The total estimated cost for the environmental management, monitoring and auditing during construction and O&M (cost will be updated for next upcoming years accordingly) comes to about **PKR 12.48 Million**.



## 8 CONCLUSION AND RECOMMENDATIONS

### 8.1 GENERAL

This section depicts conclusion and recommendations of the EIA study for the proposed Project. The EIA report has been prepared in accordance with the requirements of the Punjab Environmental Protection Act, 1997 (Amended 2012 & 2017).

### 8.2 CONCLUSION

The primary goal of the proposed project is to improve urban mobility and accessibility by developing a well-designed and strategically planned connecting roads (Neelum and Chenab) with the capacity to handle future traffic growth. Additional objectives of the Project include:

- Establishing a direct link between Pine Avenue, Ferozepur Road and Sue Asal Link Road to reduce travel time and facilitate easier movement between urban areas;
- Providing residents of housing societies such as LDA City, Safari Garden, Etihad Town Phase 2, Soul City, Mid-City, Khyaban-e-Amin, and Lake City with convenient and efficient routes to healthcare, education, and other essential services by minimizing travel time;
- Providing better access to employment centers and commercial zones to stimulate local economic activity;
- Landscaping along the connecting road to improve air quality, provide recreational areas, and enhance the visual appeal of the area;
- Installing solar-powered street lighting along the connecting road to provide a sustainable source of energy, reducing reliance on non-renewable resources;
- Promoting sustainable housing and infrastructure development through a strengthened transportation network; and
- To develop efficient and smooth-flowing urban transportation, which will segregate different traffic streams, reduce the burden on the existing roads (Defence Road and Kahna Kacha Road), and facilitate faster vehicle movement.

Significant efforts were made to identify the main physical, ecological, social, cultural and environmental issues related to the construction and operation of the proposed Project. Various stakeholders were also contacted for obtaining salient information in this regard along with that from area residents. During the pre-construction, construction and operational phases, following are the main issues and concerns:

- Disturbance to the public movement and cultural norms during construction;
- Reduction in the daily routine activities of local residents during construction;
- Noise and air pollution due to the working of construction machinery during construction and traffic operation phases of the Project;
- Solid waste and wastewater generation during construction phase;



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- Oil spillages from construction machinery, resulting in soil and groundwater contamination;
- Cutting of trees/bushes/crops falling within the proposed COI;
- Occupational and community health and safety issues; and
- Solid waste handling and disposal and waste water generation and treatment during operation phase.

Results of the EIA Study have shown that there are no critical environmental impacts associated with the proposed Project. However, several concerns / impacts with regard to physical, ecological and social environment have been identified in report which needs to be mitigated by strict implementation of Environmental Management Plan. These impacts could also be reduced by proper and well planned meticulous design of the roads and underpass and by implementing an appropriate tree plantation plan. In fact, in times of diminishing economic and natural resources, using sustainable approaches in an urban infrastructure will help us to enhance quality of life and serve the needs of the present leaving provision for future generations to meet their needs.

### 8.3 RECOMMENDATIONS

Based on the field visit, environmental monitoring and analysis of primary and secondary data, the following recommendations have been conferred to ensure efficient environment friendly and compliant operation:

- Proper location(s) for construction camps should be selected by contractor in close coordination with LDA that cause minimal/no damage to the prevailing environmental conditions of the Project area;
- Formulation and implementation of a comprehensive safety and security plan by the contractor before the start of the construction activities for the camps which should be comprised of a training manual, use of safety equipment, emergency preparedness and code of ethics;
- Wearing of Personal Protective Equipment (PPEs) such as helmets, masks, adequate footwear for bituminous pavement works, protective goggles and gloves should be made compulsory during construction activities and formulation and implementation of a Health and Safety Plan (HSP) for construction workers;
- Preparation and implementation of Solid Waste Management Plan during the construction stage by contractor in close coordination with concerned authorities for collection, reuse, recycling and disposal of waste;
- Employment opportunities should be provided to local people for skilled and unskilled work during the construction stage;
- A provision of adequate budget for the overall cost of the Project and on-site space for plantation as per guidelines of the concerned departments should be provided in the design of proposed Project to compensate tree cutting and to eradicate air pollution. Moreover, tree plantation must also be implemented;
- Soil contamination should be controlled by proper storage of chemicals;
- Surface runoff and wastewater generated during construction stage should be controlled and collected in septic tanks and soakage pits;
- Dust and fugitive emissions should be controlled by maintenance of equipment, fine tuning of the vehicles and regular sprinkling of water on soil;



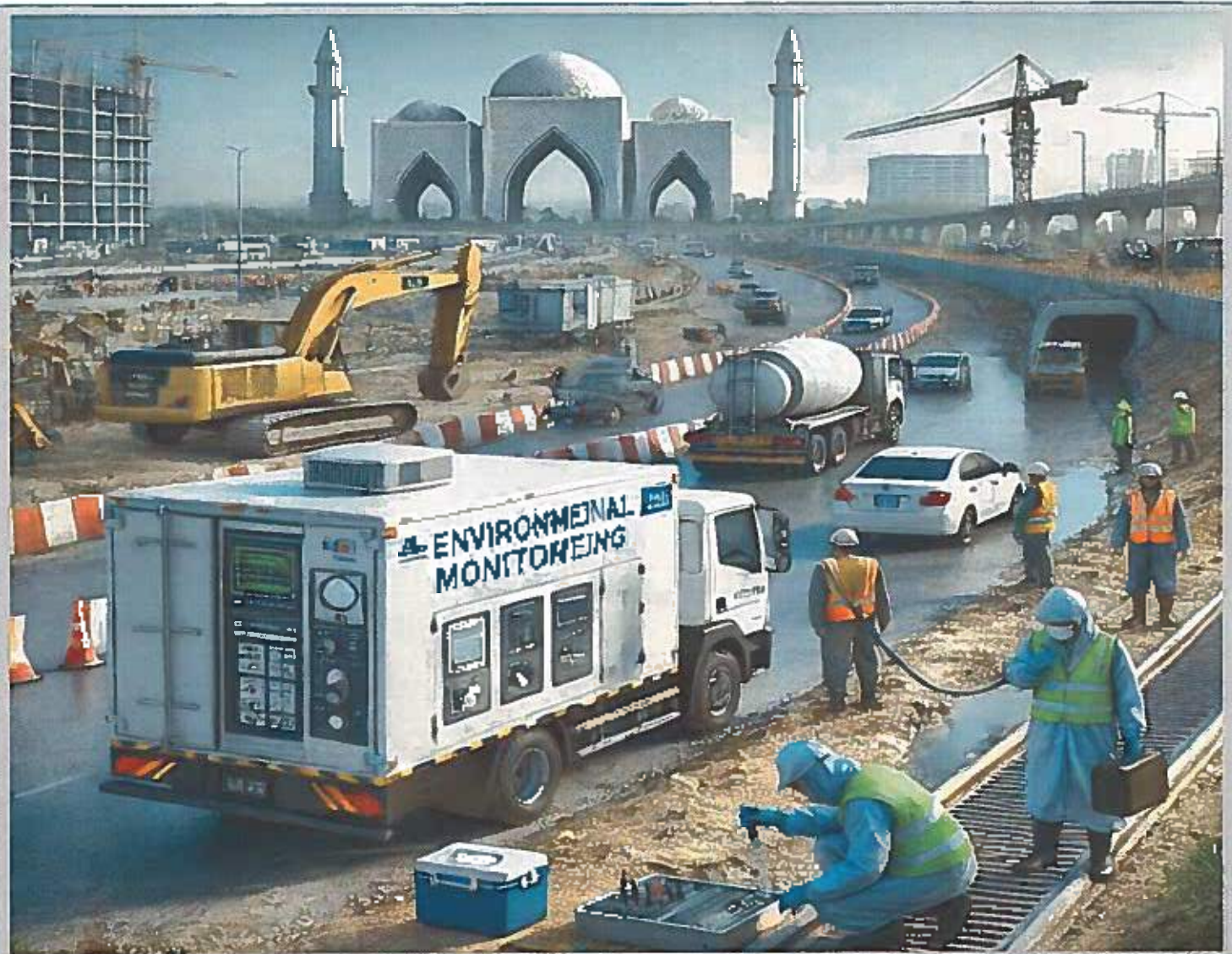
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- Noise and vibration should be controlled by equipment maintenance, by providing noise barrier and by scheduling the construction activities to avoid peak activity hours in the area;
- Provision of waste water treatment plant to treat the sewerage during the operation phase;
- A comprehensive solid waste/e-waste management plan to cater the waste during operation phase; and
- For effective implementation of suggested mitigation measures, the environmental mitigation and monitoring cost/EMP must be the part of the bidding document of the Contractor.

# **ANNEXURES**

**ANNEX-I**  
**ENVIRONMENTAL MONITORING REPORT**



# ENVIRONMENTAL MONITORING REPORT FEBRUARY - 2025

## **NATIONAL ENGINEERING SERVICES PAKISTAN (Pvt) Ltd**

Project: Construction of Structural Plan Road  
(Neelum Road and Chenab Road) Connecting  
to LDA City

Prepared by: Environmental Services

Pakistan Pvt Ltd (ESPAK)

Web: [www.espak.com.pk](http://www.espak.com.pk)

Email: [info@espak.com.pk](mailto:info@espak.com.pk)

**DISCLAIMER**

This report is produced in compliance with the client request National Engineering Services Pakistan (Pvt) Limited, for Construction of Structural Plan Road (Neelum Road) from Pine Avenue to Ferozpur Road Through LDA City, Lahore. The information contained in this report was collected and produced from site visit, monitoring and analysis data. The information provided and contained in this report is to the best of our knowledge, correct and up to date. Environmental Services Pakistan (ESPAK) accepts no responsibility for changes made to this document by any third party once report is submitted to the client.

Signature: \_\_\_\_\_

Chief Chemist: Muhammad Arfaq

Dated: February 21, 2025

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## ABBREVIATIONS

<b>AA</b>	Ambient Air
<b>APHA</b>	American Public Health Administration
<b>CO<sub>2</sub></b>	Carbon Dioxide
<b>CO</b>	Carbon Monoxide
<b>EPA</b>	Environmental Protection Agency
<b>NO</b>	Nitrogen Oxide
<b>NO<sub>2</sub></b>	Nitrogen Dioxide
<b>NO<sub>x</sub></b>	Oxides of Nitrogen
<b>O<sub>3</sub></b>	Ozone
<b>PEQS</b>	Punjab Environmental Quality Standards
<b>DW-PEQS</b>	Drinking Water-Punjab Environmental Quality Standards
<b>NL</b>	Noise Level
<b>PEPA</b>	Pakistan Environmental Protection Act 1997(Amended 2012)
<b>SPM</b>	Suspended Particulate Matter
<b>PM</b>	Particulate Matter
<b>SO<sub>2</sub></b>	Sulphur Dioxide
<b>USEPA:</b>	United States Environmental Protection Agency
<b>ESPAK</b>	Environmental Services Pakistan

## UNITS

<b>M:</b>	Meter
<b>°C:</b>	Degree Celsius
<b>Sec:</b>	Seconds
<b>Ppm:</b>	Parts per Million
<b>Mg/l:</b>	Milligram per Litre
<b>Mg/Nm<sup>3</sup>:</b>	Milligram per Normal cubic meter
<b>µg/m<sup>3</sup>:</b>	Microgram per cubic meter
<b>Mg.kg<sup>-1</sup></b>	Milligram per Kilogram

## CHAPTER# 1. INTRODUCTION

The Ravi Urban Development Authority (RUDA), an urban development authority of Punjab Government, is at the forefront of developing a sustainable and eco-friendly city along with the Ravi River of Lahore. In line with their mission to enhance flood control measures and construct a resilient riverfront, work is underway River Training Works (RTW) and Barrages.

### 1.1 Objectives

The environmental monitoring is required for the constructional activities in accordance with EPA regulation and environmental management plan. M/S National Engineering Services Pakistan (NESPAK) (Pvt) Ltd hired the services of M/s Environmental Services Pakistan for environmental monitoring of the following sites.

The objective of this study is to:

- Comply with the regulatory requirements of the project;
- To Assess the current environmental conditions in surrounding areas
- Assessing the impact of plant operations on surrounding areas
- Monitor ambient air, noise level in study area/survey area;
- Analyze water quality.

### 1.2 Scope of Services

The environmental monitoring / sampling was conducted at advised locations for following environmental parameters.

- Ambient Air Quality Monitoring
- Noise Level Monitoring
- Waste Water
- Drinking Water

Sr. No.	Required Testing/ Parameters	Sampling Duration	Quantity
1.	Ambient Air Quality Monitoring	Averaging Period 24 Hours	02
2.	Noise Level Monitoring	24 Hours Continuous Monitoring	02
3.	Drinking Water Sampling	Grab Sampling	01
4.	Waste Water Sampling	Grab Sampling	01

### 1.3 Monitoring Duration

The environmental monitoring of project was carried out from 06/02/2025 to 08/02/2025 conducted through EPA Certified Environmental Laboratory; Environmental Services Pakistan (ESPAK).

## 1.4 Monitoring Team

Sr. No.	Name	Designation	Qualification	Experience
1.	Usman Mudassar	Field Analyst	B s Chemistry	03 Year

## 1.5 Project Locations

Locations for sampling and monitoring of required environmental parameters were identified by client.

Table 1-1: List of Ambient Air & Noise Monitoring Locations

Sr. No.	Monitoring Locations	Latitude	Longitude
I.	Irha Petroleum	31.34945°N	74.31697°E
II.	Near Madrasah Sayyadna Farooq-e-Azam	31.344399°N	74.274708°E

Table 1-2: List of Drinking Water Sampling Locations

Sr. No.	Monitoring Locations	Latitude	Longitude
I.	Water Cooler at Irha Petroleum, Jia Bagga Road, Jedu		

Table 1-3: List of Surface Water Sampling Locations

Sr. No.	Monitoring Locations	Latitude	Longitude
I.	Jia Bagga Drain		

## CHAPTER# 2. METHODOLOGY

Following is the brief description of methodology adopted for this environmental monitoring:

### 2.1 Survey Planning

The project started with a planning of project activities with a management of the National Engineering Services (NESPAK) (Pvt) Ltd.

#### 2.1.1 Identification of Monitoring Locations

NESPAK Pvt Ltd provided location map of proposed project sites. Following criterion was used to finalize the sampling locations on the given site.

- Area where there will be project activities;
- Present environmental conditions at the site

### 2.2 Sampling and Analysis Methods

The sampling and testing methods are given in following sections of the report.

### 2.3 Ambient Air Quality Monitoring

Ambient air quality monitoring was conducted at advised sampling locations to assess the concentration of pollutants (Carbon monoxide, Oxides of Nitrogen (NO, NO<sub>2</sub>), Sulphur dioxide (SO<sub>2</sub>), Ozone, PM<sub>2.5</sub> and PM<sub>10</sub>, SPM). Selection of monitoring locations was based on the environmental factors including wind direction on the particular day and amount of turbulence in the air etc.

Reference method used for the measurements are included as Table 2.1 while the description is provided in subsequent sections.

Table 2-1: Methodology of Ambient Air Quality Monitoring

Air Pollutant	Monitoring Technique	Instrument Used	Reference Method	Sampling Duration
Carbon monoxide (CO)	Non-Dispersive Infrared Absorption (NDIR)	Environment S.A CO Analyzer	40 CFR Part 50, App. C (US-EPA)	8 hours
Sulfur Dioxide (SO <sub>2</sub> )	UV fluorescence (UVF)	Environment S A SO <sub>2</sub> Analyzer	EQSA-0197-114 (US-EPA)	24hours
Oxides of Nitrogen	Reduced Pressure Chemiluminescence (CLD)	Environment S.A NO <sub>x</sub> Analyzer	40 CFR Part 50, App F (US-EPA)	24 hours

Air Pollutant	Monitoring Technique	Instrument Used	Reference Method	Sampling Duration
Particulate Matter (PM <sub>10</sub> , PM <sub>2.5</sub> )	Beta Ray Absorption Method	Melone BAM	40 CFR Part 50, App J (US-EPA)	24 hours
Particulate Matter (SPM)	Gravimetric Method	High Volume Air Sampler	40 CFR Part 50, App J (US-EPA)	24 Hours
Ozone O <sub>3</sub>	Non-Dispersive UV Absorption (NDIR)	Environment S.A O <sub>3</sub> Analyzer	40 CFR Part 53	1 Hour

### 2.3.1 Carbon monoxide (CO)

Carbon monoxide (CO) was monitored using Environment S.A CO Analyzer. The Environment S.A CO Analyzer measures CO concentration using a non-dispersive Infrared (NDIR) absorption method that is based on the nature of CO in that it absorbs special infrared light. Continuous data was recorded for 24 hr.

### 2.3.2 Oxides of Nitrogen

Oxides of Nitrogen (NO<sub>x</sub>) were monitored using Environment S.A NO<sub>x</sub> Analyzer. The analyzer measures NO, NO<sub>2</sub> and NO<sub>x</sub> using chemiluminescence (CLD) method with the help of chemical reaction between NO<sub>2</sub> and O<sub>3</sub>. Continuous data was recorded for 24 hr.

### 2.3.3 Sulphur Dioxide (SO<sub>2</sub>)

SO<sub>2</sub> Sulphur dioxide was monitored using Environment S.A SO<sub>2</sub> Analyzer. The Environment S.A SO<sub>2</sub> Analyzer measures SO<sub>2</sub> using UV fluorescence method that operates on the principle that when the SO<sub>2</sub> molecules contained in the sample gas are excited by ultraviolet radiation they emit a characteristic fluorescence in the range of 220- 240 nm. This fluorescence is measured and the SO<sub>2</sub> concentration is obtained from changes in the intensity of the fluorescence. Continuous data was recorded for 24 hr.

### 2.3.4 Particulate Matter (PM<sub>10</sub> and PM<sub>2.5</sub>)

Particulate matter concentration in terms of PM<sub>10</sub> and PM<sub>2.5</sub> was monitored in the ambient air with the help of High-Volume Air Sampler. PM<sub>10</sub> and PM<sub>2.5</sub> sampling was conducted for period of 24 hour at identified sampling locations with the help of fibreglass filters. The filters were properly stored and placed in the vacuum zipper bag in order to avoid moisture and transported to ESPAK Laboratory for detection of PM<sub>10</sub>.

Suspended Particulate Matter (SPM) was measured through gravimetric sampling method by using of high-volume air sampler. The sampling continues for 24 hours at identified sampling

locations. For this purpose, fiber glass filters were used to collect the SPM. The filters were stored and transported to ESPAK Laboratory for further analysis.

### **2.3.5 Ozone (O<sub>3</sub>)**

Ozone was monitored using Environment S.A O<sub>3</sub> Analyzer. Sampling was conducted for period of 1 hour at identified sampling locations. The analyzer automatically measures and records ozone concentration levels (in milligrams or micrograms per cubic meter) using the industry-proven principle of non-dispersive UV absorption.

## **2.4 Noise Level**

Noise level monitoring was conducted at identified locations using BENTECH Sound Meter. All noise monitoring was conducted in accordance with the guidance set out in BS 7445:2003. Measurements were made using 1/1 Octave in accordance with IEC61260-1:2014 and ANSI S1.11-2004. Meters were calibrated and checked before and after each measurement period by using sound level calibrator.

## **2.5 Water Sampling**

Following methodology was adopted for water sampling and analysis:

### **2.5.1 Sample Collection**

The water samples were collected from identified sampling points. The sampling was carried out in accordance to the Standard Operating Procedures (SOP) based on the recognized methods of United State Environmental Protection Agency (USEPA), World Health Organization (WHO) and American Public Health Administration (APHA) for water sampling and analysis.

### **2.5.2 Measurement of Field Parameters**

Parameters that quickly degrade after they are sampled must be tested in the field. Following parameters were measured in field that can significantly change during storage and transportation. These includes: -

- ✓ pH (Measured at site)
- ✓ Temperature

### **2.5.3 Preservation**

Preservation is important in order to minimize the changes in the sample. The collected water samples were preserved in appropriate containers as per APHA Guidelines.

### **2.5.4 Sample Identification and Chain of Custody**

The collected samples were labeled and assigned a unique sample identification number, sampling date and time of collection to collected samples. All the relevant information (sample

location, time of collection, sample identification, temperature, pH, collected by, preservation techniques etc.) was recorded immediately on the Chain of Custody form signed by ESPAK field Analyst.

### 2.5.5 Transportation

A shipping container (Ice box with eutectic cold packs instead of ice) with maintained temperature of  $4^{\circ}\text{C} \pm 5^{\circ}\text{C}$  was used for transporting the sample from the collection site to the environmental laboratory.

### 2.5.6 Parameters

Parameters provided in the scope of work for the testing include following:

- Drinking Water
- Waste Water

The samples of waste water were collected from identified sampling points. The collected samples were given to laboratory for analysis of parameters that are listed in table 2.2.

### 2.5.7 Methods of Analysis

#### Drinking Water:

Table 2-2: Parameters and Methods Used for Testing of Drinking Water

S. No	Parameters	Method / Equipment Used	Reference
1	Total Coliforms	Multiple Tube Fermentation	SMWW 9221 B
2	Fecal Coliform Bacteria	Multiple Tube Fermentation	SMWW 9221 F
3	E. Coli	Multiple Tube Fermentation	SMWW 9221 F
4	Color	Spectrophotometer	SMWW 2120 C
5	Taste	Organoleptic	Organoleptic
6	Odor	Organoleptic	Organoleptic
7	Turbidity	Nephelometer	SMWW 2130B
8	Total Hardness as $\text{CaCO}_3^*$	Titration	SMWW 2340C
9	Total Dissolved Solids (TDS)*	Gravimetric	SMWW 2540C
10	pH*	Electrometric	SMWW 4500H*B
11	Aluminum (Al)	ICP-AES	SMWW 3111
12	Antimony (Sb)	ICP-AES	SMWW 3111
13	Arsenic (As)	ICP-AES	SMWW 3114 B
14	Barium (Ba)	ICP-AES	SMWW 3111
15	Boron (B)	ICP-AES	SMWW 4500-B B
16	Cadmium (Cd)	ICP-AES	SMWW 3111
17	Chloride (as $\text{Cl}^-$ ) *	ICP-AES	SMWW 3111
18	Chromium (Cr)	ICP-AES	SMWW 3111
19	Copper (Cu)	ICP-AES	SMWW 3111
20	Cyanide ( $\text{CN}^-$ )	Ion Selective Electrode	SMWW 4500 $\text{CN}^-$ F
21	Fluoride ( $\text{F}^-$ ) *	Ion Selective Electrode	U.S. EPA 9214
22	Lead (Pb)	ICP-AES	SMWW 3111
23	Manganese (Mn)	ICP-AES	SMWW 3111
24	Mercury (Hg)	ICP-AES	SMWW 3112
25	Nickel (Ni)	ICP-AES	SMWW 3111

S. No	Parameters	Method / Equipment Used	Reference
26	Nitrate ( $\text{NO}_3^-$ )	UV Spectrophotometer	SMWW 4500 $\text{NO}_3^-$ B
27	Nitrite ( $\text{NO}_2^-$ )	Spectrophotometer	SMWW 4500 $\text{NO}_2^-$ B
28	Selenium (Se)	ICP-AES	SMWW 3114 B
29	Residual Chlorine	DPD Colorimetric	SMWW 4500-Cl B
30	Zinc (Zn)	ICP-AES	SMWW 3111
31	Phenolic Compounds (as Phenols)	Spectrophotometer	SMWW 5530 C
32	Pesticides	Screening	U.S.EPA-200.7

Table 2-2: Parameters and Methods Used for Testing of Surface Water

S. No	Parameters	Method / Equipment Used	Reference
1	pH value ( $\text{H}^+$ ) *	By pH meter	SMWW 4500H <sup>+</sup> B
2	Biochemical Oxygen Demand ( $\text{BOD}_5$ ) at 20 °C	Incubator, Titration	SMWW 5210 B
3	Chemical Oxygen Demand ( $\text{COD}$ )*	Digester & Photometer	SMWW 5220 D
4	Total Suspended Solids (TSS)*	Gravimetric method	SMWW 2540 D
5	Total Dissolved Solids (TDS)*	Gravimetric method	SMWW 2540 C
6	Phenolic Compounds (as Phenol)	4-Aminoantipyrine Method	SMWW 5530 C
7	Grease and Oil (as n-HEM)	Pyrex Glassware	U.S.EPA 1664 B
8	Chloride (as $\text{Cl}^-$ ) *	Argentometry Titration	SMWW 4500 $\text{Cl}^-$ -B
9	Fluoride (as $\text{F}^-$ ) *	Ion Selective Electrode	U.S. EPA 9214
10	Cyanide (as $\text{CN}^-$ )	Ion Selective Electrode	SMWW 4500 $\text{CN}^-$ F
11	An-ionic detergents (as MBAS)	Spectrophotometer	SMWW 5540 C
12	Sulfate ( $\text{SO}_4^{2-}$ ) *	Gravimetric method	SMWW 4500 - $\text{SO}_4^{2-}$ C
13	Sulfide ( $\text{S}^{2-}$ )	Titration Method	SMWW 4500 - $\text{S}^{2-}$ F
14	Ammonia ( $\text{NH}_3$ )	Ion Selective Electrode & Meter	SMWW 4500- $\text{NH}_3$ - D
15	Chlorine (Cl)	DPD Method	SMWW 4500-Cl B
16	Cadmium (Cd)	ICP-AES	U.S. EPA-200.7
17	Chromium (Trivalent and Hexavalent)	ICP-AES	U.S. EPA-200.7
18	Copper (Cu)	ICP-AES	U.S. EPA-200.7
19	Iron (Fe)	ICP-AES	U.S.EPA-200.7
20	Lead (Pb)	ICP-AES	U.S. EPA-200.7
21	Manganese (Mn)	ICP-AES	U.S. EPA-200.7
22	Mercury (Hg)	ICP-AES	U.S. EPA-200.7
23	Selenium (Se)	ICP-AES	U.S. EPA-200.7
24	Nickel (Ni)	ICP-AES	U.S. EPA-200.7
25	Silver (Ag)	ICP-AES	U.S. EPA-200.7
26	Zinc (Zn)	ICP-AES	U.S. EPA-200.7
27	Arsenic (As)	ICP-AES	U.S. EPA-200.7
28	Barium (Ba)	ICP-AES	U.S. EPA-200.7
29	Boron (B)	ICP-AES	U.S.EPA-200 7
30	Total Toxic Metals	--	Calculated Value

31	Pesticide	--	Screening Method
32	Temperature	Thermometer	SMWW-2550-B

Note: SMWW = Standard Method for the Examination of Water and Wastewater, 23rd Edition (2017)

USEPA: United States Environmental Protection Agency

### CHAPTER# 3. RESULTS AND DISCUSSION

#### 3.1 Ambient Air Results

This section of the report presents the testing results of Ambient Air (CO, NO<sub>x</sub>, SO<sub>2</sub>, Ozone (O<sub>3</sub>), PM<sub>10</sub>, PM<sub>2.5</sub>, SPM) and Ambient Noise. Concentration of all the below mentioned parameters were measured at identified sampling location to get an overview of the air quality. The detail results of measure concentration at each sampling location are given in Annexure-A.

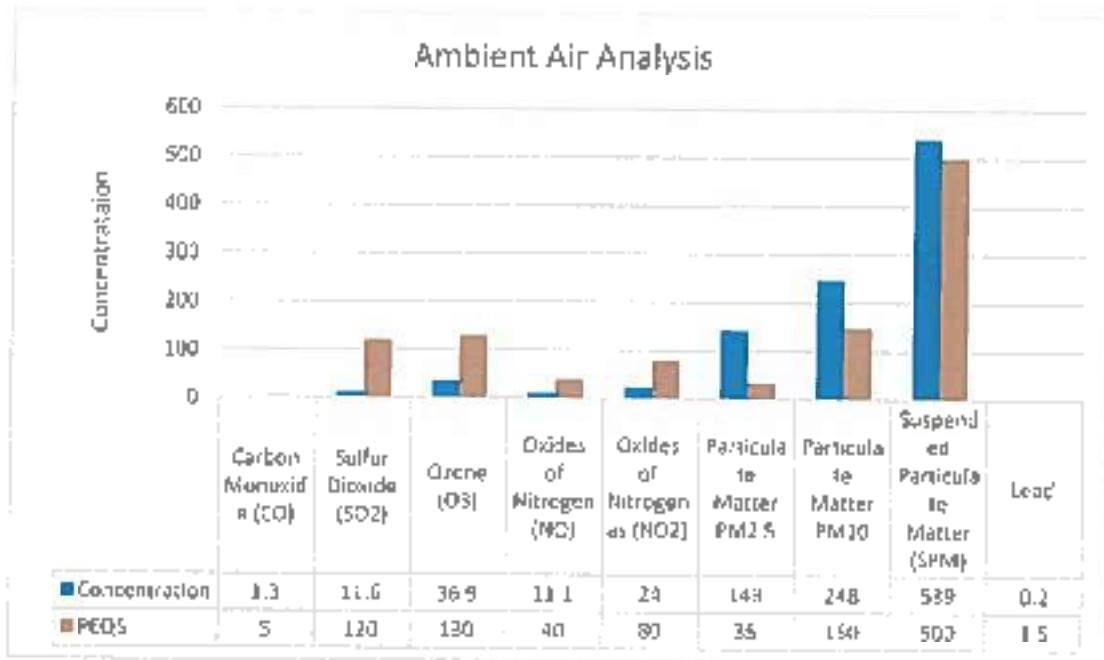


Figure 3-1: Comparison of Measured Concentrations at Isha Petroleum

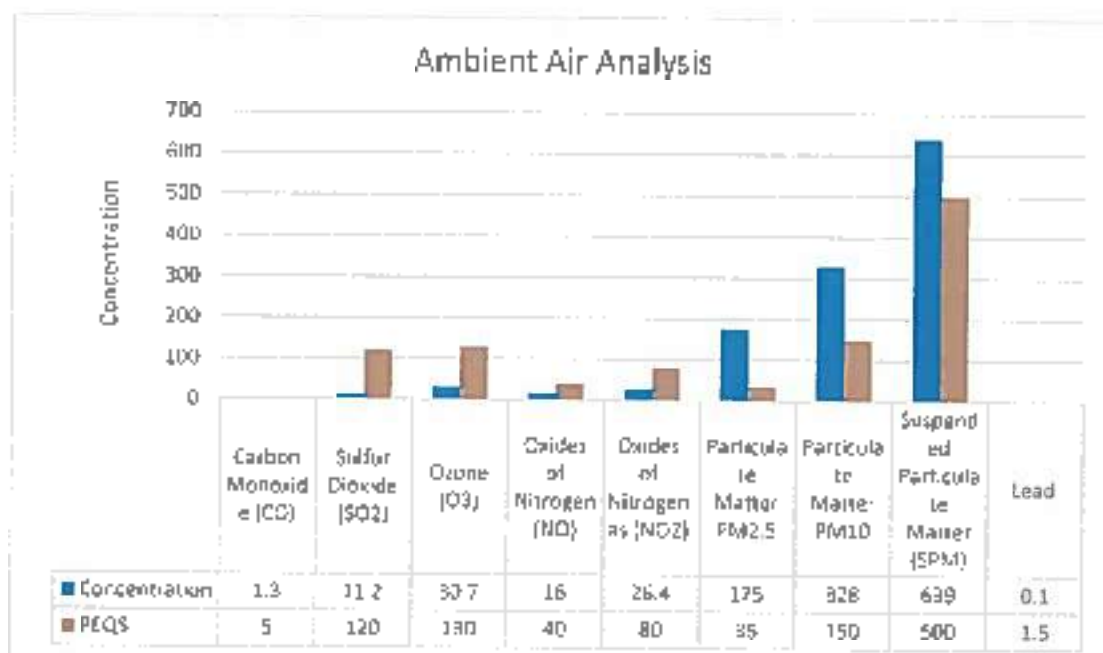


Figure 3-2: Comparison of Measured Concentrations Near Madrasah Sayyadna Farooq-Azam

**Discussion:**

The ambient air monitoring was carried at the time when the surrounding operations were in full function. The 24 hours duration provides enough time to analyze ambient air during periods of service throughout the daily work routine. Analysis of ambient air revealed that concentration of particulate matter including  $PM_{10}$ ,  $PM_{2.5}$  & SPM were found exceeding to the limits (PEQS). If possible, the working process should be improved during the day and night and ensure the use of protective equipment for the labor.

Graphical representation of all parameters with comparison of PEQS limits are shown above Figure 3-1. Detailed monitoring reports are attached as Annexure-A.

**Mitigations:**

Due to the elevated concentrations of  $PM_{10}$ ,  $PM_{2.5}$ , and SPM, it is recommended to implement air pollution control measures, such as water sprinklers, to effectively manage dust in areas prone to dust generation. In-addition to that, the use of PPEs should be ensured to combat toxic concentrations of particulate matter particularly.

### 3.2 Noise Level Monitoring Results

Noise is an important environmental stressor and is essential part of environmental studies for projects. Noise has become a very important "stress factor" in the environment of human. The term "noise pollution" has been recently used to signify the hazard of sounds which are consequence of modern-day development, leading to health hazards of different type. Noise is described as an unwanted sound emitted from un-avoidable sources of anthropogenic activities.

The noise monitoring activity was carried out at the project site and the surrounding areas of project site. Detailed environmental monitoring reports are attached as Annexure-B.

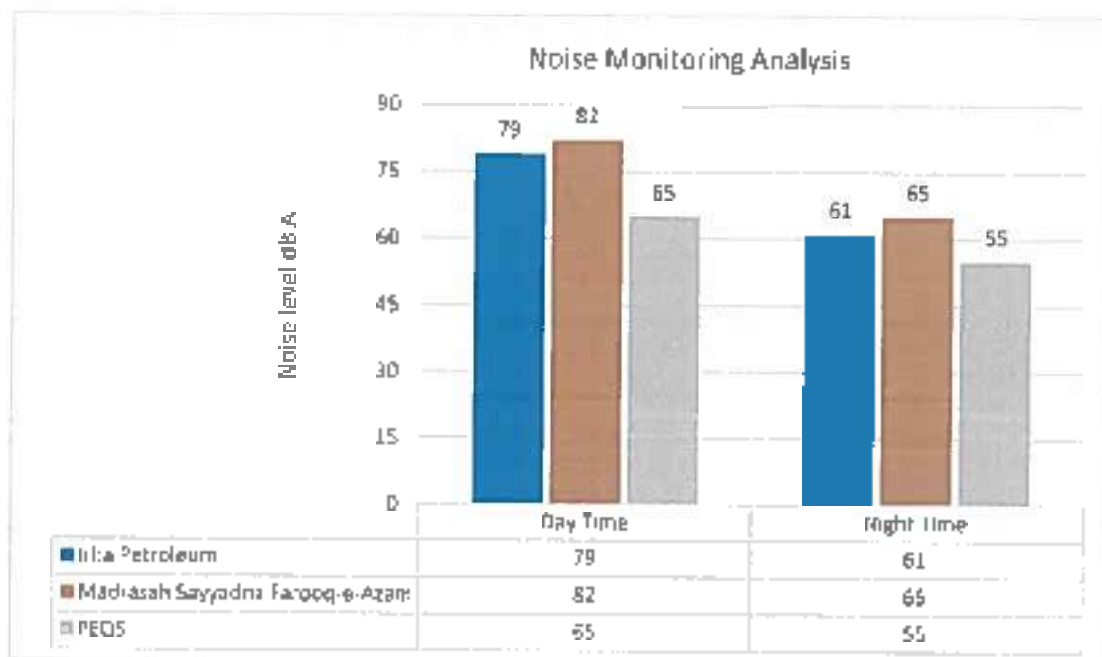


Figure 3-3: Comparison of Background Noise Levels with PEQS During Day Time

#### Discussion:

Noise levels were monitored at three different sites for 24 hours using Bentech sound meter. According to the monitoring results, both sites were found to be exceeding the limits prescribed by PEQS. The graph shows the highest noise level recorded during daytime at both sites. A graphical representation of the measurement results is presented (day and night time) in Figure 3-4 above. Detailed monitoring reports are attached as Annexure-B.

#### Mitigation Measure:

Necessary measures should be carried out to reduce the noise levels at the sampling spots. Administrative controls such as the usage of high noise producing machinery like excavators should be ensured after the sensitive hours. Moreover, the utilization of protective gears ear plugs or ear muffs should be used by labor while working.

### 3.3 Drinking Water Analysis

An essential element for livelihood, domestic, industrial and agricultural activities, all the terrestrials living on this earth planet have to entirely depend upon water. Water, one of the abundant commodities found in nature, is covering approximately three fourths of the surface of the earth.

Over 97% of the total quantity of water is in the oceans and other saline bodies of water and is not readily available for any use. Over 2% is tied up in polar ice caps and glaciers and in atmosphere and as soil moisture, which is inaccessible. Only 0.62% of water found in fresh water lakes, rivers and groundwater supplies, irregularly and non-uniformly distributed over the vast area of the global earth.

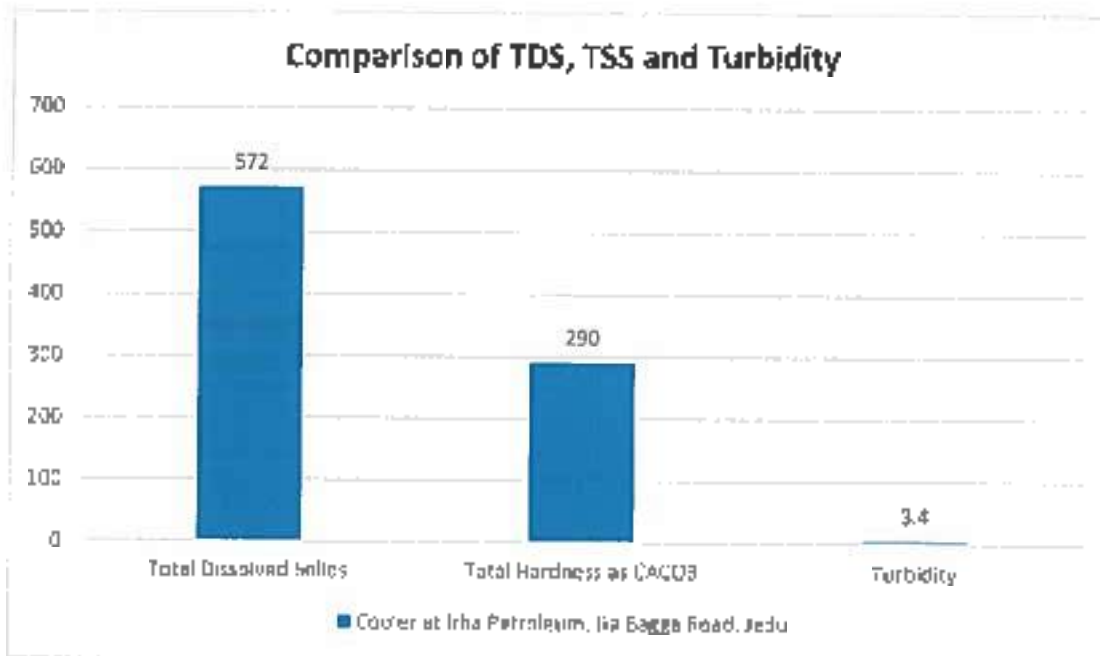


Figure 3-6: Comparison of Concentrations with DW-PEQS

#### Discussion

Drinking water sample was collected from cooler at Irha Petroleum. According to sampling protocol defined in APHA 1060 B. The samples were preserved as per APHA 1060 C. Sample for microbiological testing were collected in according to APHA 9060 A and preserved as per APHA 9060 B and afterwards, transported to ESPAK Laboratory for the analysis

The majority of the parameters in the sample taken found within the prescribed limits outlined in the DW-PEQS standards. These variations indicate the distinct characteristics of the water in the area. The detailed monitoring reports are attached as Annexure-C.

#### Mitigations:

No specific mitigation is required.

### 3.4 Waste Water Analysis

Wastewater is regarded as significant carrier of unforeseen pollutants emanated from anthropogenic derived activities be it is domestic or industrial or else. Usually, in solution or suspension, that is purposely removed from a community as rejected waste. Also known as domestic or municipal wastewater, it is characterized by physical condition, chemical and toxic constituents, and its bacteriologic status (which organisms it contains and in what quantities).

Graphical representation of major parameters for surface water samples described below and detailed reports are attached as Annexure-D.

S. No	Parameters	Limit Values (PEQS)	Jla Bagga Drain
1	pH value (H <sup>+</sup> ) *	6-9	7.6
2	Total Suspended Solids (TSS)*	200 mg/L	35 mg/L
3	Total Dissolved Solids (TDS)*	3500 mg/L	1580 mg/L
4	Chlorine (Cl)	1.0 mg/L	ND
5	Chloride (as Cl <sup>-</sup> ) *	1000 mg/L	122 mg/L
6	Fluoride (as F <sup>-</sup> ) *	10 mg/L	3.2 mg/L
7	Cyanide (as CN <sup>-</sup> )	1.0 mg/L	ND
8	Ammonia (NH <sub>3</sub> )	40 mg/L	25 mg/L
9	Sulfide (S <sup>2-</sup> )	1.0 mg/L	4.0
10	Sulfate (SO <sub>4</sub> <sup>2-</sup> ) *	600 mg/L	111 mg/L
11	Chemical Oxygen Demand (COD)*	150 mg/L	284 mg/L
12	Biochemical Oxygen Demand (BOD <sub>5</sub> ) at 20 °C	80 mg/L	168 mg/L
13	Grease and Oil (as n-HEM)	10 mg/L	5.3 mg/L
14	Phenolic Compounds (as Phenol)	0.1 mg/L	ND
15	An-ionic detergents (as MBAS)	20 mg/L	ND
16	Arsenic (As)	1.0 mg/L	ND
17	Barium (Ba)	1.6 mg/L	ND
18	Boron (B)	6.0 mg/L	ND
19	Cadmium (Cd)	0.1 mg/L	ND
20	Chromium (Trivalent and Hexavalent)	1.0 mg/L	ND
21	Copper (Cu)	1.0 mg/L	ND
22	Iron (Fe)	8.0 mg/L	0.4 mg/L
23	Lead (Pb)	0.5 mg/L	ND
24	Manganese (Mn)	1.5 mg/L	ND
25	Mercury (Hg)	0.01 mg/L	ND
26	Nickel (Ni)	1.0 mg/L	ND
27	Selenium (Se)	0.5 mg/L	ND
28	Silver (Ag)	1.0 mg/L	ND
29	Zinc (Zn)	5.0 mg/L	1.0 mg/L
30	Total Toxic Metals	2.0 mg/L	ND
31	Temperature	NGVS	22.2 °C
32	Pesticides	0.15 mg/L	ND

### **Discussion**

The sample of waste water was collected from Jia Bagga Drain. According to sampling protocol defined in APHA 1060 B. The sample was preserved as per APHA 1060 C. According to laboratory results, most of the physicochemical parameters, including pH (7.6), Total Suspended Solids (TSS) (35 mg/L), Total Dissolved Solids (TDS) (1580 mg/L), chloride (122 mg/L), fluoride (3.2 mg/L), ammonia (25 mg/L), sulfate (111 mg/L), grease and oil (5.3 mg/L), iron (0.4 mg/L), and zinc (1.0 mg/L), are well within the PEQS permissible limits. Additionally, heavy metals such as arsenic, cadmium, lead, mercury, and chromium were not detected, which is a positive indication of the absence of toxic metal contamination. The absence of pesticides and anionic detergents further suggests limited chemical pollution in the drain. Despite compliance in various parameters, some exceedances indicate potential environmental risks.

The exceedances in COD, BOD, and sulfide indicate that the Jia Bagga Drain is receiving wastewater with high organic loads and possibly untreated industrial discharges. If left unaddressed, these pollutants can deteriorate water quality, disrupt aquatic ecosystems, and pose health risks to downstream communities relying on this water source. The absence of detectable pesticides and heavy metals is reassuring, yet continuous monitoring is necessary to prevent future contamination risks.

### **Mitigations:**

Overall, while the Jia Bagga Drain meets many PEQS standards, the exceedance in key organic pollution indicators highlights the need for targeted interventions to improve water quality and treat the water before discharge to any drain.

## CHAPTER# 4. CONCLUSION

The environmental monitoring conducted for the Construction of Structural Plan Road (Neelum Road) from Pine Avenue to Ferozpur Road through LDA City, Lahore has provided valuable insights into the current environmental conditions at the project site. The analysis of ambient air, noise levels, drinkingwater, and wastewater has highlighted both compliance with regulatory standards and areas requiring intervention.

### 1. Ambient Air Quality

- Concentrations of PM<sub>10</sub>, PM<sub>2.5</sub>, and Suspended Particulate Matter (SPM) exceeded the Punjab Environmental Quality Standards (PEQS), indicating dust pollution due to construction activities.
- Gaseous pollutants such as CO, NO<sub>x</sub>, SO<sub>2</sub>, and O<sub>3</sub> were within acceptable limits.

Mitigation measures such as dust suppression (water sprinkling), use of personal protective equipment (PPEs), and improved site management are recommended.

### 2. Noise Levels

- Noise levels exceeded PEQS limits during both daytime and night-time monitoring.
- High noise levels were attributed to construction machinery and traffic

To mitigate this, restricted use of high-noise equipment during sensitive hours, installation of noise barriers, and mandatory use of ear protection for workers are advised.

### 3. Drinking Water Quality

- The drinking water samples analyzed were within PEQS limits for most parameters.
- The absence of toxic heavy metals and microbial contamination is a positive indicator of groundwater safety.

No specific mitigation measures are required.

### 4. Wastewater Quality (Jla Bagga Drain)

- Most physicochemical parameters, including pH, TSS, TDS, chloride, fluoride, ammonia, sulfate, and heavy metals, were within regulatory limits
- However, Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), and sulfide levels exceeded PEQS standards, indicating organic pollution and potential industrial or municipal wastewater discharge.

Proper pre-treatment of wastewater before discharge, regular monitoring, and enforcement of industrial effluent regulations are necessary to prevent further deterioration of water quality.

ANNEXURE – A  
**Ambient Air Results**



**ENVIRONMENTAL PROTECTION AGENCY  
GOVERNMENT OF THE PUNJAB  
National Hockey Stadium, Gate No. 08  
Gaddafi Stadium Complex, Lahore**



Validation # 4177A  
Date Issued: 14-02-2025

**Validation for Stack & Ambient Monitoring / Sampling**

Emission Monitoring under CTM-34 or OTM-39			
Facility Name & Address Phone	National Engineering Service Pakistan Private Limited.(NESPAK)	No of Stacks /Sampling Point Ambient Air & Noise (02)	
Construction of Structural Plan Road (Neelum Road) from Pine Avenue to Ferozepur Road Through LDA City ,Lahore.			
Analyzer Model & Make	AQMS		
<b>Average stack emission Values of CO, NOx (in mg/nm<sup>3</sup>)</b>			
<b>Excess Air / Excess Oxygen (%age):-</b>			
Analyzer exposed for Ramp Up phase to the sample gas for 5 minutes	Yes	No	NA
Analyzer flow rate and EC temperature monitored during calibration and testing	Yes	No	NA
Test Data Phase of sample gas recorded with 15 second interval	Yes	No	NA
All key requirements to ensure QA/QC complied for said EPA approved Method	Yes	No	NA
<b>Particulate Matter (PM) Monitoring / Sampling under USEPA Method 5 / 17</b>			
Model & make of Iso-kinetic PM Assembly			
The PM sampling train is complete as per Method 5 & 17	Yes	No	NA
Leak Test performed prior to sampling	Yes	No	NA
Field data Sheet for PM Sampling filled during PM sampling	Yes	No	NA
Data for determining of "K" factor & DGM "Y" Factor filled during sampling	Yes	No	NA
All method key requirements during sampling were complied to ensure QA/QC	Yes	No	NA
Filter of Particulate matter is suitable for metal Testing	Yes	No	NA
<b>SOx sampling as per Method 8 (Thorin Indicator Method)</b>			
The right absorbent solution is available for SOx Sampling	Yes	No	NA
The equipment is capable to maintain flow rate @ 2.0 LPM or as per method 8 requirement	Yes	No	NA
Sampling for SOx is performed as per method	Yes	No	NA
<b>Ambient Air Quality Monitoring by Automatic Monitors for PM2.5 &amp; PM10</b>			
In case of continuous monitoring at a site, One Point QC Check Single analyzer & zero/span check is performed every 14 days.	Yes	No✓	NA
The CE of NOx analyzer is ensured to be maintained within 96% - 104.1%	Yes	No✓	NA
Zero/span check is performed prior to starting ambient monitoring	Yes✓	No	NA
All key requirements for Critical & Operational Criteria for ambient air monitoring by automatic monitors were complied during monitoring	Yes✓	No	NA
The measuring techniques of monitors comply PEQS	Yes✓	No	NA
<b>Ambient Air Sampling of SPM, PM10, Pb by High Volume Sampler</b>			
In case of Sampling for SPM through samplers, the flow rate of sampler complies PEQS (1.1m <sup>3</sup> /min).	Yes✓	No	NA
Calibration of Sampler performed prior to sampling	Yes✓	No	NA
<b>Vehicular Emissions &amp; Noise Measurement</b>			
Sampling of Vehicle emissions and Noise measurement have been performed as per method and SDPs	Yes✓	No	NA

Remarks (if Any): -

Signature

*(Signature)*  
Officer  
Environmental Protection Agency  
Punjab Lahore

Monitoring Date  
06/08-02-2025

Signature  
Assistant Analyst  
Usman Ali





**ENVIRONMENTAL PROTECTION AGENCY**  
**GOVERNMENT OF THE PUNJAB**  
*National Hockey Stadium, Gate No. 08*  
*Gaddafi Stadium Complex, Lahore*



Validation # 4177-B

Validation for Wastewater & Drinking Water

Date of Valid Issuance:

14-02-2025

<b>Project / Unit Name with Address and contact details</b>		National Engineering Service Pakistan Private Limited.(NESPAK)				Sampling Point WW(01),DW(01)							
		Construction of Structural Plan Road (Neezum Road) from Pine Avenue to Ferozpur Road Through LDA City ,Lahore.											
<b>Name of Private Lab</b>		Environmental Services Pakistan (Pvt) Limited.(ESPAK)											
<b>Waste Water (WW) Treatment facility</b>				<b>Drinking Water (W) Treatment Facility</b>									
Primary		Secondary		Tertiary		NA		Chemical		RO		NA	
Total WW collected Sample .....01.....				Total Collected Drinking water samples ... 01.....									
Sample Tag for testing parameter is assigned on sample container						Yes✓	NO	NA					
Sample is preserved properly for each testing parameter						Yes✓	NO	NA					
Sample size is adequate for testing the target parameters						Yes✓	NO	NA					
Wastewater Flow Measurement performed to ensure sample representativeness						Yes	NO✓	NA					
<b>No. of Waste Water outlets</b>		<b>Waste Water Flow m<sup>3</sup>/hr from each outlet (Optional)</b>		<b>Water intake m<sup>3</sup>/hr (Optional)</b>		<b>Water Mass balance complied during sampling (Optional)</b>		<b>Sample Type</b> Waste Water, Drinking Water					
						Yes No		Grab ✓		Composite			
<b>Parameter</b>		<b>Matrix</b>		<b>Container</b>		<b>Sample Size</b>		<b>Preservation</b>		Yes		NO NA	
		W WW											
Coliform, Total or Fecal		✓ ---		Sterile Container		100 mL		Refrigerate 6 C		✓		--- ---	
Coliform, Total or Fecal, Chlorinated Water		✓ ---		Sterile Container		100 mL		0.008% Thiosulphate & cooled 6 C		✓		--- ---	
Color, Turbidity		✓ ---		P, G		500 mL		Cool 6 C		✓		--- ---	
Hardness, Total		✓ ---		P, G		500ml		HNO3 to pH<2		✓		--- ---	
Nitrogen, Nitrate + Nitrite, Phenolic Compounds, Oil & Grease, COD, BOD		✓ ✓		P,G		2000 mL		H2SO4 to pH < 2, Cool 6C		✓		--- ---	
Metals, General		✓ ✓		P, G Rinsed 1.1 HNO3		500 mL		HNO3 to pH < 2		✓		--- ---	
Cyanide, Total		✓ ✓		P, G		500 mL		NaOH to pH > 12, Cool 6C		✓		--- ---	
Pesticides, General		---		Glass		1-liter		Cool 6 C					
<b>Field Parameters*</b>													
<b>Field parameter</b>				<b>pH meter, Model Make</b>				<b>Measurement Method</b>		<b>Calibrated in Field</b>		<b>Measured value</b>	
pH				Hanna pH Meter						Yes NO			
Temp				Digi Thermo									
Cl													

Signature

*(Signature)*  
 Deputy Officer  
 Environmental Protection Agency,  
 Punjab Lahore

Monitoring Date  
 06/08-02-2025

Signature  
 Assistant Analyst  
 Usman Mudasser



## CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)



Reference Number: ESPAX/D0102P/25/AA/01068/00155 Date: 10/02/2025

Name of Industry/Client: National Engineering Services Pakistan (Pvt) Limited

Address: NESPAK House, 1-C, Block-N, Model Town Extension, Lahore

Project Name: Construction Of Structural Plan Roads (Meelum Road and Chenab Road) Connecting to LDA City, Lahore

Validation Officer: Muhammad Nadeem, Research Officer

Nature of Sample: Ambient Air Monitoring Location: At Isha Petroleum, Jla Bagga Road, Jeddah (GPS: 31.34945°N, 74.31697°E)

Date of Sample Collection: 06/02/2025

Sample Collected/Sent By: Usman Mudassar, Analyst (Field), ESPAK Grab / Composite: Continuous - 24 Hours

Date of Completion of Analysis: 07/02/2025

S. No	Parameters	Limit Values (PEQS-24 Hours)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	5 mg/m <sup>3</sup> (8 Hours)	1.3 mg/m <sup>3</sup>	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Sulfur Dioxide (SO <sub>2</sub> )	120 µg/m <sup>3</sup>	11.6 µg/m <sup>3</sup>	UV Fluorescence (UVF)	Within Prescribed Limits
3	Ozone (O <sub>3</sub> )	130 µg/m <sup>3</sup> (1 Hour)	96.9 µg/m <sup>3</sup>	Non Dispersive UV Absorption	Within Prescribed Limits
4	Oxides of Nitrogen as NO	40 µg/m <sup>3</sup>	11.1 µg/m <sup>3</sup>	Chemiluminescence Detection	Within Prescribed Limits
5	Oxides of Nitrogen as NO <sub>2</sub>	80 µg/m <sup>3</sup>	24.0 µg/m <sup>3</sup>	Chemiluminescence Detection	Within Prescribed Limits
6	Particulate Matter PM <sub>10</sub>	35 µg/m <sup>3</sup>	143 µg/m <sup>3</sup>	Particulate Sensor	Exceeding Prescribed Limits
7	Particulate Matter PM <sub>2.5</sub>	150 µg/m <sup>3</sup>	248 µg/m <sup>3</sup>	Particulate Sensor	Exceeding Prescribed Limits
8	Suspended Particulate Matter (SPM)	500 µg/m <sup>3</sup>	539 µg/m <sup>3</sup>	High Volume Sampler (HVS)	Exceeding Prescribed Limits
9	Lead (Pb)	1.5 µg/m <sup>3</sup>	0.2 µg/m <sup>3</sup>	ASS After Sampling by HVS	Within Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Ambient Air, 2016

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- The report data is not intended to be used legally by the client.

1. Sample Analyzed By: Usman Mudassar  
Analyst (Field)

2. Name of Chief Analyst with Seal: Muhammad Arfan 

3. Signature of Incharge of the Environmental Laboratory:

Name: Usman Malik  
General Manager  
Date: 10/02/2025



-----End of Report-----



Reference Number	ESPAK/00102P/25/AA/01068/00155
Name of Industry/ Client	National Engineering Services Pakistan (Pvt) Limited
Address	NESPAK House, I-C, Block-N, Model Town Extension, Lahore
Project Name	Construction Of Structural Plan Roads (Neelum Road and Chenab Road) Connecting to LDA City, Lahore
Monitoring Location	At Irha Petroleum, Jla Bagga Road, Jedu
GPS Coordinates	(31.34945°N 74.31697°E)
Monitoring Date	06-02-2025 to 07-02-2025

Date - Time	CO	SO <sub>2</sub>	O <sub>3</sub>	NO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	SPM	Temp.	RH	Wind Speed	Wind Direction
	mg/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	°C	%	m/s	
06-02-25 15:00	0.8	11.9	36.9	9.4	22.7	125.0	372	539	25	38	1.3	S
06-02-25 16:00	1.3	12.3		7.8	22.0	99.0	211		22	49	2.7	S
06-02-25 17:00	1.4	13.0		12.7	22.6	72.0	191		20	56	2.3	S
06-02-25 18:00	1.7	11.1		9.9	24.2	215.0	245		17	60	0	SW
06-02-25 19:00	1.5	11.3		11.7	21.7	295.0	302		16	57	2.8	S
06-02-25 20:00	1.5	10.9		11.1	24.5	195.0	304		15	60	1.9	S
06-02-25 21:00	1.4	12.6		8.5	23.8	280.0	390		13	65	1.4	S
06-02-25 22:00	1.4	9.1		8.1	23.6	206.0	340		12	67	1.1	S
06-02-25 23:00		9.2		12.4	19.0	182.0	315		11	71	0.9	NE
07-02-25 0:00		10.7		9.8	19.5	92.0	261		11	73	1.05	NE
07-02-25 1:00		10.9		9.6	21.4	156.0	201		10	76	0.9	NE
07-02-25 2:00		8.1		11.6	22.3	186.0	277		10	63	0.8	NE
07-02-25 3:00		9.6		9.7	21.5	104.0	395		9	75	1.15	N
07-02-25 4:00		9.9		12.9	19.4	172.0	207		8	71	0.9	N
07-02-25 5:00		13.0		11.8	26.7	67.0	237		8	67	1.0	N
07-02-25 6:00		11.7		10.2	27.7	59.0	157		8	76	0.9	N
07-02-25 7:00		15.0		10.8	28.3	80.0	108		10	74	0.9	SE
07-02-25 8:00		13.3		9.8	26.4	154.0	142		12	58	1.22	SE
07-02-25 9:00		17.0		12.1	24.6	217.0	217		17	56	0.3	SE
07-02-25 10:00		13.9		11.1	27.7	113.0	240		18	51	1.47	SE
07-02-25 11:00		10.9		12.4	27.3	79.0	239	20	55	1.2	E	
07-02-25 12:00		8.9		13.2	27.2	51.0	149	25	34	2.1	W	
07-02-25 13:00		15.0		15.5	25.7	48.0	185	25	45	1.4	E	
07-02-25 14:00		8.6		15.4	26.4	191.0	261	25	38	1.8	SE	

Average	1.3	11.6	36.9	11.1	24.0	143	248	539
Maximum	1.7	17.0	36.9	15.5	28.3	295	395	539
Minimum	0.8	8.1	36.9	7.8	19.0	48.0	108	539

Monitored By: Usman Mudassar

*Usman*

Lahore Office  
 Office No. 731,  
 Block - 2, Sector 01,  
 Shah Jilani Road, Township  
 Lahore, Pakistan.  
 Tel: +92 (42) 3515 4025-26

Islamabad Office  
 Office No. 314, 3rd  
 Floor, Gulberg Empire,  
 Gulberg Greens,  
 Islamabad, Pakistan.  
 Tel: +92 (51) 5915060

Peshawar Office  
 Unit No. 43-TF,  
 Dean's Trade Center  
 Sadar Cantt,  
 Peshawar, Pakistan.  
 Tel: +92 312 0849999



## CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)



Reference Number: ESPAK/00102P/25/AA/01069/00356 Date: 10/02/2025

Name of Industry/Clients: National Engineering Services Pakistan (Pvt) Limited

Address: NESPA House, 1-C, Block-N, Model Town Extension, Lahore

Project Name: Construction Of Structural Plan Roads (New/um Road and Chenab Road) Connecting to LDA City, Lahore

Validation Officer: Muhammad Nadeem, Research Officer

Nature of Samples: Ambient Air Monitoring Location: Near Madarsa Syedna Farooq-e-Azam, Halloki-Jia Bagga Road

Date of Sample Collection: 07/02/2025 (GPS: 31.344399°N, 74.274708°E)

Sample Collected/Sent By: Usman Mudassar, Analyst (Field), ESPAK Grab / Composite: Continuous - 24 Hours

Date of Completion of Analysis: 08/02/2025

S. No	Parameters	Limit Values (PEQS-24 Hours)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	5 mg/m <sup>3</sup> (8 Hours)	1.3 mg/m <sup>3</sup>	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Sulfur Dioxide (SO <sub>2</sub> )	120 µg/m <sup>3</sup>	11.1 µg/m <sup>3</sup>	UV Fluorescence (UVF)	Within Prescribed Limits
3	Ozone (O <sub>3</sub> )	190 µg/m <sup>3</sup> (1 Hour)	30.7 µg/m <sup>3</sup>	Non Dispersive UV Absorption	Within Prescribed Limits
4	Oxides of Nitrogen as NO	40 µg/m <sup>3</sup>	16.0 µg/m <sup>3</sup>	Chemiluminescence Detection	Within Prescribed Limits
5	Oxides of Nitrogen as NO <sub>2</sub>	80 µg/m <sup>3</sup>	26.4 µg/m <sup>3</sup>	Chemiluminescence Detection	Within Prescribed Limits
6	Particulate Matter PM <sub>2.5</sub>	35 µg/m <sup>3</sup>	175 µg/m <sup>3</sup>	Particulate Sensor	Exceeding Prescribed Limits
7	Particulate Matter PM <sub>10</sub>	150 µg/m <sup>3</sup>	328 µg/m <sup>3</sup>	Particulate Sensor	Exceeding Prescribed Limits
8	Suspended Particulate Matter (SPM)	500 µg/m <sup>3</sup>	629 µg/m <sup>3</sup>	High Volume Sampler (HVS)	Exceeding Prescribed Limits
9	Lead (Pb)	1.5 µg/m <sup>3</sup>	0.1 µg/m <sup>3</sup>	ASS After Sampling by HVS	Within Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Ambient Air, 2016

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1. Sample Analyzed By: Usman Mudassar  
Analyst (Field)

2. Name of Chief Analyst with Seal: Muhammad Arfan

3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik  
General Manager  
Date: 10/02/2025



----- End of Report -----





ESPAK

# ENVIRONMENTAL SERVICES PAKISTAN

Reference Number	ESPAK/00102P/25/AA/01069/00156
Name of Industry/ Client	National Engineering Services Pakistan (Pvt) Limited
Address	NESPAK House, 1-C, Block-N, Model Town Extension, Lahore
Project Name	Construction Of Structural Plan Roads (Neelum Road and Chenab Road) Connecting to LDA City, Lahore
Monitoring Location	Near Madarsa Syedna Farooq-e-Azam, Halloki-Jla Bagga Road
GPS Coordinates	(31.344399°N 74.274708°E)
Monitoring Date	07-02-2025 to 08-02-2025

Date - Time	CO	SO <sub>2</sub>	O <sub>3</sub>	NO	NO <sub>2</sub>	PM <sub>2.5</sub>	PM <sub>10</sub>	SPM	Temp.	RH	Wind Speed	Wind Direction
	mg/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	ug/m <sup>3</sup>	°C	%	m/s	
07-02-25 15:00	1.0	11.3	30.7	12.2	20.5	57.0	279	639	22	36	4.2	NE
07-02-25 16:00	1.1	10.5		13.8	21.1	101.0	265		22	41	3.2	NE
07-02-25 17:00	1.3	10.7		15.0	22.1	62.0	231		19	53	2.8	NE
07-02-25 18:00	1.5	8.5		16.3	23.1	86.0	413		17	53	0.3	NE
07-02-25 19:00	1.6	10.9		13.5	20.8	95.0	305		15	62	3.3	N
07-02-25 20:00	1.2	11.0		13.6	21.0	107.0	297		14	65	2.4	N
07-02-25 21:00	0.9	8.7		14.0	23.3	68.0	372		12	69	1.9	N
07-02-25 22:00	1.7	11.0		14.1	29.2	235.0	404		12	70	0	N
07-02-25 23:00		11.7		14.8	29.8	266.0	261		9	75	1.4	S
08-02-25 0:00		12.3		12.2	25.5	249.0	312		9	74	1.55	S
08-02-25 1:00		10.3		15.4	25.4	233.0	344		10	77	1.4	S
08-02-25 2:00		11.0		16.8	29.3	227.0	296		9	78	1.5	S
08-02-25 3:00		12.2		13.0	25.5	228.0	309		10	67	1.65	SE
08-02-25 4:00		11.6		16.9	28.6	232.0	290		10	71	1.4	SE
08-02-25 5:00		11.5		20.0	27.1	226.0	269		10	70	1.5	SE
08-02-25 6:00		9.7		18.8	30.1	210.0	280		10	75	1.4	SE
08-02-25 7:00		14.4		19.4	29.8	165.0	270		11	63	0.8	E
08-02-25 8:00		13.3		15.6	28.3	245.0	342		13	55	1.72	E
08-02-25 9:00		12.5		18.2	30.3	221.0	448		14	58	1.4	E
08-02-25 10:00		11.5		15.8	27.0	221.0	377		17	44	2.1	E
08-02-25 11:00		11.1		19.6	30.0	175.0	358		18	52	2.17	SE
08-02-25 12:00		9.6		19.6	29.3	161.0	354		24	30	1.0	SE
08-02-25 13:00		12.2		18.7	26.7	115.0	392		25	29	1.8	SE
08-02-25 14:00		8.6		16.3	28.8	209.0	401		26	36	2	SE

Average	1.3	11.1	30.7	16.0	26.4	175	328	639
Maximum	1.7	14.4	30.7	20.0	30.3	266	448	639
Minimum	0.9	8.5	30.7	12.2	20.5	57.0	231	639

Monitored By: Usman Mudassar

*Alha*

**Lahore Office**  
Office No. 731,  
Block - 2, Sector D1,  
Shah Jilani Road, Township  
Lahore, Pakistan.  
Tel: +92 (42) 9515 4015-16

**Islamabad Office**  
Office No. 314, 3rd  
Floor, Gulberg Empire,  
Gulberg Greens,  
Islamabad, Pakistan.  
Tel: +92 (51) 5915060

**Peshawar Office**  
Unit No. 43-TF,  
Dean's Trade Center  
Sadar Cantt,  
Peshawar, Pakistan.  
Tel: +92 312 0849999



ANNEXURE – B

**Background Noise Levels**

## NOISE MONITORING REPORT



Reference Number: ESPAK/DO202P/25/N/01070/00117 Date: 10/02/2025  
 Name of Industry/Client: National Engineering Services Pakistan (Pvt) Limited  
 Address: NE SPAK House, 1-C, Block-N, Model Town Extension, Lahore  
 Validation Officer: Muhammad Nadeem, Research Officer  
 Nature of Sample: Noise  
 Date of Sample Collection: 06/02/2025 Project Name: Construction Of Structural Plan Roads (Neeelum Road and Chenab Road) Connecting to LDA City, Lahore  
 Sample Collected/Sent By: Usman Mudassar, Analyst (Field), ESPAK  
 Date of Completion of Analysis: 07/02/2025 Grab / Composite: Continuous - 24 Hours  
 Method/Equipment Used: Sound Level Meter


S. No	Measurement Point	Limit Values (PEQS)	Noise Level dB(A) Leq	Remarks
1	At Inha Petroleum, Jla Bagga Road, Jedd (GPS: 31.34945°N, 74.81697°E) - Day time	65 dB(A)	79 dB(A)	Exceeding Prescribed Limits
2	At Inha Petroleum, Jla Bagga Road, Jedd (GPS: 31.34945°N, 74.81697°E) - Night time	55 dB(A)	61 dB(A)	Exceeding Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Noise in Commercial Area, 2016 Day Time Hours (6:00 am to 10:00 pm) Night Time Hours (10:00 pm to 6:00 am).  
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1. Sample Analyzed By: Usman Mudassar  
 Analyst (Field)

2. Name of Chief Analyst with Seal: Muhammad Arfan 


3. Signature of Incharge of the Environmental Laboratory:   
 Name: Imran Malik  
 General Manager  
 Date: 10/02/2025


-----End of Report-----

<b>Report Reference</b>		ESPAK/00102P/25/N/01070/00117
<b>Client Name</b>		National Engineering Services Pakistan (Pvt) Limited
<b>Address</b>		NESPAK House, 1-C, Block-N, Model Town Extension, Lahore
<b>Project Name</b>		Construction Of Structural Plan Roads (Neelum Road and Chenab Road) Connecting to LDA City, Lahore
<b>Monitoring Location</b>		At Irha Petroleum, Jia Bagga Road, Jedu
<b>GPS Coordinates</b>		(31.34945°N 74.31697°E)
<b>Monitoring Date</b>		06-02-2025 to 07-02-2025
Day/Night	Date & Ending Hour	Noise dB (A) Leq
Day Time	06-02-25 15:00	81.7
	06-02-25 16:00	84.0
	06-02-25 17:00	89.5
	06-02-25 18:00	82.2
	06-02-25 19:00	78.4
	06-02-25 20:00	76.8
	06-02-25 21:00	77.0
	06-02-25 22:00	77.1
	07-02-25 7:00	76.3
	07-02-25 8:00	74.4
	07-02-25 9:00	76.3
	07-02-25 10:00	78.4
	07-02-25 11:00	79.9
	07-02-25 12:00	80.5
	07-02-25 13:00	77.0
	07-02-25 14:00	76.7
<b>Average Day time</b>		79
Night Time	06-02-25 23:00	62.4
	07-02-25 0:00	62.3
	07-02-25 1:00	60.5
	07-02-25 2:00	59.3
	07-02-25 3:00	58.4
	07-02-25 4:00	58.8
	07-02-25 5:00	60.8
	07-02-25 6:00	62.0
<b>Average Night time</b>		61
<b>Monitored By:</b>		Usman Mudassar

*Usha*

 Lahore Office  
 Office No. 731,  
 Block - 2, Sector D1,  
 Shah Jilani Road, Township  
 Lahore, Pakistan.  
 Tel: +92 (42) 3515 4015-16

 Islamabad Office  
 Office No. 314, 3rd  
 Floor, Gulberg Empire,  
 Gulberg Greens,  
 Islamabad, Pakistan.  
 Tel: +92 (51) 5915060

 Peshawar Office  
 Unit No. 43-TE,  
 Dean's Trade Center  
 Sedar Centre,  
 Peshawar, Pakistan.  
 Tel: +92 312 0849999



## NOISE MONITORING REPORT



Reference Number: ESPAK/00102P/25/N/01071/00118 Date: 10/02/2025  
 Name of Industry/Client: National Engineering Services Pakistan (Pvt) Limited  
 Address: NE SPAK House, 1-C, Block-N, Model Town Extension, Lahore  
 Validation Officer: Muhammad Nadeem, Research Officer  
 Nature of Sample: Noise  
 Date of Sample Collection: 07/02/2025 Project Name: Construction Of Structural Plan Roads (Neelum Road and Chenab Road) Connecting to LDA City, Lahore  
 Sample Collected/Sent By: Usman Mudassar, Analyst (Field), ESPAK Grab / Composite: Continuous - 24 Hours  
 Date of Completion of Analysis: 08/02/2025 Method/Equipment Used: Sound Level Meter

S. No	Measurement Point	Limit Values (PEQS)	Noise Level dB(A) Leq	Remarks
1	Near Madarsa Syedna Farooq-e-Aam, Halkoh-Jia Bagga Road (GPS: 31.344399°N, 74.274708°E) - Daytime	65 dB(A)	82 dB(A)	Exceeding Prescribed Limits
2	Near Madarsa Syedna Farooq-e-Aam, Halkoh-Jia Bagga Road (GPS: 31.344399°N, 74.274708°E) - Night Time	55 dB(A)	65 dB(A)	Exceeding Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Noise in Commercial Area, 2016 Day Time Hours (6:00 am to 10:00 pm) Night Time Hours (10:00 pm to 6:00 am)  
 Note:

- The report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of this report lies with the client.
- The values represent sample conditions when monitoring/testing was carried out.
- The report data is not intended to be used legally by the client.

1. Sample Analyzed By: Usman Mudassar  
 Analyst (Field)

2. Name of Chief Analyst with Seal: Muhammad Arfan 

3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik  
 General Manager  
 Date: 10/02/2025



----- End of Report -----



<b>Report Reference</b>		ESPAK/00102P/25/N/01071/00118
<b>Client Name</b>		National Engineering Services Pakistan (Pvt) Limited
<b>Address</b>		NESPAK House, 1-C, Block-N, Model Town Extension, Lahore
<b>Project Name</b>		Construction Of Structural Plan Roads (Neelum Road and Chenab Road) Connecting to LDA City, Lahore
<b>Monitoring Location</b>		Near Madarsa Syedna Farooq-e-Azam, Hallok-Jia Bagga Road
<b>GPS Coordinates</b>		(31.344399°N 74.274708°E)
<b>Monitoring Date</b>		07-02-2025 to 08-02-2025
Day/Night	Date & Ending Hour	Noise dB (A) Leq
Day Time	07-02-25 15:00	82.6
	07-02-25 16:00	85.5
	07-02-25 17:00	87.4
	07-02-25 18:00	80.4
	07-02-25 19:00	83.2
	07-02-25 20:00	74.7
	07-02-25 21:00	72.9
	07-02-25 22:00	75.0
	08-02-25 7:00	86.8
	08-02-25 8:00	81.6
	08-02-25 9:00	78.2
	08-02-25 10:00	84.5
	08-02-25 11:00	82.8
	08-02-25 12:00	86.8
	08-02-25 13:00	82.0
	08-02-25 14:00	85.6
Average Day time		82
Night Time	07-02-25 23:00	67.8
	08-02-25 0:00	60.1
	08-02-25 1:00	56.8
	08-02-25 2:00	64.7
	08-02-25 3:00	61.7
	08-02-25 4:00	66.9
	08-02-25 5:00	72.2
	08-02-25 6:00	73.0
Average Night time		65
<b>Monitored By:</b>		Usman Mudassar

*Usha*

**Lahore Office**  
Office No. 731,  
Block - 2, Sector D1,  
Shah Jilani Road, Township  
Lahore, Pakistan.  
Tel: +92 (42) 3515 4015-16

**Islamabad Office**  
Office No. 314, 3rd  
Floor, Gulberg Empire,  
Gulberg Greens,  
Islamabad, Pakistan.  
Tel: +92 (51) 5915060

**Peshawar Office**  
Unit No. 43-TF,  
Dean's Trade Center  
Sadar Cantt,  
Peshawar, Pakistan.  
Tel: +92 312 0849999



ANNEXURE – C  
**Drinking Water Results**

## CHEMICAL ANALYSIS TEST REPORT (WASTE WATER)



Reference Number: ESPAK/00102P/25/WW/01072/00320 Date: 17/02/2025

Name of Industry / Client: National Engineering Services Pakistan (Pvt) Limited

Address: NESPAK House, E-C, Block-N, Model Town Extension, Lahore

Validation Officer: Muhammad Nadeem, Research Officer

Nature of Sample: Wastewater from Jla Bagga Drain Project Name: Construction Of Structural Plan Roads (Nelum Road and Chenab Road) Connecting to LDA City, Lahore

Date Sample Received: 10/02/2025

Date of Sample Collection: 08/02/2025

Sample Collected / Sent By: Usman Mudassar, Analyst (Field), ESPAK Grab / Composite: Grab

Date of Completion of Analysis: 15/02/2025

S. No	Parameters	Limit Values (PKES)	Concentration	Method / Equipment Used	Remarks
1	pH value (H <sup>+</sup> )*	6-9	7.6	SMWW 4500E B	Within Prescribed Limits
2	Total Suspended Solids (TSS)*	200 mg/L	35 mg/L	SMWW 2540 D	Within Prescribed Limits
3	Total Dissolved Solids (TDS)*	3500 mg/L	1580 mg/L	SMWW 2540 C	Within Prescribed Limits
4	Chlorine (Cl)	10 mg/L	ND	SMWW 4500-C B	Within Prescribed Limits
5	Chloride (as Cl <sup>-</sup> )*	1000 mg/L	122 mg/L	SMWW 4500C <sup>-</sup> B	Within Prescribed Limits
6	Fluoride (as F <sup>-</sup> )*	10 mg/L	3.2 mg/L	U.S. EPA 9214	Within Prescribed Limits
7	Cyanide (as CN <sup>-</sup> )	1.0 mg/L	ND	SMWW 4500 CN- F	Within Prescribed Limits
8	Ammonia (NH <sub>3</sub> )	40 mg/L	25 mg/L	SMWW 4500-NH <sub>3</sub> - D	Within Prescribed Limits
9	Sulfide (S <sup>2-</sup> )	1.0 mg/L	4.0 mg/L	SMWW 4500 - S <sup>2-</sup> F	Exceeding Prescribed Limits
10	Sulfate (SO <sub>4</sub> <sup>2-</sup> )*	600 mg/L	111 mg/L	SMWW 4500 - SO <sub>4</sub> <sup>2-</sup> C	Within Prescribed Limits
11	Chemical Oxygen Demand (COD)*	150 mg/L	284 mg/L	SMWW 5220 D	Exceeding Prescribed Limits
12	Biochemical Oxygen Demand (BOD <sub>5</sub> ) at 20 °C	80 mg/L	168 mg/L	SMWW 5210 B	Exceeding Prescribed Limits
13	Grease and Oil (as n-HEM)	10 mg/L	5.3 mg/L	U.S.EPA 1664 B	Within Prescribed Limits
14	Phenolic Compounds (as Phenol)	0.1 mg/L	ND	SMWW 5530 C	Within Prescribed Limits
15	An-ionic detergents (as MBAS)	20 mg/L	ND	SMWW 5540-C	Within Prescribed Limits
16	Arsenic (As)	1.0 mg/L	ND	SMWW 3114 B	Within Prescribed Limits
17	Barium (Ba)	1.5 mg/L	ND	SMWW 3111	Within Prescribed Limits
18	Boron (B)	60 mg/L	ND	SMWW 4500-B B	Within Prescribed Limits
19	Cadmium (Cd)	0.1 mg/L	ND	SMWW 3111	Within Prescribed Limits
20	Chromium (Trivalent and Hexavalent)	1.0 mg/L	ND	SMWW 3111	Within Prescribed Limits
21	Copper (Cu)	1.0 mg/L	ND	SMWW 3111	Within Prescribed Limits
22	Iron (Fe)	3.0 mg/L	0.4 mg/L	SMWW 3111	Within Prescribed Limits
23	Lead (Pb)	0.5 mg/L	ND	SMWW 3111	Within Prescribed Limits
24	Manganese (Mn)	1.5 mg/L	ND	SMWW 3111	Within Prescribed Limits
25	Mercury (Hg)	0.01 mg/L	ND	SMWW 3112	Within Prescribed Limits
26	Nickel (Ni)	1.0 mg/L	ND	SMWW 3111	Within Prescribed Limits



## CHEMICAL ANALYSIS TEST REPORT (WASTE WATER)

Reference Number: ESPAK/00102P/25/WW/01071/00320 Date: 17/02/2025  
 Name of Industry / Client: National Engineering Services Pakistan (Pvt) Limited



S. No	Parameters	Limit Values (PEQS)	Concentration	Method / Equipment Used	Remarks
27	Selenium (Se)	0.5 mg/L	ND	SMWW 3114 B	Within Prescribed Limits
28	Silver (Ag)	1.0 mg/L	ND	SMWW 3111	Within Prescribed Limits
29	Zinc (Zn)	5.0 mg/L	L.D mg/L	SMWW 3111	Within Prescribed Limits
30	Total Toxic Metals	2.0 mg/L	ND	Calculated Value	Within Prescribed Limits
31	Temperature	NGVS	22.2 °C	Thermometer	****
32	Pesticides	0.15 mg/L	ND	Screening Method	Within Prescribed Limits

PEQS: Punjab Environmental Quality Standards for Municipal & Liquid Industrial Effluents, 2016

SMWW: Standard Methods for the Examination of Water and Waste Water, American Public Health Association, American Water Works Association, Water Environment Federation

USEPA: United States Environmental Protection Agency

ND: Not Detected


- Laboratory tests and measurements were carried out at 25 ± 5 °C and ≤75 % Relative Humidity conditions unless required otherwise.
- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of sample acceptance or rejection with equal shared risk due to measurement uncertainty

**Note:**

- The report should be reproduced as a whole and not in parts.
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- Only parameters marked with asterisk (\*) are ISO 17025:2017 accredited.

1. Sample Analyzed By: Semahie Khalid Nageen Arshad Sumra Manzoor Zirwa-tuz-Zahra  
 Analyst (Chemical) Analyst (Chemical) Analyst (Chemical) Analyst (Chemical)

2. Name of Chief Analyst with Seal: Muhammad Arfan 

3. Signature of Incharge of the Environmental Laboratory:   
 Name: Imran Malik  
 General Manager  
 Date: 17/02/2025

\*\*\*\*\* End of Report \*\*\*\*\*

**Lahore Office**  
 Office No. 731,  
 Block - 2, Sector D1,  
 Shah Jilani Road, Township  
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 Tel: +92 (42) 3515 4015-16

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**Peshawar Office**  
 Unit No. 43-TF,  
 Qean's Trade Center  
 Sadar Cantt,  
 Peshawar, Pakistan.  
 Tel: +92 312 0849999



ANNEXURE – D  
**Waste Water Results**

## CHEMICAL ANALYSIS TEST REPORT (DRINKING WATER)



Reference Number: ESPAK/00102P/25/DW/01073/00277 Date: 17/02/2025

Name of Industry / Client: National Engineering Services Pakistan (Pvt) Limited

Address: NESPAR House, 1-C, Block-N, Model Town Extension, Lahore

Validation Officer: Muhammad Nadeem, Research Officer

Nature of Sample: Drinking Water from Cooler at Isha Petroleum, Jla Bagga Road, Fudu

Date Sample Received: 10/02/2025 Project Name: Construction Of Structural Plan Roads (Meerum Road and Chenab Road) Connecting to LDA City, Lahore

Date of Sample Collection: 08/02/2025

Sample Collected / Sent By: Usman Mudasar, Analyst (Field), ESPAK

Date of Completion of Analysis: 15/02/2025 Grab / Composite: Grab

S. No	Parameters	Limit Values (DW-PEQS)	Concentration	Method / Equipment Used	Remarks
1	Total Coliforms	—	ND	SMWW 9222 B	—
2	Fecal Coliform Bacteria	Must not be detectable in any 100mL sample	ND	SMWW 9222 H	Within Prescribed Limits
3	E. Coli	Must not be detectable in any 100mL Sample	ND	SMWW 9222 H	Within Prescribed Limits
4	Taste	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Prescribed Limits
5	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Prescribed Limits
6	pH*	6.5-8.5	8.1	SMWW 4500H*B	Within Prescribed Limits
7	Turbidity	<5 NTU	3.4 NTU	SMWW 2190B	Within Prescribed Limits
8	Color	≤15 TCU	ND	SMWW 2120 C	Within Prescribed Limits
9	Total Dissolved Solids (TDS)*	<1000 mg/L	572 mg/L	SMWW 2540C	Within Prescribed Limits
10	Total Hardness as CaCO <sub>3</sub> *	<500 mg/L	290 mg/L	SMWW 2340E	Within Prescribed Limits
11	Residual Chlorine	0.2-0.5 mg/L	ND	SMWW 4500-Cl B	—
12	Chloride (as Cl <sup>-</sup> )*	<250 mg/L	4 mg/L	SMWW 4500-Cl B	Within Prescribed Limits
13	Fluoride (F <sup>-</sup> )*	≤1.5 mg/L	0.3 mg/L	U.S. EPA 9214	Within Prescribed Limits
14	Cyanide (CN <sup>-</sup> )	≤0.05 mg/L	ND	SMWW 4500-CN*F	Within Prescribed Limits
15	Nitrate (NO <sub>3</sub> <sup>-</sup> )	≤50 mg/L	ND	SMWW 4500NO <sub>3</sub> *B	Within Prescribed Limits
16	Nitrate (NO <sub>3</sub> <sup>-</sup> )	≤3 mg/L	ND	SMWW 4500NO <sub>3</sub> *B	Within Prescribed Limits
17	Phenolic Compounds (as Phenols)	NGVS	ND	SMWW 5530 C	—
18	Aluminum (Al)	≤0.2 mg/L	ND	SMWW 3111	Within Prescribed Limits
19	Antimony (Sb)	≤0.005 mg/L	ND	SMWW 3111	Within Prescribed Limits
20	Arsenic (As)	≤0.05 mg/L	ND	SMWW 3114 B	Within Prescribed Limits
21	Barium (Ba)	0.7 mg/L	ND	SMWW 3111	Within Prescribed Limits
22	Boron (B)	0.3 mg/L	ND	SMWW 4500-B B	Within Prescribed Limits

## CHEMICAL ANALYSIS TEST REPORT (DRINKING WATER)



Reference Number: ESPAK/00102P/25/DW/01073/D0277 Date: 17/02/2025  
 Name of Industry / Client: National Engineering Services Pakistan (Pvt) Limited

S. No	Parameters	Limit Values (DW-PEQS)	Concentration	Method / Equipment Used	Remarks
23	Cadmium (Cd)	0.01 mg/L	ND	SMWW 3111	Within Prescribed Limits
24	Chromium (Cr)	≤0.05 mg/L	ND	SMWW 3111	Within Prescribed Limits
25	Copper (Cu)	1.0 mg/L	ND	SMWW 3111	Within Prescribed Limits
26	Lead (Pb)	≤0.05 mg/L	ND	SMWW 3111	Within Prescribed Limits
27	Manganese (Mn)	≤0.5 mg/L	ND	SMWW 3111	Within Prescribed Limits
28	Mercury (Hg)	≤0.001 mg/L	ND	SMWW 3112	Within Prescribed Limits
29	Nickel (Ni)	≤0.02 mg/L	ND	SMWW 3111	Within Prescribed Limits
30	Selenium (Se)	0.01 mg/L	ND	SMWW 3114 B	Within Prescribed Limits
31	Zinc (Zn)	5.0 mg/L	0.4 mg/L	SMWW 3111	Within Prescribed Limits
32	Pesticides	Various	ND	Screening Method	—

DW-PEQS: Punjab Environmental Quality Standards for Drinking Water Quality, 2016

SMWW: Standard Methods for the Examination of Water and Waste Water, American Public Health Association, American Water Works Association, Water Environment Federation

USEPA: United States Environmental Protection Agency

NGVS: No Guideline Value Set

ND: Not Detected

- Laboratory tests and measurements were carried out at 25 ± 5 °C and 67% Relative Humidity conditions unless required otherwise.
- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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1. Sample Analyzed By: SanaBilr Khalid Nageem Arshad Sumea Manzoor Zinwa-tuz-Zahra Khateer Daro  
 Analyst (Chemical) Analyst (Chemical) Analyst (Chemical) Analyst (Chemical) Analyst (Microbiology)

2. Name of Chief Analyst with Seal: Muhammad Arfan 

3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik  
 General Manager

Date: 17/02/2025

End of Report



ANNEXURE – E

**PHOTOLOG**

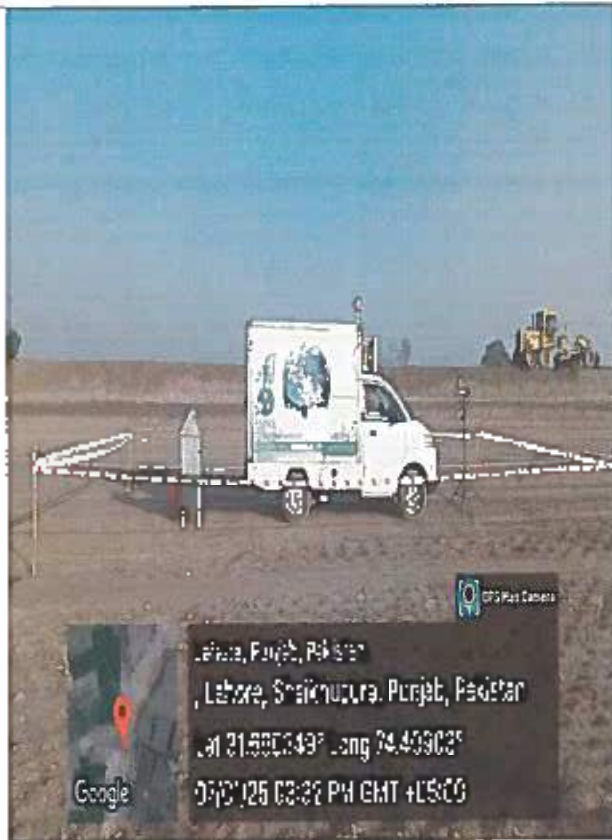


Figure 1. Ambient Air Monitoring at Irha Petroleum

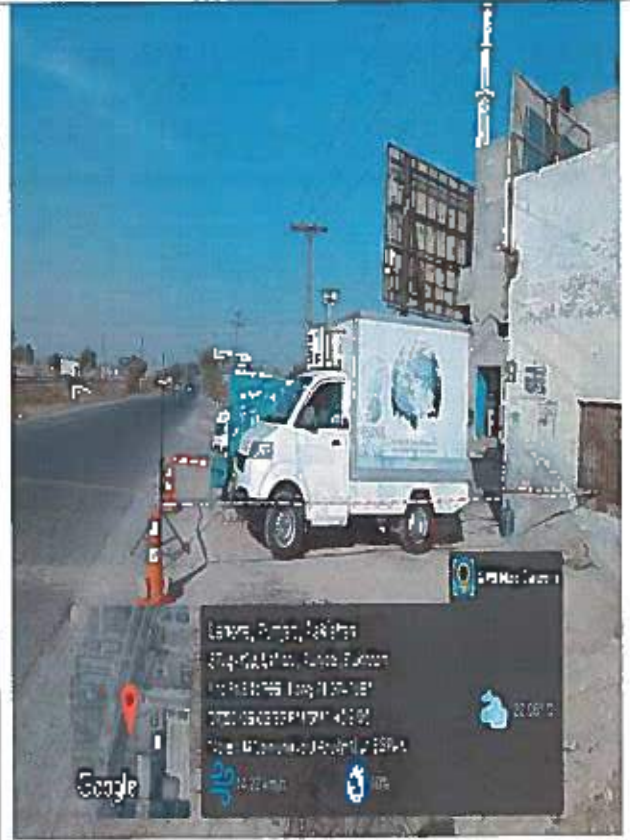
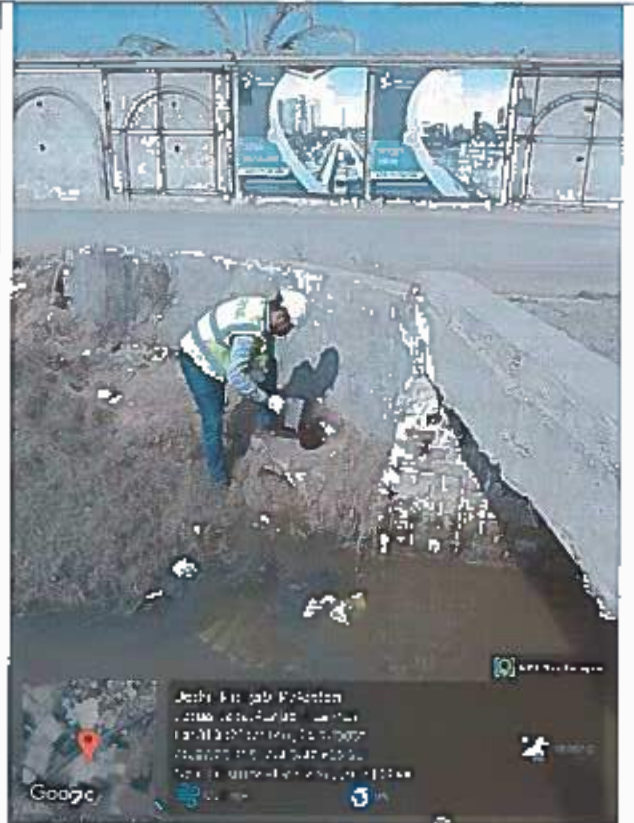


Figure 2. Ambient Air Monitoring at Near Madrasa Syedna Farooq-e-Allah

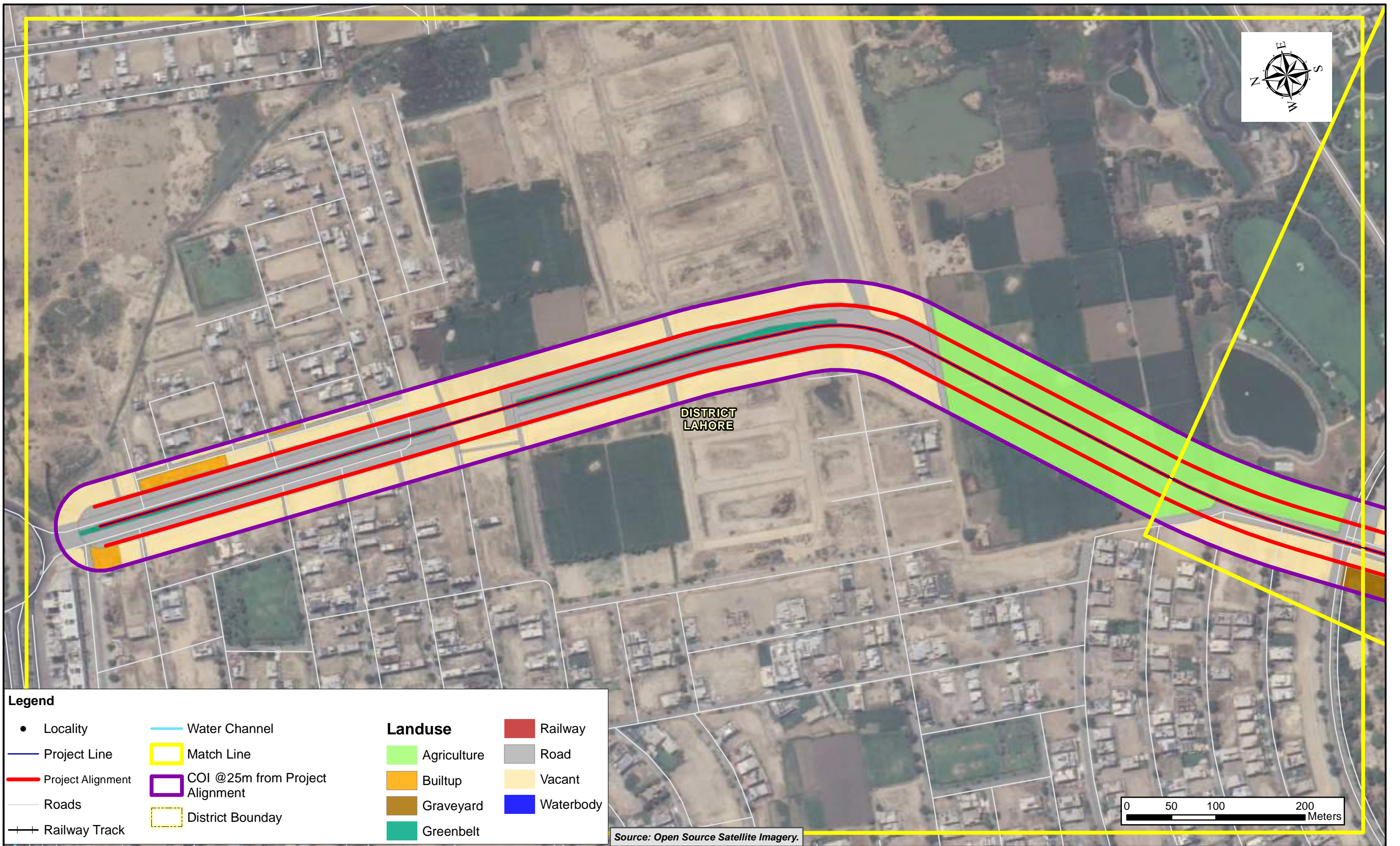


**Figure 3. Drinking Water from Cooler at Irha Petroleum**



**Figure 4. WasteWater from Jia Bagga Drain**

**ANNEX-II**  
**DETAILED LANDUSE MAPS**



**Legend**

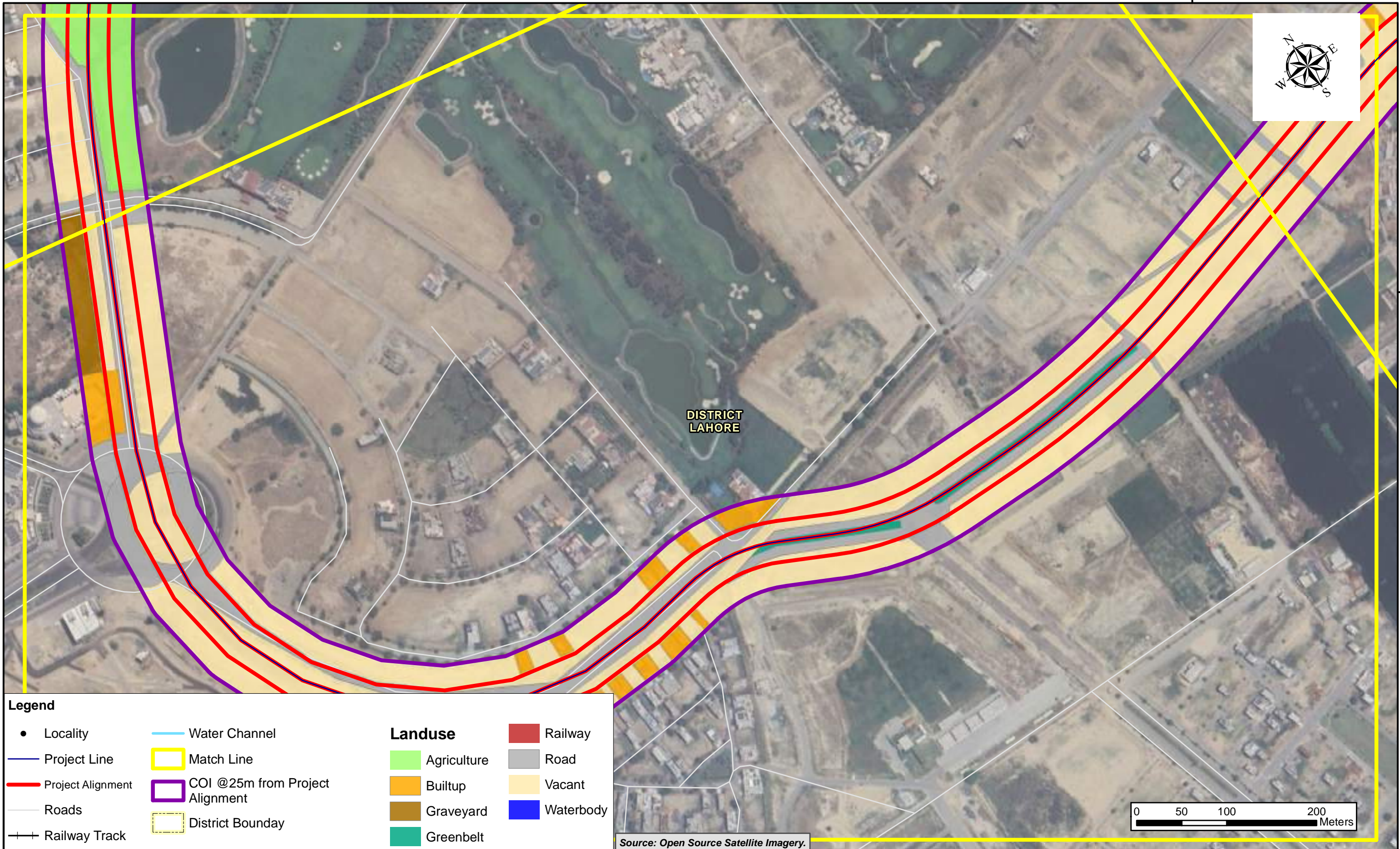
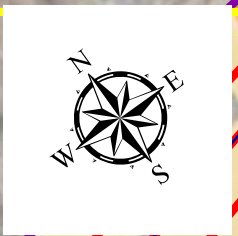
- Locality
- Project Line
- Project Alignment
- Roads
- ++ Railway Track
- Water Channel
- Match Line
- COI @25m from Project Alignment
- District Boundary

**Landuse**

- Agriculture
- Builtup
- Graveyard
- Greenbelt
- Railway
- Road
- Vacant
- Waterbody

Source: Open Source Satellite Imagery.

 <b>NATIONAL HIGHWAY AUTHORITY OF PAKISTAN</b>	<b>CONSULTANT</b> <b>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD</b> HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	04 03 02 01				DRAWN FARHEEN SUBMITTED RECOMMENDED CHD/VER. APPROVED SHEHNILA	<b>PROJECT</b> EIA STUDY FOR CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE	<b>LANDUSE MAP</b>		SCALE 1:4,000
			REV. DATE DESCRIPTION APPROVED APPROVED				DATE DECEMBER-2024	FIG. NO. Page 1 of 9	REV. 0	



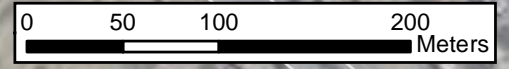
**Legend**

- Locality
- Project Line
- Project Alignment
- Roads
- +— Railway Track
- Water Channel
- Match Line
- COI @25m from Project Alignment
- District Boundary

**Landuse**

- Agriculture
- Builtup
- Graveyard
- Greenbelt
- Railway
- Road
- Vacant
- Waterbody

Source: Open Source Satellite Imagery.



**CLIENT**

NATIONAL HIGHWAY AUTHORITY OF PAKISTAN

**CONSULTANT**

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD

HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN

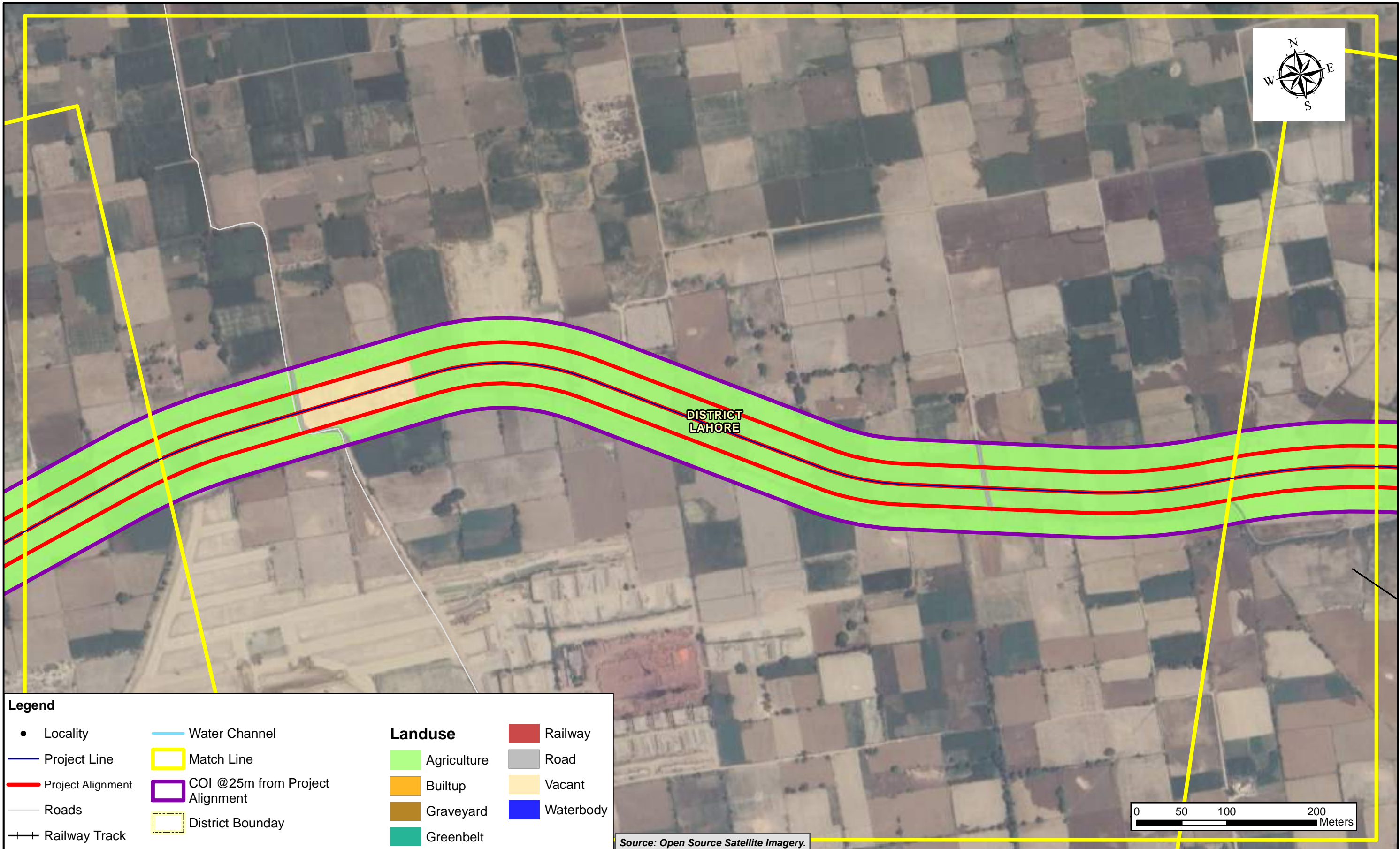
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03					SUBMITTED	
02					RECOMMENDED	
01					CHD/VER.	
REV.	DATE	DESCRIPTION	APPROVED	APPROVED	SHEHNILA	

**PROJECT**

EIA STUDY FOR CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE

<b>LANDUSE MAP</b>		SCALE
		1:4,000
DATE	FIG. NO.	REV.
DECEMBER-2024	Page 2 of 9	0





**Legend**

- Locality
- Project Line
- Project Alignment
- Roads
- ++ Railway Track
- Water Channel
- Match Line
- COI @25m from Project Alignment
- District Boundary

**Landuse**

- Agriculture
- Builtup
- Graveyard
- Greenbelt
- Railway
- Road
- Vacant
- Waterbody

Source: Open Source Satellite Imagery.

**CLIENT**

NATIONAL HIGHWAY AUTHORITY OF PAKISTAN

**CONSULTANT**

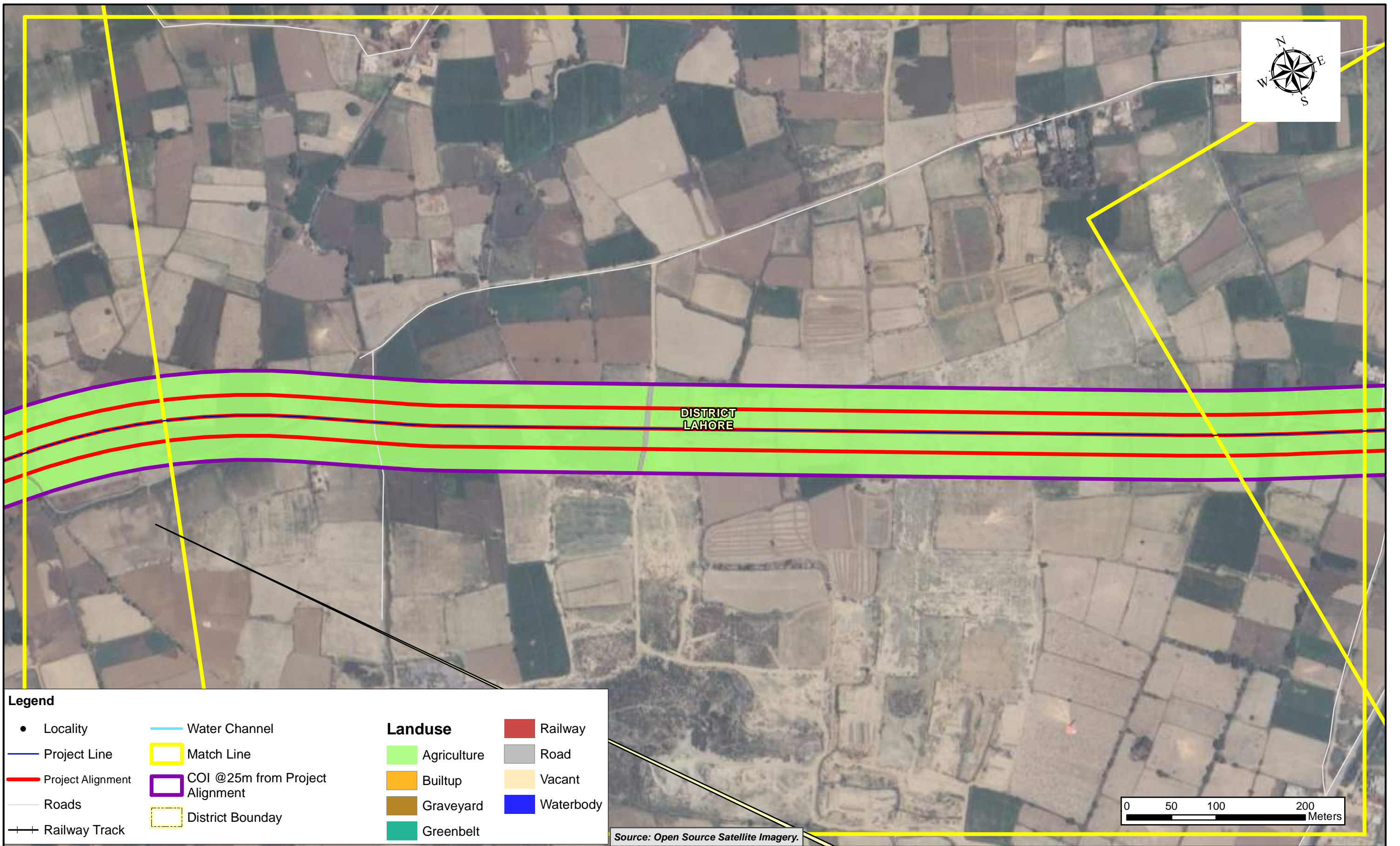
NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD  
 HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN

04					DRAWN	FARHEEN
03					SUBMITTED	
02					RECOMMENDED	
01					CHD/VER.	
REV.	DATE	DESCRIPTION	APPROVED	APPROVED	SHEHNILA	

**PROJECT**

EIA STUDY FOR CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE

<b>LANDUSE MAP</b>		<b>SCALE</b>
		1:4,000
<b>DATE</b>	<b>FIG. NO.</b>	<b>REV.</b>
DECEMBER- 2024	Page 4 of 9	0



**Legend**

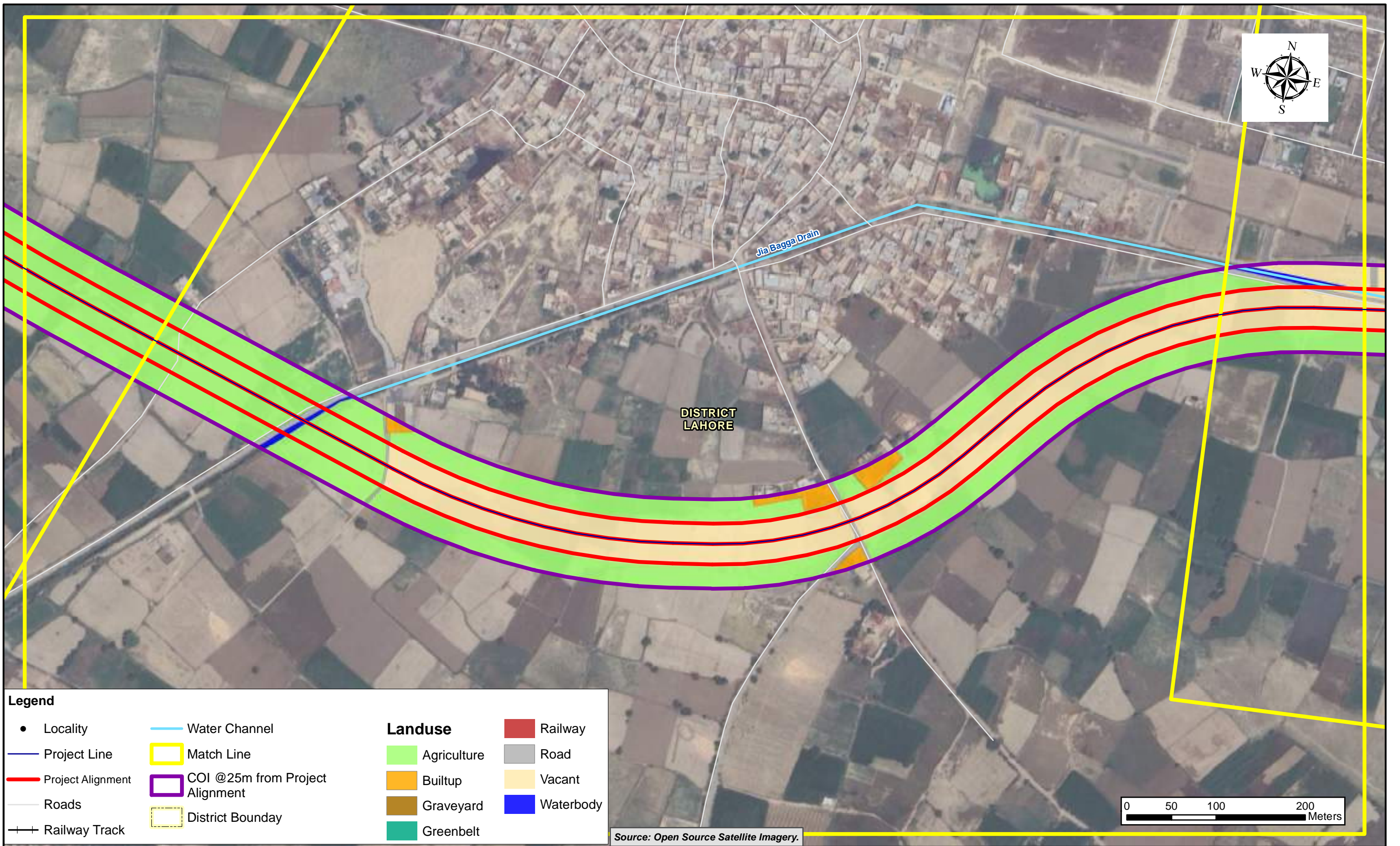
- Locality
- Project Line
- Project Alignment
- Roads
- ++ Railway Track
- Water Channel
- Match Line
- COI @25m from Project Alignment
- District Boundary

**Landuse**

- Agriculture
- Builtup
- Graveyard
- Greenbelt
- Railway
- Road
- Vacant
- Waterbody

Source: Open Source Satellite Imagery.

 <b>NATIONAL HIGHWAY AUTHORITY OF PAKISTAN</b>	<b>CONSULTANT</b> <b>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD</b>	04				DRAWN	FARHEEN	<b>PROJECT</b> EIA STUDY FOR CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE	<b>LANDUSE MAP</b>		SCALE
	HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	03				SUBMITTED			DECEMBER- 2024	FIG. NO.	Page 5 of 9
		02				RECOMMENDED					REV.
		01				CHD/VER.					0
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	SHEHNILA				



**Legend**

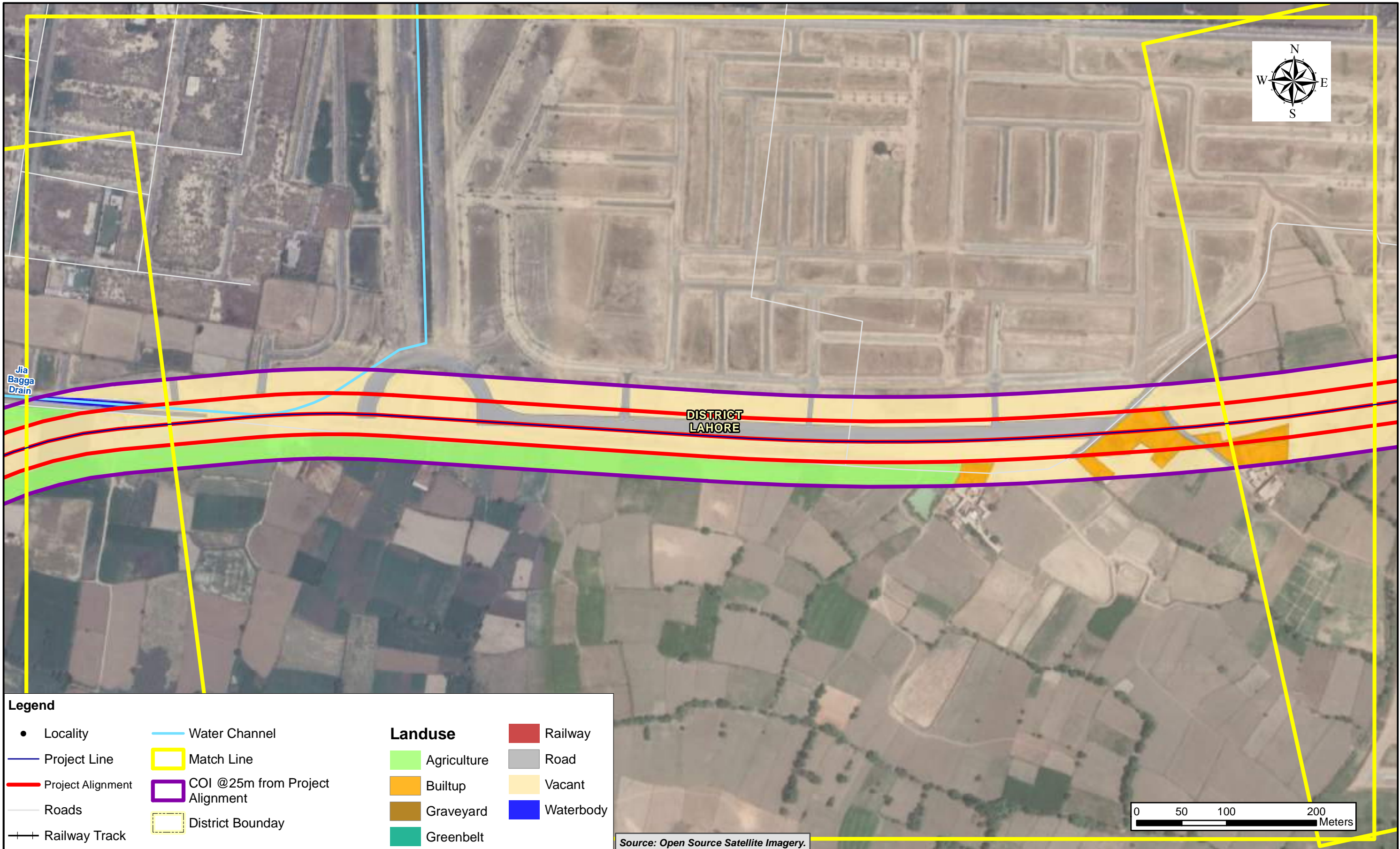
- Locality
- Project Line
- Project Alignment
- Roads
- + + Railway Track
- Water Channel
- Match Line
- COI @25m from Project Alignment
- District Boundary

**Landuse**

- Agriculture
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- Railway
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- Waterbody

Source: Open Source Satellite Imagery.

 <b>NATIONAL HIGHWAY AUTHORITY OF PAKISTAN</b>	<b>CONSULTANT</b> <b>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD</b>	04				DRAWN	FARHEEN	<b>PROJECT</b> EIA STUDY FOR CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE	<b>LANDUSE MAP</b>		SCALE
	HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	03				SUBMITTED			DECEMBER- 2024	FIG. NO.	Page 6 of 9
		02				RECOMMENDED					REV.
		01				CHD/VER.					0
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	SHEHNILA				



**Legend**

- Locality
- Project Line
- Project Alignment
- Roads
- ++ Railway Track
- Water Channel
- Match Line
- COI @25m from Project Alignment
- District Boundary

**Landuse**

- Agriculture
- Builtup
- Graveyard
- Greenbelt
- Railway
- Road
- Vacant
- Waterbody


Source: Open Source Satellite Imagery.

**CLIENT**



**NATIONAL HIGHWAY AUTHORITY OF PAKISTAN**

**CONSULTANT**



**NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD**

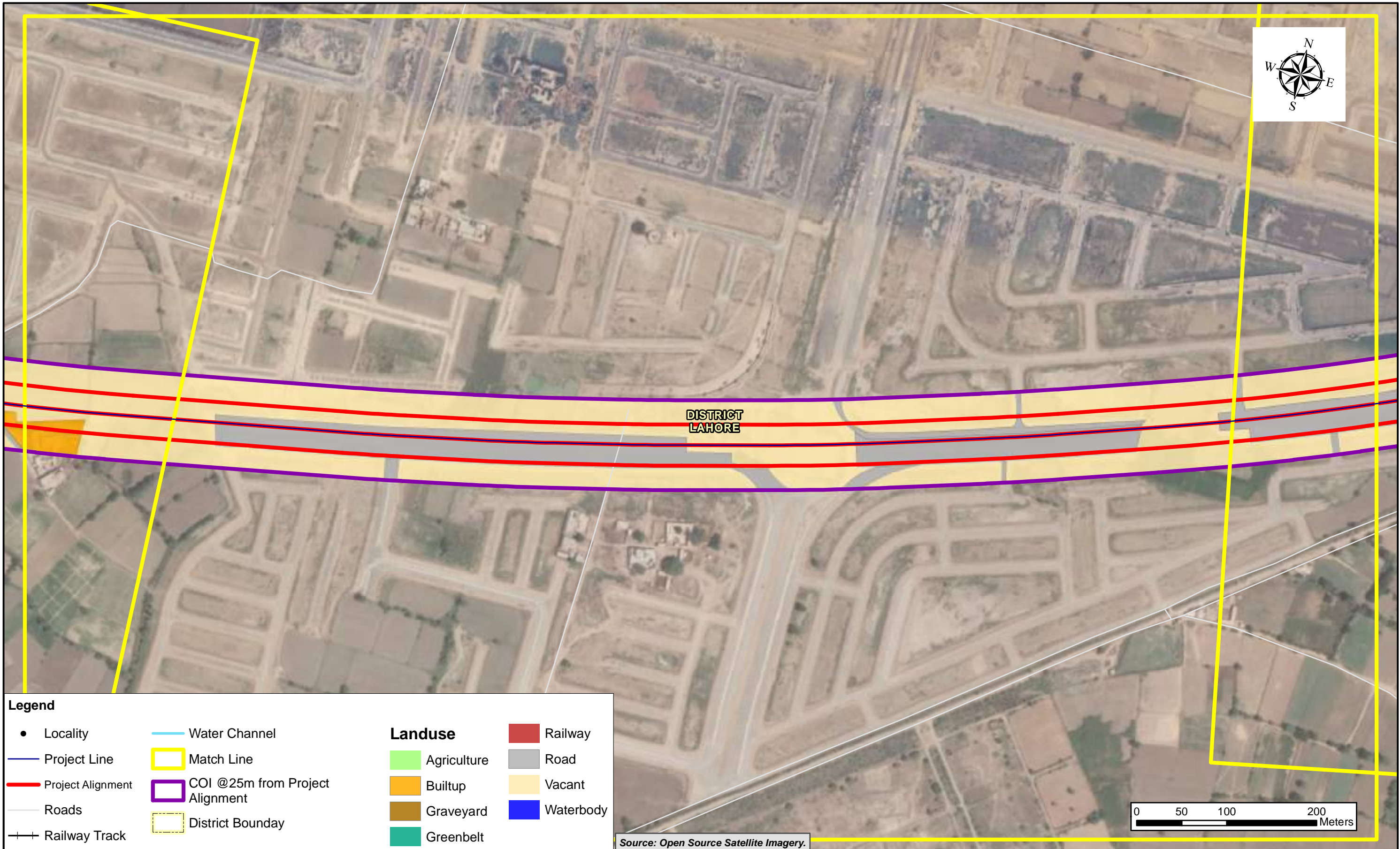
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REV.	DATE	DESCRIPTION	APPROVED	APPROVED	SHEHNILA	

**PROJECT**

**EIA STUDY FOR CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE**

<b>LANDUSE MAP</b>		<b>SCALE</b>
		1:4,000
<b>DATE</b>	<b>FIG. NO.</b>	<b>REV.</b>
DECEMBER- 2024	Page 7 of 9	0



**Legend**

- Locality
- Project Line
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- + + Railway Track
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Source: Open Source Satellite Imagery.

**CLIENT**

NATIONAL HIGHWAY AUTHORITY OF PAKISTAN

**CONSULTANT**

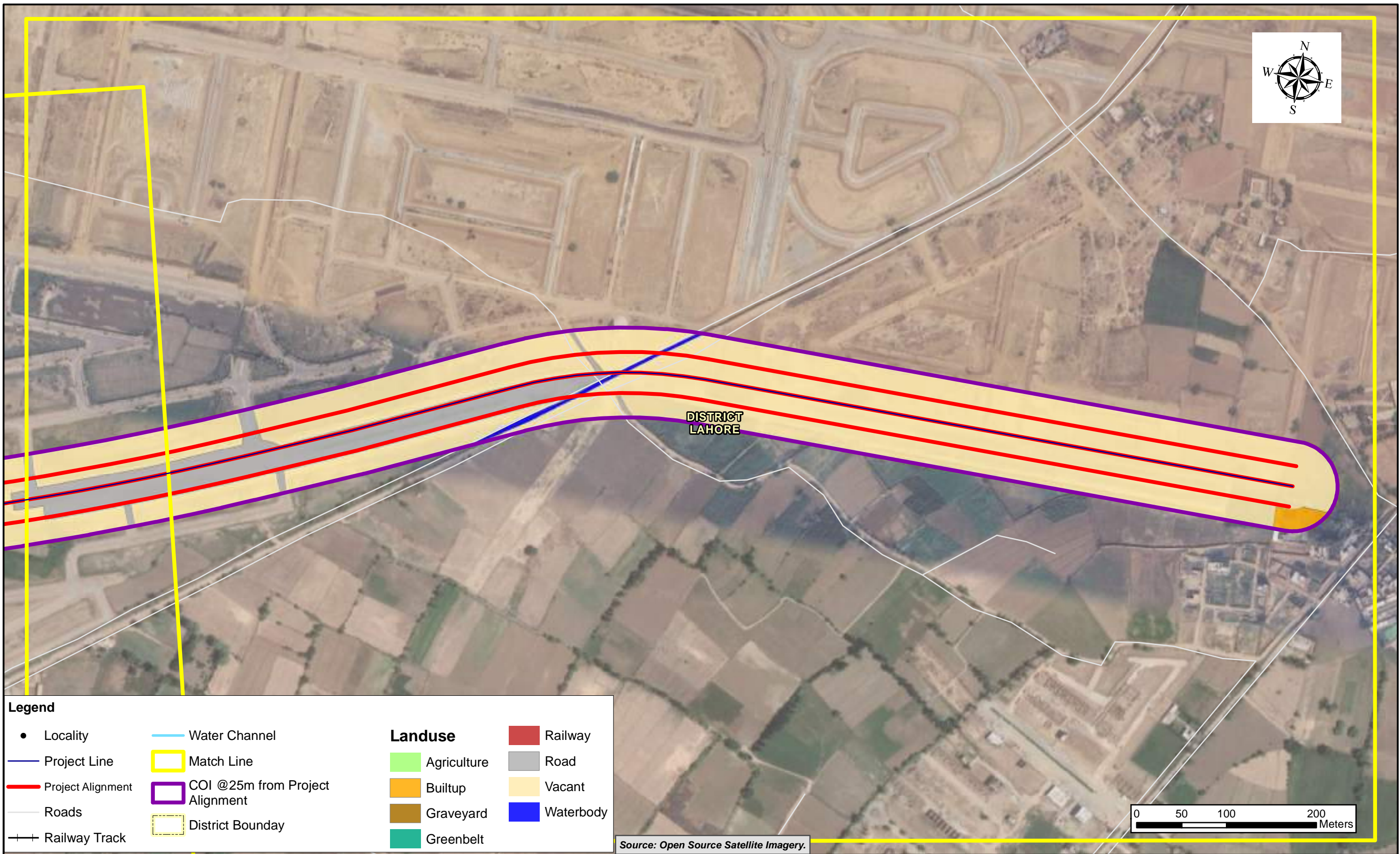
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 HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN

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**PROJECT**

EIA STUDY FOR CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FERAZPUR ROAD THROUGH LDA CITY, LAHORE

<b>LANDUSE MAP</b>		<b>SCALE</b> 1:4,000
DATE DECEMBER-2024	FIG. NO. Page 8 of 9	REV. 0



**Legend**

- Locality
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- ++ Railway Track
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 <b>NATIONAL HIGHWAY AUTHORITY OF PAKISTAN</b>	<b>CONSULTANT</b> <b>NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD</b>	04				DRAWN	FARHEEN	<b>PROJECT</b> EIA STUDY FOR CONSTRUCTION OF STRUCTURAL PLAN ROAD (NEELUM ROAD) FROM PINE AVENUE TO FEROPUR ROAD THROUGH LDA CITY, LAHORE	<b>LANDUSE MAP</b>		<b>SCALE</b> 1:4,000
	HEAD OFFICE:- NESPAK HOUSE ,1-C, BLOCK-N MODEL TOWN EXTENSION, LAHORE, PAKISTAN	03				SUBMITTED				DATE	FIG. NO.
		02				RECOMMENDED		DECEMBER- 2024	Page 9 of 9	0	
		01				CHD/VER.					
		REV.	DATE	DESCRIPTION	APPROVED	APPROVED	SHEHNILA				

**ANNEX-III**  
**RESOURCE CONSERVATION PLAN**

## RESOURCE CONSERVATION PLAN

### 1. INTRODUCTION

The most of the resources in this world are finite and non-renewable in nature. We are completely dependent on these resources to fulfill all our daily requirements. Therefore, sustainable development calls for the need to conserve resources in a way that meet our needs of present generation as well as future generation, especially the non-renewable resources.

### 2. OBJECTIVE OF THE PLAN

The Resource Conservation Plan is intended to make an effort towards achieving sustainable development. The objective of the resource conservation plan is to:

- Minimize the use of natural resources; and
- Mitigate and prevent pollution contaminating the natural resources.

### 3. PLANNING

Careful estimations of quantities of material, fuel, water and energy required directly or indirectly shall be done to avoid excessive or unnecessary wastage of these materials. In addition to this, pollution prevention strategies shall also be devised to prevent contamination of resources.

- The estimations include the following:
  - Estimation of construction material required for the project;
  - Estimation of fuel consumption for construction machinery, construction vehicles and generators;
  - Estimations of the energy requirements during all the stages of the project; and
  - Estimations of water consumption for construction activities and construction camp sites.
- Strategies shall be planned to reduce loads on the identified resources to be consumed;
- Best management practices shall be devised to control or reduce pollution resulting from the activities during different stages of the project; and
- An inspector shall be assigned responsibility to oversee the ongoing activities to check the compliance of the planned strategies.

### 4. EXECUTION OF THE PLAN

The planned strategies shall be implemented to conserve the natural resources including but not limited to the following:

#### ***Material***

- Material supplied shall be in conformance with the estimated quantities and excess material shall be returned to the supplier;
- Material wastage shall be avoided by using best management practices;
- Waste produced during the project execution shall be disposed off safely to the designated disposal sites through approved contractors; and
- Reuse of the materials shall be appreciated.

#### ***Energy***

- Reduce trips and optimize routes to and from the construction site for all kinds of activities;
- Regular maintenance of equipment and vehicles to avoid leaks and sustain efficient fuel consumption;

- Switch off idle equipment and vehicles to avoid wastage of fuel;
- Minimize warm up time, unnecessary acceleration and deceleration of the construction equipment and vehicles;
- Avoid unnecessary burning of fuel for cooking in construction camps;
- Avoid unnecessary use of heating and cooling systems during extreme weathers events;
- Construction shall start in early hours of the day to avoid heat in summers and utilization of day light; and
- Alternate energy sources shall be considered for electricity generations during construction and operation to conserve fossil fuel as it is non-renewable resource.

***Water***

- Avoid using potable water for sprinkling, curing and washing of equipment and vehicles. Surface water or treated effluent can be used instead;
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water;
- Unnecessary equipment washings should be avoided;
- Awareness amongst workers shall be raised to conserve water and immediately report for any leaks detected; and
- Ensure protection of canal water from contamination resulting from construction activities.

***Pollution***

- Emissions shall be reduced and controlled as far as possible and direct discharges to air shall be avoided by strictly adhering to the mitigation measures outlined in EIA report;
- Waste water shall not be discharged directly and must be managed as per the recommendations presented in EIA; and
- Construction and demolition waste, and municipal solid waste shall not be dumped and burnt openly, and shall be handled according to the preventative measure given in EIA study.

**5. CHECKING AND CORRECTIVE ACTIONS**

The Client shall bind the construction contractor through contract agreement to comply with the strategies outlined in the Resource Conservation Plan. The Environmental Committee shall also appoint an Inspector who shall monitor the daily onsite activities and shall report any issues and concerns raised in relation to Resource Conservation Plan. The inspector shall recommend adequate corrective actions to mitigate the issues raised.

**ANNEX-IV  
WASTE MANAGEMENT PLAN**

## CONSTRUCTION WASTE MANAGEMENT PLAN

### 1. GENERAL INTRODUCTION

Construction work refers to a wide range of materials depending on their origin; they are categorized as excavation material, demolition materials and worksite waste material. Construction waste material of the proposed project consists mainly of concrete, bentonite, masonry, limestone, sandstone, metal, and wood. In addition to this, significant amount of municipal waste will also generate from the construction camps.

### 2. ORIGINS AND CAUSES OF CONSTRUCTION WASTE

Origins of Waste	Causes of Waste
Contractual	<ul style="list-style-type: none"> <li>▪ Errors in contract documents; and</li> <li>▪ Contract documents incomplete at commencement of construction.</li> </ul>
Design	<ul style="list-style-type: none"> <li>▪ Design changes;</li> <li>▪ Design and detailing complexity;</li> <li>▪ Design and construction detail errors;</li> <li>▪ Unclear and unsuitable specifications; and</li> <li>▪ Poor coordination and communication (late information, last minute client requirements, slow drawing revision and distribution).</li> </ul>
Procurement	<ul style="list-style-type: none"> <li>▪ Ordering errors (i.e. ordering items not in compliance with specification);</li> <li>▪ Over allowances (i.e. difficulties to order small quantities); and</li> <li>▪ Supplier errors.</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>▪ Damage during transportation;</li> <li>▪ Difficulties for delivery vehicles accessing construction sites;</li> <li>▪ Insufficient protection during unloading; and</li> <li>▪ Inefficient methods of unloading</li> </ul>
On-Site Management and Planning	<ul style="list-style-type: none"> <li>▪ Lack of on-site waste management plans;</li> <li>▪ Improper planning for required quantities;</li> <li>▪ Delays in passing information on types and sizes of materials and components to be used;</li> <li>▪ Lack of on-site material control; and</li> <li>▪ Lack of supervision.</li> </ul>
Material Storage	<ul style="list-style-type: none"> <li>▪ Inappropriate site storage space leading to damage or deterioration;</li> <li>▪ Improper storing methods; and</li> <li>▪ Materials stored far away from point of application.</li> </ul>
Material Handling	<ul style="list-style-type: none"> <li>▪ Materials supplied in loose form;</li> <li>▪ On-site transportation methods from storage to the point of application; and</li> <li>▪ Inadequate material handling.</li> </ul>
Site Operation	<ul style="list-style-type: none"> <li>▪ Accidents due to negligence;</li> <li>▪ Unused materials and products;</li> <li>▪ Equipment malfunction;</li> </ul>

Origins of Waste	Causes of Waste
	<ul style="list-style-type: none"> <li>▪ Poor craftsmanship;</li> <li>▪ Use of wrong materials resulting in their disposal;</li> <li>▪ Time pressure; and</li> <li>▪ Poor work ethics.</li> </ul>
Residual	<ul style="list-style-type: none"> <li>▪ Waste from application processes (i.e. over preparation of mortar);</li> <li>▪ Off-cuts from cutting materials to length;</li> <li>▪ Waste from cutting uneconomical shapes; and</li> <li>▪ Packaging.</li> </ul>
Other	<ul style="list-style-type: none"> <li>▪ Weather</li> <li>▪ Vandalism</li> <li>▪ Theft</li> </ul>

### 3. CONSTRUCTION WASTE MANAGEMENT PLAN

#### i) Waste Management Goals

The contractor established goal that this project will generate at least 50 percent less waste into landfills and the processes shall be employed to ensure that this goal is met. These shall include prevention of damage to materials to be incorporated into the work due to mishandling, improper storage, contamination, inadequate protection, minimizing poor quantity estimation, and through design.

#### ii) Responsibility

- a) The Contractor shall be responsible for the implementation of the administrative portions of this program, including the notification of subcontractor management, the training of the site supervisor and the onsite posting of this plan.
- b) The site supervisor shall be responsible for the implementation of the onsite portions of this program including the training of subcontractor personnel.

#### iii) Waste Prevention Planning

- a) In addition to other requirements specified herein it is a requirement for the work of this project that the contractor comply with the applicable city waste disposal requirements.
- b) Of the inevitable waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling where practical and possible. Waste disposal in landfills shall be minimized as much as possible.
- c) Project Construction Documents: The Contractor will contractually require all subcontractors to comply with the Construction Waste Management Plan (WMP)". A copy of the WMP will accompany all subcontractor agreements and require subcontractor participation.
- d) The "Construction Waste Management Plan" shall be implemented and executed as follows and as on the chart:
  - i) Salvageable materials will be diverted from disposal where feasible;
  - ii) There will be a designated area on the construction site reserved for materials that can be recycled;
  - iii) Areas shall be marked to designate what recycle materials are to be stored there; and
  - iv) Hazardous waste shall be managed by a licensed hazardous waste vendor.

**iv) Communication and Education Plan**

- a) This Waste Management Plan will be posted onsite;
- b) Each subcontractor will be made aware of the intent of this project with respect to reduction of waste and recycling. Onsite recycling containers and/or areas will be plainly marked;
- c) The subcontractor will be expected to make sure all their crews comply with the Waste Management Plan;
- d) All recycling containers and areas will be clearly marked;
- e) Lists of acceptable and unacceptable materials will be posted at the site; and
- f) All subcontractors will be informed in writing of the importance of non-contamination with other materials or trash.

**v) Motivation Plan**

The Contractor will conduct a pre-award meeting for subcontractors. Subcontractors under consideration will be required to attend the meeting to review project goals and requirements with the project team. Attendance will be a prerequisite for award of subcontracts. This document will be an attachment to every subcontract. Copies of the attachment will be posted prominently at the job site.

**vi) Expected Project Waste, Disposal, and Handling**

The following chart identifies waste materials expected on the proposed project, their expected disposal methods and handling procedures. New items may be added as needed.

<b>Material</b>	<b>Disposal Method</b>	<b>Handling Procedure</b>
Land Clearing Debris	Keep separate for reuse and or wood sale. Suitable materials may be delivered to a composting site. Separate topsoil and rock for future landscaping use.	Keep separated in designated areas onsite.
Clean Dimensional Wood and Palette Wood	Keep separate for reuse by on-site construction or by site employees for either heating stoves or reuse in home projects. May be offered to public.	Keep separated in designated areas onsite.
Painted or Treated Wood	Reuse, off site recycle, and landfill.	Keep separated in designated areas onsite. Place in "Trash" container.
Concrete	Recycle when possible.	Keep separated in designated areas onsite.
Concrete Masonry Units	Keep separate for re-use by on-site construction or by site employees	Keep separated in designated areas onsite
Metals	Recycle off site when possible. Separate copper wire when possible.	Keep separated in designated areas onsite. Place in "Metals" container.
Gypsum drywall (unpainted)	Recycle with supplier when possible.	Keep scraps separate for recycling – stack on pallets in provided onsite. All scrap drywall should be taken back by contractor to drywall supplier
Paint	Reuse onsite; donate to Habitat for Humanity Restore.	Keep separated in designated areas onsite
Insulation	Reuse and landfill.	Keep separated in designated areas onsite.
Glass	Recycle locally.	Keep separated in designated areas onsite.
Plastics	Plastic Bottles: recycle locally; be aware of plastics that are acceptable to recycle facility.	Keep separated in designated areas onsite.

**vii) Waste Disposal Company:**

- a) Lahore Waste Management Company
- b) Local Government

**viii) Recycle Hauler**

- a) To be determined;
- b) Contact Address; and
- c) Some or all recycle may be hauled by the authorized representative.

**ix) Possible Recycle Locations and Acceptable Materials**

- a) Coordinate with companies in Lahore or which are registered with LWMC that accept materials for recycle; and
- b) Using the above as a resource, a list will be kept indicating local opportunities for recycle of expected materials. New locations should be added as needed.

**ANNEX-V**  
**OCCUPATIONAL HEALTH AND SAFETY PLAN**

## **GUIDELINE OCCUPATIONAL HEALTH AND SAFETY PLAN**

Occupational Health and Safety covers all personnel working under the project and will be in line with the World Bank EHS guidelines on health and safety.

The Occupational Health and Safety program will aim to ensure that the workplace is safe and healthy by: addressing the hazards and risks at the workplace; outlining the procedures and responsibilities for preventing, eliminating and minimizing the effects of those hazards and risks; identifying the emergency management plans for the workplace or workplaces; and, specifying how consultation, training and information are to be provided to employees at various workplaces.

Some of the risks/hazards associated with workplaces are due to working close to or at sites associated with the various project construction activities. Other risks associated with the project construction phase include risk of increase of vector borne and other different diseases.

The following sections will be implemented during the construction phase to address and ensure workers' health and safety.

### **1.1 SCREENING AND REGULAR UNANNOUNCED CHECKING OF WORKERS**

As per the procedure for hiring workers, all contractors and labor agencies are required to make all prospective workers undergo medical tests to screen for diseases and sicknesses, prior to selection and employment of any worker. The contractor is also responsible for ensuring that no worker who has a criminal record is employed at the project site. It will be ensured that all workers undergo medical tests to screen diseases at source and at sites in consultation with the designated Health Officer.

In addition to this, the Project Management will also undertake sudden, unannounced checks on workers to look for diseases such as COVID-19, HIV, STDs, and hepatitis and take necessary steps as mandated by the Contractual agreement between the Contractor and the Worker(s).

### **1.2 MINIMIZING HAZARDS AND RISKS AT THE WORKPLACE**

To ensure safety at all work sites, the following will be carried out:

- i. Installation of signboards and symbols in risky and hazardous areas, to inform workers to be careful.
- ii. Construction of barricades around construction sites and deep excavated pits, to cordon off and deter entry of unauthorized personnel and workers into these areas.
- iii. Providing a safe storage site/area for large equipment such as power tools and chains, to prevent misuse and loss.
- iv. Proper Housekeeping: Ensuring that materials are all stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling, or collapse. Brick stacks will not be more than 7 feet in height and for concrete blocks they will not be more than 6 feet high.
- v. Removing all scrap timber, waste material and rubbish from the immediate work area as the work progresses.
- vi. Where scaffolds are required, ensuring that each scaffold or its components shall be capable of supporting its own weight and at least 4 times the maximum intended load applied or transmitted to it. The platform/scaffold plank shall be at least 15 inches wide and 1.5 inches thick. The rope should be capable of supporting at least 6 times the maximum intended load applied or transmitted to that rope. Pole scaffolds over 60 feet in height shall be designed by a registered professional engineer and shall be

- constructed and loaded in accordance with that design. Where scaffolds are not provided, safety belts/safety nets shall be provided;
- vii. Ensure that all ramps or walkways are at least 6 feet wide, having slip resistance threads and not inclined at more than a slope of 1 vertical and 3 horizontal.
  - viii. Stacking away all excavated earth at least 2 feet from the pit to avoid material such as loose rocks from falling back into the excavated area and injuring those working inside excavated sites.
  - ix. Constructing support systems, such as bracing to adjoining structures that may be endangered by excavation works nearby.
  - x. Only a trained electrician to construct, install and repair all electrical equipment to prevent risks of electrical shocks and electrocution.
  - xi. Install fire extinguishers and/or other fire-fighting equipment at every work site to prepare for any accidental fire hazards.

### 1.3 PROVISION OF PERSONAL PROTECTIVE EQUIPMENT

Risks to the health and safety of workers can be prevented by provision of Personal Protective Equipment (PPEs) to all workers. This will be included in the construction cost for each Contractor. Depending on the nature of work and the risks involved, contractors must provide without any cost to the workers, the following protective equipment:

- i. High visibility clothing for all personnel during road works must be mandatory.
- ii. Helmet shall be provided to all workers, or visitors visiting the site, for protection of the head against impact or penetration of falling or flying objects.
- iii. Safety belt shall be provided to workers working at heights (more than 20 ft) such as roofing, painting, and plastering.
- iv. Safety boots shall be provided to all workers for protection of feet from impact or penetration of falling objects on feet.
- v. Ear protecting devices shall be provided to all workers and will be used during the occurrence of extensive noise.
- vi. Eye and face protection equipment shall be provided to all welders to protect against sparks.
- vii. Respiratory protection devices shall be provided to all workers during occurrence of fumes, dusts, or toxic gas/vapor.
- viii. Safety nets shall be provided when workplaces are more than 25 feet (7.5 m) above the ground or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors or safety belts is impractical.

The specific PPE requirements for each type of work are summarized below.

**Table 1: PPE Requirement List**

Type of Work	PPE
Elevated work	Safety helmet, safety belt (height greater than 20 ft), footwear for elevated work.
Handling work safety	Helmet, leather safety shoes, work gloves.
Welding and cutting work	Eye protectors, shield and helmet, protective gloves.
Grinding work	Dust respirator, earplugs, eye protectors.
Work involving handling of chemical substances	Dust respirator, gas mask, chemical-proof gloves. Chemical proof clothing, air-lined mask, eye protectors.
Wood working	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Blasting	Hard hat, eye and hearing protection.
Concrete and masonry work	Hard hat, eye protectors, hearing protection, safety footwear, leather gloves and dust respirator.
Excavation, heavy equipment, motor graders, and bulldozer operation	Hard hat, safety boots, gloves, hearing protection.
Quarries	Hard hat, eye protectors, hearing protection, safety footwear, leather

Type of Work	PPE
	gloves and dust respirator.

#### **1.4 PROCEDURES TO DEAL WITH EMERGENCIES SUCH AS ACCIDENTS, SUDDEN ILLNESS AND DEATH OF WORKERS**

First aid kits will be made available at all times throughout the entire construction period by the respective contractors. This is very important, because most work sites will be at some distance from the nearest hospital. In addition to the first aid kits, the following measures should be in place:

- i. Provision of dispensaries by the individual EPC contractor.
- ii. A vehicle shall be on standby from the Project Office so that emergency transportation can be arranged to take severely injured/sick workers to the nearest hospital for immediate medical attention.
- iii. A designated Health Officer/worker for the Project will be identified as a focal person to attend to all health and safety related issues. This employee's contact number will be posted at all work sites for speedy delivery of emergency services. The focal person shall be well versed with the medical system and facilities available at the hospital.
- iv. Communication arrangements, such a provision of radios or mobile communication for all work sites, for efficient handling of emergencies, will be made.

#### **1.5 RECORD MAINTENANCE AND REMEDIAL ACTION**

The Project Management will maintain a record of all accidents and injuries that occur at the work site. This work will be delegated by the contractor to the site supervisor and regularly reviewed every quarter by project management. Reports prepared by the contractor shall include information on the place, date and time of the incident, name of persons involved, cause of incident, witnesses present and their statements. Based on such reports, the management can jointly identify any unsafe conditions, acts or procedures and recommend for the contractor to undertake certain mitigative actions to change any unsafe or harmful conditions.

#### **1.6 COMPENSATION FOR INJURIES AND DEATH**

Any casualty or injury resulting from occupational activities should be compensated as per the local labor laws of Pakistan. Where compensation is sought by the injured party, proper procedures for documentation of the case will be followed, including a detailed report on the accident, written reports from witnesses, report of the examining doctor and his/her recommendation for treatment. Each individual contractor will be responsible for ensuring compensation for the respective workers.

#### **1.7 AWARENESS PROGRAMS**

The Project management will undertake awareness programs through posters, talks, and meetings with the contractors to undertake the following activities:

- i. Dissemination sessions will clarify the rights and responsibilities of the workers regarding interactions with local people (including communicable disease risks, such as HIV/AIDS, COVID-19), work site health and safety, waste management (waste separation, recycling, and composting), and the illegality of poaching.
- ii. Make workers aware of procedures to be followed in case of emergencies such as informing the focal health person who in turn will arrange the necessary emergency transportation or treatment.

## **1.8 NOMINATION OF A HEALTH AND SAFETY FOCAL PERSON**

Within each site (especially if different sites are being implemented by different contractors), a Health and Safety Focal Person will be appointed. The Terms of Reference for the focal person will mainly be as follows:

- i. Function as the focal person/representative for all health and safety matters at the workplace;
- ii. Responsible for maintaining records of all accidents and all health and safety issues at each site, the number of accidents and its cause, actions taken and remedial measures undertaken in case of safety issues;
- iii. Be the link between the contractor and all workers and submit grievances of the workers to the contractor and instructions/directives on proper health care and safety from the contractors back to the workers;
- iv. Ensure that all workers are adequately informed on the requirement to use Personal Protective Equipment and its correct use;
- v. Also responsible for the first aid kit and making sure that the basic immediate medicines are readily available.

## **1.9 SUGGESTED CONTENTS OF OCCUPATIONAL HEALTH AND SAFETY PLAN**

The suggested contents of Occupational Health and Safety Plan to be developed by the Contractor(s) are described below:

- a Purpose
- b Scope of Application
- c Complying Basis
- d Occupational Health and Safety Objectives
- e Organization and Responsibility
  - Contractor's Project Manager
  - HSE Management Department of the Contractor(s)
  - Medical Treatment Room of the Contractor(s)
  - Subcontractor's Project Manager
  - Subcontractor's HSE Managers
  - Occupational Health and Safety
  - Community Health and Safety
- f Health Plan
  - Labour Protection
  - Sanitary Epidemic Prevention
- g Safety Plan
  - Summary
  - Qualification Review
  - Safety Training
  - Construction Plans and Documents
  - Control Measures
  - Monitoring Measures
  - Management of the Key Safety Accidents
- h Public Security Plan
- i Local Community Health and Safety

**ANNEX-VI  
TRAFFIC MANAGEMENT PLAN**

# **GUIDELINE TRAFFIC MANAGEMENT PLAN**

## **1. Need for Plan**

During the construction period of the project, considerable vehicular movement carrying large amounts of material and machinery is expected. This will definitely interrupt the local traffic and is therefore important to manage the traffic to avoid the nuisance to local residents in terms of noise, dust, congestion and inconvenience.

## **2. The plan**

The objective of Traffic Management Plan (TMP) is to define the requirements that should be implemented to mitigate any potential negative risks to the environment, workers or the community resulting from construction traffic.

The TMP will advise and inform site Contractors and external suppliers of equipment and materials of access and entry points along with other key information such as tipping areas and wash-out areas. It is intended to compliment and work alongside relevant EMP. The TMP will be classed as “live” and therefore be subjected to updates as required.

The Contractor, at the time of the execution of the project, will prepare a comprehensive TMP in coordination with local traffic police department, RUDA, emergency services and local administrative department. RUDA and CSC will review and approve the Contractor’s TMP. The Contractor’s TMP shall include following mitigation measures during its preparation:

- Undertake a road conditions assessment prior to and following the peak construction period, to assess any damage to road infrastructure that can be attributed to Project development.
- Repair damage as appropriate or enter into a voluntary agreement with the relevant roads authority to reimburse the cost of any repairs required to the public road network as a result of the Project.
- Spoil dumpsites located close to project site to minimize journey distance and limit movements to site access roads.
- Construction of worker accommodation on site to reduce light vehicle movements relating to travel to/ from the site.
- Provision of bus/minibus services for personnel living in nearby settlements.
- Movements of construction workers will be planned to avoid the busiest roads and times of day when traffic is at its greatest.
- Schedule deliveries and road movements to avoid peak periods.
- Driver training for HGV drivers and refresher course every six months for project drivers.
- Speed restrictions for project traffic travelling through communities (to be agreed with National Highway Authority and Client).
- Run a safety campaign to improve the people’s knowledge of the traffic hazard on their roads, public information and other activities to address the issues.

- Run a pedestrian awareness programme.
- Temporary signage

The traffic management plan for the project corridor is provided below.

### **3. Other Recommendations**

It is important to manage public access routes during construction because it can cause delay to local traffic and create a safety hazard both on and offsite. People working and living near the tower sites would be annoyed by the emissions, noise and visual intrusion of queuing vehicles. Some important factors involved in access routes and site traffic are as follows:

#### **3.1. Public Access Routes**

The use of public road for site access may be restricted in terms of:

- Vehicle size, width and type of load
- Time limits
- Parking
- Pedestrian conflicts

Contractor should have consultation with the local police or local authority to address these issues and to effectively manage them before the beginning of the construction.

#### **3.2. Site Workers Traffic**

Site personnel should not be permitted to park vehicles right on the road; this will lead to disruption in material deliveries. Designated parking areas with appropriate parking space will be needed for this purpose; any plain area near construction site can be used for this purpose.

#### **3.3. Site Rules**

- Access to and from the site must be only via the specified entrance.
- On leaving the site, vehicles must be directed to follow the directions given.
- Drivers must adhere to the site speed limits.
- All material deliveries to site must keep allocated time limits.
- No material or rubbish should be left in the loading-unloading area.
- Develop a map for alternate routes showing material delivery services.
- Assign designated personnel on site to receive deliveries and to direct the vehicles.
- Monitor vehicle movement to reduce the likelihood of queuing or causing congestion in and around the area.
- Project vehicles should have a unanimous badge or logo on windscreen displaying that they belong to the project.

### **4. Contractor's Obligation**

The traffic management plan of the Contractor should be safe enough and widening of any access roads and construction of the detours (as applicable and practical) must be completed

prior to start of project construction activities so that heavy vehicular transportation for construction activities do not hinder the normal course of traffic lanes. Contractor must ensure that road closures are carried out by a competent person. The Contractor obligation must include the display of traffic signs according to the need to divert the traffic volume and to guide the road users in advance. The traffic sign, traffic light should be placed from any diverting route or road marking.

The Contractor should consider the environmental and social impacts of the traffic during construction. It will be sole responsibility of the Contractor to implement a plan which produces minimum nuisance to the local people and to the environment. Safety of the people should be given due importance. It will be under Contractor obligation to notify the traffic management plan and its later changes to CSC, RUDA, emergency services and Traffic Police, and also publish weekly programme in the local newspaper.

**ANNEX-VII  
EMERGENCY RESPONSE PLAN**

## **GUIDELINE EMERGENCY PREPAREDNESS AND RESPONSE PLAN**

### **1.1 PURPOSE**

The purpose of this Emergency Response Procedure is to provide measures and guidance for the establishment and implementation of emergency preparedness plans for the project. The aim of the Emergency Response Procedure is to:

- i. Ensure all personnel and visitors to the office/job sites are given the maximum protection from unforeseen events.
- ii. Ensure all personnel are aware of the importance of this procedure to protection of life and property.

### **1.2 EMERGENCY PREPARATION AND RESPONSE MEASURE SCOPE**

The emergency management program is applied to all Project elements and intended for use throughout the Project life cycle. The following are some emergencies that may require coordinated response.

- i. Construction Accident
- ii. Road & Traffic Accident
- iii. Hazardous material spills
- iv. Structure collapse or failure
- v. Trauma or serious illness
- vi. Sabotage
- vii. Fire
- viii. Environmental Pollution
- ix. Loss of person
- x. Community Accident

### **1.3 RESPONSIBILITIES**

The detailed roles and responsibilities of certain key members of the Emergency Response team available to assist in emergency are provided in **Table 1** below.

**Table 1: Emergency Response Team**

<b>Action Group</b>	<b>Responsibility</b>
Emergency Coordinator	<ul style="list-style-type: none"><li>▪ Overall control of personnel and resources.</li><li>▪ The Emergency Coordinator will support and advise the Site Safety Supervision as necessary.</li><li>▪ Serves as public relations spokes persons, or delegates to some staff member the responsibility for working with news media regarding any disaster or emergency. Also assure proper coordination of news release with appropriate corporate staff or other designated people.</li></ul>
Site Safety Supervision (Emergency Commander)	<ul style="list-style-type: none"><li>▪ Overall responsibility for activating emergency plan and for terminating emergency actions.</li><li>▪ Be alternative of emergency response chairpersons.</li><li>▪ Disseminates warnings and information as required to ensure all people in the immediate area have been warned and evacuated either by alarms or by word of mouth.</li><li>▪ Supervise the actions of the Emergency Response Team to ensure all persons are safe from the danger.</li><li>▪ Notify outside authorities if assistance is required.</li><li>▪ Carries the responsibility for coordinating actions including other organizations in accordance with the needs of the situation.</li></ul>

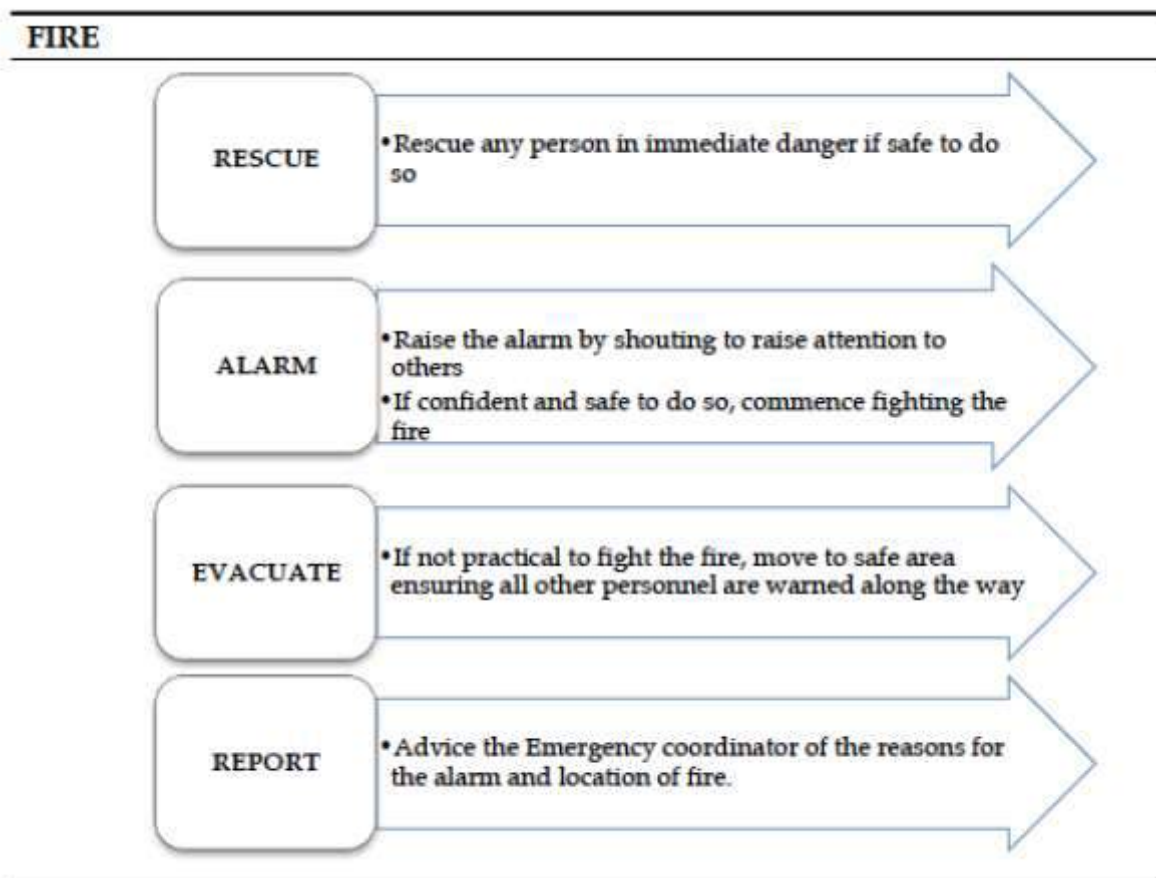
Action Group	Responsibility
	<ul style="list-style-type: none"> <li>▪ Ensure maximum co-operation and assistance is provided to any outside groups called to respond to an emergency.</li> <li>▪ Establish and appoint all emergency organization structure and team.</li> <li>▪ Assures adequate delegation of responsibilities for all key positions of assistants on the Project to assist with any foreseeable emergency.</li> <li>▪ Ensure resources available to purchase needed emergency response equipment and supplies.</li> <li>▪ Assures that all persons on the Emergency Response Team aware and fully understand their individual responsibilities for implementing and supporting the emergency plan.</li> <li>▪ Establish the emergency drill schedule of all identified emergency scenarios, track the status and evaluate the emergency.</li> <li>▪ The Emergency Commander shall ensure that senior management personnel have been reported of the emergency as soon as practical after the event.</li> </ul>
Security Team	<ul style="list-style-type: none"> <li>▪ Ensure that the exit route is regularly tested and maintained in good working order.</li> <li>▪ Maintain station at the security gate or most suitable location to secure the area during any emergency such that only authorized personnel and equipment may enter, prevent access to the site of unauthorized personnel.</li> <li>▪ Assist with strong/activation of services during an emergency.</li> <li>▪ Ensure vehicles and obstructions are moved to give incoming emergency vehicles access to the scene, if ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct any incoming emergency service to the site of emergency.</li> </ul>
Rescue & Medical Team	<ul style="list-style-type: none"> <li>▪ Protect the injured from further danger and weather.</li> <li>▪ Provide treatment to the victim(s) to the best of their ability by first aid and then transfer to hospital.</li> <li>▪ Remain familiar with the rescue activities and rescue apparatus.</li> <li>▪ Assist outside medical services personnel when they arrive</li> </ul>
General Administration Team	Response to support any requested general facilities for assisting Emergency Response Team in their work.
Government Relation Team	<ul style="list-style-type: none"> <li>▪ Coordinate with local government on a matter of concerned in the emergency response plan to liaise with local officers in their affair for support Emergency Response Team.</li> <li>▪ Coordinate emergency plan with the government authorities, local community.</li> </ul>
Environment Team	In case of emergency related to the environmental pollution such as the chemical spill, oil spill into the ambient, the environment team will support the technical advice to control and mitigate the pollution until return to the normal situation.
Department Heads	<ul style="list-style-type: none"> <li>▪ Call up of personnel into the safe location for protective life and property.</li> <li>▪ Take immediate and appropriate action while Emergency Response Team is being mobilized.</li> <li>▪ Keep in touch with the Emergency Commander</li> <li>▪ Control and supervise operators and contractors on the implementation of this procedure, with consultation with Safety Team as necessary.</li> <li>▪ Provide and maintain emergency equipment of their responsible areas.</li> </ul>

Action Group	Responsibility
Other Staff and Employees	<ul style="list-style-type: none"> <li>▪ All other staff and employees will remain at their workstations or assembly point unless directed otherwise from Emergency Response Team.</li> <li>▪ Each supervisor will ensure that all members of his work group are accounted for and keep in touch with each of their Department Head.</li> </ul>

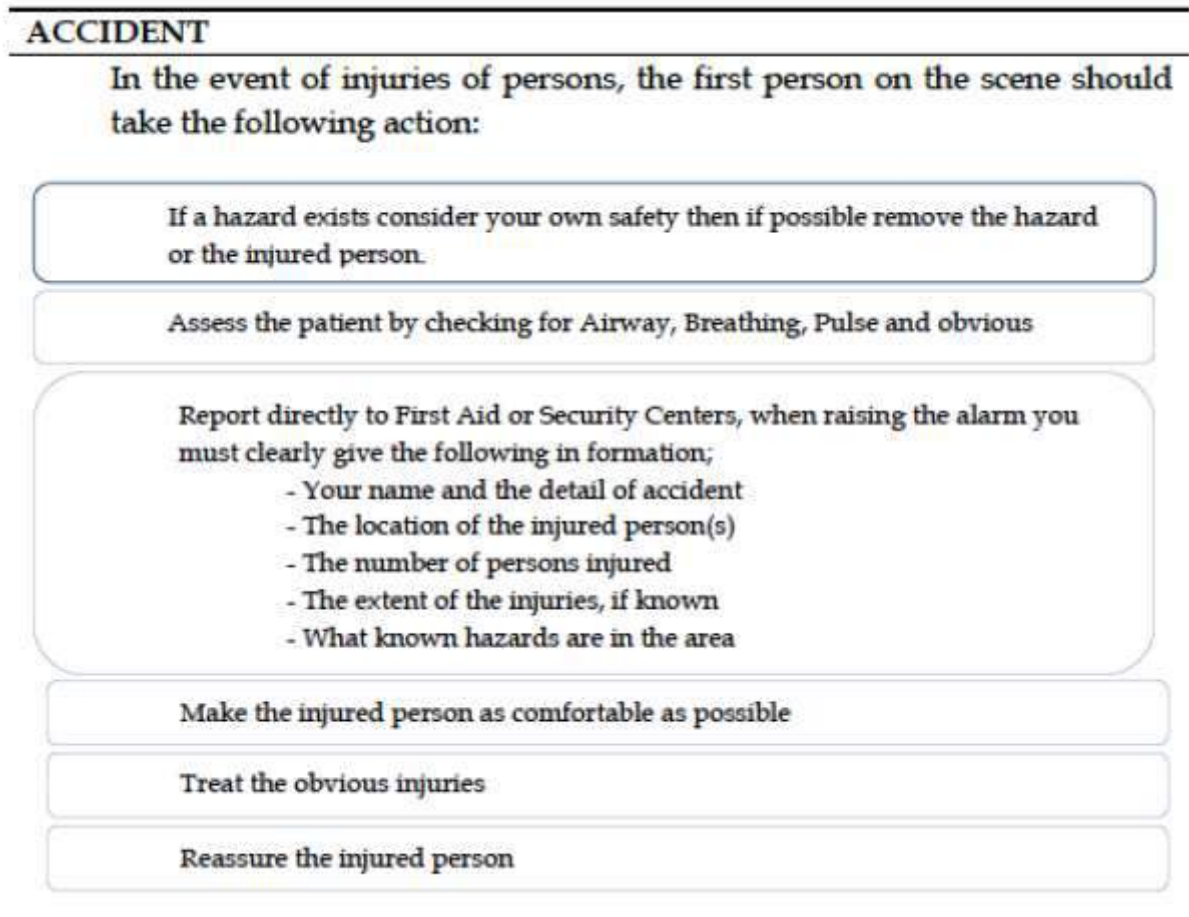
#### 1.4 PROCEDURE

Emergency situation and injuries to person can occur at any time or place either on Project site or elsewhere. The most two common types of emergencies on site are fire and serious accident.

**Figure 3.1 Emergency Procedures for Fire**



**Figure 3.2 Emergency Procedures for Serious Accident**



### **3.5 COMMUNICATION WITH AUTHORITIES / PRESS AT SITE**

In the event of an accident or incident, only senior staff is permitted to give factual information to the authorities for resource of liability exposure. The press must be avoided politely, at all costs, with the terse comment that “the matter is under investigation and relevant information when available will be provided by our Head Office” Do not ever give your opinion or story.

### **1.5 FIRST AID PERSONS**

Upon advice of medical emergency, make immediate assessment to response required and if necessary, advise security to summon ambulance or medical assistance, the qualified first aid attendant should also,

- Provide treatment to the victim(s) to the best of his/her ability.
- Ensure the safety of victims by ceasing any work activity in the area.
- Protect the injured from further danger and weather.
- Assist medical services personnel when they arrive.

### **1.6 GENERAL ADMINISTRATION TEAM**

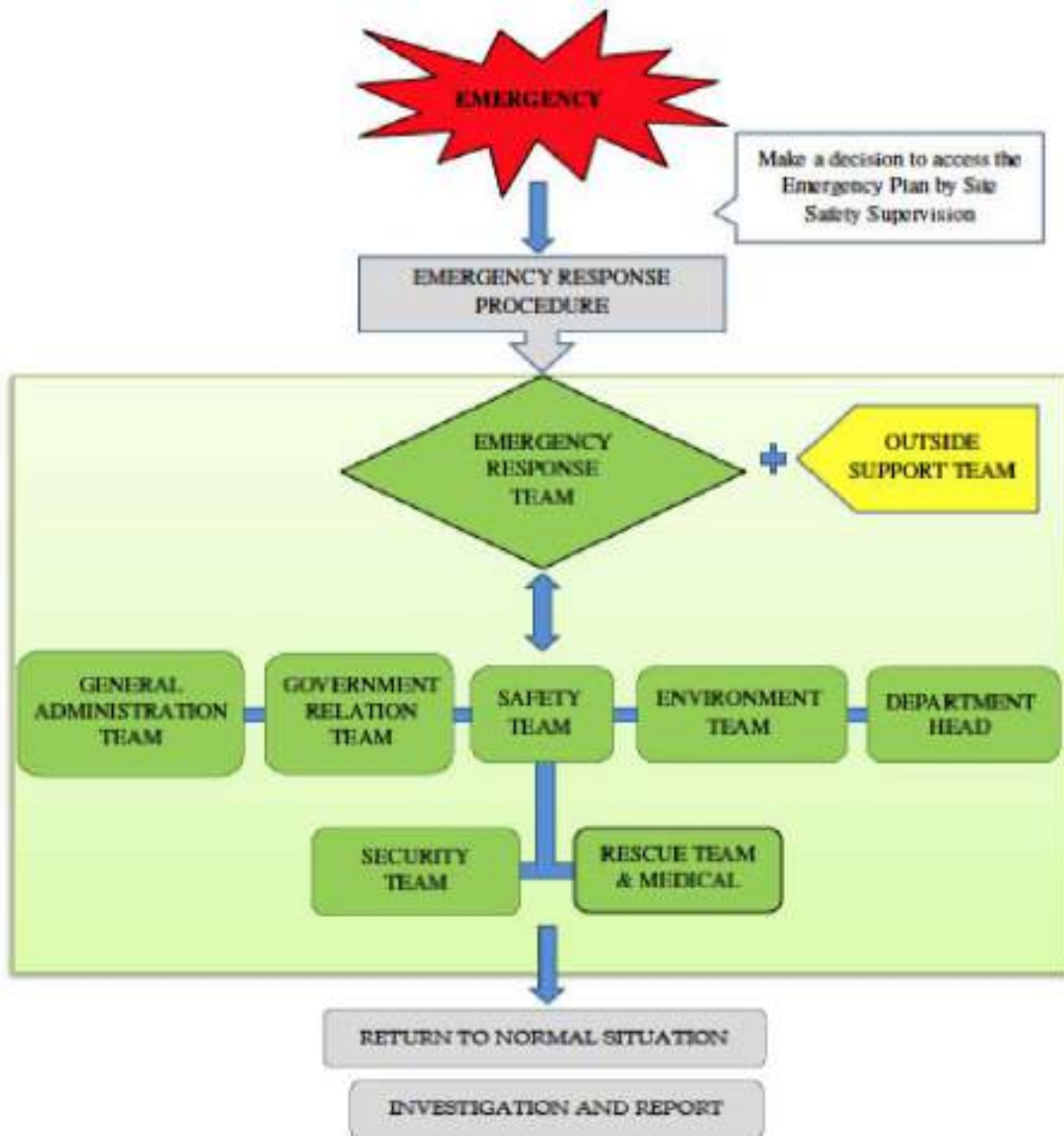
Upon advice of medical emergency, maintain contact with first aid personnel and summon ambulance if required.

## 1.7 SECURITY TEAM

- If ambulance or emergency services are attending the site, ensure clear access and personnel are located to direct vehicle closest to the scene.
- Prevent access to the site of unauthorized personnel (press, etc.).

## 1.8 EMERGENCY COORDINATOR

- The Emergency Coordinator shall assist emergency personnel at the scene as required through allocation of company resources.
- The Emergency Coordinator shall ensure next-of-kin are properly notified as soon as possible and give whatever company support and assistance is necessary to assist them bundle the situation
- The Emergency Coordinator shall ensure that senior management personnel are advised of the emergency as soon as practical after the event.



Note: Name of contact person and call number from Owner/Contractor to be determined.

## 1.9 INCIDENT AND ACCIDENT REPORT

Section A: Identification Data									
Report No:	Date of Reported:			Reporter:	Sign:				
Job Title:				Company Name:					
Section B: Violence Rate									
Accident Violence: <input type="checkbox"/> 01-Death <input type="checkbox"/> 02-Serious Injury <input type="checkbox"/> 03-Lost Time Injury <input type="checkbox"/> 04-First Aid <input type="checkbox"/> 05- Not Injury <input type="checkbox"/> 06-Near Miss									
Property Damage Cost: <input type="checkbox"/> 1-2,000 USD <input type="checkbox"/> 2,001-10,000 USD <input type="checkbox"/> 10,001-50,000 <input type="checkbox"/> > 50,001									
Section C: Environmental Impact									
Affected area	<input type="checkbox"/> Construction area		<input type="checkbox"/> Public area						
Receptor	<input type="checkbox"/> None		<input type="checkbox"/> Workers		<input type="checkbox"/> Community				
Type of pollution	<input type="checkbox"/> Physical		<input type="checkbox"/> Chemical		<input type="checkbox"/> Biological				
Toxicity	<input type="checkbox"/> Non-toxic		<input type="checkbox"/> Low - toxic		<input type="checkbox"/> High - toxic				
Return to Normal	<input type="checkbox"/> 1 day		<input type="checkbox"/> 1 day to 1 week		<input type="checkbox"/> ≥ 1 week				
Cumulative impact	<input type="checkbox"/> Non-cumulative		<input type="checkbox"/> Cumulative						
Section D: Injured/Illness Employee									
1.Name:		Sex:	Date of Birth:			Age:	Regular Job Title:	Experience:	
		<input type="checkbox"/> Male <input type="checkbox"/> Female	Month	Day	Year			In this job title	In this Project
								Years Weeks	Years Weeks
Site:	Company:		Reference:			Phone No:		Social Security Number:	
Part of Body Injured or Affected:					Nature of Injury or Illness:				
<input type="checkbox"/> Head	<input type="checkbox"/> Hands	<input type="checkbox"/> Face	<input type="checkbox"/> Nose	<input type="checkbox"/> Laceration	<input type="checkbox"/> Amputation	<input type="checkbox"/> Puncture	<input type="checkbox"/> Fracture		
<input type="checkbox"/> Eyes	<input type="checkbox"/> Legs	<input type="checkbox"/> Teeth	<input type="checkbox"/> Neck	<input type="checkbox"/> Strain & Sprain	<input type="checkbox"/> Burns	<input type="checkbox"/> Contusion	<input type="checkbox"/> Dry Heat Friction		
<input type="checkbox"/> Trunk	<input type="checkbox"/> Toes	<input type="checkbox"/> Elbow	<input type="checkbox"/> Shoulder	<input type="checkbox"/> Hematoma	<input type="checkbox"/> Foreign Body	<input type="checkbox"/> Chemical	<input type="checkbox"/> Contamination		
<input type="checkbox"/> Back	<input type="checkbox"/> Ankle	<input type="checkbox"/> Wrist	<input type="checkbox"/> Foot	<input type="checkbox"/> Skin (Occupational)	<input type="checkbox"/> Rash	<input type="checkbox"/> Irritation			
<input type="checkbox"/> Arms	<input type="checkbox"/> Thumb	<input type="checkbox"/> Fingers	<input type="checkbox"/> Internal	Remark: .....					
2.Name:		Sex:	Date of Birth:			Age:	Regular Job Title:	Experience:	
		<input type="checkbox"/> Male <input type="checkbox"/> Female	Month	Day	Year			In this job title	In this Project
								Years Weeks	Years Weeks
Site:	Company:		Reference:			Phone No:		Social Security Number:	
Part of Body Injured or Affected:					Nature of Injury or Illness:				
<input type="checkbox"/> Head	<input type="checkbox"/> Hands	<input type="checkbox"/> Face	<input type="checkbox"/> Nose	<input type="checkbox"/> Laceration	<input type="checkbox"/> Amputation	<input type="checkbox"/> Puncture	<input type="checkbox"/> Fracture		
<input type="checkbox"/> Eyes	<input type="checkbox"/> Legs	<input type="checkbox"/> Teeth	<input type="checkbox"/> Neck	<input type="checkbox"/> Strain & Sprain	<input type="checkbox"/> Burns	<input type="checkbox"/> Contusion	<input type="checkbox"/> Dry Heat Friction		
<input type="checkbox"/> Trunk	<input type="checkbox"/> Toes	<input type="checkbox"/> Elbow	<input type="checkbox"/> Shoulder	<input type="checkbox"/> Hematoma	<input type="checkbox"/> Foreign Body	<input type="checkbox"/> Contamination	<input type="checkbox"/> Chemical		
<input type="checkbox"/> Back	<input type="checkbox"/> Ankle	<input type="checkbox"/> Wrist	<input type="checkbox"/> Foot	<input type="checkbox"/> Skin (Occupational)	<input type="checkbox"/> Rash	<input type="checkbox"/> Irritation			
<input type="checkbox"/> Arms	<input type="checkbox"/> Thumb	<input type="checkbox"/> Fingers	<input type="checkbox"/> Internal	Remark: .....					
Section E: Accidents/Incident Details									
Date Accident/Incident Occurred:				Time Accident/Incident Occurred:				Exact Location of the Accident / Incident:	

Details of the actual Job Being done at the time:		
Details of Accident / Incident / What actually happened?		
<b>Section F: Accident Cause (Basic cause mark X / Contributing cause, if any mark O)</b>		
<b>UNSAFE CONDITIONS</b>	<b>UNSAFE ACTS</b>	
1 <input type="checkbox"/> Inadequately Guarded	1 <input type="checkbox"/> Operating Without Authority / Training	
2 <input type="checkbox"/> Unguarded	2 <input type="checkbox"/> Operating at Unsafe Speed	
3 <input type="checkbox"/> Defective Tools, Equipment, or Substance	3 <input type="checkbox"/> Marking SHB Device Inoperative	
4 <input type="checkbox"/> Unsafe Design or Construction	4 <input type="checkbox"/> Using Unsafe Equipment or Equipment Unsafely	
5 <input type="checkbox"/> Hazardous Arrangement	5 <input type="checkbox"/> Unsafe Loading, Placing, Mixing	
6 <input type="checkbox"/> Unsafe Illumination	6 <input type="checkbox"/> Taking Unsafe Position	
7 <input type="checkbox"/> Unsafe Ventilation	7 <input type="checkbox"/> Working on Moving or Dangerous Equipment	
8 <input type="checkbox"/> Unsafe Clothing	8 <input type="checkbox"/> Distraction, Teasing, Horse Play	
9 <input type="checkbox"/> Insufficient Instruction	9 <input type="checkbox"/> Failure to use Personal Protective Devices	
10 <input type="checkbox"/> Lack of system of work	10 <input type="checkbox"/> Lack of effective instruction or supervision	
Why was the unsafe act committed? _____	Why did the unsafe condition exist? _____	
<b>Section G: Guide to Corrective Action (Base on the cause checked above, I am taking the following corrective action)</b>		
<b>UNSAFE ACT</b>	<b>UNSAFE CONDITION</b>	<b>If Supervisor can't handle, then recommend to</b>
<input type="checkbox"/> Stop the Behaviour	<input type="checkbox"/> Remove	<input type="checkbox"/> Site Engineer, or
<input type="checkbox"/> Study the job	<input type="checkbox"/> Guard	<input type="checkbox"/> Site Manager, or
<input type="checkbox"/> Instruct (tell-show-try-check)	<input type="checkbox"/> Warn	<input type="checkbox"/> Project Manager, or
<input type="checkbox"/> Follow Up	<input type="checkbox"/> Supervisory Training	<input type="checkbox"/> Safety Committee
<input type="checkbox"/> Enforce		
Detail below any immediate remedial actions that have been taken:		
Detail below any corrective and preventative actions that could be taken to prevent future re-occurrence:	Responsible	Completion Date

Section H: Witness Statement			
Witness Name		Interviewer Name	
Section I: Reviewed & Recommend by			
Recommendation:			
Reviewed By:	Position:	Signature:	Date:
<b>Remarks :</b> If Accident or Incident happened with lost time injury and affected to the publicity must further report to Safety Department; : First Aid Cases will not applicable to this form; : The accident report shall submit to Safety Department within 3 days : Attached the photograph or sketch the location of accident / incident;			

### 1.10 SUGGESTED CONTENTS OF EPRP

The Contractor should prepare the EPRP based on the guidelines provided in the above sections. The suggested structure of the EPRP is listed below:

1. Purpose
2. Applicable Scope
3. Preparation Basis
4. Emergency Response System
  - 4.1 Generals
  - 4.2 Emergency Response System
  - 4.3 Responsibilities
5. Major Safety Risks
6. Precautionary Measures
  - 6.1 Training and Exercise
  - 6.2 Hazard Source Monitor
  - 6.3 Alert Action
  - 6.4 Management Measures
7. Control Measures
  - 7.1 Response
  - 7.2 Response Procedures
  - 7.3 Emergency Response
  - 7.4 Emergency Completion and Restoration
8. Emergency Response Report and Settlement
9. Supporting Measures
  - 9.1 Communication
  - 9.2 Emergency Team
  - 9.3 Funding for Emergency
  - 9.4 Provisions and Resources
10. Records

**ANNEX-VIII  
CHANCE FIND PROCEDURE**

# **ARCHAEOLOGICAL ‘CHANCE FIND’ PROCEDURE**

## **1. BACKGROUND**

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

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

## **2. POTENTIAL IMPACTS TO ARCHAEOLOGICAL SITES**

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

## **3. RELEVANT LEGISLATION**

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

## **4. REMEDIES AND PENALTIES**

The Antiquities Act, 1975 provides for heritage inspection or investigation orders, temporary protection orders, civil remedies and penalties to limit contraventions. These powers provide:

“A contravention of any provision of this Act or the rules shall, where no punishment has been specifically provided be punishable with rigorous imprisonment for a term which may extend to two years, or with fine up to rupees ten hundred thousand, or with both. ”

## **5. ARCHAEOLOGICAL ‘CHANCE FIND’ PROCEDURE**

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

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

- i. Workers will be trained in the location of heritage zones within the construction area and in the identification of potential items of heritage significance.
- ii. Should any potential items be located, the site supervisor will be immediately contacted and work will be temporarily stopped in that area.

- iii. If the site supervisor determines that the item is of potential significance, an officer from the Department of Archaeology (DoA) will be invited to inspect the site and work will be stopped until DoA has responded to this invitation.
- iv. Work will not re-commence in this location until agreement has been reached
- v. between DoA and NTDC as to any required mitigation measures, which may include excavation and recovery of the item.
- vi. A precautionary approach will be adopted in the application of these procedures.

## **6. DETAILED PROCEDURAL STEPS**

- If the Director, department of Archaeology receives any information or otherwise has the knowledge of the discovery or existence of an antiquity of which there is no owner, he shall, after satisfying himself as to the correctness of the information or knowledge, take such steps with the approval of the Government, as he may consider necessary for the custody, preservation and protection of the antiquity.
- Whoever discovers, or finds accidentally, any movable antiquity shall inform forth with the Directorate within seven days of its being discovered or found.
- If, within seven days of his being informed, the Director decides to take over the antiquity for purposes of custody, preservation and protection, the person discovering or finding it shall hand it over to the Director or a person authorized by him in writing.
- Where the Director decides to take over an antiquity, he may pay to the person by whom it is handed over to him such cash reward as may be decided in consultation with the Advisory Committee.
- If any person, who discovers or finds any movable antiquity contravenes the provisions of the Act, he shall be punishable with imprisonment for a term which may extend to five (05) years, or with fine not less than fifteen hundred thousand rupees or with both and the Court convicting such person shall direct that the antiquity in respect of which such contravention has taken place shall stand forfeited to Government.
- The Director or any officer authorized by him with police assistance may, after giving reasonable notice, enter into, inspect and examine any premises, place or area which or the sub-soil of which he may have reason to believe to be, or to contain an antiquity and may cause any site, building, object or any antiquity or the remains of any antiquity in such premises, place or area to be photographed, copied or reproduced by any process suitable for the purpose.
- The owner or occupier of the premises, place or area shall afford all reasonable opportunity and assistance to the Director.
- No photograph, copy of reproduction taken or made shall be sold or offered for sale except by or with the consent of the owner of the object of which the photograph, copy or the reproduction has been taken or made.
- Where substantial damage is caused to any property as a result of the inspection, the Director shall pay to the owner thereof reasonable compensation for the damage in consultation with the Advisory Committee.
- If the Director after conducting an inquiry, has reasonable grounds to believe that any land contains any antiquity, he may approach the Government to direct the Revenue Department to acquire such land or any part thereof and the Revenue Department shall thereupon acquire such land or part under the Land Acquisition Act, 1894 (I of 1894), as for a public purpose.

**ANNEX-IX  
TREE PLANTATION PLAN**

## **TREE PLANTATION PLAN**

The basic purpose of afforestation/plantation of suitable species in the Project area is to reduce the risk made due to the cutting of trees for the proposed Project. The risk made will be compensated by the planting of saplings to enhance green cover and improve the overall environment of the area. Afforestation will not only reduce the risk being made but will also increase the carrying capacity of the area regarding many positive aspects.

It is pertinent to mention that 100 trees may be impacted on site, which is recommended for compensation and cutting should be avoided up to the maximum. Plantation will be done after the construction work immediately. Plantation of indigenous tree species is highly important to maintain biodiversity and ecological balance. It is also important to prevent global warming, soil erosion, and pollution. Afforestation purifies the environment and helps in reducing the carbon dioxide level. Along with the importance of construction, the afforestation activity will further help in enhancing the socio-economic condition of the area and project sustainability.

### **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 ecosystems in which they reside.
- Trees absorb and store rainwater which reduces runoff and sediment deposit after storms. This helps the groundwater 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.

### **OBJECTIVES**

- To Restore native species
- To improve the quality of air and reduce its pollution
- To add color to the landscape and enhance 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 has a positive impact on the project area.
- To reduce sedimentation by plantation in the project area which will act as a protection wall against wind-born dust particles.

## AREA ENHANCEMENT PLAN

Plants will be raised along the nearby available area or roads. Total number of plants to be planted is **1000** Number for this Project.

*\*The concerned Authority may update the standards of planting and choice of species as per the actual requirements and site suitability.*

## TREES RECOMMENDED

**Table-1** shows the recommended trees for afforestation for the Project.

**Table-1: Recommended Trees for Plantation**

Sr. No.	Local/English Name	Scientific Name
1.	Neem	<i>Azadirachta indica</i>
2.	Sukh Chain	<i>Pongamia pinnata</i>
3.	Jaman	<i>Eugenia jambolina</i>
4.	Kachnar	<i>Bauhinia variegata</i>

## 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:

### FIRST YEAR

Sr. No.	Item	Quantity	Rate	Amount (PKR)
1.	Layout	1 Av.km	2 MD/Av.km	3,000.00
2.	Digging of Pits 2.5 ft. each 2.5x250 = 625 cft.	625 cft.	5 MD/Av.km	7,500.00
3.	Cost of Plants including	250 No.	Rs100/- plant	25,000.00
4.	Cost of planting of plants	250 No.	Rs. 25/- plant	6,250.00
5.	Carriage of plants from private nursery to site including loading/unloading	250 No.	Rs. 10/- plant	2,500.00
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
<b>Total</b>				<b>200,000.00</b>

## **SECOND YEAR**

<b>Sr. No.</b>	<b>Item</b>	<b>Quantity</b>	<b>Rate</b>	<b>Amount (PKR)</b>
1.	Cost of Plants 20% Restocking	50 No.	Rs.100/- plant	5,000.00
2.	Cost of planting	50 No.	Rs. 25/- plant	1,250.00
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			1,250.00
<b>Total</b>				<b>1,38,000.00</b>

## **THIRD YEAR**

<b>Sr. No.</b>	<b>Item</b>	<b>Quantity</b>	<b>Rate</b>	<b>Amount (PKR)</b>
1.	Cost of Plants 10% Restocking 25 No.	25 No.	Rs.100/- plant	2,500.00
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	75,000.00
5.	Reopening of Pits twice (250x2)	500	5MD/per %0	3,750.00
6.	Unforeseen			2,875.00
<b>Total</b>				<b>85,000.00</b>

## **FOURTH YEAR**

<b>Sr. No.</b>	<b>Item</b>	<b>Quantity</b>	<b>Rate</b>	<b>Amount (PKR)</b>
1.	H/watering 30 times	7500 no.	5MD/per %0	56,250.00
2.	Pruning and cleaning of plants	250 no.	5MD/per %0	1,875.00
3.	Unforeseen			1,875.00
<b>Total</b>				<b>60,000.00</b>

\*Cost for raising 1 Av. Km and Maintenance or 250 plants in single row: = **PKR. 483,000/-**

**For 4 years cost of 1000 Plants = PKR 1,932,000 Total.**

*\*The above calculations and standards are approximate and tentative provided based on available data which may be updated by the implementing agency as per actual, during implementation.*

**ANNEX-X  
BREAKUP OF HEALTH AND SAFETY COST**

## BREAKUP OF HEALTH AND SAFETY COST

Items	Quantity	Cost / Item (Rs.)	Total Cost (Rs.)	Rationale
<b>(A) Personal Protective Equipment's PPEs</b>				
Dust masks	3,600	50	180,000	One dust mask to be used in a week by each labourer for 6 months and for 24 weeks the quantity will be 3,600 dust masks.
Safety Shoes	300	3,500	1,050,000	Two safety shoes are supposed to be used for 6 months by each labourer and for 150 labourers for 6 months construction period it is estimated to be 300
Gloves	300	500	150,000	Two pairs of gloves is to be used by each labourer for 6 months and 300 gloves are estimated to be used by 150 labourers.
First Aid Box	6	3,000	18,000	One First Aid Box is proposed for 25 labourers and for 150 labourers 6 aid boxes are estimated.
Ear Plugs	3,600	100	360,000	One set of ear plug to be used for a week by each labourer and for 24 weeks (6 months) it is estimated to be 3,600 for 150 labourers.
Safety Helmets	300	1,000	300,000	Two safety helmets are to be used by each labourer for 6 months and for 150 labourers 300 safety helmets are estimated.
Safety Jackets (Hi Vis)	300	1,000	300,000	Two safety Jacket (Hi Vis) to be used by each labourer for 6 months and 300 safety Jackets are estimated to be used by 150 labourers.
<b>Sub-Total (A)</b>			<b>2,358,000</b>	
<b>(B) Others</b>				
Provision of Dust Bins	10	700	7,000	Ten dust bins are proposed to be placed at construction site for the whole construction period.
Warning Tape	30	500	15,000	---
Safety Cones	40	800	32,000	40 safety cones are estimated to be placed at active construction sites.
Safety Sign Boards	15	1,000	15,000	15 safety sign boards are proposed to be placed at active construction sites.
<b>Sub-Total (B)</b>			<b>69,000</b>	
<b>Grand Total (A + B)</b>			<b>2,427,000</b>	

Time required for Construction = 6 Months

No. of labour required during construction = 150