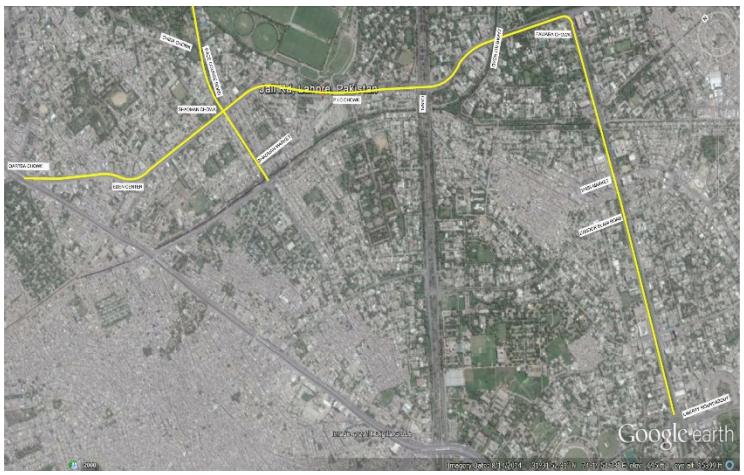
Lahore Development Authority
Lahore

Construction of Signal Free Corridors
Jail Road & Main Boulevard Gulberg
Lahore



Environmental Impact Assessment (EIA)
Report

Jan-2015

ASIAN

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List of Abbreviations

Nr.	Abbreviation	Description
1	CC	Construction Contractor
2	CO	Carbon Monoxide
3	EA	Executing Agency
4	EIA	Environmental Impact Assessment
5	EMMC	Environmental Management and Monitoring Committee
6	EPD	Environmental Protection Department
7	EPA	Environmental Protection Agency
8	HC	Hydrocarbons
9	IEE	Initial Environmental Examination
10	LDA	Lahore Development Authority
11	LAA	Land Acquisition Act
12	LACU	Land Acquisition and Compensation Unit
13	NEQS	National Environmental Quality Standards
14	PAP's	Project Affected Persons
15	PEPA	Pakistan Environmental Protection Agency
16	PEPC	Pakistan Environmental Protection Council
17	PHA	Parks and Horticulture Authority
18	TEPA	Traffic Engineering and Planning Agency
19	WAPDA	Water and Power Development Authority
20	WHO	World Health Organization

References

1.	Census Reports of Punjab/Lahore District
2.	Environmental Impact Assessment-Improvement of Canal Bank Roads and Extension of Maulana Shaukat Ali Roads, Lahore
3.	Lahore Master Plan-2030
4.	Pakistan Environmental Protection Act, 1997 and subsequent additions-supplements
5.	PC-1 / Project Cost Estimates of the proposed Project
6.	Transport Master Plan for Lahore-2030

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2	**Annexure-4.2** Emissions from the Motorized Vehicles
3	**Annexure-7.1** Check List Parameters-Construction Stage& Operation Stage
4	**Annexure-7.2** Emissions from the Motorized Vehicles-Present & Future
5	**Annexure-7.3** Environmental Mitigation Plan
6	**Appendix-A** The World Bank's Operational Manual OP 4.01 for Environmental Assessment
7	**Appendix-B** • Pakistan Environmental Protection Act (PEPA), 1997 • National Environmental Quality Standards (NEQS) • Revised National Environmental Quality Standards (RNEQS) • Schedules

EXECUTIVE SUMMARY

1. General

The Lahore Development Authority, Lahore intends to improve upon the roads and crossings along route from Qartaba Chowk to Fawara Chowk in Gulberg to Liberty Market Roundabout and has appointed Asian Consulting Engineers (AsCE), Lahore as Consultants for rendering services towards preparation of Environment Impact Assessment of the said project.

The main objectives of the study were to establish baseline environmental conditions, identify potential impacts and suggest suitable mitigation measures for the execution of the proposed project. This study has been accomplished in line with the provisions – guidelines and directives of Pakistan /Punjab Environmental Protection Agency with stipulations and practices formulated by the Federal Environmental Protection Agency Pakistan and as prescribed in the "Pakistan Environmental Assessment Procedures."

The proposed signal free corridor is located in the hub of the city accommodating best educational, health facilitation centres and business hub areas. The main objective of the construction of signal free corridors is to facilitate the commuters so that they will get rid of long queues and traffic jams at junctions/crossings. The project commences from Qartaba Chowk and ends at Liberty Roundabout in Gulberg, components include:

- Improvement of Shadman Chowk-Provision of Underpass
- Improvement of PIC Chowk
- Improvement of Canal Road crossing
- Improvement of Zafar Ali Road crossing
- Improvement of Fawara Chowk-Provision of Underpass
- Improvement of Main Market Chowk
- Improvement of Zahoor Elahi Chowk

The cost of the project has been estimated as Rs. 1,520.63 million. The project life is assessed as 100-years for concrete structures and 25-years for road pavements when the same will be rehabilitated.

2. Environmental Baseline Data

2.1 Geography

The project area lies in a location which is built-up environment or green belts on outer side of the road pavements. The green belts are duly land-scaped generally of soft landscape i.e. grassing, plantation and other plants, flowers, etc.

The project lies partly in Gulberg Town, and Data Gunj Baksh Town of the Lahore City District.

The geotechnical properties and mineralogical composition of the soil, das established during various studies / boring of tube wells for water supply by WASA/LDA confirm that the Lahore soil is composed of silty clay. The major mineral composition for Lahore soil is Quartz, Muscovite and Clinochlore, which shows that the alluvial deposit received sediments from metamorphic origin.

2.2 Climatology

The average annual temperature in Lahore is fairly hot at 24.3 degrees Celsius (75.7 degrees Fahrenheit) and there is a range of average monthly temperatures of 21.1 °C (38°F) which is a below moderate range. The average diurnal temperature variation/ range is 15.5 °C (27.9 °F).

The warmest month (June) is very, very hot with an average temperature of 33.9 degrees celcius (93.02 degrees Fahrenheit). The coolest month (January) is mild having an average temperature of 12.8 degrees celcius (55.04 degrees Fahrenheit).

Annual average sunshine is for 8.4 hours/ day. January has the minimum sunshine to the tune of 6.9 hours/ day.

The wind characteristics determine that 60% days of the year are calm and 33% days have mean speed of 1-3 knots. Only 6% days exhibit speed of 4-6 knots and higher. Wind directions are from north-west and south-east during summer and winter respectively.

Lahore mainly receives its rainfall during the monsoon season from June till September, and in winter season from December till February. The highest-ever annual rainfall in Lahore was recorded in 1955 when 1,317.5 millimetres (51.87 in) of rainfall was recorded. Lahore received below normal rains in 2009, and normal rains in 2007 and 2010.

The evapotranspiration is rapid in warmer periods of April-August and at times it is more than 70%.

The city / project site receives moderate dust storms both in terms of intensity and frequency.

On the average, the humidity is about 77% in the morning and is above 40% in the evening. The average annual relative humidity is 37.9% and average monthly relative humidity ranges from 20% in May to 58% in August.

2.3 Air Quality

The quality of air prevalent in the project area has been determined. For the purpose, four locations i.e. Qartaba Chowk, Shadman Chowk, Fawara Chowk, and Liberty Roundabout have been selected. The air quality determined is well below the prescribed limits for Nitrogen Oxide, Sulphur Dioxide, and Carbon Mono Oxide. However particulate matter is just approaching the prescribed limit of 150 ug/m^3 for 24-hours particularly the situation is critical at Qartaba Chowk.

2.4 Noise Level

The noise level at the selected location i.e. Qartaba Chowk, Shadman Chowk, Fawara Chowk, and Liberty Roundabout is determined as under:

N	Location	Min. Noise Lev	Max. Noise Lev	Prescribed I
1	Liberty Roundabout	68.2(0300 hours)	74.6(1900 hours)	85
2	Fowara Chowk	68.3(0300 hours)	74.4(2100 hours)	85
3	Shadman Chowk	68.5(1000 hours)	74.6(0400 hours)	85
4	Qartaba Chowk	73.4(0300 hours)	81.3(1600 hours)	85

2.5 Surface and Ground Water

No river exist in the vicinity; however, storm water drains (Cantt Drain) cross the proposed corridor for disposal into the Ravi River. River Ravi receives almost all the municipal/ industrial wastes from the city of Lahore. The potential value as a recreational water body and breeding place for fish is threatened by the municipal and industrial pollution.

Ground water quality is fresh (defined as acceptable in terms of its salinity).Raw water abstracted from the deep tube wells is believed to be essentially bacteria free. Groundwater is available at a depth ranging between 15 to 23m below the natural surface level.

The water quality in the upper 50 meters zone of subsoil is generally brackish.

Deep groundwater from a depth of about 200 m in the vicinity of the Project Area is being extracted for meeting the domestic and commercial water demands in nearby areas.

2.6 Flora and Fauna

The diversity and distribution of plant species within the Lahore District depends upon the availability of water and the underlying geology. There are significant numbers of trees in Green Belts – green areas in the vicinity. About 200 trees and 100 plants will be affected due to the proposed project. However, the cut-trees/plants will be replaced by many-folds trees and plants along with adequately land-caped locations.

No endangered species exist in the project area.

2.7 Socio-economic Level

The entire length of the project is surrounded by varying socio-economic level of population; rich communities living in Gulberg and the one in Ichra-its vicinity describe such variations.

Pakistan ranks 144th in UNDP's Human Development Index (HDI), out of total 178 countries. According to UNDP's HDI report, Pakistan faces enormous challenges, including poverty, poor healthcare facilities, illiteracy and a continuously soaring population. The HDI for Lahore is 0.688 whereas this index for Karachi is 0.789

2.8 Cultural and Religious Resources

There are no reported cultural resources in the project etc. In addition, no mosque and other religious place falls within the right of way of the proposed improvement of roads- provision of underpass and improvement of crossings.

2.9 Public Consultation and Disclosure

Public of varying trade and profession and located within or around the project area have been consulted towards implementation of the project; majority of the so consulted favour taking-up the project so as to provide relief to the public.

3. Environmental Impacts

3.1 General

The proposed project almost no negative impact on the existing environment due to the following facts:

i. The trees / plants falling within the right-of-way of the project will be replaced by new plants / trees, therefore the impact of the cutting of trees will be insignificant.

ii. The type of construction involved does not produce any significant negative impacts.

iii. Effect on fauna is negligible.

iv. Since no land acquisition or removal of any settlement is involved, therefore impact of human settlement are almost negligible. A small property in the project location will be duly compensated.

v. The positive impact of enhanced traffic facility thereby reducing the Vehicle Operating Costs (VOC) and time savings will go a long way towards improving long-term economic activity.

vi. No significant negative impacts are foreseen during operation stage of the Project rather a decrease in Vehicular Emission is foreseen with the construction of the project.

3.2 Possible Negative Impacts

The likely negative impacts that are likely to be involved include:

i. Only a small public property measuring 15,500 sq.ft. is to be compensated and dismantled.

ii. A small piece of land measuring about 28-marlas is to be acquired under the project implementation.

iii. Although the Project involves some significant adverse environmental impacts, those are mostly related to the construction stage of the Project. This Project has been placed in category A i.e. projects having significant adverse environmental impacts. No long-term and significant adverse environmental impacts are however envisaged for the operation stage of the Project. Hence, the proposed project is environmentally feasible provided that the mitigation measures.

iv. During the construction stage, dust and noise level are foreseen to increase, which will require proper mitigation.

v. The trees / plants falling in the right-of-way will be replaced by fresh-newly plants trees of better species. The affected trees and plants are 200 and 100 respectively.

4. Mitigation of Negative Impacts

The likely negative impacts are proposed to be mitigated as under:

i. Upon completion of the project certain pedestrian linkages would be disturbed which will be mitigated through provision of pedestrian bridges, as such the project will take care of this inconvenience to the public and at locations, Overhead Pedestrians will be provided.

ii. In order to mitigate impact of cutting of trees and plants, it is planned to plant fresh trees/plants equal to at least double the species so cut. In addition, proper landscaping of the area will be accomplished. A provision of 6.438 million has already been made in the project cost estimates.

iii. Local persons should be preferred in jobs of the construction activities. The procedure so adopted will provide compensation to workers/vendors presently earning livelihood while locating their business along the corridor.

iv. Some of the negative impacts during construction activity including dust issues, emissions from the heavy machinery deployed by the Contractor for construction.

v. The Contractor is under obligation to keep the site of works in sanitary way. For the purpose, it is anticipated that at least 50-sanitary workers will be deployed throughout the construction period.

vi. Monitoring of noise, air quality, social problems, and aesthetics is required during construction and operation phases of the project.

5. Environmental Management Plan

Environmental Management Plan has been developed to monitor all the construction and operation activities. The plan so adopted will take into account all the vital and sensitive issues in the project implementation. Lahore development Authority will be responsible for the execution of this plan in coordination with Construction Contractor, Environment Protection Department, Punjab and Parks & Horticulture Authority, Lahore.

6. Cost for Mitigation Measures

The total environmental costs has been estimated as Rs.1.0 million and is included in the project cost, to be borne by the Construction Contractor; cost deemed to be included in other items of works.

7. Project Implementation Feasible in Environment Terms

Construction of the proposed project is environmentally feasible provided that the mitigation measures are properly implemented.

SECTION-1
INTRODUCTION

1.1 General

The Lahore Development Authority (LDA) has planned improvement of roads-crossings along the route as part of traffic improvement in the Metropolis of Lahore. The Government of Punjab (GoPb) initiated a strong commitment to develop and improve the public transport by implementing the first Metro Bus System (MBS) out of three corridors of Lahore Metropolis. The implementation of part of the MBS is helping out of the traffic and transport problems and improve upon the existing corridor.

For upgrading Lahore Public Transport System, the GoPb has initiated MBS on the following three corridors:

Corridor-1: Ferozepur Road (Gajju Matta to Shahdra), 27 km which has since been accomplished and under operation.
Corridor-II: Multan Road (Thokar to MAO College), 13 km
Corridor-III: G.T.Road (from Azadi Chowk to Lahore Ring Road), 13 km.

The proposed project is part of the traffic improvement facilities so far extended and will help reduce traffic congestions along the traffic route.

1.2 Project Components

The project comprises:

- Improvement of Shadman Chowk-Provision of Underpass
- Re-Modelling of Race Course Road
- Re-Modelling of Jail Road
- Re-Modelling of Main Boulevard Road and Underpass at Fawara Chowk
- Improvement of Road Crossings at PIC, Canal, Zafar Ali

The main objectives of this EIA Report are to establish the baseline environmental conditions and to identify potential impacts and suggest suitable mitigation measures for the execution of the proposed project.

The assignment for carrying out EIA for construction of the proposed improvements to roads along the corridor has been assigned by the LDA to Asian Consulting Engineers, Lahore.

1.3 Environmental Impact Assessment (EIA)

1.3.1 General

The primary purpose of EIA is to ensure that the government and/or decision makers are aware of the environmental consequences of a project. The more specific reasons for undertaking the EIA are to:

- show clearly any effects that the development project will have on the environment and the people who use that environment;
- compare alternative options to the complete project, or to the way in which a project will be implemented;
- inform all stakeholders of the findings of the assessment and help with decisions on whether or not the project should be implemented;
- recommend improvements to a project to reduce impacts; and
- help decision-makers learn from experience to make better decisions on future projects.

The real objective of an EIA is sometimes forgotten by individuals and organizations who regard EIAs as merely a procedural requirement, instead of an opportunity to assess the impacts of the project, evaluate project alternatives and consult the stakeholders involved in order to assist them to make an informed decision.

Often EIAs generate large amounts of information, which is not focused enough. For projects involving urban re-development, the true environmental and social - resources are carried out with the involvement of stakeholders.

1.3.2 Need for EIA

According to Pakistan Environmental Protection Act (PEPA, 1997) Appendix-B and its interpretation in Pakistan Environmental Protection Agency's (PEPA) Policy and Procedures for the filing, review and approval of environmental assessments, the present project falls under *Schedule II.* The Schedule A enlists all projects those require an EIA.

1.4 Objectives of the EIA Study

1.4.1 Objectives

The main objective of the EIA study is to assess the environmental impacts likely to occur due to the construction of the roads improvement project, and to suggest mitigation measures to minimize the likely negative impacts.

For achieving the above objectives, the study was mainly divided into following sectors:

- Identification of all requirements as set forth by Pakistan Environmental Protection Act. 1997 and the Guidelines for preparation of EIA reports, etc.
- Study of existing regulatory framework in Pakistan with reference to the developmental projects;
- Study of Guidelines for the preparation of EIA reports;
- Collection and scrutinizing data related to physical, ecological and socio-economic, and physical recourses of the project area;
- Evaluation of data and identification of significant environmental impacts;
- Identification of necessary mitigation measures to minimize the negative impacts; and
- Preparation of an Environmental Management Plan.

1.4.2 Benefits to Society

The end-users / society is also benefited, such as:

- enhanced protection of natural ecosystems, habitats and landscapes;
- more efficient use of resources such as land, water, energy and other natural resources;
- the protection of cultural and archaeological resources;
- reduced risks to human health and safety from accidents and emissions; and
- improved health for employees and human communities.

1.5 Roles and Responsibilities

1.5.1 Executing Agency

The Executive Agency of the project is Lahore Development Authority (LDA) through its Chief Engineer, UD Wing.

1.5.2 Implementation of Mitigation Measures

Mitigation measures shall be implemented through Environment Management Plan, with responsibilities assigned to various departments/ agencies as mentioned in Section –7 of this Report.

1.5.3 Role of Environment Protection Department (EPD) Punjab

The main responsibility of EPD Punjab will be implementing the measures suggested in the Environment Management Plan for the construction-operation phases of the project. They will execute their responsibility in close coordination with the Lahore Development Authority.

1.6 Proposed Procedure

The proposed procedure for carrying out EIA is presented in the under-mentioned part of the report.

1.6.1 Environmental Baseline Data

a. Geography

The reconnaissance of the project site and available data will determine:

- Location of the project and its vicinity;
- General topography of the site;
- Present and potential use of the site;
- Anticipated benefits/losses due to shift in land use;
- Approaches to the site;
- Linkages through road(s) / pedestrian bridges;

- The roadways as well as the structures present in the vicinity of the site and sign of any damage/distress, which could be associated to the weak ground condition; and
- Others.

b. Subsurface Geotechnics

Through data from secondary sources, establish subsurface stratigraphy at the site of the project including:

- Type of soils;
- Presence of obnoxious substances which may affect adversely the foundation and other infrastructure proposed to be developed at the site;
- Others.

c. Drainage

Study drainage pattern of the area including presence of any natural water body or seepage / surface water drain.

d. Climatology

The meteorology of the project site area will be collected to ascertain local climatology including:

- Temperatures;
- Rainfall;
- Humidity;
- Air Quality, if data is available for local situation; and
- Annual average sunshine; and
- Wind pattern.

e. Ground Water

Ground water availability and its suitability for use by the project are to be established. Existing wells' data will be helpful in determining the water availability and its quality.

f. Flora and Fauna

The presence of tree cover, etc. and endangered species, should be determined.

g. Socio-economic conditions

The socioeconomic level of the population in the vicinity of the project site is to be determined from data through secondary sources. Possible job opportunities due to construction and operation of the project would be available to the busy route located in economic hub of the city.

1.7 The Proponent

1.7.1 Contact Details

For further details or clarifications regarding this IEE, the proponent or the Consultants can be contacted at the following addresses:

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SECTION-2
PROJECT DESCRIPTION

2.1 Lahore Urban Expansions

2.1.1 General

Lahore) is the capital of the province of Punjab and the second largest city in the country. One of the most densely populated cities in the world, Lahore remains a vibrant economic, political, transportation, entertainment, and educational hub. The city of Lahore has been a center of cultural heritage for many civilizations.

The Lahore District lies between 31°15′—31°45′ N and 74°01′—74°39′ E, and is bounded on the north and west by the Sheikhupura District, on the east by Wagah, and on the south by Kasur District. The Ravi River flows on the northern side of Lahore. Lahore city covers a total land area of 404 km² and is still growing.

The administrative towns of the city of Lahore are as under:

1. Ravi Town
2. Shalimar Town
3. Wagah Town
4. Aziz Bhatti Town
5. Data Gunj Bakhsh Town
6. Gulberg
7. Samanabad Town
8. Iqbal Town
9. Nishtar Town

The project lies partly in Gulberg Town, and Data Gunj Baksh Town of the Lahore City District.

2.1.2 Improvements in City Traffic

Since last about two decades, several traffic and transport studies of Lahore Metropolis has been conducted, either funded by internal agencies / loans or local budget plans. Although some of the studies concluded in a comprehensive manner, but implementation of crucial recommendations could not be realized.

The Government of Punjab (GoPb) initiated a strong commitment to develop and improve the public transport by implementing the first Metro Bus System (MBS) out of three corridors of Lahore Metropolis. The implementation of part of the MBS is

helping out of the traffic and transport problems and improve upon the existing corridor.

The implementation of MBS is helping out of the traffic and transport problems and improve upon the existing corridor. For upgrading Lahore Public Transport System, the Government of Punjab (GoPb) has initiated MBS on the following three corridors:

Corridor-1: Ferozepur Road (Gajju Matta to Shahdra), 27 km which has since accomplished and under operation.
Corridor-II: Multan Road (Thokar to MAO College), 13 km.
Corridor-III: G.T.Road (from Azadi Chowk to Lahore Ring Road), 13 km.

Dedicated lanes have been provided in the median of articulated buses for interrupted flow with well-coordinated integrated operational system. The concept of MBS is a rapid mode of transportation. The MBS stations have been provided at suitable locations on the main carriageway. The provision of pedestrian bridges at required locations is also underway/completed so as to access to the commuters to MBS Stations.

The Ferozepur Road being congested due to rapid growing urban development and industrial infrastructure, has been selected as the priority corridor for MBS and has since been completed and open to operation since February-2013. The corridor is initially 27 km from Gujju Matta to Shahdara. The corridor is partly at grade and partly elevated. From Gujju Matta to Qaddafi Stadium, it is at grade and from Qazaffi Stadium to Bhatti Chowk (8.5 km), it is elevated and is again at grade till Shahdra. At grade, the MBS operation is facing difficulties and conflicting traffic at eight points/junctions. Out of these eight points, four junctions, Qainchi, Ghazi Road, Khaira and Azadi Chowk are more critical which require improvements; the interchange at Qainchi very recently put to operation whereas construction at Azadi Chowk is proceeding rapidly while other locations will be accomplished in due course of time.

The purpose of the project would be two-fold:

- Reducing congestions at the crossings.
- Development of road network to reduce time of commuters and consequently resulting in savings.

2.2 Necessity for the proposed Provision

The city of Lahore is one of the most accessible cities of the Punjab Province. In addition to the historic Grand Trunk Road (G.T. Road), a motorway (M-2) was completed in 1997 from Lahore to Islamabad. The government has built underpasses to ease congestion and prevent traffic jams, and according to official figures, Lahore transportation services have improved to accommodate the growing number of visitors to the city. It is well connected by air to other countries as well as all major cities of Pakistan. Buses, trains, taxis and rickshaws are the other means of transport available in Lahore.

Under the JICA Study, there is a lack of Overpasses and Underpasses in the city. Despite these improvements, Lahore struggles for safety on its roads, which are

dangerous because the number of vehicles overwhelms the road space. Massive congestion occurs every day as millions of Lahorites travel through disorganized, fast-moving traffic, and accidents are widespread.

The link requiring improvements plays an important role traffic and transport system of the Lahore metropolis including:

- Serves the traffic of ever expanding suburbs to the city centre
- Shares the traffic load of highly congested and limited number of historically developed radial routes in the city.
- Serves an important link for Main City Centres in Gulberg and rest of the city.

As such, accounting for the importance of this route, although roads have been widened at many of the locations, improvement of crossings and making the link a Signal-free is becoming inevitable.

Therefore, GoP has decided to improve the route to cater the traffic problems. The existing traffic situation at various locations is included in Exhibit-2.1 and Exhibit-2.2.

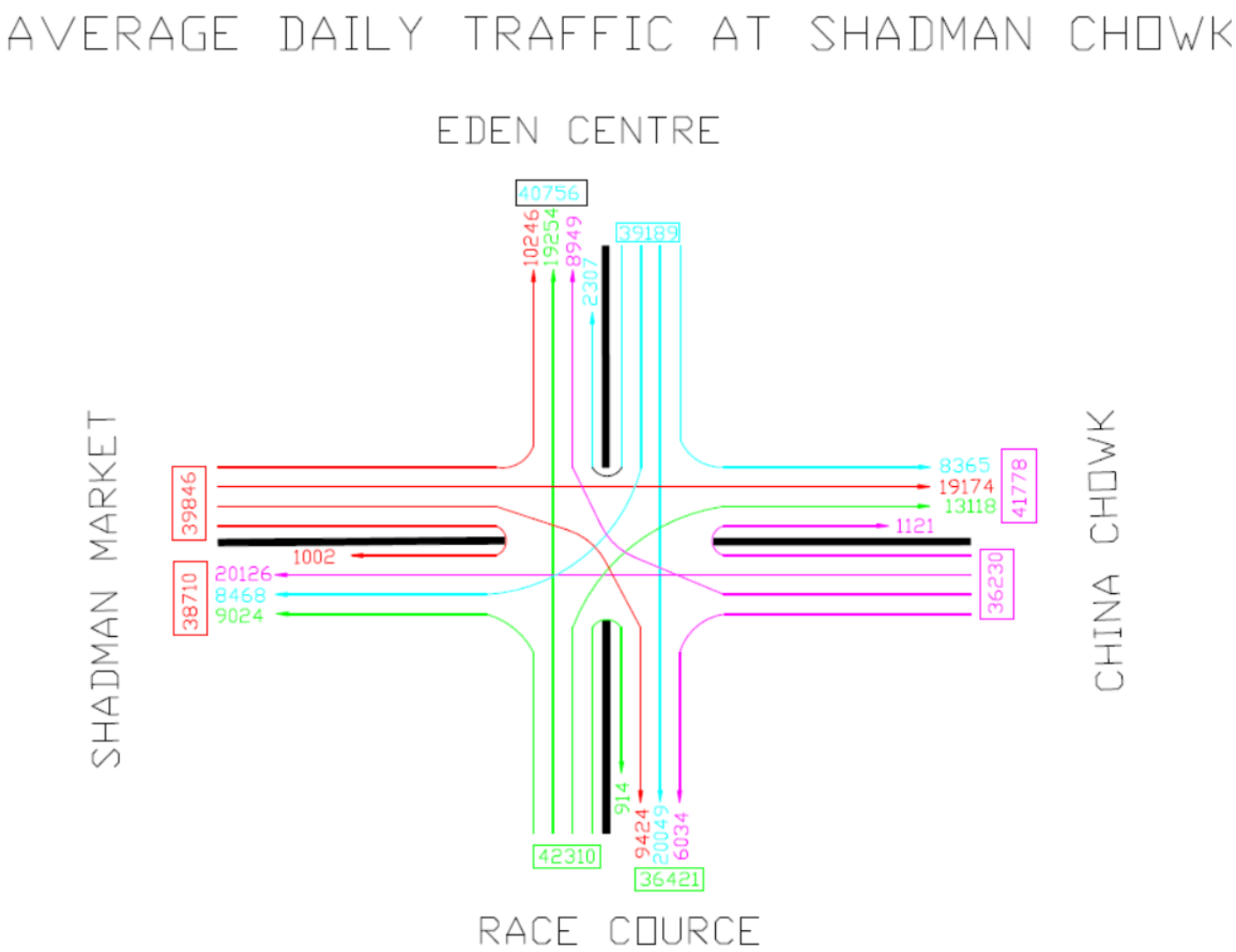


Exhibit-2.1, Traffic along the Route of Proposed Project-Shadman Chowk

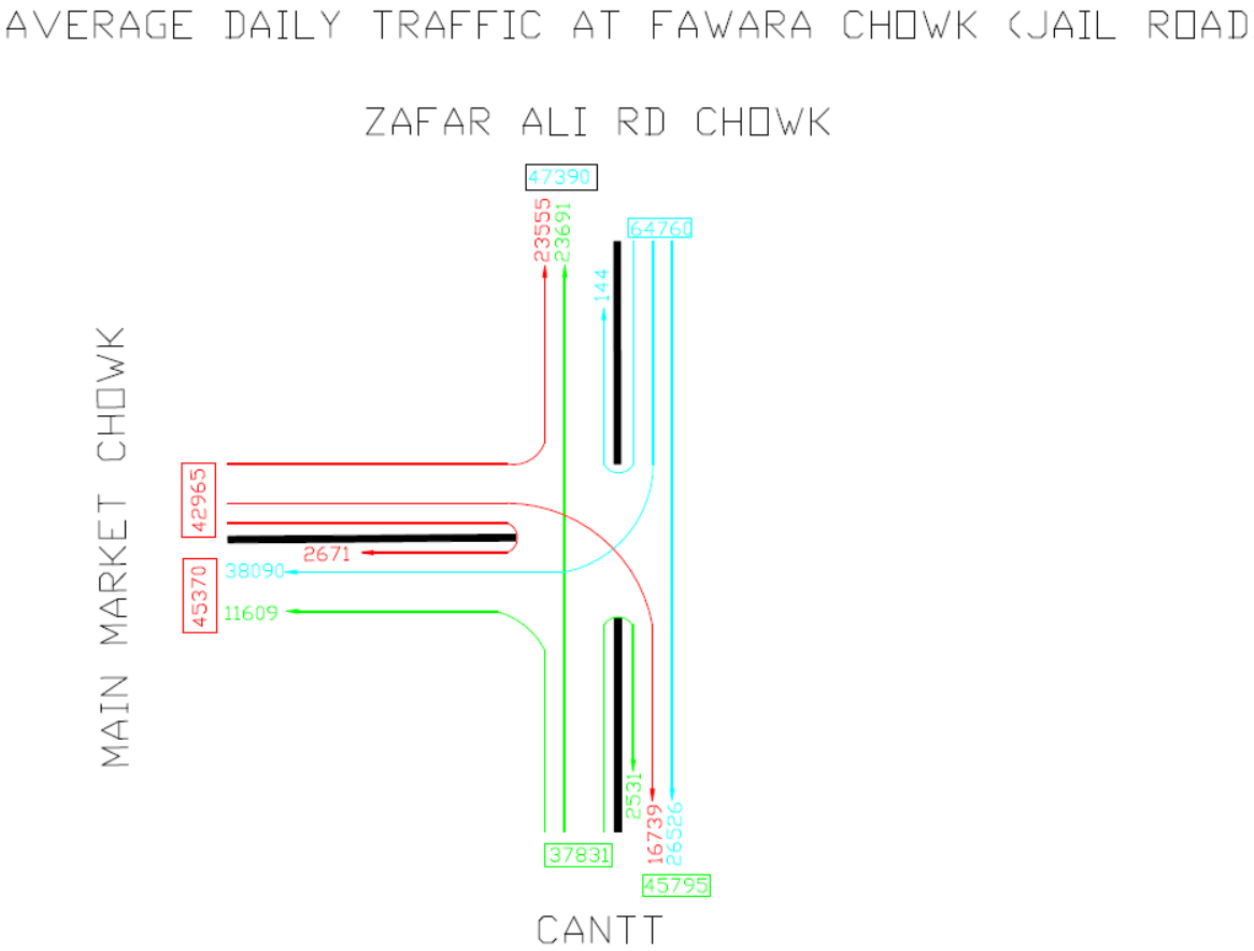


Exhibit-2.2, Traffic along the Route of Proposed Project-Fawara Chowk

The traffic situation as above, therefore, still requires more improvements so as to achieve the targets of hindrance and signal-free traffic flow along the route.

2.3 Alternatives Developed and Evaluated

Four alternate options have been considered, evaluated and the preferred option selected for implementation purpose. The options comprise:

Alternative-I: No Project Option
Alternative-II: Provision of Overhead Bridges at Crossings
Alternate-III: Underpasses at Important Crossings and Improvement of Others

a) Alternative – 1, "No Project Option"

Under the option, increase in traffic volumes over the period will create traffic congestion and the situation will get worst. This road is the main artery in the business-educational centre, which provides links to other major roads. Due to excessive use of this road, the traffic congestion is becoming a major and routine issue. In the absence of the Project, the existing traffic problem and the level of service will further aggravate with the passage of time. Therefore, it is important to upgrade the existing road to cater for the increased vehicular movement. Moreover, emissions from vehicles will cause air pollution that will continue deteriorating the environmental quality of the project area.

b) Alternative – 2, Provision of Overhead Crossings

Under the alternative, overhead bridges at the Shadman Chow and Fawara Chowk along with improvement of other crossings is considered. Under the option, in addition to increased capital cost of construction, the fibre of the area will be significantly disturbed. Therefore evaluation in terms of capital cost, inconvenience to existing trade and business, educational and other institution, the option is not favoured.

c) Alternative - 3 Provision of Underpasses at Shadman Chowk and Fawara Chowk associated with other Improvements

Under the option, improvement of the route is considered including the following improvements:

- Improvement of Shadman Chowk-Provision of Underpass
- Improvement of PIC Chowk
- Improvement of Canal Road crossing
- Improvement of Zafar Ali Road crossing
- Improvement of Fawara Chowk-Provision of Underpass
- Improvement of Main Market Chowk
- Improvement of Zahoor Elahi Chowk

The comparison – evaluation of the options is included in Table-2.1.

Table-2.1, Evaluation of Options

Nr.	Option	Environmental Issues	Social Issues
1.	Option-1, No Project	• Air Pollution • Noise Pollution • Time Consumption • Fuel Consumption	• Frequent Conflicts • Time delays • Risk of Accidents
2.	Option-2, Provision of Overhead Bridges at Crossings	• Reduction in Time Delays • Reduction in Air Pollution due to reduced vehicle emissions • Wear and Tear of Vehicles reduced due to smooth traffic	• High Cost • Land Acquisition Issues
3.	Option-3, Underpasses at Important Crossings and Improvement of Others	• Reduction in Time Delays • Reduction in Air Pollution • Reduction in Fuel Consumption due to smooth Traffic Flow • Structure Stability at Risk	• No private Land for Acquisition involved except a small piece • Reduction in Accidents • Relatively lower cost involved

d) Preferred – Selected Option

In the light of above discussion, Alternative-3 is the most feasible option as it will help managing traffic flow resulting in reduction in time delays and air pollution. Smooth flow of traffic will also help in lesser wear and tear of vehicles.

2.4 Components of the Project

- Improvement of Shadman Chowk-Provision of Underpass
- Re-Modelling of Race Course Road
- Re-Modelling of Jail Road
- Re-Modelling of Main Boulevard Road and Underpass at Fawara Chowk
- Improvement of Road Crossings at PIC, Canal, Zafar Ali

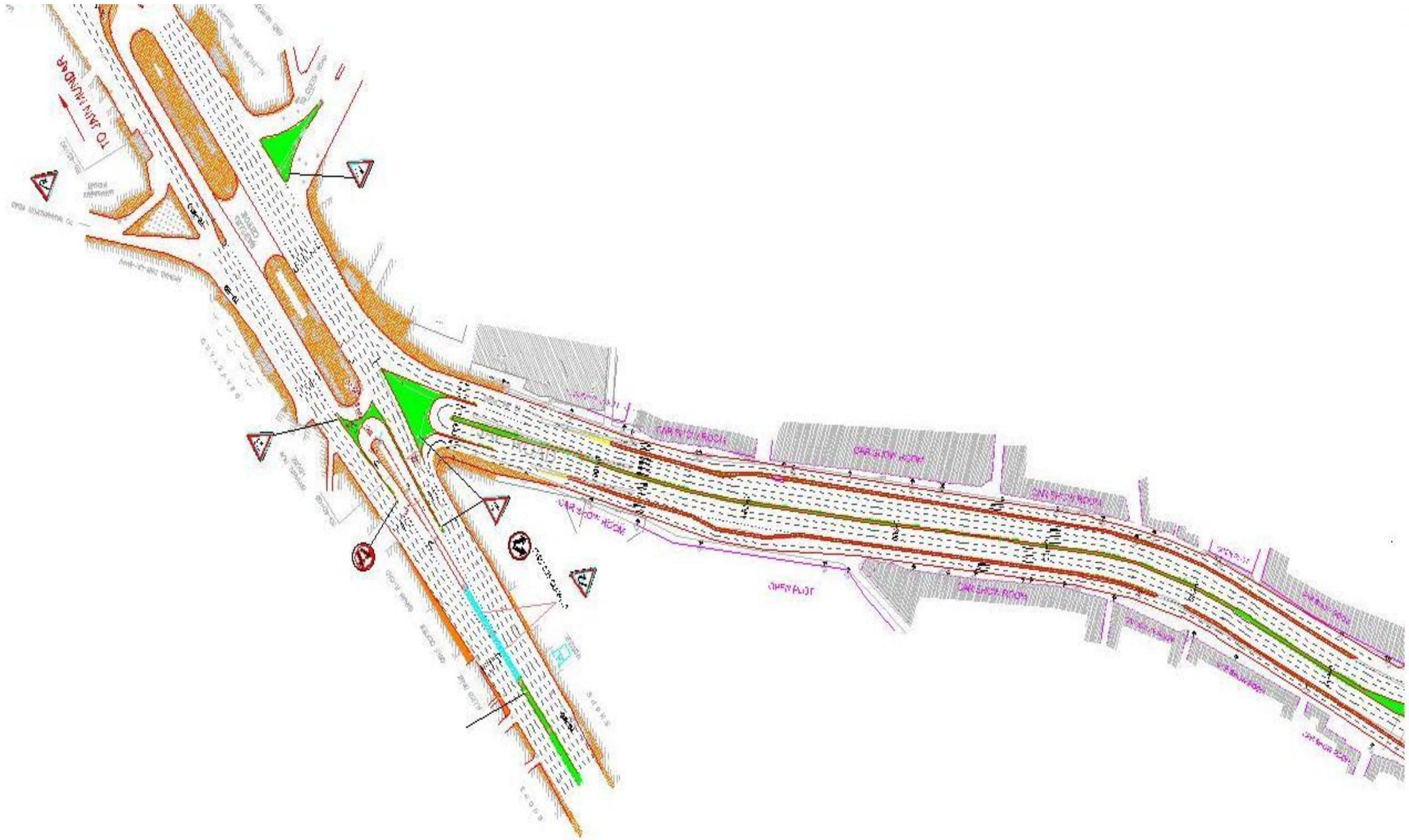
The project components are briefed hereunder.

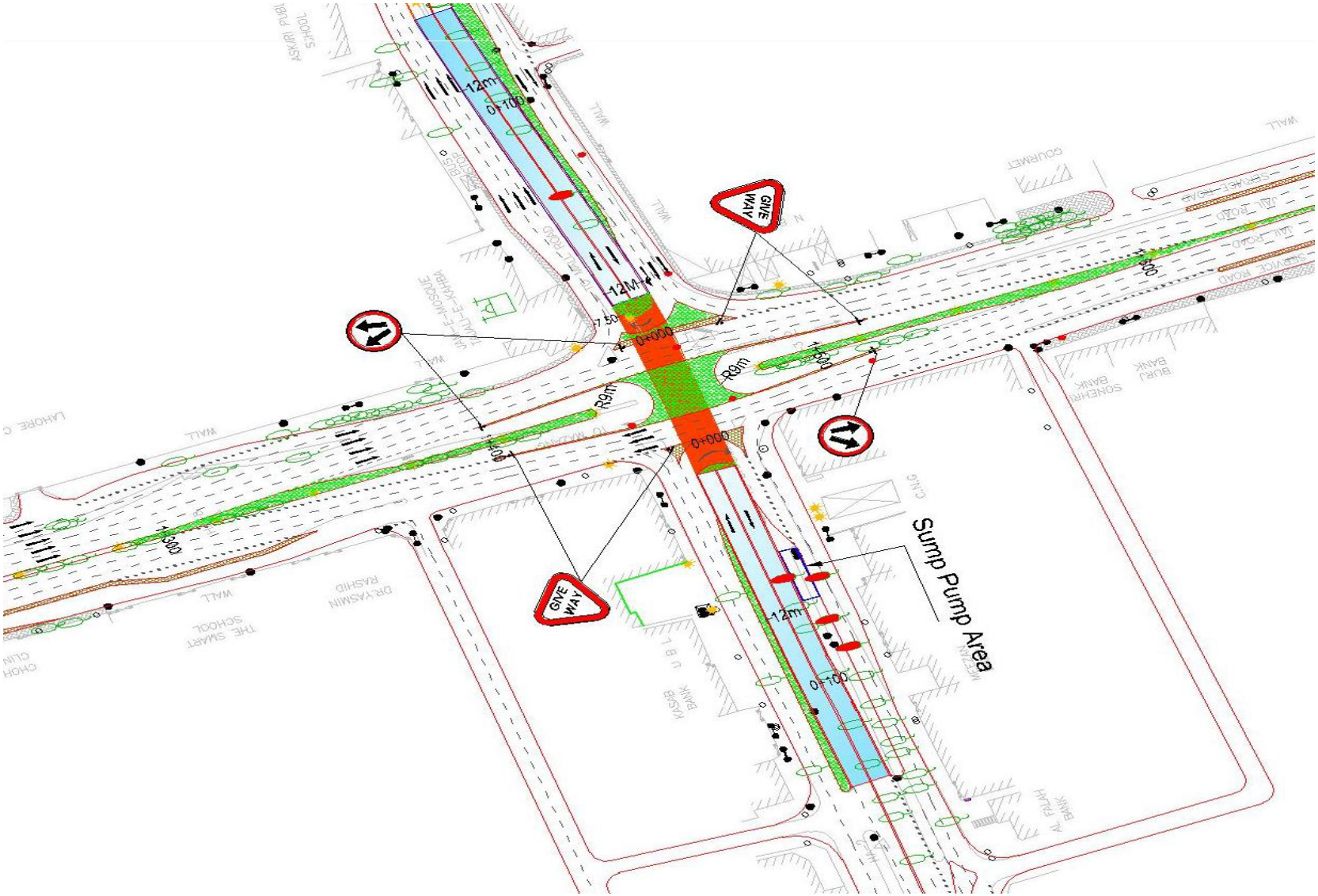
2.4.1 Jail Road

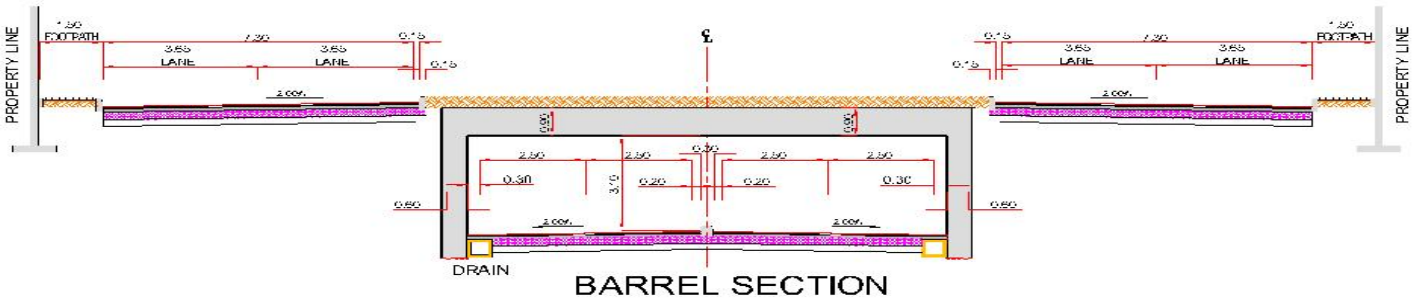
The length of the road is 4.5 kms, and improvement of the road includes following components:

- Remodeling of Jail Road
- Remodeling of Race Course Road
- Shadman Chowk Underpass
- Widening of Bridge at Zafar Ali Road
- Fawara Chowk Underpass
- Double Free U-Turns at Eden Chowk, Shadman Chowk, PIC Chowk, Canal Road, Zafar Ali Road.
- 02 nos. Pedestrian Bridges
- Land Acquisition
- Shifting of Services

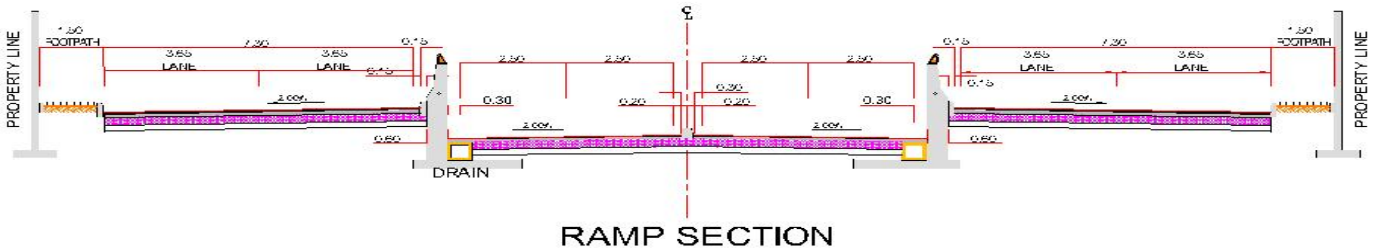
The plans for the component works are included in Exhibit-2.3.



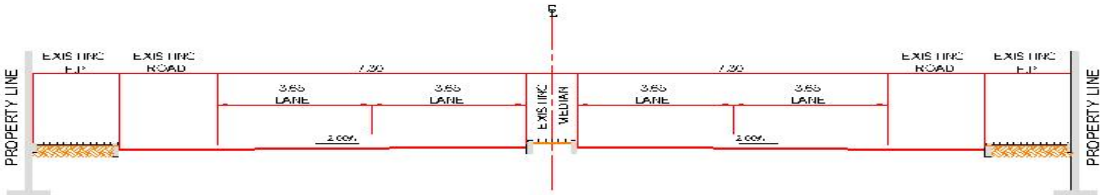

GIVE WAY
GIVE WAY
Sump Pump Area
R9m
R9m
12m
12m
12m
0+000
0+000
0+100
0+100
WALL
GOURMET
SERVICE ROAD
JAIL ROAD
LAHORE C
DR.YASMIN RASHID
THE SMART SCHOOL
KASAB BANK
AL FALAH BANK
SONEHRI BANK
BURJ BANK
ASKARI PUBL SCHOOL



BARREL SECTION



RAMP SECTION



AT GRADE SECTION

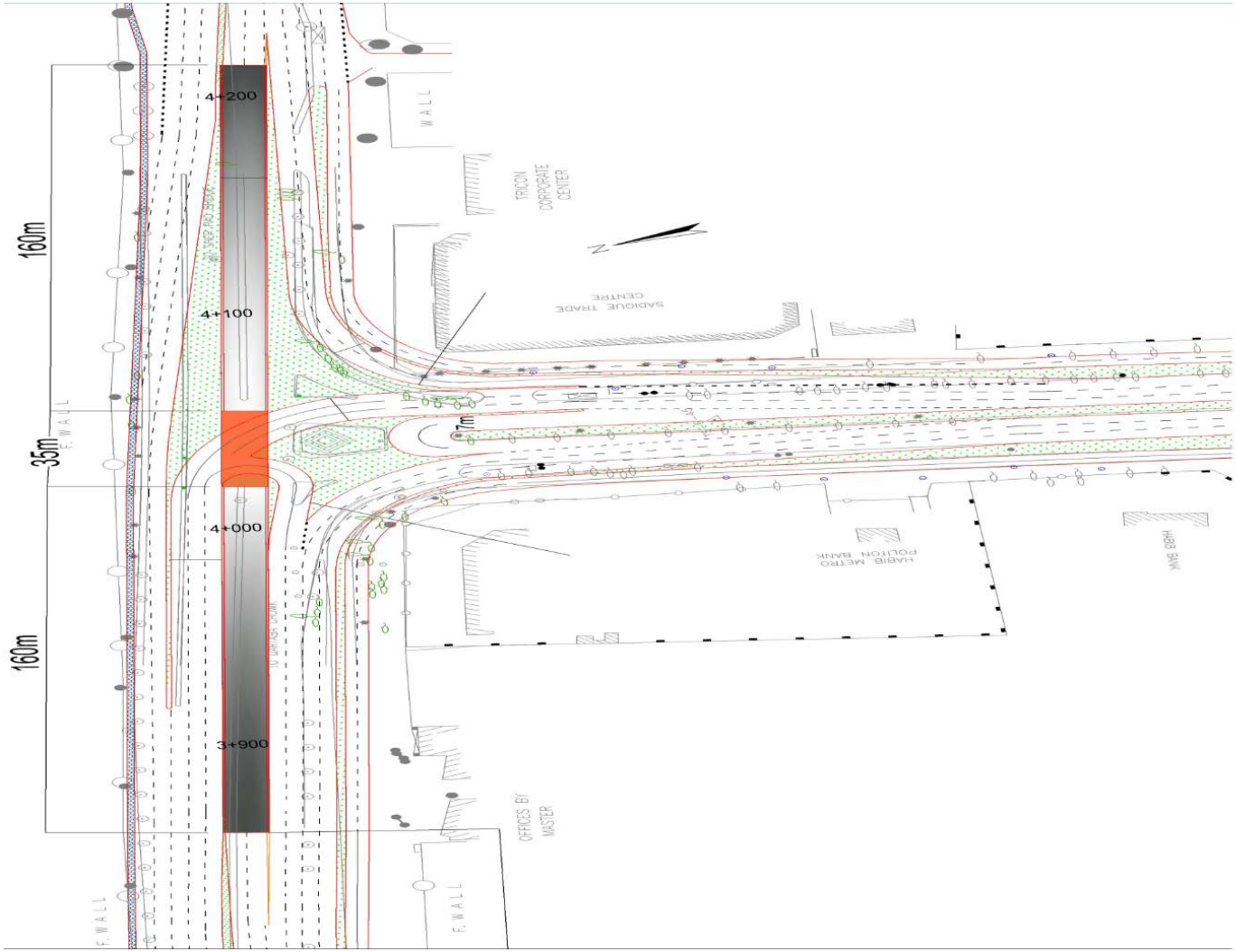
Exhibit-2.3, The Improvement of Jail Road

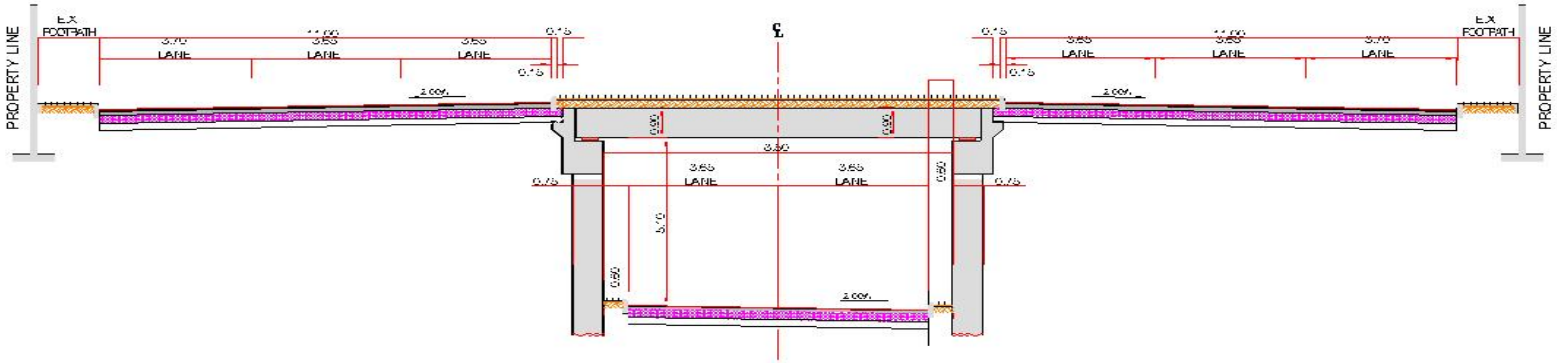
2.4.2 Main Boulevard

The length of the road is 2.6 kms, and improvement of the road includes following components:

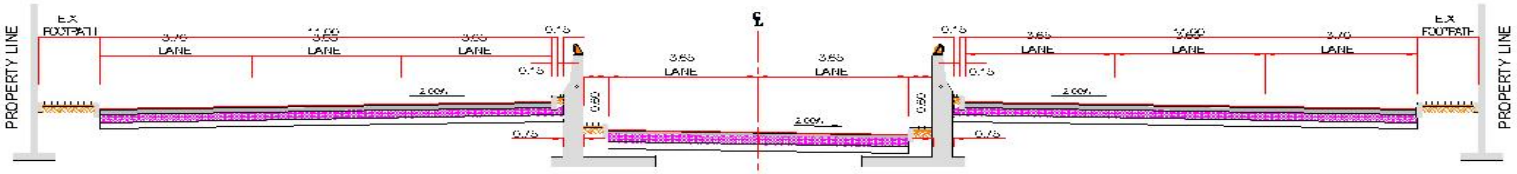
- Remodeling of Main Boulevard
- Strengthening of both carriage ways.
- Remodeling of Liberty Roundabout
- New Central Drain from Zahoor Elahi Chowk to Fawara Chowk
- Double Free U-Turns at Main Market Chowk & Zahoor Elahi Chowk
- 02 nos. Pedestrian Bridges
- Shifting of Services

The plans for the component works are included in Exhibit-2.4.


160m
35m
160m
4+200
4+100
4+000
3+900
7m
WALL
TRICON CORPORATE CENTER
SADIQUE TRADE CENTRE
HABIB METRO POLITON BANK
HABIB BANK
OFFICES BY MASTER
F. WALL
F. WALL
F. WALL



BARREL SECTION



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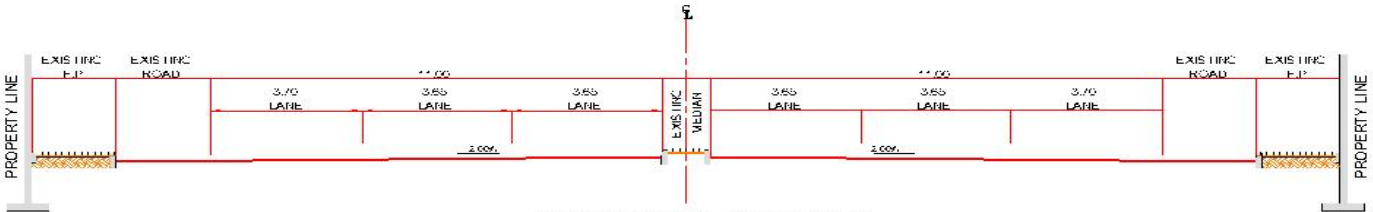


AT GRADE SECTION

Exhibit-2.4, Main Boulevard Improvements

2.5 Design Life of the Proposed Project

The anticipated design life for components of the project is as under:

- Roads pavements 20 years
- Structures/Underpasses 100 years

2.6 Benefits upon Completion of the Project

The completion of the project will result in the following benefits:

- Good road surfaces will be available to the public, which will improve the environment of the city;
- The commercial activities and business in the city will be improved as people feel ease in reaching bazaars which are connected to these roads;
- Public mental tension, frustration will be minimized; and
- The city will have a better look.

To meet the roads and their service level in the city, under mentioned improvements would be required:

- Widening and improvement of existing road by way of earthwork, sub base, base, surface treatment and drainage;
- The capacity requirements for the period 2035 will form basis for project implementation;
- Operation and maintenance to be streamlined by way of additional resources; both manpower & revenue collection to be improved / augmented to meet the operation and maintenance cost.

The purpose of the project is keeping with the sector development objectives which provide for the sustainable delivery of a productive and efficient road network within the urban area of the rapidly expanding Lahore city.

2.7 Construction Materials

The materials used in construction of the road for the proposed project would include coarse aggregates (crush), fine aggregates (sand), steel, water, asphalt, reinforcement, cement etc. Fine aggregates are locally available in the area, while the soil, cement and steel will be procured from other sources. The details of the construction material for the proposed project are given as under:

a) Sargodha Quarries (Crushed Aggregate Source)

Sargodha rock quarries are located on the left side of Faisalabad - Sargodha road. The Precambrian basement complex near Sargodha is spread over an area of about 200 sq. Km between Chiniot and Sargodha. These hills are called Kirana hills. The rocks are exposed as isolated ridges in an otherwise level plain, filled by alluvium.

The rocks in this area comprise meta-sediments, represented by quartize, phylite and slate. The volcanic rocks include rhyolite, volcanic tuff and brecciate volcanic

matter.
By crushing these aggregates of desired size can be produced without producing a significant amount of flat and elongated particles. However, aggregates produced by crushing slate contain a considerable amount of flat and elongated particles. The inclusion of slate may therefore be avoided during blasting and crushing. Crush stone were tested by the Design Consultant and suggested that this material is suitable for use in road construction, after crushing to the specified size and gradation. The quantities available are quite large and mining leases have already been obtained by various parties.

b) Fine Aggregate (Sand)

Good quality natural fine aggregate or sand of acceptable degradation is not available in nearby locality of the Project. The nearest source of sand is the Ravi River, which is accessible. But the sand from this source is devoid of coarse sand sizes and requires blending of these sizes. The other source of sand of good properties and grading is Haro River from where sand will be utilized for construction purposes.

c) Asphalt, Reinforcement and Cement

Asphalt, reinforcement and cement will be transported from the factories near Lahore, or local agents in Lahore or Faisalabad for road construction for the proposed project.

2.8 Construction Camps

Camp sites will be selected keeping in view the availability of adequate area for establishing camp sites, including parking areas for machinery, stores and workshops, access to communication and local markets, and an appropriate distance from sensitive areas in the vicinity. Final locations will be selected by the Contractor with the consent of supervision Consultants and upon approval from, LDA.

2.9 Manpower Requirements

The manpower requirement during construction and operation of the project will be about 200 people including managerial staff, skilled and unskilled labour.

2.10 Construction Equipment

The machinery and the equipment required for the proposed project will comprise:

- Dump Trucks
- Front End Loaders
- Dozers
- Graders
- Vibratory Rollers
- Water Tankers

- Aggregate Spreaders
- Three Wheels Rollers
- Tandem Rollers
- Asphalt Plant
- Pavers
- Asphalt Distributors
- Concrete Batching Plants
- Transit Mixers-Trucks
- Vibrators
- Concrete Pumps
- Water Pumps
- Cranes
- Generators
- Other misc.

2.11 Geometric Design of the Proposed Imporvment in Roads

The Geometric Design of the project is governed by AASHTO Criteria for highways design. The Geometric design parameters are given below:

a) Design ESALs

The analysis period for the Project has been selected as 20 years. Traffic projected over the 20 year's period (2014 to 2035) and design ESALs accomplished accordingly.

b) Soil Support Value

A CBR value of 6 is adopted, a usual characteristic of local soil.

c) Pavement Design Methodology

The pavement design will be done by making use of AASHTO Method, a usual practice in the country.

2.12 Project Implementation Schedule

The project is scheduled to be completed within four (4) months and is expected to be completed in June-2015.

2.13 Project Cost

The cost of the project has been estimated as Rs. 1,520.363 million, break-up is included in Table-2.2.

Table-2.2, Project Cost Estimates

Description of Items	Shadman Chowk Underpass (A)	Remodelling of Race Course Road (Road Work) (B)	Remodelling of Jail Road (Road Work) (C)	Remodelling of Main Boulevard (Road Work) (D)	Fawara Chowk Underpass (E)	Total Amount (F=A+B+C+D+E)
	Reducing U- Turn	with GOR	Reducing Asphalt		Along Jail Road	
Construction Cost						
Bill No. 1:- Earthwork and Allied Activities	3,903,726	2,768,361	8,711,748	5,736,482	6,072,580	27,192,897
Bill No.2:- Subbase and Base	6,455,734	25,270,343	72,725,940	150,682,846	17,459,399	272,594,263
Bill No.3:- Surface Course & Pavement	4,008,320	17,390,238	113,741,303	109,002,830	6,269,531	250,412,223
Bill No. 4:- Structures (Extension of Bridge at Zafar Ali Chowk) (10 M X 20 M 2 Nos.)	-	-	33,582,358	-	-	33,582,358
Bill No. 4.1:- Structures (Underpass) (58M X 12.5 M)	139,566,848	-	-	-	206,872,524	346,439,372
Bill No. 4.2:- Structure :- RCC Retaining Walls & N.J Barrier	10,512,200	-	13,490,534	-	10,089,854	34,092,587
Bill No.4.3:- Structure (Sump Pump Staion)	32,158,438	-	-	-	43,885,341	76,043,779
Bill No. 4.4:- Structures (Rigid Pavement)	9,913,136	-	-	-	5,547,103	15,460,239
Bill No.5:- Drainage and Erosion Works	3,482,325	479,011	51,304,555	23,264,356	3,397,434	81,927,682
Bill No. 6:- Ancillary Works	6,280,486	7,110,465	24,601,307	27,081,263	12,016,350	77,089,871
Sub Total (Bill no.01 to Bill no.06)	**216,281,214**	**53,018,418**	**318,157,746**	**315,767,778**	**311,610,116**	**1,214,835,272**
Lahore College	-	-	7,541,835	-	-	7,541,835
Kinnaird College	-	-	3,335,572	-	-	3,335,572
Sub Total	**216,281,214**	**53,018,418**	**329,035,153**	**315,767,778**	**311,610,116**	**1,225,712,678**
Add 4.16% of Mega Project (on bill no 1 to bill no.06)	8,997,298	2,205,566	13,687,862	13,135,940	12,962,981	50,989,647
Electrical Works (Detail Attached)	3,726,004	-	3,909,464	1,826,260	1,369,401.00	10,831,129
Total Construction (A)	**229,004,516**	**55,223,984**	**346,632,479**	**330,729,977**	**325,942,498**	**1,287,533,455**
Cost of Land Acquistion/ Structure Compensation						
Land Acquistion (28 Marlas)	-	-	-	-	-	50,000,000
Structure Compensation (15500 Sft)	-	-	-	-	-	30,000,000
Total (B)	-	-	-	-	-	**80,000,000**
Construction of Pedestrian Bridges at Jail Road & Main Boulevard (04 Nos.). LUMSUP	-	-	30,000,000	30,000,000	-	**60,000,000**
Total (D=A+B+C)	**229,004,516**	**55,223,984**	**376,632,479**	**360,729,977**	**325,942,498**	**1,427,533,455**
Add 1% Contingencies (on Total A)	2,290,045	552,240	3,466,325	3,307,300	3,259,425	12,875,335
Add 1% Consultancy Charges (on Total A)	2,290,045	552,240	3,466,325	3,307,300	3,259,425	12,875,335
Add 0.5% Horticulture Works (on Total A)	1,145,023	276,120	1,733,162	1,653,650	1,629,712	6,437,667
Add 0.25% for Media Campaign (on Total A)	572,511	138,060	866,581	826,825	814,856	3,218,834
Shifting of services i.e electrical & PTCL poles, Sui Gas, WASA etc.	20,000,000	10,000,000	5,000,000	10,422,000	12,000,000	57,422,000
Total (E)	**26,297,624**	**11,518,660**	**14,532,393**	**19,517,074**	**20,963,419**	**92,829,170**
Total Work Cost (E= D+E)	**255,302,140**	**66,742,644**	**391,164,872**	**380,247,052**	**346,905,917**	**1,520,362,625**
Total Cost in Million	**255.302**	**66.743**	**391.165**	**380.247**	**346.906**	**1520.363**
Total Project Cost in Million						**1520.363**

2.14 Horticulture and Landscape

The horticulture and land scape is part of the project and a provision of about Rs.6.438 million has already been made in the project cost estimates. The component works shall include:

- Plantation of plants particularly the shady ones
- Grassing and plantation of green belts
- Seasonal flowers in green belts
- Underpasses at appropriate locations will be provided with plants/flowers both in earth as well as in flower pots.

During project implementation, the number of trees and plants to be cut are 200 and 100 numbers respectively. Upon completion of the project, the horticulture and landscaping will provide for almost double the said tress/plants.

SECTION-3

ENVIRONMENTAL STANDARDS & GUIDELINES

3.1 General

This part of the report deals with the relevant policy, legal and administrative framework instituted by the Government of Pakistan for the protection of environment. All the relevant provisions of these policy and legal frameworks have been duly considered in this IEE study. Moreover, World Bank's Safeguards Environmental Policies, Annexure-3.1, are also considered in the Report. In addition to this, the roles and responsibilities of the proponent as well as the Environmental Protection Agency (EPA), Punjab have been mentioned in this section.

3.2 EIA Requirements

3.2.1 General

The environment in both the urban and rural areas of the country has been adversely affected during the three decades (1950-80) due to industrialization, high population growth rates, improper civic amenities, low literacy and the low per capita income of the general masses. Factors such as migratory trends from the rural to urban centers and virtually non-existent laws regulating the quality of the environment, contributed to the worsening of the situation. The result is that at present the poor air quality situation in the urban centers is compounded by acute pressure on resources of drinking water, wastewater disposal, sanitation system and roads. The situation in the rural areas is even worse as far as public health facilities (i.e. drinking water, liquid and solid waste disposal) are concerned. The indiscriminate use of farm pesticides and chemicals for agricultural purposes have also contributed to the general degradation of the environment.

A number of laws have been enacted by the Government of Pakistan from time to time to regulate the public practice regarding land use, water use, land reclamation and drainage, forestry, wildlife, archaeological and historical properties, public health, energy, etc. However, the milestone of Pakistan environmental law and regulation is Ordinance No. XXXVII, "Control of Pollution and Preservation of Living Environment", enacted on December 1983. This was made effective from February 1984 with the establishment of the Pakistan Environmental Protection Council (PEPC), headed by the Prime Minister of Pakistan or his/her nominee and the Pakistan Environmental Protection Agency (PEPA), headed by an appointed Director General. PEPC is a policy making body, while PEPA has the responsibility for establishing environmental quality standards, and implementing and enforcing the Ordinance. In order to assist the PEPA, Provincial Environmental Protection Agencies have also been established.

3.2.2 Pakistan Environmental Protection Act, 1997 (PEPA-97)

The Act was enacted on December 06, 1997 by repealing the Pakistan Environmental Protection Ordinance (1983), Annexure-3.2. It provides the

framework for implementation of the PNCS-1992, establishment of provincial sustainable development funds, protection and conservation of species, conservation of renewable resources, and establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examination (IEE), and Environmental Impact Assessment (EIA).

Section 12 of the Act stresses the need to carry out environmental assessment study prior to construction or operation of a project.

The Pakistan Environmental Protection Act, 1997 (the act) is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The Act is applicable to a broad range of issues and extends to air, water, soil, marine and noise pollution, as well as the handling of hazardous waste. The discharge or emission of any effluent, waste, air pollutant or noise in an amount, concentration or level in excess of the National Environmental Quality Standards (NEQS) specified by the Pakistan Environmental Protection Agency (Pak – EPA) has been prohibited under the Act, and penalties have been prescribed for those contravening the provisions of the Act. The powers of the federal and provincial Environmental Protection Agencies (EPAs), established under the Pakistan Environmental Protection Ordinance 1983, have also been considerably enhanced under this legislation and they have been given the power to conduct inquiries into possible breaches of environmental law either of their own accord, or upon the registration of a complaint.

The requirement for environmental assessment is laid out in Section 12 (1) of the Act. Under this section, no project involving construction activities or any change in the physical environment can be undertaken unless an initial environmental examination (IEE) or an environmental impact assessment (EIA) is conducted, and approval is received from the federal or relevant provincial EPA. Section 12 (6) of the Act states that this provision is applicable only to such categories of projects as may be prescribed. The categories are defined in the Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000 and are discussed hereunder.

3.2.3 Environmental Management Framework in Pakistan

The approach taken for the protection of the environment in Pakistan is laid down in the Environmental Conservation Strategy of 1992 and its review in 2000. For specific rules and regulations, "The Environmental Protection Act" was enacted in 1997 and it provides the backbone and framework for environmental legislation in Pakistan. This act establishes the Pakistan Environmental Protection Council, the highest decision making body in environmental issues, the Pakistan Environmental Protection Agency (Pak EPA) and Environmental Tribunals.

The Pakistan Environmental Protection Council (PEPC) shall, among other duties, co-ordinate and approve comprehensive national environmental policies and approve National Environmental Quality Standards.

The act further defines the functions of institutions, providing a broad mandate to for enacting rules, procedures and technical standards in different areas of environmental protection. The Act requires Pak EPA to co-ordinate

environmental policies and programs nationally and internationally, initiates legislation, establish surveys, manage monitoring and auditing schemes, and promote research as well as education and awareness in the field of the environment.

The Environmental Protection Act does further require the provincial authorities to establish Provincial Environmental Protection Agencies for carrying out functions delegated to the provinces.

The Government of Pakistan has recently elaborated its further action in-line with the finding of the review of the National Conservation Strategy in the form of the National Environmental Action Plan, NEAP (as approved by PEPC in 2001).

3.2.4 Administrative Framework

a. General

The Pakistan Environmental Protection Act, 1997 lays down the administrative framework for environmental management and monitoring.

The Federal and Provincial EPAs has the overall responsibility for monitoring the environmental parameters and for ensuring that any proposed project would not unduly harm to the existing environmental resources. They are also responsible for checking that the pollution generation and waste management in projects are within the allowable limits as set out in the NEQs.

In the case of this Project, the administrative provincial agency for environmental conservation is the Pakistan Environmental Protection Agency (EPA), Punjab.

b. Pakistan Environmental Protection Agency (PEPA)

Pakistan Environmental Protection Agency (PEPA), which works under the Federal Government, is the prime body responsible for implementation and monitoring of policies concerning environmental protection in Pakistan. As a first step, it has created an awareness among the masses about the deteriorating situation of environment and has urged the people, through the press and media campaigns, to participate in the fight to protect environment.

In addition to this, guidelines/regulations have been formulated to control the pollution created by domestic sewage, industrial effluents discharged into water bodies, emissions into atmosphere, etc. As a policy, it has been decided that in future any industrial unit which does not include a sound environmental protection and management plan would not be sanctioned. Moreover, environmental assessment and protection studies must form an essential part of the feasibility studies of every project. The functions of PEPA include:

- Preparation of National Environmental Quality Standards
- Establishment of systems for surveys, surveillance and monitoring
- Measurement, examination and inspection to contain environmental pollution

- Identification of the legislative requirements in the environmental field

3.2.5 National Environment Policy, 2005

The National Environmental Policy (2005) provides an overarching framework for addressing the environmental issues (particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification etc.) confronting Pakistan. It recognizes the goals and objectives of the Pakistan National Conservation Strategy (PNCS, 1992), National Environmental Action Plans, and other existing environment related national policies, strategies, and action plans. 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.

3.2.6 National Environmental Quality Standards (NEQS), 2000

Pakistan Environmental Protection (PEPA) Act 1997 along with the Guidelines and National Environmental Standards (NEQS) 2000 addresses environmental policy, legislation, guiding principles, and Sectoral guideline and emission standards. These standards are aimed at protecting the environment by controlling emission. The NEQS, promulgated under the PEPA 1997, specify the following standards:

Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources, Maximum allowable concentration of water pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment and sea (three separate set of numbers). Selected NEQS for liquid effluents discharged to inland waters, gaseous emission from industrial sources and emissions from motor vehicles are provided in respectively. These standards will be applicable to the gaseous emissions and liquid effluents discharged to the environment from the proposed project. NEQS are an emission standard which relate to the "end of pipe" emissions from water discharges or air outlets and is designed to limit the emissions of individual sources such as plant or factories or any other activity. These standards are aimed at protecting the environment by controlling emissions from individual source, but do not state what a desirable or acceptable level of environmental comfort is. These level of comfort are usually linked with "National standards", e.g. National Ambient Air Quality Standards (NAAQS), Indoor Air Quality Standards (IAQS), Professional Indoor Air Quality Standards (PIAQS), Drinking Water Quality Standards (DWQS),Agricultural Water Quality Standards (AWQS), River Water Quality Standards (RWQS) generally adopted to give protection to the most vulnerable groups of a society, such as elderly or children, would be deemed to pose no threat to the health or welfare of the most vulnerable exposed group. National standards may be adopted nationally for drinking, agriculture and river water, beneficial uses of rivers and streams, the ambient, indoor and professional air and soils, and noise. Pakistan has not yet adopted any of such standards. In the absence of such standards it is usual to adopt "international standards" by the WHO, FAO, various developed countries EPA etc.

3.2.7 Pak – EPA Review of IEE and EIA Regulation, 2000

The Pakistan Environmental Protection Agency Review of EIA and EIA Regulations, 2000 (the 'Regulations'), prepared by the Pak-EPA under the powers conferred upon it by the Act, provides the necessary details on preparation, submission and review of the Initial Environmental Examination (IEE) and the EIA. Categorization of projects for IEE and EIA is one of the main components of the Regulations. Projects have been classified on the basis of expected degree of adverse environmental impacts by that type of the activity. Project types listed in Schedule I are designated as potentially less damaging to the environment, and those listed in Schedule II as having potentially serious adverse effects. Schedule I projects require an IEE to be conducted, provided they are not located in environmentally sensitive areas. For the Schedule II projects, conducting an EIA is necessary.

Salient features of the regulations, relevant to the proposed project are listed below:

- Categories of projects requiring IEE and EIA are issued through two schedules attached with the Regulations.
- A fee, depending on the cost of the project, has been imposed for review of IEE and EIA.
- The submittal is to be accompanied by an application in prescribed format included as Schedule IV of the Regulations.
- The EPA is bound to conduct a preliminary scrutiny and reply within 10 days of submittal of report a) confirming completeness, b) asking for additional information, or c) requiring additional studies.
- The EPA is required to make every effort to complete the review process for IEE within 45 days and of the EIA within 90 days, of issue of confirmation of completeness.
- When EPAs accord their approval subject to certain conditions:
- Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.
- Before commencing operation of the project, the proponent is required to obtain from EPA a written confirmation of compliance with approval conditions and requirements of the EIA.
- An EMP is required to be submitted with the request for obtaining confirmation of compliance.
- The EPAs are required to issue confirmation of compliance within 15 days of receipt of request and complete documentation.
- The EIA approval will be valid for three years from the date of accord.
- A monitoring report is required to be submitted to the EPA after completion of construction, followed by annual monitoring reports during operations.

3.2.8 Pakistan Environmental Assessment Procedures (Pak – EPA)

The Federal EPA has prepared a set of guidelines for conducting environmental assessments. The guidelines derive from much of the existing work done by international donor agencies and NGOs. The package of regulations, of which the guidelines form a part, includes the PEPA 1997 and the NEQS. The guidelines themselves are listed below:

- Guidelines for the Preparation and Review of Environmental Reports
- Guidelines for Public Consultation
- Guidelines for Sensitive and Critical Areas
- Sectoral Guidelines

It is stated in the Pak – EPA Review of IEE and EIA Regulations, 2000 that the EIA or IEE must be prepared, to the extent practicable, in accordance with the Pak – EPA Environmental Guidelines.

3.2.9 Relevant Legal Policies of the Government of Pakistan

A number of laws have been promulgated to deal with the environmental and social aspects in connection with the development projects in Pakistan."

Under the Act-1997, it has been made mandatory to carry out an EIA for all the developmental Projects. Government of Pakistan has also framed guidelines for EIA of projects in various sectors. According to Pakistan Environmental Protection Act, 1997, the National Environmental Quality Standards (NEQS) were established for Effluent Characteristics of Industries and Municipalities. The latest update of National Environmental Quality Standards as revised in year 2001 is attached as Annexure 3.2.

Provincial Environmental Departments are also working on the formulation and enforcement of environmental statutes. Government of Pakistan has also been issuing policies and measures for improving various sectors including the Transportation sector. Though the need for environmental screening and assessment has received some weightage during the recent past, strict implementation of the (NEQS) is still a dream to be realized.

The applicable laws for the environmental study of the proposed improvement of roads and under passes besides Pakistan Environmental Protection Act are briefly described below:

- **The Land Acquisition Act, 1984** (including later amendments)**.** This Act sets out the rules for acquiring needed and other built-up properties affected by a Project, and for compensating the affected owners of the land.

- **The Protection of Trees and Brushwood Act, 1949.** This Act prohibits cutting or chopping of trees and brushwood without permission of the Forest Department.

- **The Local Government Ordinance, 1979.** Section 93 of this Ordinance pertains to environmental pollution. Under the Ordinance, the local councils are authorized to restrict projects causing pollution to air, water or land. They may also initiate schemes for improving the environment.

- **Pakistan Penal Code, 1860.** This defines the penalties for violations concerning with polluting air, water bodies and land.

In addition to the NEQs legislative guidelines regarding preservation and conservation of the environmental resources at the provincial and national levels also exist which are as follows:

- Fouling of Public Reservoirs
  Pakistan Penal Code 1960
- Discharging of untreated sewage and industrial waste in water bodies
  Fisheries Ordinance 1980
- Destruction, damage and defacement of antiquities
  The Antiquities Act 1975
- Clearing of forests, defacing of trees and burning of fire wood
  The Forest Act 1927
- Hunting of wild animals and Destroying rare species
  Wildlife Protection Ordinance 1972
- For the occupational health of the workers
  The Labour Laws (Amendments) and labours. Ordinance 1972 and Factories Act 1934.

The Government of Pakistan has issued a standard proforma questionnaire for the preparation of environmental impact statements. A copy is annexed in Annexure-3.2. The statement will be compiled by the Executing Agency and will then be reviewed by PEPA which will recommend to the Government of Pakistan whether or not the Project should be allowed to proceed.

3.3 Standards and Guidelines

3.3.1 Air Pollution

During the constructional and operational periods vehicular traffic would be the main generator of air pollution. Gaseous emissions have to be monitored with respect to the amount of smoke and particulate matters as specified by the NEQs, Appendix-B, for motor vehicle exhaust and noise.

3.3.2 Noise

During the constructional phase, construction activities would be the main source of noise pollution. During the operational phase, heavy vehicular traffic & industrial activities would be the primary noise generator in EIA. The maximum permissible noise level at 7.5 m from the source is 85 dB (A) according to the current NEQs.

3.3.3 Occupational Health

Constructional and operational activities could affect the occupational health of the workers. Quantitative National Standards with respect to the occupational health are yet to be developed in Pakistan. However, guidance in qualitative terms may be obtained from the Pakistan Factories Rules, 1962 (based on the Factories Act, 1934) and the Labour Laws (Amendments) Ordinance, 1972.

3.3.4 Ecology

The ecology along the EIA is quite unique as it changes from urban locality (Lahore) to agricultural land as we come towards the project site.

Relevant legislation for the conservation of the ecology is provided by the Wildlife Protection Ordinance 1972, Forest Department, the Forest Act 1927 and the Ministry of Food and Agriculture, 1927. Public reservoirs are protected against fouling under the Pakistan Penal Code 1960.

3.3.5 Toxic or Hazardous Waste

Protection of the environment with regard to toxic and hazardous waste is covered by the Pakistan Penal Code 1960. The transportation of all toxic and hazardous materials is monitored by the PEPA.

3.3.6 Reservation of Cultural Heritage

The EIA corridor could contain structures and artifacts of historical and cultural interest that must be preserved. The Antiquities Act 1975, administered by the provincial government, exists for the preservation of cultural heritage. Destruction and/or defacement of antiquities are an offence under the Act.

3.4 Institutional Setup

3.4.1 General

The apex environmental body in the country is Pakistan Environmental Protection Council (PEPC), which is presided by the Ministry of the country. Other bodies include the Pakistan Environmental Protection Agency (Pak – EPA), provincial EPAs (for four provinces, AJK and Northern Areas), and environmental tribunals.

The EPAs were first established under the 1983 Environmental Protection Ordinance; the PEPA 1997 further strengthened their powers. The EPAs have been empowered to receive and review the environmental assessment report (IEEs and EIAs) of the proposed projects, and provide their approval (or otherwise).

3.4.2 Institutional and Administrative Framework

The proposed project falls under the following Institutional and Administrative Framework.

a) Lahore Development Authority (LDA)

The Implementing Agency of the proposed project is LDA. The Chief Engineer with assistance of Supervision Consultants will ensure that all the measures proposed in the Environmental Management Plan are effectively implemented during the course of the proposed project.

b) Environmental Protection Agency, Punjab

The Pakistan Environmental Protection Agency (Pak-EPA) is meant for the enforcement of environmental laws in Pakistan. They have delegated powers to provincial environmental protection departments/agencies for review, approval and monitoring of environmental assessment projects. As regards the proposed Project, the EPA Punjab will be responsible for reviewing the report, issuing Environmental Approval and overall/broad based monitoring of the proposed Project activities to ensure compliance with the Environmental Management Plan. Under the Punjab Local Government Ordinance, 2001, District Officers (Environment) are responsible to deal with environmental issues at the district level. National Reconstruction Bureau has formulated the following rules of business for district environment offices:

- To regulate motor vehicles subject to the provisions of the Pakistan Environmental Protection Act, 1997 and the rules and regulations made thereunder;
- To ensure, guide and assist the proponents of new projects in submission of Initial Environmental Examination (IEE)/ Environmental Impact Assessment (EIA) to the D.G, EPA for approval;
- To ensure implementation of environmental protection and preservation measures in all development projects at the district level and to sensitize government agencies on environmental issues;
- To identify the needs for legislation in various sectors of the environmental
- matters;
- To provide information and guidance to the public on environment;
- To encourage the formation and working of non-governmental organizations, to
- prevent and combat pollution and promote sustainable development; and
- To undertake regular monitoring of projects and to submit progress reports to the DG, EPA for publication in the annual Report.

SECTION 4

BASELINE ENVIRONMENTAL DATA

4.1 General

The existing environment around the proposed project has been studied with respect to physical, ecological and socio-economic resources.

4.2 Study Parameters

The information – data for use in the report has been secured from:

- secondary sources – available with various organizations has been collected;
- visits to the site of works of the proposed project; and
- previous similar studies for other projects in the city.

The study parameters are described hereunder.

4.2.1 Physical Resources

Physical environment consists of existing land form and land use of the project site, geology and geomorphology, soils, groundwater, surface water, meteorology and climate. The pre-project condition (i.e. baseline) of each these components of the physical environment are described here below. This description has been developed with the help of site data collection, and secondary sources.

The baseline environmental conditions on the basis of the said data sets have subsequently been used to identify the potential impacts on the physical, biological and socio-economic environment that are likely to arise from the project activities.

The physical resources included in the study comprise:

a. Geography
b. Geology and soils
c. Climatology
d. Surface and ground water
e. Faulting and seismology
f. Flooding
g. Water logging and salinity
h. Air quality
i. Noise

4.2.2 Ecological Resources

a. Marine and aquatic ecology
b. Flora
c. Fauna
d. Endangered species

4.2.3 Human and Economic Development

a. Communities population and features
b. Economy and Industrial Activity
c. Institutions
d. Transportation
e. Land-use planning and land rights
f. Electrical power
g. Agricultural development

4.2.4 Quality of Life

a. Socio-economic conditions
b. Aesthetic resources
c. Cultural resources

4.3 Physical Resources

4.3.1 Geography

The project site has been inspected and necessary reconnaissance conducted for the purposes of EIA study. The site is located in the traffic-busiest spot of the Metropolis, it had been noted.

The topography of the site is almost flat and slopes upward gently from north to south i.e. moving upwards when reaching the canal and vice versa.

The roadways as well as the structures are present in the location and vicinity of the site. The project site passes through the towns of the metropolis, exhibited hereunder in Exhibit-4.1.

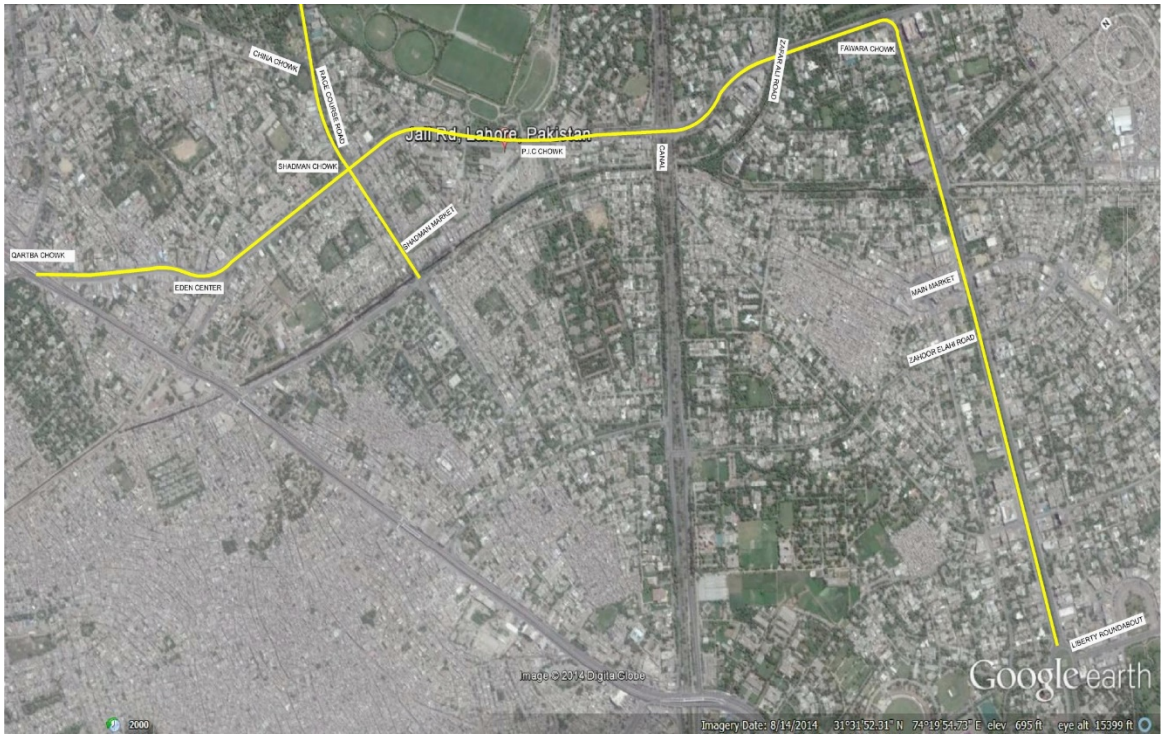


Exhibit-4.1, Project Location

The project site lies in Samanabad, and Gulberg Towns of the Lahore City District.

4.3.2 Geology and Soils

The agro-ecological zones of the country are presented in Exghibit-4.2. The project site falls under Zone-IV (b); the zone generally comprises sandy loam, and clayey loam.

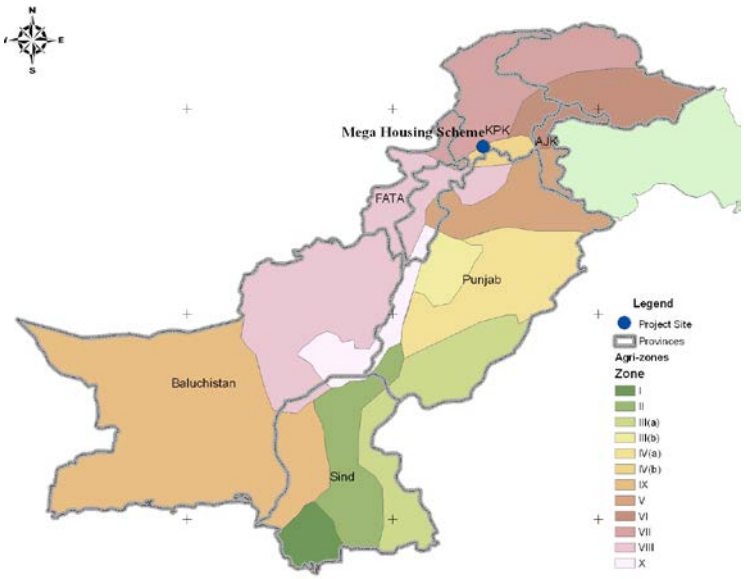


Exhibit-4.2, Agro-ecological Zones of Pakistan

Lahore plains are most probably underlain by the Potwar stratigraphy, but it would be deeply eroded. Lahore is located just north of the NW-SE running Sargodha high, where the sedimentary rocks may also be truncating against the high. Moreover, very thick alluvial and older fluvial deposits (Recent to Miocene)

before older eroded rocks are also encountered.

The geotechnical properties and mineralogical composition of the soil, das established during various studies / boring of tube wells for water supply by WASA/LDA confirm that the Lahore soil is composed of silty clay. The major mineral composition for Lahore soil is Quartz, Muscovite and Clinochlore, which shows that the alluvial deposit received sediments from metamorphic origin.

In general, subsurface stratigraphy at the site consists of three basic lithological units as given below:

- Lean Clay/Silty Clay
- Sandy Silt/Silt
- Silty fine Sand/fine Sand

These soils are the alluvial deposits of the recent geologic times. The subsurface stratigraphy is as discussed below:

- The first soil unit of brown silty clay/lean clay forms the topsoil cover at the site at all the locations and generally continues to a depth of 1 .0 m-3.5m below top of ground. This stratum contains trace fine sand and trace to little concretions at places. It is present in a soft to a stiff state of consistency and has low to medium plasticity.

- The second soil unit of brownish grey sandy silt/silt underlies the upper silty clay/ lean clay stratum. This layer has a thickness of 1.0 to 3.0m and is present in a firm state.

- The third soil unit of brownish grey non-plastic fine silty sand underlies the silt/silty sand stratum. It is present in a loose to medium-dense state.

The lithological distribution of soils consists of slightly cohesive, generally firm to stiff silty clay lean clay from 1.0 to 3.5m depth, followed by firm to stiff sandy silt/silt of 1.0 to 3.0m thickness in turn followed by medium dense silty fine sand. Groundwater is present at a depth of 4.5 to 5.0m below top of ground.

The subsurface generally appears suitable for supporting light to medium loads through spread foundations placed at 1.0 to 2.0m depth. Besides, some isolated weak spots are also expected, which will require special measures to be adopted.

4.3.3 Climatology

a. Temporal Division of the Country

The temporal division of the country is exhibited in Exhibit-4.3.

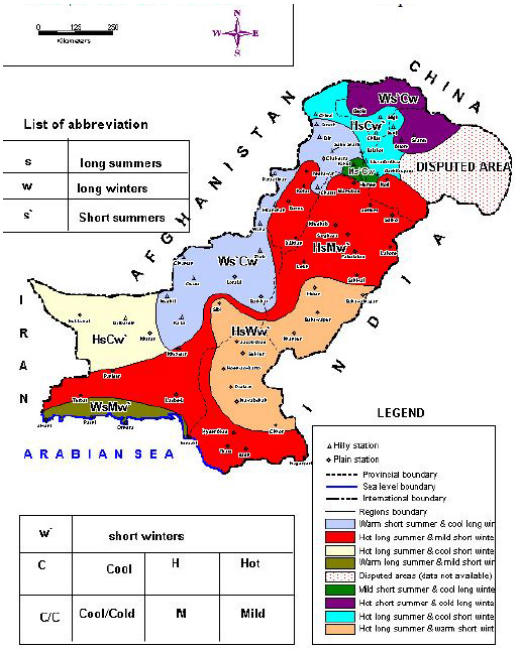


Exhibit-4.3, Temporal Division of the Country

It is noted from the above map that the project site falls under hot long summers and mild short winters.

a. Temperature

i. Mean Maximum Temperature

The mean maximum annual temperatures in the country are exhibited in Exhibit-4.4. It is noticed that the city of Lahore falls under 25-30 degree Centigrade temperature. As such, the location is in a relatively cooler area than southern part of the country.

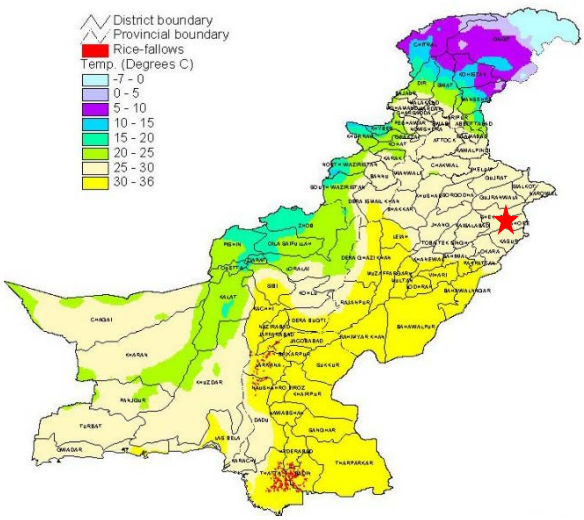


Exhibit-4.4, Mean Maximum Temperature in the Country

ii. Mean Minimum Temperature

The situation for minimum annual temperature follows almost the same pattern, Exhibit-4.5. The minimum annual temperature in the area is in the range of 15-20 degree centigrade.

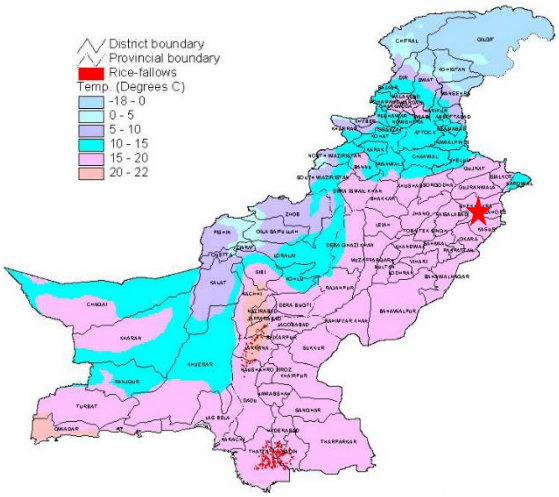


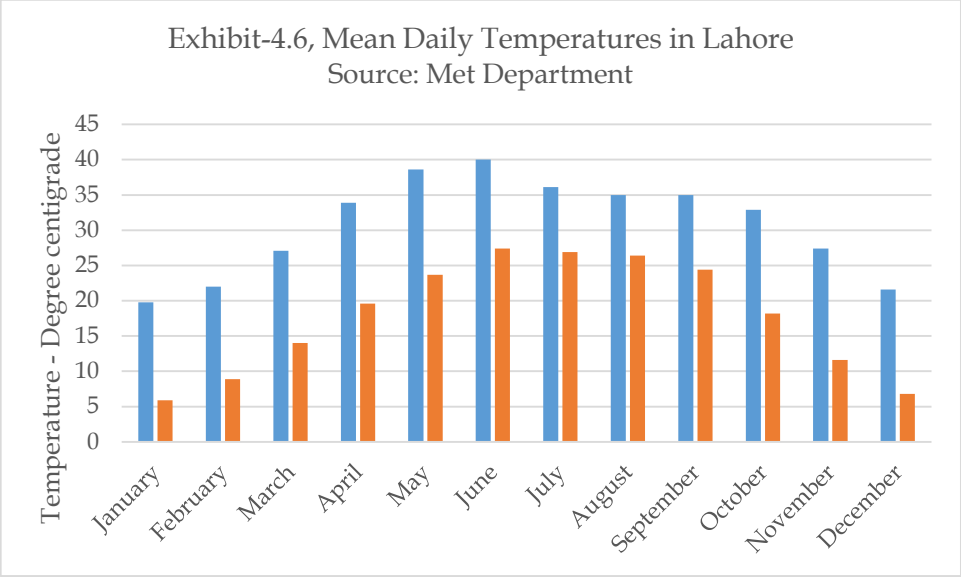
Exhibit-4.5, Mean Minimum Temperature in the Country

Generally the climate of the area is dry and severe during summer season and moderately cold in winter. Average record of 30 years (1961-90) climatic data is summarized in Tables-4.1 and exhibited in Exhibit-4.6.

Table-4.1, Mean Temperatures °C (Period 1961-90)

Month	Maximum Daily	Minimum Daily
January	19.8	5.9
February	22.0	8.9
March	27.1	14.0
April	33.9	19.6
May	38.6	23.7
June	40.0	27.4
July	36.1	26.9
August	35.0	26.4
September	35.0	24.4
October	32.9	18.2
November	27.4	11.6
December	21.6	6.8
Yearly Average	**30.8**	**17.8**

(Source: Regional Meteorological Centre, Lahore 1999)



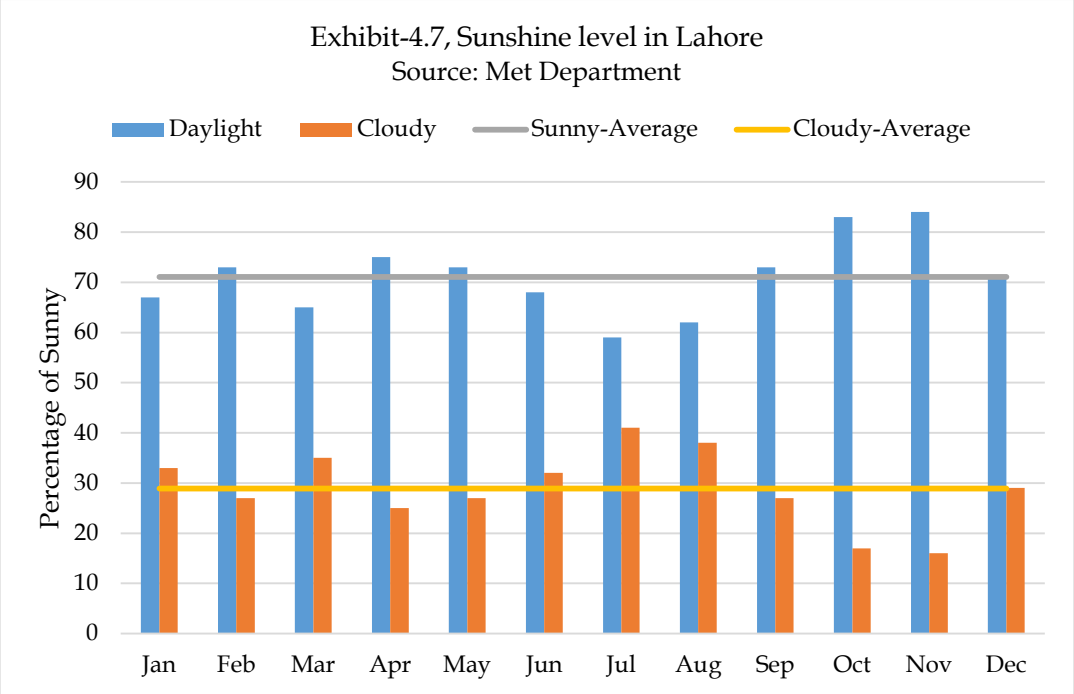
June is the hottest month of the year with maximum daily temperature of 40.4o C and extra maximum temperature of 48oC. January is the coldest month with a minimum temperature of 5.9oC.

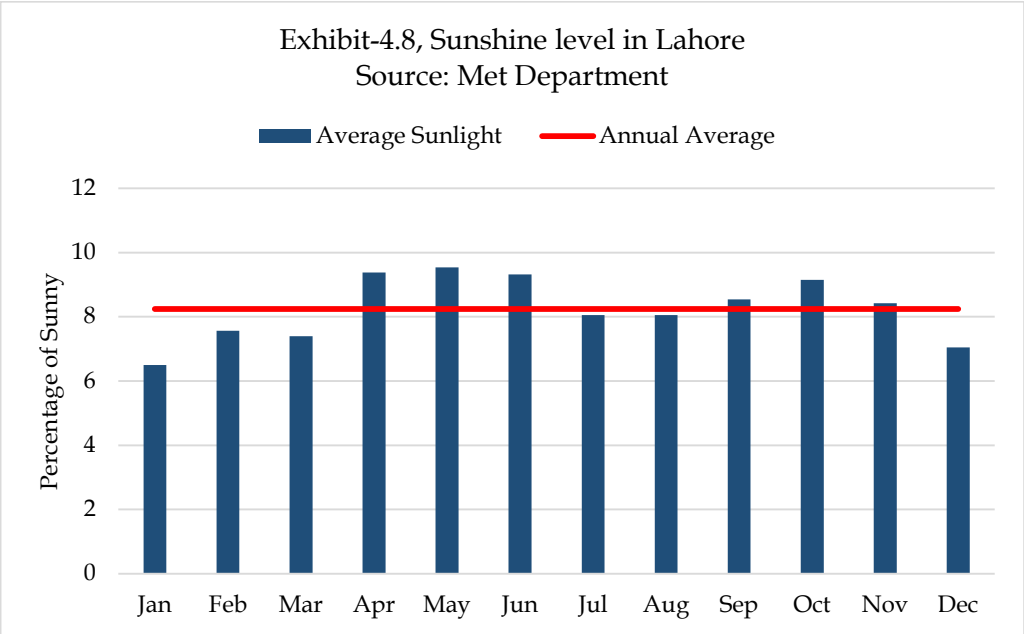
The Lahore, Punjab has a subtropical steppe/ low-latitude semi-arid climate that is hot all year (Köppen-Geiger classification: BSh). The Average Temperatures in Lahore are as under:

- The average annual temperature in Lahore, Punjab, Pakistan is fairly hot at 24.3 degrees Celsius (75.7 degrees Fahrenheit).
- There is a range of average monthly temperatures of 21.1 °C (38°F) which is a below moderate range. The average diurnal temperature variation/ range is 15.5 °C (27.9 °F).
- The warmest month (June) is very, very hot with an average temperature of 33.9 degrees celcius (93.02 degrees Fahrenheit).
- The coolest month (January) is mild having an average temperature of 12.8 degrees celcius (55.04 degrees Fahrenheit).

b. Sunshine Hours

Annual average sunshine is for 8.4 hours/ day. January has the minimum sunshine to the tune of 6.9 hours/ day, Exhibit-4.7 & Exhibit-4.8.





Sunshine & Daylight Hours in Lahore, Punjab, Pakistan

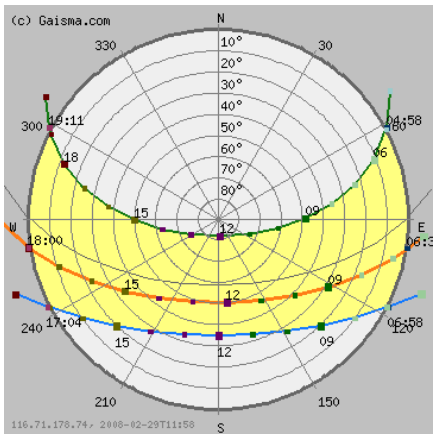
Mean hours of sunlight in Lahore, Punjab range from 6:50 for every day in January to 9:54 per day in May. The average of 8:28 of sunlight per day. Moreover, it is sunny about 71% of daylight hours. The remaining 29% of daylight hours are likely cloudy or with shade, haze or low sun intensity.

c. Sun Path

Sun path refers to the apparent significant seasonal-and-hourly positional changes of the sun (and length of daylight) as the Earth rotates, and orbits around the sun. The relative position of the sun is a major factor in the heat gain of

buildings and in the performance of solar energy systems.[1] Accurate location-specific knowledge of sun path and climatic conditions is essential for economic decisions about solar collector area, orientation, landscaping, summer shading, and the cost-effective use

The path of sun for the city of Lahore / Project area is exhibited hereunder:



d. Wind Characteristics

Table-4.2 reveals that 60% days of the year are calm and 33% days have mean speed of 1-3 knots. Only 6% days exhibit speed of 4-6 knots and higher. Wind directions are from north-west and south-east during summer and winter respectively. Summer winds bring monsoon rains.

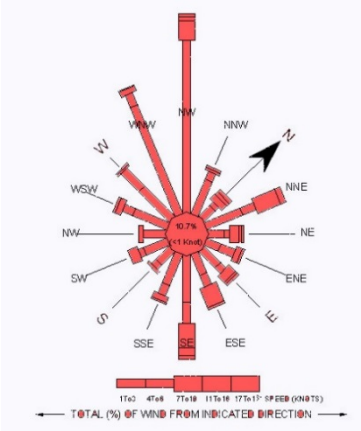
Table-4.2, Mean Wind Speed and Direction

Month	Wind Frequency (%) Speed in Knot Ranges						Predominant Direction From
	Calm	3-Jan	6-Apr	10-Jul	16-Nov	17-21	
January	72	25	3	0.4	-	-	NW
February	60	33	7	1	-	-	NW
March	55	35	7	2	1	0.1	NW
April	48	40	9	3	1	0.1	NW
May	51	39	7	3	1	-	NW
June	40	45	12	4	0.4	-	SE
July	43	46	9	2	0.4	-	SE
August	52	42	5	1	0.4	-	SE
September	65	30	5	0.3	0.1	0.1	SE
October	75	22	1	1	-	1	NW
November	79	19	1	1	0.1	-	NW
December	83	16	1	-	-	-	NW
Yearly Average	**60**	**33**	**6**	**1**	**0.3**	**0.1**	**NW**

(Source: Regional Meteorological Centre Lahore, 1999).

Note: NW = North West, SE = South East, 1 Knot = 1.854 km/hour

Wind storms of moderate intensity occur during summer (April - July). Their occurrence is maximum in June when low pressures are caused due to high temperature.



e. Rainfall/ Precipitation

The Exhibit-4.9 exhibits rainy days in the country. It is evident that wet days during monsoon are increasing when moved towards north. In case of Lahore, the rainy days are relatively more than in southern region; as such surface water infiltration into the soil is higher than in the southern part of the country.

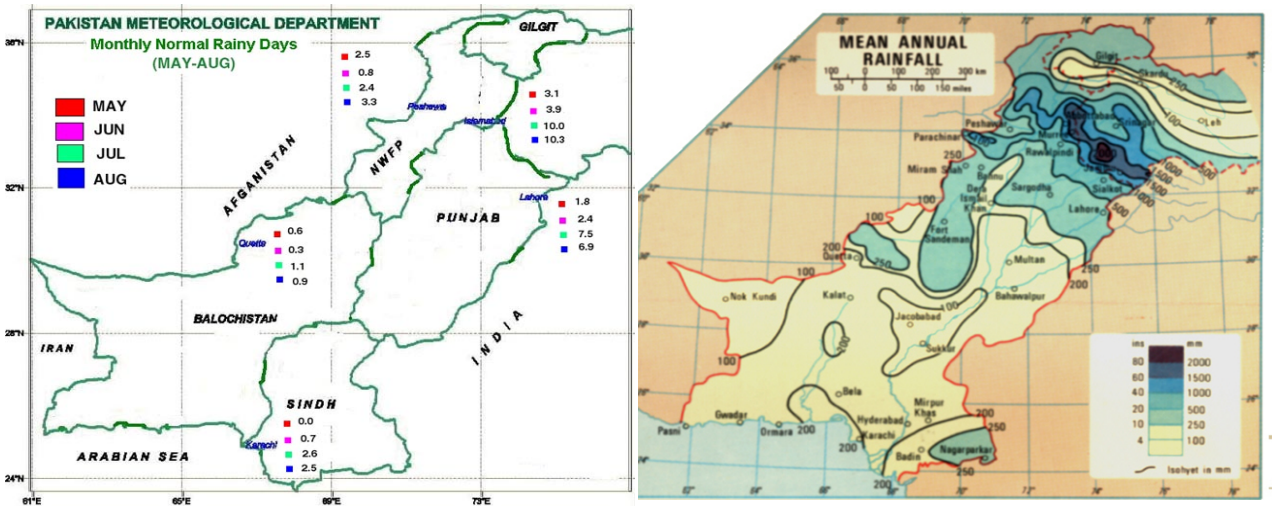


Exhibit-4.9, Rainfall Pattern in the Country

Lahore mainly receives its rainfall during the monsoon season from June till September, and in winter season from December till February. The highest-ever annual rainfall in Lahore was recorded in 1955 when 1,317.5 millimeters (51.87 in) of rainfall was recorded. Lahore received below normal rains in 2009, and normal rains in 2007 and 2010.

The following is the Annual rainfall in Lahore since 2007 based on data from

the Pakistan Meteorological Department:

- In 2007, a total of 716 millimeters (28.2 in) rain was recorded
- In 2008, a total of 917 millimeters (36.1 in) rain was recorded
- 2009, a total of 468.4 millimeters (18.44 in) rain was recorded.
- In 2010, a total of 738 millimeters (29.1 in) rain was recorded
- In 2011, a total of 1,576.8 millimeters (62.08 in) rain was recorded as of September 21, 2011

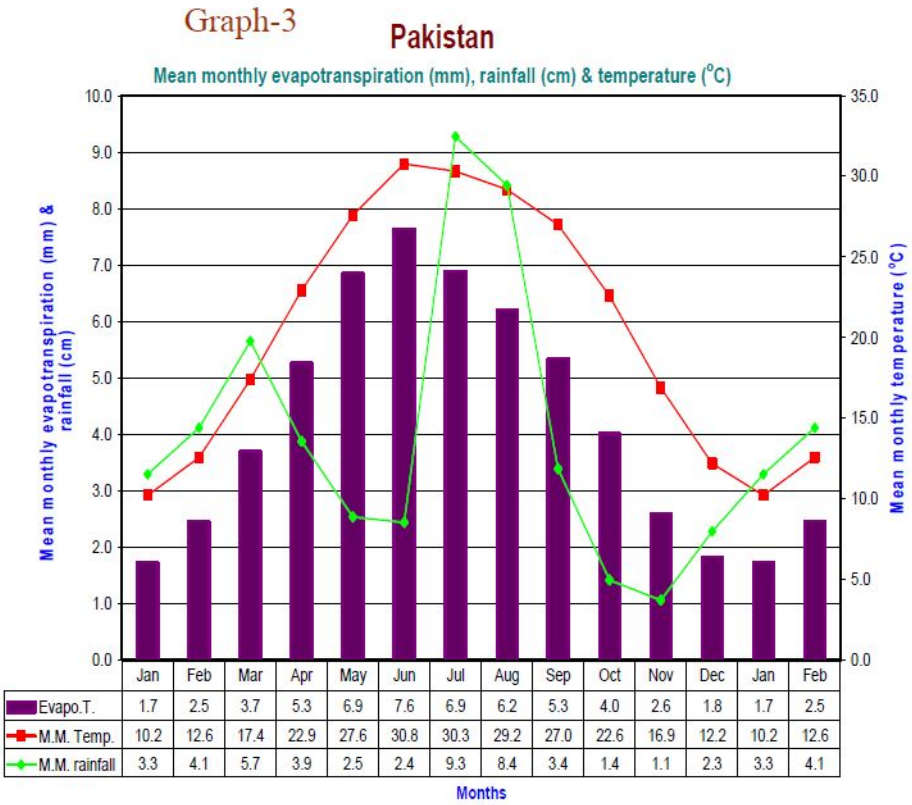
f. Extreme Weather Effects

On February 26, 2011 Lahore received an isolated but strong hailstorm measuring 4.5 mm that carpeted several roads of the city. The hailstorm was the heaviest in Lahore for the last 35 years. Usually hailstorms occur in the plain areas of the Punjab province during the winter season.

The hailstorm lasted for 30 minutes intermittently with heavy rain showers.[41] According to Meteorological Department the city received 12 millimeters (0.47 in) of rain and 4.5 millimeters (0.18 in) at the airport.

g. Evapotranspiration

The climatology with emphasis on evapotranspiration is included in Exhibit-4.10.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
Evapo.T.	1.7	2.5	3.7	5.3	6.9	7.6	6.9	6.2	5.3	4.0	2.6	1.8	1.7	2.5
M.M. Temp.	10.2	12.6	17.4	22.9	27.6	30.8	30.3	29.2	27.0	22.6	16.9	12.2	10.2	12.6
M.M. rainfall	3.3	4.1	5.7	3.9	2.5	2.4	9.3	8.4	3.4	1.4	1.1	2.3	3.3	4.1

Exhibit-4.10, Level of Evapotranspiration in the Country

Obviously, the evapotranspiration is rapid in warmer periods of April-August and at times it is more than 70%.

h. Dust Storm

The situation of dust storm in the country is exhibited in Exhibit-4.11.

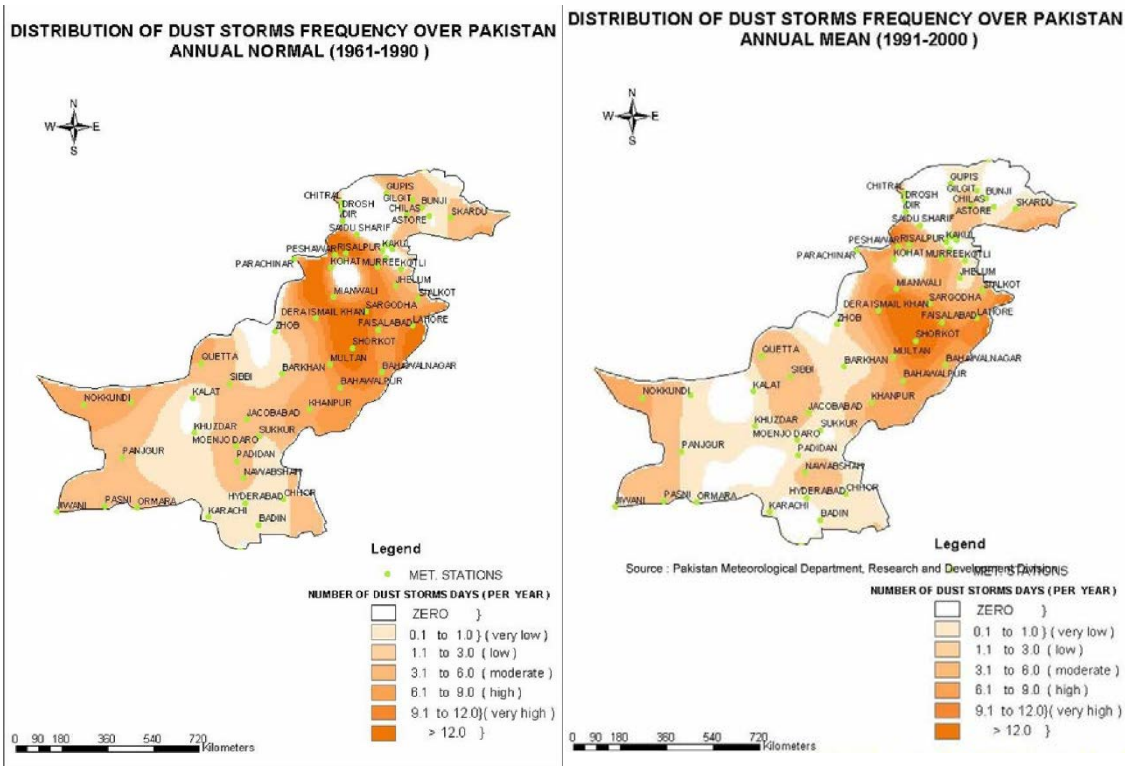


Exhibit-4.11, Dust Situation in the Country

It is noted from the above map that the project site moderate dust storms both in terms of intensity and frequency.

Average annual rainfall is 629 mm as against monthly average of 52.4 mm. Rain occurs both in summer and winter seasons. Months of July, August and September receive the maximum rainfall (about two third of the annual average). Mean number of rainy days are 34.

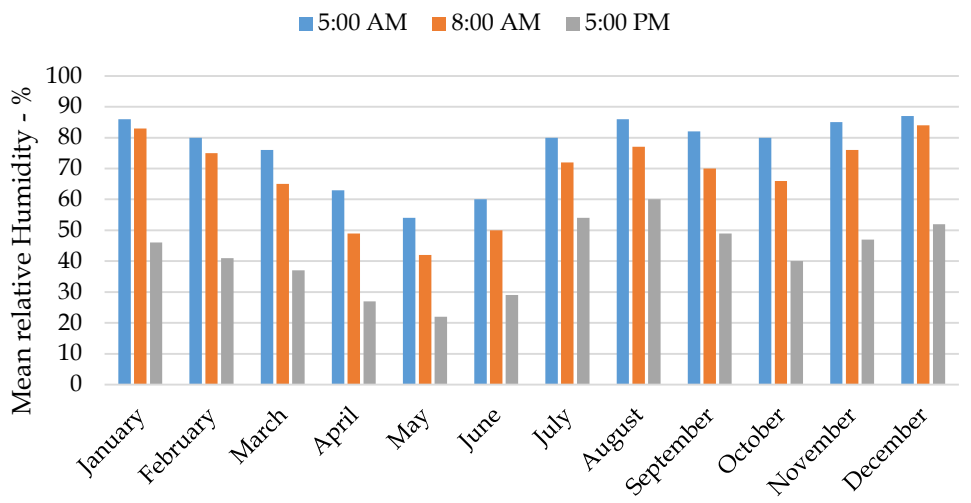
i. Humidity

January has the maximum relative humidity values of 86% and 46% at 0500 and 1700 hours respectively. Minimum values of relative humidity of 54% and 22% at 0500 and 1700 hours respectively are found in May. Table-4.3 and Exhibit-4.12 give the statistics about humidity.

Table-4.3, Mean Relative Humidity and Precipitation (Period 1961-90)

Month	Relative Humidity (%)		
	5.00 a.m.	8.00 a.m.	5.00 p.m.
January	86	83	46
February	80	75	41
March	76	65	37
April	63	49	27
May	54	42	22
June	60	50	29
July	80	72	54
August	86	77	60
September	82	70	49
October	80	66	40
November	85	76	47
December	87	84	52
Yearly Average	77	68	42

Exhibit-4.12,Mean Relative Humidity in Lahore
Source: Met Department



It is noted from the above exhibit that on the average, the humidity is about 77% in the morning and is above 40% in the evening.

The average annual relative humidity is 37.9% and average monthly relative humidity ranges from 20% in May to 58% in August.

4.3.4 Surface Water & Ground Water

a. Surface Water

No rivers exist in the vicinity; however, storm water drains cross the route for disposal into the Ravi River. Water from River Ravi, flowing on the northwestern

side of the city of Lahore, is being used for other purposes other than drinking purposes. River Ravi receives almost all the municipal/ industrial wastes from the city of Lahore. The potential value as a recreational water body and breeding place for fish is threatened by the municipal and industrial pollution.

b. Groundwater

Ground water quality is fresh (defined as acceptable in terms of its salinity).Raw water abstracted from the deep tube wells is believed to be essentially bacteria free. The status of quality of ground water both in the country and Punjab Province is included in Exhibit-4.13.

The water quality in the upper 50 meters zone of subsoil is generally brackish.

For city's drinking purposes water is abstracted from groundwater aquifer by means of tube wells located throughout the city. The quality of water is generally adequate for direct consumption. About 83% of city population is consuming groundwater for drinking purposes.

Groundwater is available at a depth ranging between 15 to 23m below the natural surface level. Deep groundwater from a depth of about 210m in the vicinity of the Project Area is being extracted for meeting the domestic and commercial water demands in nearby areas.

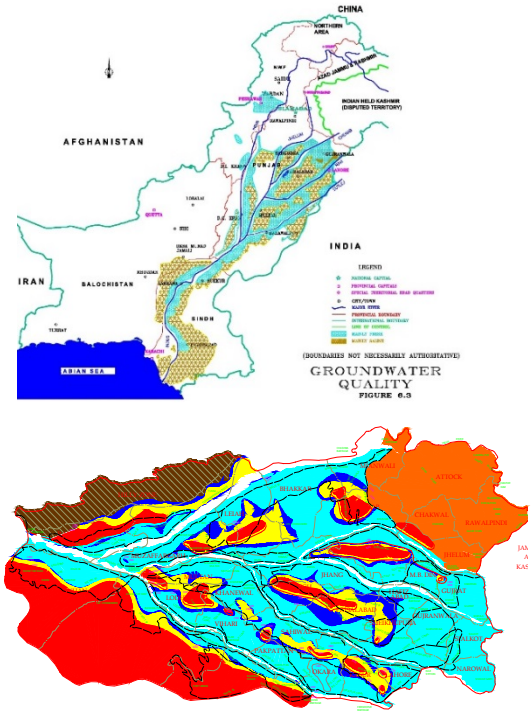


Exhibit-4.13, Quality of Ground water

Adequate quantity of good quality groundwater is available below a depth of 50m.

Water consumption varies significantly and its variation as of industrial units. Usual water consumption pattern for industrial units and data collected from the

prospective industrialist will form basis for total water demand.

According to Master Plan-2030 for the city of Lahore, the mean average decline in ground water is about 2.03 feet per year. The water table contour map for the Year-2000 is exhibited in Exhibit-4.14. It is noted from the exhibit that ground water is at a greater depths in the central part of the city where abstraction is more than the re-charge and close to surface waters i.e. Ravi River and Canal, the situation is in the reverse order.

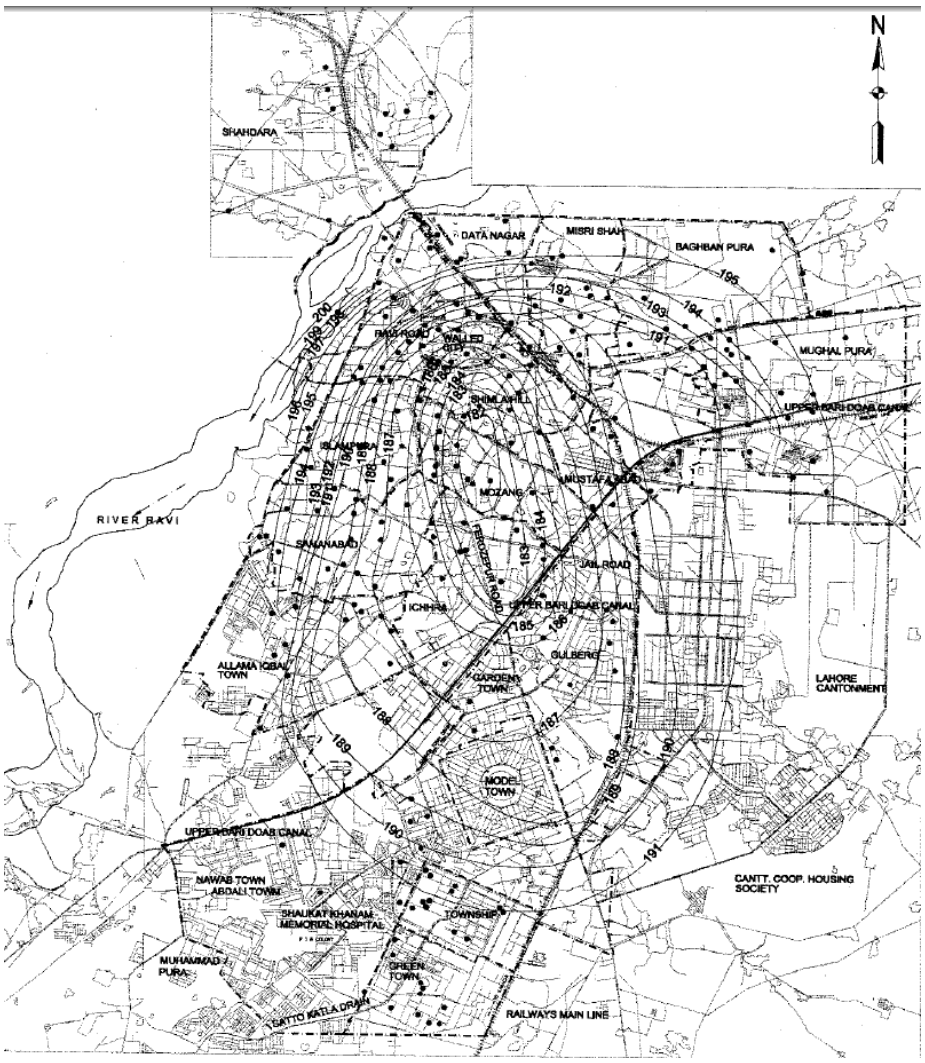


Exhibit-4.14, Ground water Contours in Lahore City

It is noted from the above map that ground water depth is increasing when moving into the central parts and away from the recharge sphere of River Ravi.

The water quality is normally satisfactory in the WASA's service area. However, in wet seasons, chlorination is done so as to eliminate possibility of any bacterial pollution in rainy season. As per WASA's reporting included in the Master Pla-2030, every month about 300-350 samples are collected for quality testing and wherever signs of pollution are noticed, chlorination is accomplished.

4.3.5 Seismology

Pakistan Building Code distributes the country into 4-zones, Exhibit-4.15. The project site falls in Moderate damage Zone, as such structural design of buildings and others will follow the applicable criteria for the zone.

Seismic details are very important consideration for any planning activity. As it directly lays impact on the construction of site.

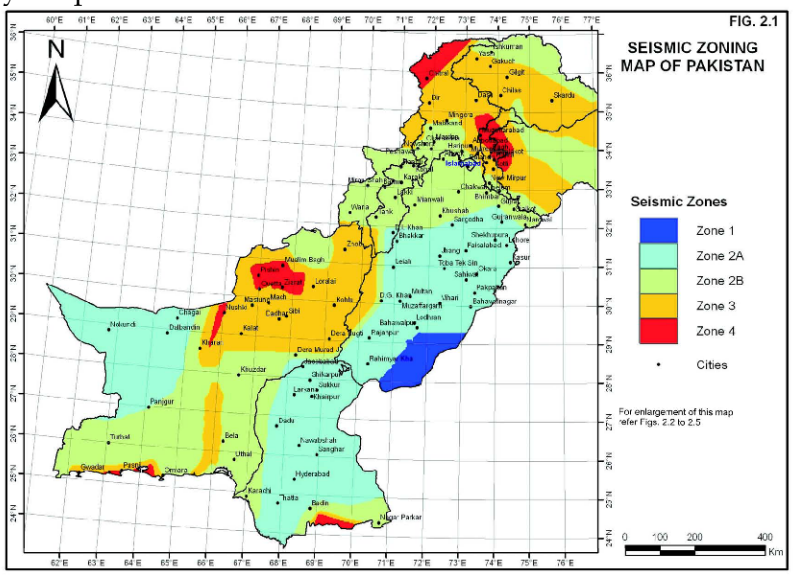


Exhibit-4.15, Seismic Zones of the City

The project lies in seismic Zone-2A, seismic zoning map of Pakistan as exhibited above. This Zone-2A prone to minor damage, distant earthquake may cause damage to structure with fundamental periods greater than 1.0 second. It is correspond to intensity V to VI of the Modified Mercalli Intensity Scale of 1931.

4.3.6 Flooding

No surface drainage problems are foreseen as surface water can be disposed in the existing primary and secondary drainage network including partly moving into the sewerage.

4.3.7 Water Logging and Salinity

There are no signs of water logging in the project site.

4.3.8 Air Quality

a. General

Motor vehicle emissions are composed of the by-products that comes out of the exhaust systems or other emissions such as gasoline evaporation. These emissions contribute to air pollution and are a major ingredient in the creation of smog in some large cities. A study by MIT indicates that 53,000 early deaths occur per year in the United States alone because of vehicle emissions

Main source of air pollution in the Project area is traffic congestion that occurs off and on in the Project Area. Traffic load has increased manifold due to rapid growth of the City. Ambient air is being polluted due to emission of fuel gases like Carbon Monoxide (CO), Nitrogen Oxide (NO_x) and Sulphur Oxide (SO_x) due to the vehicle exhaust. Untreated fuel from rickshaws also contain trace amount of Lead (Pb) in it.

The quality of air has been determined through monitoring (24-hour basis) at the following locations:

- Qartaba Chowk
- Shadman Chowk
- Fawara Chowk (near Siddique Trade Centre)
- Liberty Roundabout

Liberty Roundabout

Fawara Chowk

Shadman Chowk

Qartaba Chowk

As a result of traffic blockages, vehicular emissions are higher at the junction, however due to the presence of plantation and green areas, air quality is generally satisfactory in the morning but deteriorates during the day.

Air Quality Determined

The air quality has been determined by SGS at the following locations/points:

- Qartaba Chowk
- Shadman Chowk
- Fawara Chowk
- Liberty Roundabout

The quality determination has been made on 24-hour basis; determinations are included in **Annexure-4.1** and abstracted hereunder in Tabl-4.4 through Table-4-7

Table-4.4, Abstract of Air Quality-Liberty Roundabout

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	NEQS
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	24Hours	1.00	17.14	80 ($\mu g/m^3$) For 24 Hours
Sulphur Dioxide (SO_2)	$\mu g/m^3$	24 Hours	1.00	36.93	120 ($\mu g/m^3$) For 24 Hours
Carbon Monoxide (CO)	mg/m^3	24 Hours	0.01	2.01	05 (mg/m^3) For 08 Hours
Particulate Matter (PM_{10})	$\mu g/m^3$	24 Hours	2.00	136.0	150 ($\mu g/m^3$) For 24 Hours

$\mu g/m^3$: micrograms per cubic meter
mg/m^3: miligram per cubic meter
LDL: Lowest Detection Limit
NEQS: National Environmental Quality Standards

It is noted from the above determinations that air quality is well within the prescribed limits except particulate matter which is closer to the prescribed limit.

Table-4.5, Abstract of Air Quality-Fowara Chowk

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	NEQS
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	24Hours	1.00	21.57	80 ($\mu g/ m^3$) For 24 Hours
Sulphur Dioxide (SO_2)	$\mu g/m^3$	24 Hours	1.00	33.33	120 ($\mu g/ m^3$) For 24 Hours
Carbon Monoxide (CO)	mg/m^3	24 Hours	0.01	1.99	05 (mg/m^3) For 08 Hours
Particulate Matter (PM_{10})	$\mu g/m^3$	24 Hours	2.00	141.9	150 ($\mu g/ m^3$) For 24 Hours

$\mu g/m^3$: micrograms per cubic meter
mg/m^3: miligram per cubic meter
LDL: Lowest Detection Limit
NEQS: National Environmental Quality Standards

It is noted from the above determinations that air quality is well within the prescribed limits except particulate matter which is almost reaching the threshold.

Table-4.6, Abstract of Air Quality-Shadman Chowk

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	NEQS
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	24Hours	1.00	26.40	80 ($\mu g/ m^3$) For 24 Hours
Sulphur Dioxide (SO_2)	$\mu g/m^3$	24 Hours	1.00	53.62	120 ($\mu g/ m^3$) For 24 Hours
Carbon Monoxide (CO)	mg/m^3	24 Hours	0.01	2.05	05 (mg/m^3) For 08 Hours
Particulate Matter (PM_{10})	$\mu g/m^3$	24 Hours	2.00	135.0	150 ($\mu g/ m^3$) For 24 Hours

$\mu g/m^3$: micrograms per cubic meter
mg/m^3: miligram per cubic meter
LDL: Lowest Detection Limit
NEQS: National Environmental Quality Standards

It is noted from the above determinations that air quality is well within the prescribed limits except particulate matter which is closer to the threshold.

Table-4.7, Abstract of Air Quality-Qartaba Chowk

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	NEQS
Nitrogen Dioxide (NO_2)	$\mu g/m^3$	24Hours	1.00	17.43	80 ($\mu g/ m^3$) For 24 Hours
Sulphur Dioxide (SO_2)	$\mu g/m^3$	24 Hours	1.00	71.47	120 ($\mu g/ m^3$) For 24 Hours
Carbon Monoxide (CO)	mg/m^3	24 Hours	0.01	2.18	05 (mg/m^3) For 08 Hours
Particulate Matter (PM_{10})	$\mu g/m^3$	24 Hours	2.00	190.9	150 ($\mu g/ m^3$) For 24 Hours

$\mu g/m^3$: micrograms per cubic meter
mg/m^3: miligram per cubic meter
LDL: Lowest Detection Limit
NEQS: National Environmental Quality Standards

It is noted from the above determinations that air quality is well within the prescribed limits except particulate matter which exceeds the prescribed limits.

Noise Level Determined

The noise level prevalent at the crucial locations has been determined for locations as stated under air quality, the determinations are ofresented in Table-4.8.

Table-4.8, Abstract of Prevalent Noise Level

Nr.	Location	Min. Noise Level	Max. Noise Level	Prescribed Limit
1.	Liberty Roundabout	68.2(0300 hours)	74.6(1900 hours)	85
2.	Fowara Chowk	68.3(0300 hours)	74.4(2100 hours)	85
3.	Shadman Chowk	68.5(1000 hours)	74.6(0400 hours)	85
4.	Qartaba Chowk	73.4(0300 hours)	81.3(1600 hours)	85

b. Emissions determined from Motorized Vehicles

General

Motor vehicle emissions are composed of the by-products that comes out of the exhaust systems or other emissions such as gasoline evaporation. These emissions contribute to air pollution and are a major ingredient in the creation of smog in some large cities. A 2013 study by MIT indicates that 53,000 early deaths occur per year in the United States alone because of vehicle emissions.

Traffic Counts

In the project area, presently (on the average), the traffic count determines traffic counts as exhibited in the following exhibit:

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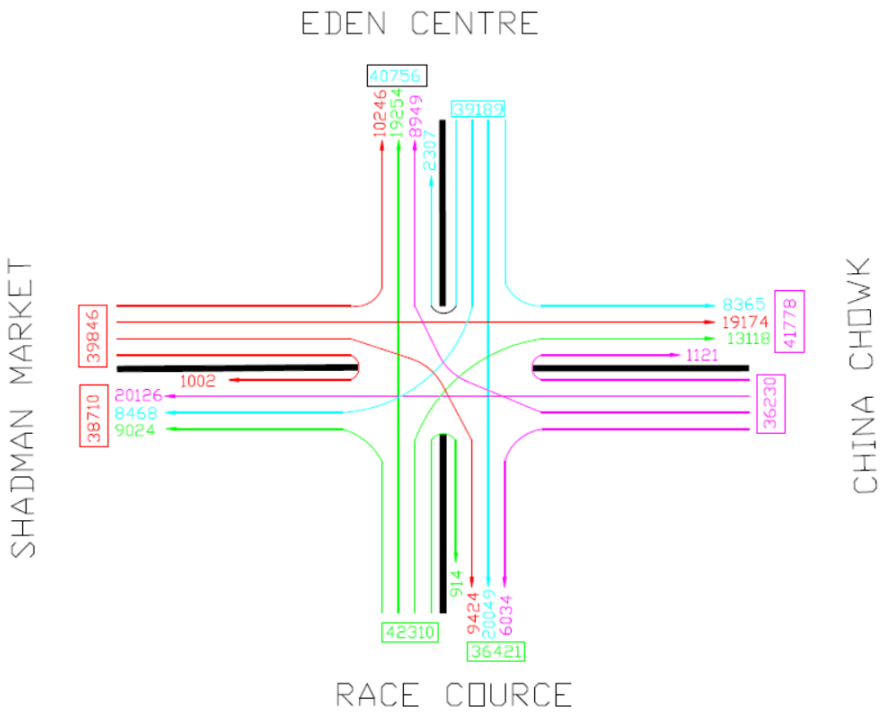
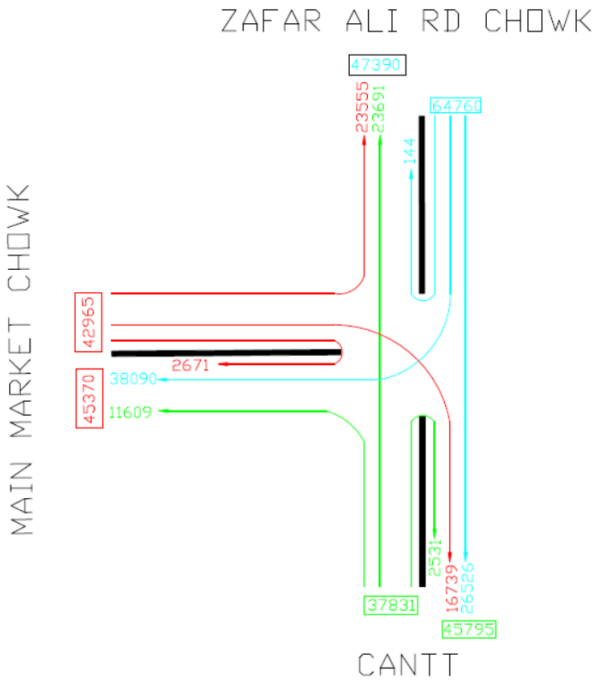
AVERAGE DAILY TRAFFIC AT SHADMAN CHOWK



AVERAGE DAILY TRAFFIC AT FAWARA CHOWK (JAIL ROAD



Significant Emissions

NOx
In a 2005 U.S. EPA study the largest emissions of NOx came from on road motor vehicles, with the second largest contributor being non-road equipment which is mostly gasoline and diesel stations.

Volatile organic compounds
A 2005 U.S. EPA report gives road vehicles as the second largest source of VOCs in the U.S. at 26% and 19% are from non-road equipment which is mostly gasoline and diesel stations

Ozone
Ozone is beneficial in the upper atmosphere, but at ground level, ozone irritates the respiratory system, causing coughing, choking, and reduced lung capacity.

Carbon monoxide (CO)
Carbon monoxide poisoning is the most common type of fatal air poisoning in many countries.[17] Carbon monoxide is colorless, odorless and tasteless, but highly toxic. It combines with hemoglobin to produce carboxyhemoglobin, which is ineffective for delivering oxygen to bodily tissues. In the U.S. 60% of carbon monoxide is caused by on road vehicles.

Particulate matter (PM10 and PM2.5)
The health effects of inhaling airborne particulate matter have been widely studied in humans and animals and include asthma, lung cancer, cardiovascular issues, and premature death. Because of the size of the particles, they can penetrate the deepest part of the lungs. A 2011 UK study estimates 90 deaths per year due to passenger vehicle. In a 2006 publication, the U.S. Federal Highway Administration (FHWA) state that in 2002 about 1 per-cent of all PM10 and 2 per-cent of all PM2.5 emissions came from the exhaust of on-road motor vehicles (mostly from diesel engines).

Carbon dioxide (CO2)
Carbon dioxide is a greenhouse gas. Motor vehicle CO2 emissions are part of the anthropogenic contribution to the growth of CO2 concentrations in the atmosphere which is believed by a majority of scientists to play a significant part in climate change. The vehicles are calculated to generate about 20% of the European Union's man-made CO2 emissions, with passenger cars contributing about 12%.

Release of Emissions
The release of emissions from motorized vehicles for the purpose of determination of quantity/level of emissions is assumed and included in Table-4.9.

Table-4.9, Release of Emissions from Motorized Vehicles

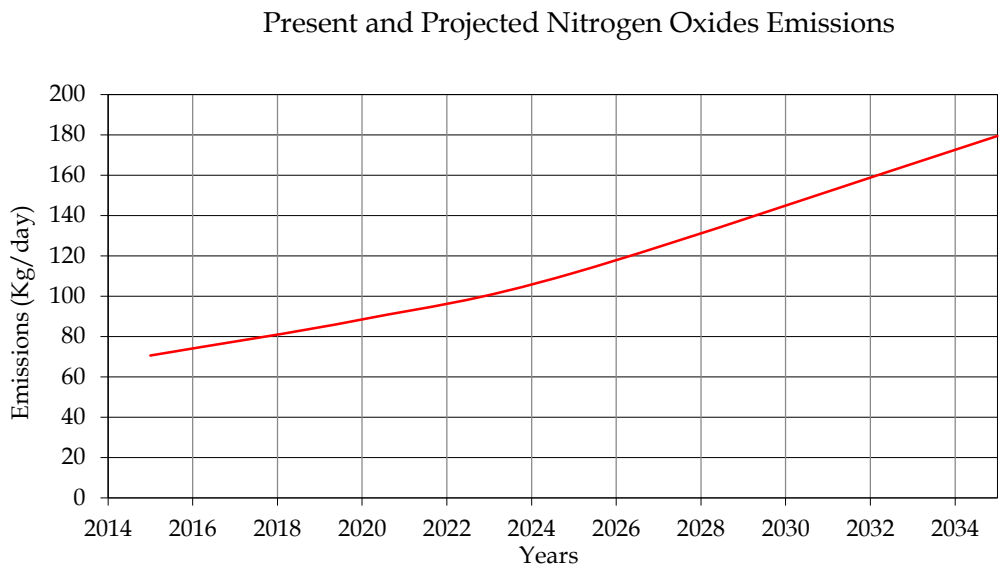
Vehicle Type	Speed Km/hr	Carbon Monoxide (g/km)	Hydrocarbons (g/km)	Nitrogen Oxides (g/km)
Cars	40	22.90	1.88	2.83
Pick-ups	35	22.90	1.88	2.83
Coasters	35	13.20	2.50	0.99
Hiace Wagon	35	13.20	2.50	13.4
Buses	30	13.20	2.50	13.4
Tractor Trolleys	25	13.20	2.50	13.4
Trucks	25	13.20	2.50	13.4
Trailer	25	13.20	2.50	13.4
Rikshaw	30	17.00	9.90	0.075
Motorcycle	30	17.00	9.90	0.075

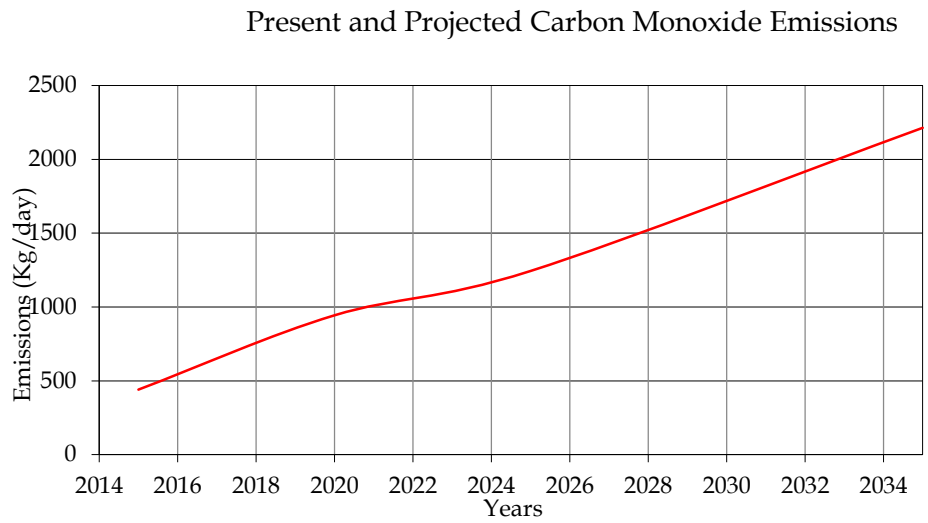
a. Present and Anticipated Emissions from Motorized Vehicles

The level of present emissions and anticipated ones (average situation at Shadman Chowk) when the situation is without the proposed project is presented in Table-4.10 and exhibited in Exhibit-4.17, the details are included in **Annexure-4.2.**

Table-4.10, Present & Anticipated Emissions from Motorized Vehicles

Nr.	Year	Emissions (Kg)		
		Carbon Monoxide	Hydrocarbons	Nitrogen Oxides
1	2015	441	249	71
2	2020	944	333	89
3	2025	1244	435	112
4	2035	2214	758	179





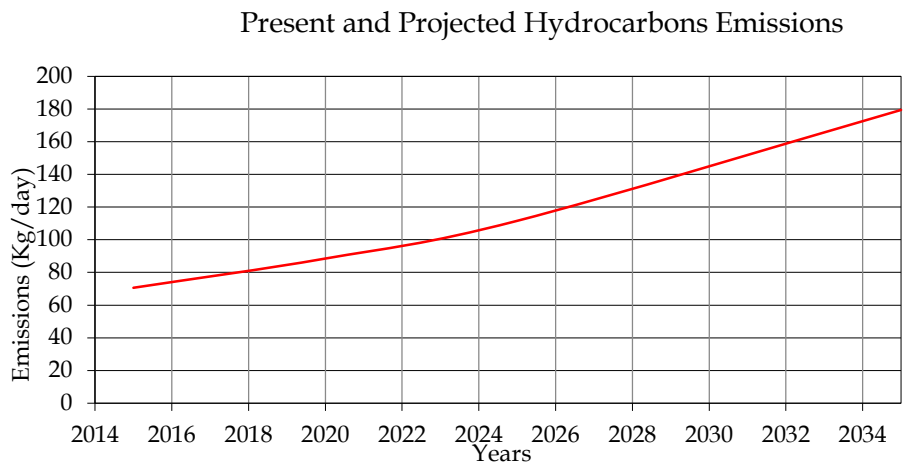


Exhibit-4.17, Present and Future Emissions from Vehicles

It is concluded from the above exhibits-determinations that:

- Level of emission is increasing over the period, implies with without project, the vehicles' speed is reducing and these are producing more emissions; and
- Cars and Pick-ups are more producers of carbon monoxide whereas Rickshaws and Motor cycles produce more hydrocarbon and heavier traffic produces more nitrogen oxides.

4.3.9 Noise

The project area falls under a calm environment and presently, the noise level is within the permissible limits of 85 db.

4.4 Ecological Resources

4.4.1 Marine and Aquatic Ecology

This is not applicable to the Project area.

4.4.2 Flora

The diversity and distribution of plant species within the Lahore District depends upon the availability of water and the underlying geology. There are significant numbers of trees in Green Belts en-route.

The flora existing within the right of way of the proposed project – extensions are exhibited hereunder:

- Trees 200 numbers
- Plants 100 numbers

4.4.3 Fauna

Common birds found in the area are crows and sparrows. Domestic animals are seen grazing in the agricultural land as well as on the project site. Chirping birds are having their nests at the well grown trees that are providing a natural habitat for the birds. Some squirrels, parrot, rats, weaver, sparrows are also found in the area.

Different species of reptile and amphibians such as lizards and frogs are also found. Various bird species known to occur in the area include myna, bulbul, crow and sparrow.

4.4.4 Endangered Species

The endangered plant in Pakistan is the Elm i.e., Ulmus wallichiana which is not found here. No endangered species exist in the project area.

4.5 Human & Economic Development

4.5.1 Communities Population and Features

a. Demographics

The demography of the city is as under in Table-4.11.

Table-4.11, Demography of Lahore City

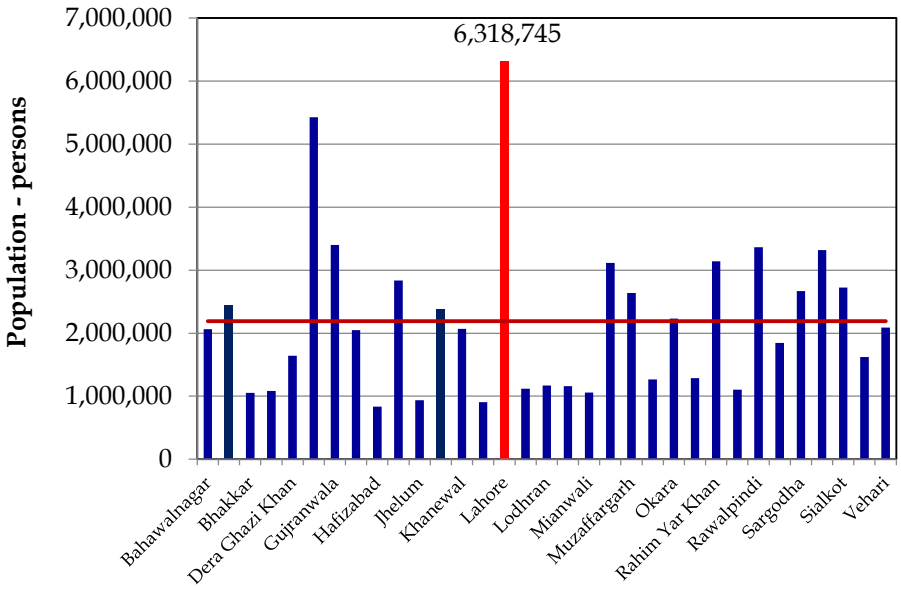
Population		Growth Rate	Household	
1998	1981	1981 to 1998	Size	Number
4,577,744	2,707,215	3.14	7.10	644,753

b. Share of Lahore City Population in the Province

The Lahore District with population-98 as 6,318,745 is the top district which has population above the average of about 2,192,314 persons, Exhibit-4.18.

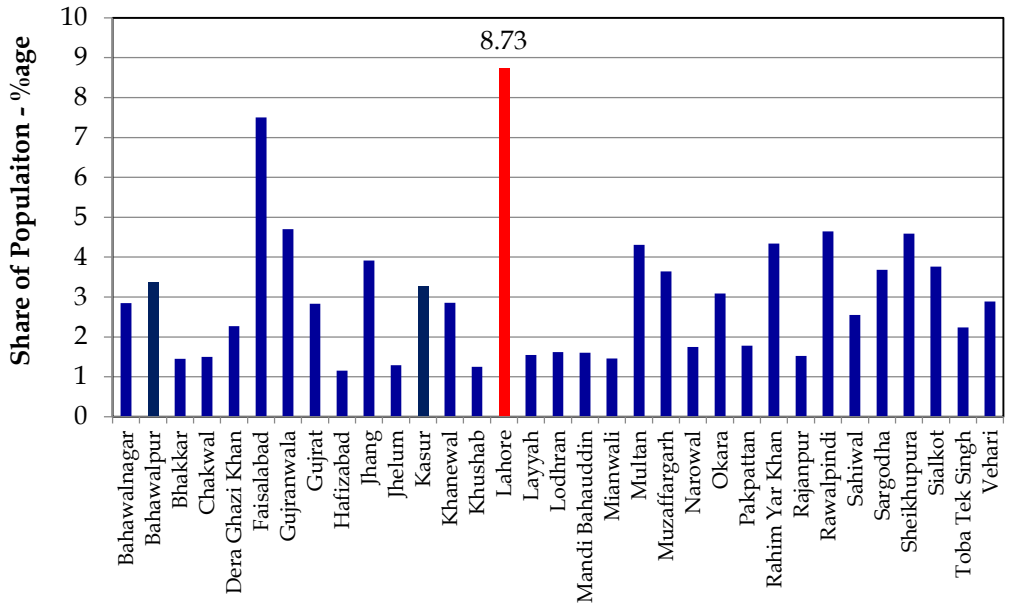
Exhibit-4.18, District-Wise Population in Punjab

Source: Census-1998



The share of population in the districts is about 8.73%, Exhibit-4.19.

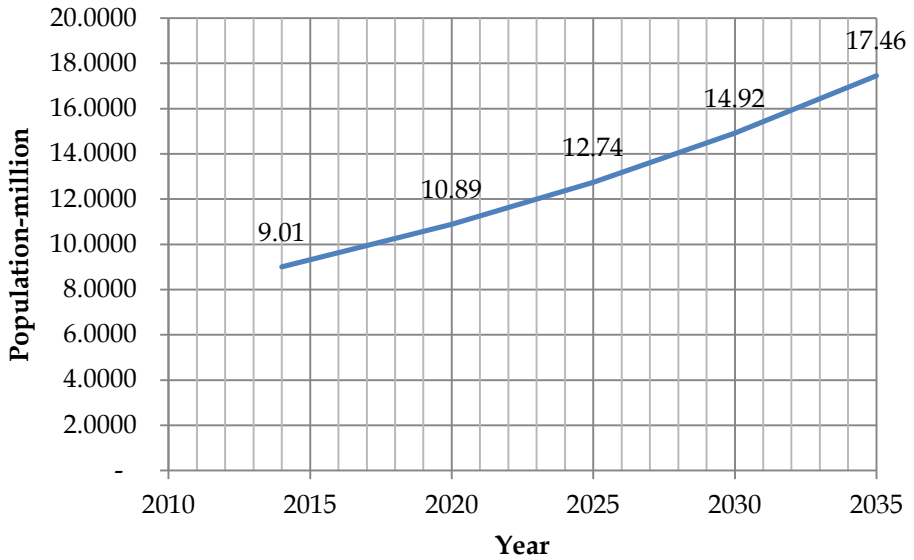
Exhibit-4.19, Share of District Population in Punjab
Source: Census-1998



c. Projected Population, City of Lahore

As per Census-1998, the population of Lahore was 4,577,744 persons and annual growth rate experienced during the period 1981-1998 was 3.14%. The projected population has been established as about 11,290,180 persons towards end of the year-2030, Exhibit-4.20.

Exhibit-4.20, Population Growth Pattern for the City of Lahore
Source: Census-1998 and Projected



The metropolis city of Lahore is expanding at a rate of about 3.2% per annum and its present population of about 9 million is anticipated to be above 17 million by the end of Year-2035, the design period for the proposed roads. With increasing population coupled with socioeconomic level, the more and more vehicles will be

on the road and result in congestions if additional capacity– convenient links are not provided.

4.5.2 Economy and Industrial Activities

As of 2008, the city's gross domestic product (GDP) by purchasing power parity (PPP) was estimated at $40 billion with a projected average growth rate of 5.6 percent. This is at par with Pakistan's economic hub, Karachi, with Lahore (having half the population) fostering an economy that is 51% of the size of Karachi's ($78 billion in 2008).

The contribution of Lahore to the national economy is supposed to be around 13.2%. As a whole Punjab has $115 billion economy making it first and to date only Pakistani Subdivision of economy more than $100 billion at the rank 144.

Lahore's GDP is 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%. Central to Lahore's economy is the Lahore Stock Exchange (LSE), Pakistan's second largest stock exchange.

Lahore has offices of several Pakistani government corporations including the Water and Power Development Authority (WAPDA) and Water and Sewage Authority (WASA). Food and restaurant businesses remain open all night. Lahore is the second largest financial hub of Pakistan and has industrial areas including Kot Lakhpat and the new Sundar Industrial Estate (near Raiwand). Lahore's economic base is broad and varied.

The city is the engineering hub of Pakistan.[citation needed] Major industries include the manufacture of automobiles and motorcycles, Heavy machinery, railway coaches, home appliances, steel, telecommunications, information technology, chemicals, pharmaceuticals, computers, engineering, and construction material. A major industrial agglomeration with about 9,000 industrial units, Lahore has shifted in recent decades from manufacturing to service industries.[61] Some 42% of its work force is employed in finance, banking, real estate, community, cultural, and social services. The city is Pakistan's largest software producing Centre, and hosts a growing computer-assembly industry. Arfa Software Technology Park in Lahore is the biggest and most advanced IT park in the country.

4.5.3 Institutions

Under the Devolution Plan-2001, City District Government is responsible for the management of infrastructure, but development works pertaining to traffic, transportation, are looked after by Lahore Development Authority (LDA). The LDA is equipped with resources which are fulfilling its obligations for execution and maintenance of roads including the proposed project.

4.5.4 Transportation

The city of Lahore is one of the most accessible cities of the Punjab Province. In addition to the historic Grand Trunk Road (G.T. Road), a motorway (M-

2) was completed in 1997 from Lahore to Islamabad. The government has built underpasses to ease congestion and prevent traffic jams, and according to official figures, Lahore transportation services have improved to accommodate the growing number of visitors to the city. It is well connected by air to other countries as well as all major cities of Pakistan. Buses, trains, taxis and rickshaws are the other means of transport available in Lahore.

Under the JICA Study, there is a lack of Overpasses and Underpasses in the city. Despite these improvements, Lahore struggles for safety on its roads, which are dangerous because the number of vehicles overwhelms the road space. Massive congestion occurs every day as millions of Lahorites travel through disorganized, fast-moving traffic, and accidents are widespread.

The Government of Punjab (GoPb) initiated a strong commitment to develop and improve the public transport by implementing the first Metro Bus System (MBS) out of three corridors of Lahore Metropolis. The implementation of part of the MBS is helping out of the traffic and transport problems and improve upon the existing corridor.

For upgrading Lahore Public Transport System, the GoPb has initiated MBS on the following three corridors:

Corridor-1: Ferozepur Road (Gajju Matta to Shahdra), 27 km which has since been accomplished and under operation.
Corridor-II: Multan Road (Thokar to MAO College), 13 km
Corridor-III: G.T.Road (from Azadi Chowk to Lahore Ring Road), 13 km.

The proposed project is part of the traffic improvement facilities so far extended and will help reduce congestions along the route and will provide signal-free corridor. The component works include:

- Improvement of Shadman Chowk-Provision of Underpass
- Improvement of PIC Chowk
- Improvement of Canal Road crossing
- Improvement of Zafar Ali Road crossing
- Improvement of Fawara Chowk
- Improvement of Main Market Chowk
- Improvement of Zahoor Elahi Chowk

4.5.5 Land Use & Land Rights

The proposed project is part of the master plan of the city of Lahore and land use as such has already been defined-adopted at the site. The project is improvement-rehabilitation and augmentation of existing facilities, as such the substance for land use and land rights is insignificantly involved and only about 28 marlas of land would be acquired.

4.5.6 Agricultural Development

The project site falls under urban locations, as such agricultural activities and development is not involved.

4.6 Quality of Life

4.6.1 Socio-Economic Conditions

a. Settlements

The project site is located in two towns of the city of Lahore namely Gulberg and Samanabad Towns.

The settlements around and in the vicinity of project comprise various housing establishments including Shadman, GOR-1, Gulberg, Lahore College for Women University, Kinnaird College, Services Hospital, Punjab Institute of cardiology, and other commercial and business centres.

b. Vocations

The resident population is mainly associated with services and the profession which provide services to the travelers for instance, gasoline stations, maintenance workshops, restaurants, hotels and small shops. In addition, they do work in other parts of the city as well. Whereas a fair amount of population is associated with trade directly or indirectly.

c. Commercial Centres/Markets

There is no significant commercial activity directly on the route except small ones close to Services' Hospital.

d. Industrial areas

The proposed route of the project does not pass through any industrial set-up, both in public and private sector.

4.7 Quality of Life

4.7.1 Socioeconomic Environment

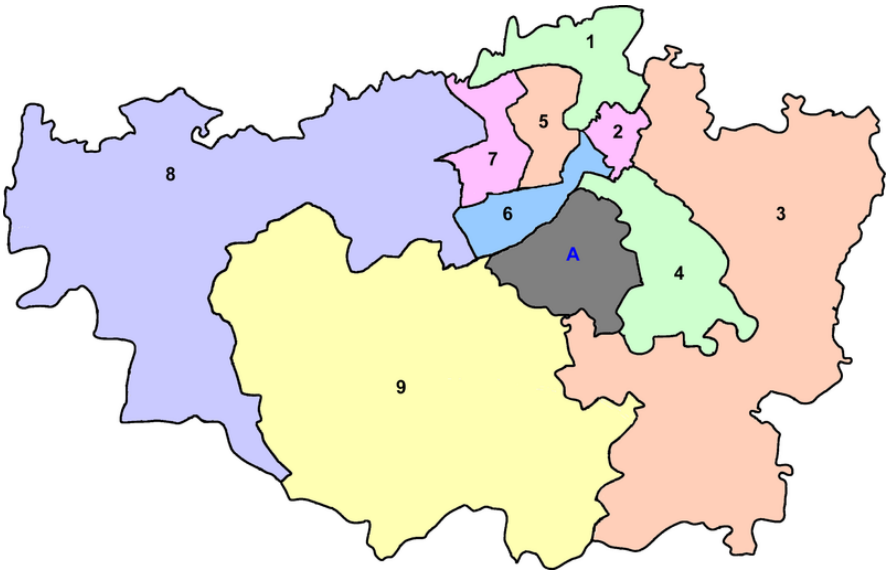
a. General

Lying between 31°15′—31°45′ N and 74°01′—74°39′ E, Lahore is bounded on the north and west by the Sheikhupura District, on the east by Wagah, and on the south by Kasur District. The Ravi River flows on the northern side of Lahore. Lahore city covers a total land area of 404 square kilometers (156 sq mi) and is still growing.

With a rich history dating back over a millennium, Lahore is a main cultural centre of Punjab and one of the most densely populated cities in the world. The city of Lahore remains an economic, political, transportation, entertainment, and educational hub. It is referred to as the "Mughal City of Gardens" due to the historic presence of gardens in and around the city dating back to the Mughal period.

b. Administrative Setup

1. Ravi Town
2. Shalimar Town
3. Wagah Town
4. Aziz Bhatti Town
5. Data Ganj Bakhsh Town
6. Gulberg Town
7. Samanabad Town
8. Iqbal Town
9. Nishtar Town



The administrative set-up comprises formation as prescribed by the Local Government Ordinance i.e. District Coordination Officer (DCO) is the In-charge of the district whereas Director General, Lahore development Authority is the administrative head of LDA responsible for entire development activities within the city.

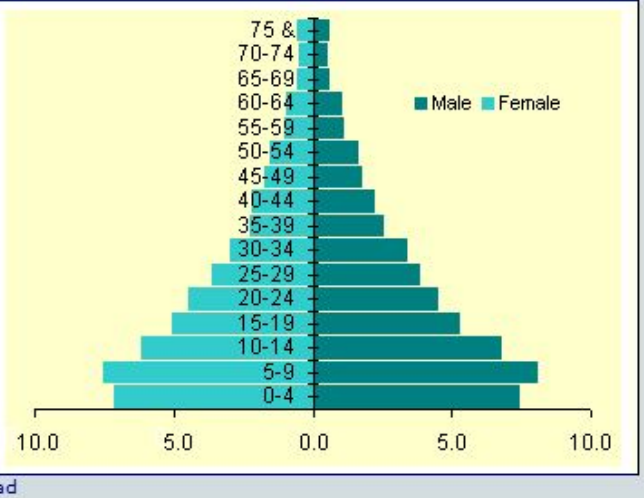
c. Average Household Size

The population characteristics of the country as per Census-98 are exhibited in Exhibit-4.21.

Table 1.1: Population Characteristics

Population*	145.5 Million
World Ranking**	6
Growth Rate	2.1%
Population Density	166 persons/ Sq. Km.
Urban Population	32.52%
Broad Age-Groups	
< 15 years	43.4%
15-64 years	53.09%
> 65	3.5%
Population Doubling Time	33 years
Sex Ratio (Male : Female)	108.5 : 100

Figure 1.1: Population Pyramid of Pakistan, 1998



*Based on 2002 estimations, NIPS, Islamabad
**Population Reference Bureau
Census Report of Pakistan 1998, Pakistan Census Organization, GoP

Exhibit-4.21, Population Characteristics of the Country

The population as above has been upgraded as of Year-2002 and is noted that by that period, the population was above 145 million which is determined as above 180 million by now.

The average house hold size as per Census-98 was as under:

- Country (average) 6.8
- Punjab Province (average) 6.9

The house hold size of Lahore should be slightly lower than the average figure for the Punjab, likely to be 6 persons per household.

d. Income Level

The GDP for the country and its growth is exhibited in Exhibit-4.22.

Exhibit-4.22, Pakistan GDP per Capita

It is noted that by now, the GDP per capita would be about US $ 1,000 per capita. In the project location, the GDP on the average would be slightly higher than the national average.

e. Human Resource Development Index

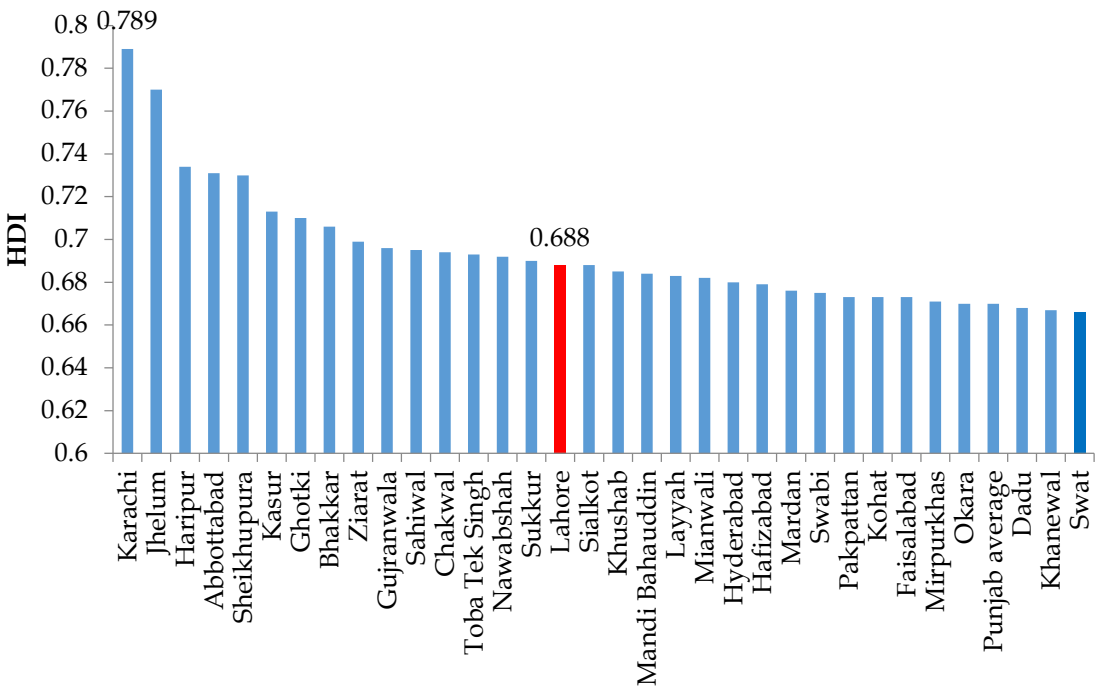
i. UNDP Report

As per UNDP report, the Human Development Report 2010, Pakistan's HDI value increased from 0.311 to 0.490 during 1980 to 2010, an increase of 58% or average annual increase of about 1.5% which ranked it 10 in terms of HDI improvement in comparison to the average progress of other countries. Pakistan's life expectancy at birth increased by more than 9 years, mean years of schooling increased by about 3 years and expected years of schooling increased by almost 4 years. Pakistan's GNI per capita increased by 92 per cent during the same period.

ii. UNDP's Human Development index-2010

Pakistan ranks 144th in UNDP's Human Development Index (HDI), out of total 178 countries. According to UNDP's HDI report, Pakistan faces enormous challenges, including poverty, poor healthcare facilities, illiteracy and a continuously soaring population. The medium human development index for Pakistan is included in Exhibit-4.23.

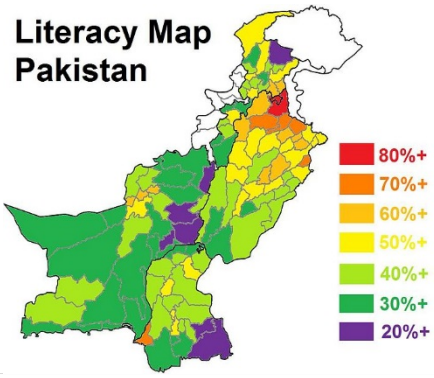
Exhibit-4.23, Medium Human Development Index-Pakistan



Evidently, the HDI for Lahore is 0.688 whereas this index for Karachi is 0.789.

f. Education and Literacy

The literacy rate in the country ranges from 97% in Islamabad to 20% in the Kohlu District. Between 2000—2004, Pakistanis in the age group 55–64 had a literacy rate of almost 30%, those aged between 45–54 had a literacy rate of nearly 20%, those between 25–34 had a literacy rate of 20%, and those aged 15–24 had a literacy rate of 10%. These data indicate that, with every passing generation, the literacy rate in Pakistan has risen by around 10%. Literacy rates vary regionally, particularly by sex. Despite these statistics, Pakistan still has one of the highest illiteracy rates in the world. The literacy rate shown in Exhibit-4.24 indicates a very disappointing status towards increase in rate over the period:



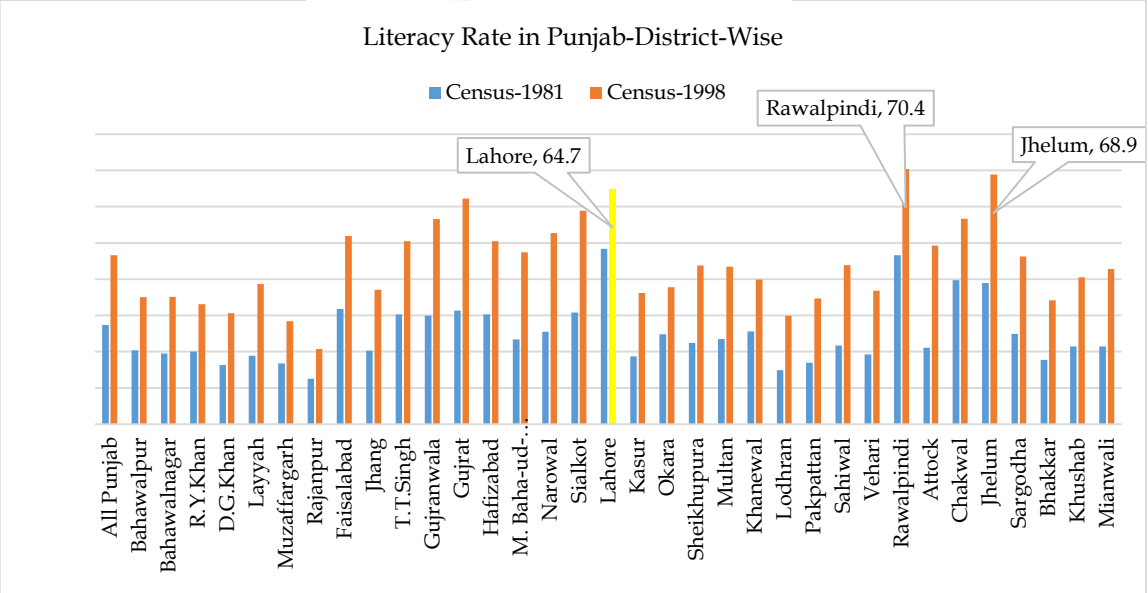


Exhibit-4.24, Literacy Level in the Country-Districts

On all Punjab basis, the literacy of about 47% in the Year-1998 has increased to about 58% by Year-2012.

4.7.2 Aesthetic Resources

The Race Course Park (Jillani Park) is located along the route of the project, but is not affected due to the project.

4.7.3 Cultural & Religious Resources

There is not any documented or known site of archeological, or historical in the project site. However, quite a number mosques either fall entirely within the project site or part of these is within the right of way of the project.

4.7.4 Transportation and Communication in the Project Area

The management will follow a proper Traffic Management System on the entrance of this project, wide roads, lightening, parking areas, etc.

4.7.5 Industrial Activities

Lahore is one of the major industrial cities of Pakistan. There has been a steady expansion of industries in and around the city since Independence. Many large industrial units are situated in the vicinity. In the vicinity of Project Area, there are many industrial units. (Source: Field Survey).

4.7.6 Approaches to the Project Area

The proposed project area is already developed and with suggested improvements, the functioning of the traffic facilities will be improved.

4.7.7 Historical, and Recreational Places Near close or along the project site

There is no historical place near the close or along the project site. There is one public place Lahore Safari Park for entertainment at a distance of about 10-15 kms. People have to go to the restaurants located away from the project area.

4.7.8 Project affected Persons

As referred earlier, there is no Project Affected Persons found in the project area. In order to take care of pedestrian traffic, overhead bridges have been proposed.

4.7.9 Cultural, and other Structures

No cultural structures are located inside the proposed project site. No graveyard is located near the proposed Project.

4.7.10 Historical and Archeological Sites

No site of historical and archeological importance site was observed within or near the Project as well as study area.

Annexure-4.1
Air Quality Baseline Determinations

Annexure-4.2

Emissions from Motorized Vehicles (without Project)

Total Emissions from Motor Vehicles for the Year 2015

Jail Road(Traffic Data , average situation)

Without Project Conditions

Nr.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)	
			Km/hr	1 km/vehicle	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total
1	Cars/Pickups	16736	40	16736	0.77231	22.90	295.99	295.99	0.8331	1.88	26.21	26.21	1.0440	2.83	49.45	49.45
2	Coasters	1183	35	1183	0.89352	13.20	13.95	13.95	1.0000	2.50	2.96	2.96	1.0000	0.99	1.17	1.17
3	Hiace Wagon	1064	35	1064	0.79455	13.20	11.16	11.16	0.8707	2.50	2.32	2.32	1.0896	13.4	15.54	15.54
4	Buses	125	30	125	0.95361	13.20	1.57	1.57	0.9708	2.50	0.3034	0.3034	1.0202	13.4	1.71	1.71
5	Tractor Trolleys	12	25	12	1.01130	13.20	0.16	0.16	1.0352	2.50	0.0311	0.0311	1.0250	13.4	0.16	0.16
6	Trucks	51	25	51	1.01130	13.20	0.68	0.68	1.0352	2.50	0.1320	0.1320	1.0250	13.4	0.70	0.70
8	Trailer	12	25	12	1.01130	13.20	0.16	0.16	1.0352	2.50	0.0311	0.0311	1.0250	13.4	0.16	0.16
9	Rikshaw	3110	30	3110	0.95361	17.00	50.42	50.42	0.9708	9.90	29.8902	29.8902	1.0202	0.075	0.24	0.24
10	Motorcycle	19516	30	19516	0.95361	17.00	316.38	316.38	0.9708	9.90	187.5682	187.5682	1.0202	0.075	1.49	1.49
	Total	41809		41809			690.47	690.47			249.44	249			70.62	71

Total Emissions from Motor Vehicles for the Year 2020

Jail Road (Traffic Data , average situation)

Without Project Conditions

Nr.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)	
			Km/hr	1 km/vehicle	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total
1	Cars/Pickups	21360	37	21359.84823	0.8417	22.90	411.71	411.71	0.8845	1.88	35.52	35.52	1.0289	2.83	62.20	62.20
2	Coasters	1510	32	1509.841088	0.9808	13.20	19.55	19.55	1.0000	2.50	3.77	3.77	1.0000	0.99	1.49	1.49
3	Hiace Wagon	1358	32	1357.963583	0.8840	13.20	15.85	15.85	0.9270	2.50	3.15	3.15	1.0506	13.4	19.12	19.12
4	Buses	160	27	159.5351953	1.0050	13.20	2.12	2.12	1.0155	2.50	0.4050	0.4050	1.0110	13.4	2.16	2.16
5	Tractor Trolleys	15	22	15.31537875	1.0230	13.20	0.21	0.21	1.0717	2.50	0.0410	0.0410	1.0508	13.4	0.22	0.22
6	Trucks	65	22	65.09035969	1.0230	13.20	0.88	0.88	1.0717	2.50	0.1744	0.1744	1.0508	13.4	0.92	0.92
8	Trailer	15	22	15.31537875	1.0230	13.20	0.21	0.21	1.0717	2.50	0.0410	0.0410	1.0508	13.4	0.22	0.22
9	Rikshaw	3969	27	3969.235659	1.0050	17.00	67.81	67.81	1.0155	9.90	39.9029	39.9029	1.0110	0.075	0.30	0.30
10	Motorcycle	24908	27	24907.91097	1.0050	17.00	425.53	425.53	1.0155	9.90	250.4003	250.4003	1.0110	0.075	1.89	1.89
	Total	53360		53360			943.86	943.86			333.40	333			88.51	89

Total Emissions from Motor Vehicles for the Year 2025

Jail Road (Traffic Data , average situation)

Without Project Conditions

Nr.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)	
			Km/hr	1 km/vehicle	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total
1	Cars/Pickups	27261	35	27261.18047	0.8935	22.90	557.81	557.81	0.9225	1.88	47.28	47.28	1.0189	2.83	78.61	78.61
2	Coasters	1927	30	1926.982343	1.0461	13.20	26.61	26.61	1.0000	2.50	4.82	4.82	1.0000	0.99	1.91	1.91
3	Hiace Wagon	1733	30	1733.143883	0.9536	13.20	21.82	21.82	0.9708	2.50	4.21	4.21	1.0202	13.4	23.69	23.69
4	Buses	204	25	203.6118283	1.0113	13.20	2.72	2.72	1.0352	2.50	0.5270	0.5270	1.0250	13.4	2.80	2.80
5	Tractor Trolleys	20	20	19.54673552	1.0327	13.20	0.27	0.27	1.1020	2.50	0.0539	0.0539	1.0723	13.4	0.28	0.28
6	Trucks	83	20	83.07362597	1.0327	13.20	1.13	1.13	1.1020	2.50	0.2289	0.2289	1.0723	13.4	1.19	1.19
8	Trailer	20	20	19.54673552	1.0327	13.20	0.27	0.27	1.1020	2.50	0.0539	0.0539	1.0723	13.4	0.28	0.28
9	Rikshaw	5066	25	5065.862289	1.0113	17.00	87.09	87.09	1.0352	9.90	51.9197	51.9197	1.0250	0.075	0.39	0.39
10	Motorcycle	31790	25	31789.50754	1.0113	17.00	546.53	546.53	1.0352	9.90	325.8087	325.8087	1.0250	0.075	2.44	2.44
	Total	68102		68102			1244.24	1244.24			434.89	435			111.59	112

Total Emissions from Motor Vehicles for the Year 2035

Jail Road (Traffic Data , average situation)

Without Project Conditions

Nr.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)	
			Km/hr	1 km/vehicle	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total
1	Cars/Pickups	44406	30	44405.59039	1.0461	22.90	1063.80	1063.80	1.0329	1.88	86.23	86.23	0.9938	2.83	124.88	124.88
2	Coasters	3139	25	3138.851185	1.2395	13.20	51.35	51.35	1.0000	2.50	7.85	7.85	1.0000	0.99	3.11	3.11
3	Hiace Wagon	2823	25	2823.108758	1.0113	13.20	37.69	37.69	1.0352	2.50	7.31	7.31	1.0250	13.4	38.77	38.77
4	Buses	332	20	331.6622131	1.0327	13.20	4.52	4.52	1.1020	2.50	0.9138	0.9138	1.0723	13.4	4.77	4.77
5	Tractor Trolleys	32	15	31.83957246	1.0684	13.20	0.45	0.45	1.2133	2.50	0.0966	0.0966	1.1511	13.4	0.49	0.49
6	Trucks	135	15	135.318183	1.0684	13.20	1.91	1.91	1.2133	2.50	0.4105	0.4105	1.1511	13.4	2.09	2.09
8	Trailer	32	15	31.83957246	1.0684	13.20	0.45	0.45	1.2133	2.50	0.0966	0.0966	1.1511	13.4	0.49	0.49
9	Rikshaw	8252	20	8251.755863	1.0327	17.00	144.87	144.87	1.1020	9.90	90.0274	90.0274	1.0723	0.075	0.66	0.66
10	Motorcycle	51782	20	51781.75801	1.0327	17.00	909.08	909.08	1.1020	9.90	564.9435	564.9435	1.0723	0.075	4.16	4.16
	Total	110932		110932			2214.12	2214.12			757.87	758			179.43	179

Emissions from Motorized Vehicles (with Project)

Total Emissions from Motor Vehicles for the Year 2015

Jail Road(Traffic Data , average situation)

With Project Conditions

Sr. No.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction	Unit	Emmisions		Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)	
			Km/hr	1 km/vehicle	Factor	(g/km)	Running	Kg.	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total
1	Cars/Pickups	16736	70	16736	0.4134	22.90	158.44	158.44	0.5702	1.88	17.94	17.94	1.1948	2.83	56.59	56.59
2	Coasters	1183	60	1183	1.0000	13.20	15.62	15.62	1.0000	2.50	2.96	2.96	1.0000	0.99	1.17	1.17
3	Hiace Wagon	1064	60	1064	0.3969	13.20	5.57	5.57	0.6205	2.50	1.65	1.65	1.2630	13.4	18.01	18.01
4	Buses	125	60	125	0.3969	13.20	0.65	0.65	0.6205	2.50	0.1939	0.1939	1.2630	13.4	2.12	2.12
5	Tractor Trolleys	12	40	12	0.6753	13.20	0.11	0.11	0.7957	2.50	0.0239	0.0239	1.1416	13.4	0.18	0.18
6	Trucks	51	50	51	0.5083	13.20	0.34	0.34	0.6906	2.50	0.0880	0.0880	1.2145	13.4	0.83	0.83
8	Trailer	12	50	12	0.5083	13.20	0.08	0.08	0.6906	2.50	0.0207	0.0207	1.2145	13.4	0.20	0.20
9	Rikshaw	3110	40	3110	0.6753	17.00	35.70	35.70	0.7957	9.90	24.4973	24.4973	1.1416	0.075	0.27	0.27
10	Motorcycle	19516	40	19516	0.6753	17.00	224.03	224.03	0.7957	9.90	153.7267	153.7267	1.1416	0.075	1.67	1.67
	Total	41809		41809			440.55	440.55			201.10	201			81.03	81

Total Emissions from Motor Vehicles for the Year 2020

Jail Road (Traffic Data , average situation)

With Project Conditions

Sr. No.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)		Correction	Unit	Emmisions (kg)	
			Km/hr	1 km/vehicle	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total	Factor	(g/km)	Running	Total
1	Cars/Pickups	21360	65	21359.84823	0.4453	22.90	217.83	217.83	0.5908	1.88	23.73	23.73	1.1696	2.83	70.70	70.70
2	Coasters	1510	55	1509.841088	1.0000	13.20	19.93	19.93	1.0000	2.50	3.77	3.77	1.0000	0.99	1.49	1.49
3	Hiace Wagon	1358	55	1357.963583	0.4475	13.20	8.02	8.02	0.6523	2.50	2.21	2.21	1.2409	13.4	22.58	22.58
4	Buses	160	55	159.5351953	0.4475	13.20	0.94	0.94	0.6523	2.50	0.2602	0.2602	1.2409	13.4	2.65	2.65
5	Tractor Trolleys	15	35	15.31537875	0.7946	13.20	0.16	0.16	0.8707	2.50	0.0333	0.0333	1.0896	13.4	0.22	0.22
6	Trucks	65	45	65.09035969	0.5825	13.20	0.50	0.50	0.7373	2.50	0.1200	0.1200	1.1821	13.4	1.03	1.03
8	Trailer	15	45	15.31537875	0.5825	13.20	0.12	0.12	0.7373	2.50	0.0282	0.0282	1.1821	13.4	0.24	0.24
9	Rikshaw	3969	35	3969.235659	0.7946	17.00	53.61	53.61	0.8707	9.90	34.2153	34.2153	1.0896	0.075	0.32	0.32
10	Motorcycle	24908	35	24907.91097	0.7946	17.00	336.44	336.44	0.8707	9.90	214.7091	214.7091	1.0896	0.075	2.04	2.04
	Total	53360		53360			637.56	637.56			279.08	279			101.29	101

Total Emissions from Motor Vehicles for the Year 2025

Jail Road (Traffic Data , average situation)

With Project Conditions

Sr. No.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction Factor	Unit (g/km)	Emmisions (kg)		Correction Factor	Unit (g/km)	Emmisions (kg)		Correction Factor	Unit (g/km)	Emmisions (kg)	
			Km/hr	1 km/vehicle			Running	Total			Running	Total			Running	Total
1	Cars/Pickups	27261	60	27261.18047	0.4855	22.90	303.08	303.08	0.6190	1.88	31.72	31.72	1.1445	2.83	88.30	88.30
2	Coasters	1927	50	1926.982343	1.0000	13.20	25.44	25.44	1.0000	2.50	4.82	4.82	1.0000	0.99	1.91	1.91
3	Hiace Wagon	1733	50	1733.143883	0.5083	13.20	11.63	11.63	0.6906	2.50	2.99	2.99	1.2145	13.4	28.20	28.20
4	Buses	204	50	203.6118283	0.5083	13.20	1.37	1.37	0.6906	2.50	0.3515	0.3515	1.2145	13.4	3.31	3.31
5	Tractor Trolleys	20	30	19.54673552	0.9536	13.20	0.25	0.25	0.9708	2.50	0.0474	0.0474	1.0202	13.4	0.27	0.27
6	Trucks	83	40	83.07362597	0.6753	13.20	0.74	0.74	0.7957	2.50	0.1652	0.1652	1.1416	13.4	1.27	1.27
8	Trailer	20	40	19.54673552	0.6753	13.20	0.17	0.17	0.7957	2.50	0.0389	0.0389	1.1416	13.4	0.30	0.30
9	Rikshaw	5066	30	5065.862289	0.9536	17.00	82.12	82.12	0.9708	9.90	48.6880	48.6880	1.0202	0.075	0.39	0.39
10	Motorcycle	31790	30	31789.50754	0.9536	17.00	515.35	515.35	0.9708	9.90	305.5288	305.5288	1.0202	0.075	2.43	2.43
	Total	68102		68102			940.15	940.15			394.35	394			126.38	126

Total Emissions from Motor Vehicles for the Year 2035

Jail Road (Traffic Data , average situation)

With Project Conditions

Sr. No.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction Factor	Unit (g/km)	Emmisions (kg)		Correction Factor	Unit (g/km)	Emmisions (kg)		Correction Factor	Unit (g/km)	Emmisions (kg)	
			Km/hr	1 km/vehicle			Running	Total			Running	Total			Running	Total
1	Cars/Pickups	44406	50	44405.59039	0.5979	22.90	608.03	608.03	0.7024	1.88	58.64	58.64	1.0943	2.83	137.51	137.51
2	Coasters	3139	40	3138.851185	1.0000	13.20	41.43	41.43	1.0000	2.50	7.85	7.85	1.0000	0.99	3.11	3.11
3	Hiace Wagon	2823	40	2823.108758	0.6753	13.20	25.16	25.16	0.7957	2.50	5.62	5.62	1.1416	13.4	43.19	43.19
4	Buses	332	40	331.6622131	0.6753	13.20	2.96	2.96	0.7957	2.50	0.6597	0.6597	1.1416	13.4	5.07	5.07
5	Tractor Trolleys	32	20	31.83957246	1.0327	13.20	0.43	0.43	1.1020	2.50	0.0877	0.0877	1.0723	13.4	0.46	0.46
6	Trucks	135	30	135.318183	0.9536	13.20	1.70	1.70	0.9708	2.50	0.3284	0.3284	1.0202	13.4	1.85	1.85
8	Trailer	32	30	31.83957246	0.9536	13.20	0.40	0.40	0.9708	2.50	0.0773	0.0773	1.0202	13.4	0.44	0.44
9	Rikshaw	8252	20	8251.755863	1.0327	17.00	144.87	144.87	1.1020	9.90	90.0274	90.0274	1.0723	0.075	0.66	0.66
10	Motorcycle	51782	20	51781.75801	1.0327	17.00	909.08	909.08	1.1020	9.90	564.9435	564.9435	1.0723	0.075	4.16	4.16
	Total	110932		110932			1734.07	1734.07			728.22	728			196.45	196

SECTION-5

SCREENING OF ENVIRONMENTAL IMPACTS

5.1 Screening of the Potential Impacts and Mitigation Measures

The IEE has identified potential impacts that are likely to arise during construction and operation phase of the project. The IEE has examined in detail both negative and positive impacts of the project. The adverse impacts of the project are to be mitigated, the IEE has recommended mitigation measures. These mitigation measures include the use of alternative technologies, management and physical controls or compensation in monetary terms.

The residual impacts (impacts remaining after apply the recommended mitigation measures) and for impacts in which there can be a level of uncertainty in prediction at IEE stage shall have monitoring measures to ascertain these impacts during the course of the project.

5.2 Environmental Screening

An environmental screening matrix was developed as a part of the present IEE study. The focus being on the potential environmental impacts of the project during construction and operation phases. The format so developed examines the interaction of project activities with various components of the environment.

The impacts are broadly classified as physical, biological and social, and then each of these broad categories further divided into different aspects. The potential impacts thus predicted are characterized as follows:

- High negative impact
- Low negative impact
- Insignificant impact
- High positive impact
- Low Positive impact
- No impact

The occurrence and severity of the potentially adverse impacts are identified and included in the subsequent part of the report.

5.2.1 Construction Phase Impacts

Construction phase will be by far the most significant part of the proposed project with respect to environmental considerations, since most of the impacts are likely to take place during this period. Various construction activities will invariably create environmental disturbances, which may have impacts on the environmental resources of the area and nearby communities, Table-5.1**.** Such impacts include the following:

Physical Environmental

- Soil erosion, degradation
- Soil contamination
- Air quality deterioration
- Surface water contamination
- Groundwater contamination
- Impacts on downstream water resources

Biological Environment

- Loss of / damage to the floral resources (natural vegetation) of the area
- Loss of / damage to the faunal resources (wildlife) of the area

Socio-economic Environment

- Land procurement
- Loss of damage to cultivation
- Blocked access
- Noise and vibration
- Safety hazards
- Public health and nuisance issues
- Damage to infrastructure
- Damage to archeological, historical or cultural artifacts

Table-5.1, Environmental Screening Matrix (Unmitigated)

	Physical					Biological		Socio-Economic										
	Soil	Air Quality	Surface Water	Groundwater	Water Consumption	Natural Vegetation	Wildlife	Blocked Access	Noise and Vibration	Cultivation	Compensation Issue	Safety Hazard	Employment	Infrastructure	Public Health and Nuisance	Gender Issues	Historical/ Archeological Sites	Population Influx
Construction Phase																		
Contractor Mobilization	0	-1	0	0	N	N	N	N	-1	0	N	-1	0	-1	-1	0	N	N
Construction Camp Establishment	-1	0	0	-1	-1	N	N	-1	0	N	N	-1	0	0	-1	-1	N	-1
Construction Camp Operation	0	-1	-1	-1	-1	-1	0	-1	-1	-1	N	N	1	0	-1	-1	N	0
Site Preparation	-2	-2	-1	-1	0	-2	-1	0	-2	-1	N	N	1	0	-1	-1	N	0
Excavation for Foundations	-2	-2	0	0	0	0	0	0	-2	-1	N	N	1	0	-1	0	N	N
Construction of Roads/Underpasses	-1	-1	-1	-1	-1	0	0	0	-1	0	N	-1	2	1	-1	0	N	N
Landscaping	2	1	1	1	-2	1	1	0	N	N	N	N	1	N	2	0	N	N
Construction Materials Supply	0	-1	N	N	N	0	0	0	-1	N	N	-1	1	-1	-1	0	N	N
Construction Crew Transportation	0	-1	N	N	N	0	0	0	-1	N	N	-1	1	-1	-1	0	N	N

	Physical					Biological		Socio-Economic										
	Soil	**Air Quality**	**Surface Water**	**Groundwater**	**Water Consumption**	**Natural Vegetation**	**Wildlife**	**Blocked Access**	**Noise and Vibration**	**Cultivation**	**Compensation Issue**	**Safety Hazard**	**Employment**	**Infrastructure**	**Public Health and Nuisance**	**Gender Issues**	**Historical/ Archeological Sites**	**Population Influx**
Demobilization of Contractors	0	-1	0	0	N	N	0	0	-1	0	N	-2	0	-1	-1	0	N	N

Key: -2: High negative impact, -1: Low negative impact; 0: insignificant/negligible impact; +1: low positive impact; +2: high positive impact; N: no impact

5.2.2 Operation Phase Impacts

The operation of the project will interact with different components of the environment as shown in Table-5.2. This interaction may result into the following adverse impacts:

- Soil contamination (caused by inappropriate waste disposal)
- Surface and ground water contamination
- Water consumption
- Safety hazards, public health and nuisance
- Damage to infrastructure
- Population influx

However, the magnitude of most of the above impacts is likely to be much smaller compared to the construction phase impacts.

To ensure harmony of the project with the environment the project sponsor will implement sound environmental management practices to effectively handle the basic environmental issues, including:

- Landscaping and plantation
- Environmentally responsible conduct Environmentally responsible conduct of personnel
- Noise and other public nuisance abatement

Table -5.2, Environmental Screening Matrix (Unmitigated)

	Physical					Biological		Socio-Economic										
	Soil	Air Quality	Surface Water	Groundwater	Water Consumption	Natural Vegetation	Wildlife	Blocked Access	Noise and Vibration	Cultivation	Compensation Issue	Safety Hazard	Employment	Infrastructure	Public Health and Nuisance	Gender Issues	Historical/ Archeological Sites	Population Influx
Operation Phase																		
Vehicular Traffic	N	-1	N	N	N	N	-1	0	-1	0	N	N	0	1	-1	0	N	0

Key: -2: High negative impact, -1: Low negative impact; 0: insignificant/negligible impact; +1: low positive impact; +2: high positive impact; N: no impact

5.3 Environmental Impact Characterization

The predicted impacts have been characterized; various aspects of the impact characterized include:

- Nature (direct/indirect)
- Duration of impact (Short term, medium term, Long term)
- Geological extend (local, regional)
- Timing (Project phase)
- Reversibility of impact (Reversible/Irreversible)
- Likelihood of the impact (certain, likely, unlikely, rare)
- Impact consequence severity (major, moderate, minor)
- Significance of impact (High, medium, low)

The above aspects of environmental characterization are defined in Table-5.3.

Table-5.3, Impact Characterization

Categories	Characteristics
Nature	**Direct:** The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes as a result of change in another parameter.
Duration of Impact	**Short-term:** lasting only for the duration of the project such as noise from the construction activities. **Medium-term:** Lasting for a period of few months to a year after a the project before naturally reverting to the original condition such as loss of vegetation due to clearing of campsite, contamination of soil or water by fuels or oil. **Long-term:** lasting for a period much greater than medium term impact before naturally reverting to the original condition such as loss of soil due to soil erosion.
Geographical extent	**Local, regional (spatial dimension)**
Timing	**Construction and Operation**
Reversibility of Impact	**Reversible:** when a receptor resumes its pre-project condition. **Irreversible:** when a receptor does not or cannot resume its pre-project condition.
Likelihood of the Impact	**Almost Certain:** Impact expected to occur under most circumstances. **Likely:** Impact will probably occur under most circumstances. **Possibly:** Impact may possibly occur at some time. **Unlikely:** Impact could occur at some time. **Rare:** Impact may occur but only under exceptional circumstances.
Impact Consequences severity	**Major:** When an activity causes irreversible damage to a unique environmental feature; causes a decline in abundance or change in distribution over more than one generation of an entire population of species of flora and fauna: has long term effects (period of years) on socioeconomic activities of significance on regional level. **Moderate:** When an activity causes long-term (period of years), reversible damage to a unique environmental feature; causes reversible damage or change in abundance or distribution over one generation of a population of flora or fauna: have short-term effects (period of years) on socioeconomic activities of significance on regional level. **Minor:** When an activity causes short-term (period of a few months), reversible damage to a unique environmental feature; slight reversible damage to a few species of flora or fauna within a population over a short period; has short-term (period of months) effects on socioeconomic activities of local significance. **Negligible:** when no measureable damage to physical, socioeconomic, or biological environment above the existing level of impact occurs.
Significance of Impact	Categorized as **High, Medium, Low** Based on the consequence, likelihood, reversibility, geographical extent, and duration: level of public concern: and conformance with legislative of statutory requirements.

The characterization of impacts during construction phase are included in Table-5.4 whereas Table-5.5 covers the ones during operation phase of the project.

Table-Error! No text of specified style in document.**.4, Impact Characterization - Construction Phase**

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Signification
Physical Environment							
Soil Erosion	Direct	Long Term	Local	Irreversible	unlikely	Moderate	Low to medium
Soil Contamination	Direct	Long Term	Local	Reversibility	Likely	Major	Low
Air Quality Deterioration	Direct	Short Term	Local	Reversibility	Likely	Minor	Medium
Surface Water Contamination	Direct	Short Term	Local	Reversibility	Likely	Major	High
Ground Water Contamination	Indirect	Medium Term	Local	Reversibility	Likely	Major	High
Biological Resources							
Loss of/damage to Natural Vegetation	Direct	Medium to Long Term	Local	Irreversible	Likely	Moderate	Low
Loss of/damage to wildlife	Direct	Medium to Long Term	Local	Irreversible	Unlikely	Minor	Low

Socioeconomic Issues							
Land Acquisition	Direct	Medium Term	Local	Irreversible	Certain	Moderate to Major	Medium to High
Cultivation	Direct	Short Term	Local	Irreversible	Certain	Minor	Low
Blocked Access	Indirect	Short Term	Local	Reversibility	Possible	Minor	Medium
Noise and Vibration	Direct	Short Term	Local	Reversibility	Likely	Moderate	Medium
Damage to Infrastructure	Direct	Short Term	Local	Reversibility	Possible	Moderate	Medium
Gender Issues	Indirect	Short Term	Local	Reversibility	Possible	Moderate	Low

Table-5.5, Impact Characterization - Operation Phase

Impact	Nature	Duration	Geo Extend	Reversibility	Likelihood	Consequence	Impact Signification
Soil Contamination	Direct	Medium Term	Local	Irreversibility	Unlikely	Moderate	Low to medium
Surface Water Contamination	Direct	Short to Medium Term	Local	Reversibility	Unlikely	Major	High
Ground Water Contamination	Direct	Medium Term	Local	Reversibility	Unlikely	Major	High
Water Consumption	Indirect	Medium Term	Local	Reversibility	Unlikely	Moderate	Medium
Population Influx	Direct	Medium to Long Term	Local	Irreversible	Unlikely	Moderate	Low
Public Health and Nuisance Issues	Direct and Indirect	Short Term	Local	Reversibility	Likely/possibly	Moderate	Medium

Subsequent to the characterization, appropriate mitigation measures were identified, in order to minimize if not completely eliminate the adverse impact associated with project activities. The suggested mitigation measures are included in a separate section of the study report.

SECTION 6
PUBLIC CONSULTATION & DISCLOSURE

6.1 General

The public consultation process is an important tool of project planning and implementation as well as an integral part of Environmental Impact Assessment. It is the process for managing two way communication between sponsor and the public for decision making and promoting understanding through the active engagement of individuals, groups, stakeholders, organizations who have a stake in the project and its outcomes.

Public consultation plays a critical role in raising awareness of impacts by the new developments in the city. The information disclosure and in response of that information gathered by public involvement plays an important role for the selection of project alternatives as well as projects design and routing selection with the positive impacts by the proposed developments in the area. Information gathered by public consultation at this stage provides proponent and other stakeholders with sufficient information to decide whether or not to proceed with the project or to ensure that likely environmental impacts are duly mitigated so as to safeguard the public – end users.

The objectives of this process were to:

- Share information with stakeholders on proposed project, implementation period, cost and expected impact on the physical, biological, and socio-economic environment of the project;
- Understand stakeholder concerns regarding various aspects of the sub-project and the likely impacts of construction and operation related activities of the Improvement of roads
- Obtain feedback/valuable suggestions by stakeholders to improve the current system and mitigation measures;
- To allow participants to ask questions in order to better understand the specifics of the improvement of roads, voice their opinion and their expectations from the project;
- Understand the perceptions and concerns of the affected people / communities (if any);
- To invite people to express their views about the positive / negative impacts on their life styles / environment of the city by the project; and
- To disclose information about contact offices / officers for any complains/queries.

The public had the option to send their comments by post, fax or email to LDA.

6.2 Identification of Main Stakeholders

6.2.1 General

There are two types of stakeholders related to the project i.e. primary and secondary stakeholders. Primary stakeholders are those which are directly

affected by the project activities and secondary stakeholders are those which are affected indirectly.

There are no primary stakeholders for the Improvement of Jail & Main Boulevard Roads. However, secondary stakeholders are institutional stakeholders, which includes, general public, local residents, shop keepers, vendors, pedestrians and businessmen of the market of the adjacent areas. All those stakeholders have different types of stakes according to their involvements in various aspects of the project.

The Consultants tried to contact with all the stakeholders and shared their views and concerns and also interacted with the community based organizations that can support the community.

6.2.2 Categories of stakeholders consulted

The stakeholders contacted during the consultations belong to different categories of people as shown in Table 6.1.

Table-6.1, Categories of Stakeholders Consulted

Nr.	Category
1	Local residents
3	Mosques
4	Business/ shop owners
5	Representatives of market
6	Vendors
7	Pedestrians

6.3 Issues Briefed during Public Consultation

6.3.1 Major Stakeholders and their Apprehensions

In the Project area, all the possible stakeholders were identified during the survey. Table-6.2 contains the list of major stakeholders.

Table-6.2, Different Stakeholders and their Stakes in the Project Area

Nr.	Stakeholders	Stakes (apprehensions)
1	Residents	Air Pollution, exit/ entry problems, and disturbance of utilities, security / safety issues, and waste material.
3	Shop owners	Noise, Air Pollution, exit/entry problems, disturbance of utilities, security/ safety and decline in business including fear about dismantling of their shops falling within ROW.
4	Hotel owners	Noise, Air Pollution, exit/ entry problems, disturbance of utilities, security/ safety and decline in business.
6	Vendors	Displacement, possible loss of livelihood.
7	Hawkers	Displacement
8	Clinics	Noise, Air Pollution, Accessibility, disturbance of utilities, security/ safety issues, business decline.
9	Colleges	Noise, Air Pollution, Accessibility, Utilities safety issues.
10	Mosques	Accessibility, Noise, Air Pollution.
11	Motorized Transport users	Appropriate detour, management, and pollution.
12	Non-motorized Transport users	Appropriate detour, management, and pollution.
13	Pedestrians / People using Pedestrian bridges	Appropriate detour.

The public consultation, an important aspect of the project preparation, was conducted and the localities had been selected on the basis of different parameters including socioeconomic level.

During the consultation, the stakeholders (groups / individuals) were briefed about the project including its purpose, funding arrangements and implementation schedule. They were also briefed about the benefits of the project and the likely environmental impacts and measures proposed to mitigate these impacts: The stakeholders were asked to state their current priorities for improvements to the urban environmental infrastructure in their area and about the likely impacts of the proposed subproject during construction and operation phases. Most of the people have knowledge about the project perhaps through their local representatives. Their queries about the project were answered to their satisfaction.

People were informed about the positive impacts of project on society & environment due to the Improvement of roads in the location. They were also briefed about the operation & maintenance of facility by LDA who will be responsible for the maintenance of roads, underpasses, and there will be no negative impacts due to project implementation.

6.3.2 Awareness Regarding the Proposed Project

Out of total 18 respondents, 56% knew about the project whereas 44% were not aware of the project planning and implementation, Table-6.3.

Table-6.3, Knowledge about the Construction

Nr.	Response	Number	%Age
1	Know	10	56
2	Do not Know	8	44
	Total	**18**	**100**

6.3.3 Acceptability of the Proposed Project

Majority of the respondents, 77% favoured the construction of the project keeping in view its importance and only 23% of the respondents responses were against the construction of the project, Table-6.4.

Table-6.4, Acceptability of the Project

Nr.	Response	Number	%Age
1	Favour	10	77
2	Do not Favour	3	23
Total		**13**	**100**

6.3.4 Protective Measures Suggested by the Respondents

It is noted from the data in Table-6.5 that in 13% cases, people remained quiet about suggesting the protective measures during construction in order to safeguard their interests. About 26% responses emphasized on the need to provide the proper alternate traffic plan for smooth flow of traffic during construction. Proper compensation for the losses, timely completion of the project, and safety of the businesses along the road and avoidance of disturbance to the passengers during construction were also some of the proposed protective measures by the respondents.

Table-6.5, Protective Measures Suggested by the Respondents

Nr.	Measures Suggested	Frequency	Percentage
1	No response	5	22
2	Proper alternate traffic plan	5	22
3	Proper compensation of the losses	0	0
4	Timely completion of the Project	5	22
5	Safety of business	4	17
6	Less disturbance to passengers	4	17
Total		**23**	**100**

A brief of public consulted for the purpose is included in **Annexure-6.1.**

6.4 Summary of Comments & Discussions

Following are the viewpoints of the stakeholders based on these sessions and consultations about the proposed project:

Right Decision
Most common comments by public reveal that Improvement of roads / provision of underpasses is a right decision as a priority project in the city. Many of the participants stated that improvement of roads is the real need of people.

Road Crossing by Local Population
People were of the strong apprehension that upon completion of the project, the local crossings available on the road may be disturbed and they will be put to trouble by way of long distances for crossing or otherwise.

Workforce Utilization
People were also concerned that the workers and laborers will be brought by the Contractor from outside the project area and an opportunity of employment generated locally shall be availed by the people from other areas. They were informed that a condition in the Contract Document will be imposed that the maximum skilled and un-skilled employment shall be offered to the locals.

Assurance Provided

The Consultants has also explained that due consideration will be given in the preparation of project that it includes comments / observations of the community.

All the fears of community were alleviated by providing the answers of their doubts about the new development in the city. Above all, the project will have positive impacts towards the education, health, welfare, anti-poverty, environment, women & children, and ethics. All the people showed their satisfaction for the improvement of jail road and main boulevard/in the area.

6.5 Conclusions

During public consultations, people were made aware of the benefits of the project and were invited to express their viewpoints on the subject. Several issues were raised by the community during the consultation, which were immediately addressed by the Consultants' officials. Residents of the city were very much supportive to the implementation of the proposed project. The project will have positive impacts on community and environment.

Keeping in view the proposed development in the city, it can be anticipated that after the implementation of the proposed project, the environment of area will be very much improved.

The comments/ observations of the people are given due consideration in the project preparation resulting in:

- Improvement in traffic and transport facilities;
- Good roads surfaces will be available to the public, which will improve the environment of the city.
- In the absence of crossings by pedestrians, the comfort level presently available will be disturbed, therefore pedestrian bridges should be take-up for completion simultaneously.
- The difficulties and problems faced by pedestrians during movement on roads will be eliminated.
- The commercial activities and businesses along the roads will be improved.
- Public mental tension, frustration will be minimized.
- The city will have a better look.

Annexure-6.1

Resume of Public Consulted for EIA

Nr.	Name	Occupation/Status	Tel Nr.	CNIC
1	FAISAL JAMIL	Senior Accountant	0321-4039031	35202-1733240-5
2	MIAN ZEESHAN ZAFFAR	Assistant Manager	0322-4981366	35202-6679691-9
3	MUHAMMAD UMAIR	Accountant	0322-7317315	35202-8046379-3
4	ARIF MANZOOR	Finance officer	0321-8143205	35202-2641494-9
5	FARHAN ALI	Senior Accountant	0323-4533494	35202-6969497-5
6	M. SHEHZAD ANJUM	Account Officer	0300-4255203	35202-1897198-9
7	M. RAFI VIRAK	Treasury Manager	0300-8429408	35201-1700805-3
8	SAMAAT ULLAH KHAN	Assistant Accountant	0300-8429409	35201-1514274-5
9	M.YOUNAS BHATTI	Mechanical Engineer	0302-8405603	35201-3649213-3
10	TALHA WASEEM	Student(BSCS)	0321-8636216	35202-2273642-1
11	HAMID KHAN	Site Supervisor	0311-5397875	35202-1555850-5
12	FURQAN ZAHEER	Assistant Director	0342-4490909	35202-6171817-3
13	ASIM SHEHZAD	Student	0313-8168488	32201-3032740-5
14	QURBAN ALI	Student(M.Sc.)	0322-5691121	34101-9753057-9
15	M. ASHFAQ MALIK	B.tech Engr.	0314-4877028	34502-4757908-1
16	SHAHID SATTAR	Architect	0321-9499302	35202-9457905-7
17	TALHA MUKHTAR	Student(BBA Hons)	03005-4476256	352027252864-3
18	MUHAMMAD IJAZ	Business Man	0334-9937899	35202-4729848-5
19	ZEESHAN ALI AKBAR	Student	0301-4549794	35201-3886677-1
20	ZUBAIR MANZUR	Civil Servant	0322-4828705	35202-1880485-3
21	IMRAN AHMAD	Civil Engr.	0321-8071158	37301-9252758-3
22	ABDUL AZIZ	Govt. Employee	0308-4180636	
23	ZAHEER -U -DIN	Marketing Manager	0332-4105078	35202-8688285

SECTION 7

ENVIRONMENTAL IMPACTS ASSESSMENT AND MITIGATION MEASURES

7.1 General

The implementation and subsequently operation of the proposed project is to ensure environmentally sustainable development. Therefore, in order to achieve the objectives, it is imperative that all the potential impacts related to the proposed project are identified at an early stage and their mitigation measures are designed and implemented. Based on the study of different components of the proposed project and the existing environmental conditions of the area, the proposed project may pose different types of impacts on the environment.

For the purpose, a checklist of environmental parameters was prepared for the project, which is annexed as Annexure-7.1. Based on the study of different components of the proposed project and the existing conditions of the project area, environmental impacts on physical, ecological and socio-cultural resources have been identified and measures have been suggested for their mitigation during different stages of the project.

The summary of said check list is included in Table-7.1.

Table-7.1, Summary of Checklist of Environmental Parameters

Nr.	Environment Component	Environmental Issues	Impact
1	**Physical**		
	Land	i) Resettlement/Land Acquisition	Negative
		ii) Dismantling of Structures	"
		iii) Relocation of Existing Utilities	"
		iv) Change of Landuse	"
		v) Induced Road side Development	"
		vi) Soil Erosion and Landslide	"
		vii) Disposal of Spoil	"
		viii) Damage Due to Seismic Activities	"
		ix) Landscape/Aesthetic Value	Positive
	Water	i) Impacts on Surface Water Bodies	
		• Erosion and Sedimentation	Negative
		• Contamination from Accidental Spillage	"
		ii) Ground Water	None
		iii) Flooding	"

	Air	i) Ambient Air ii) Noise iii) Dust	Negative " "
2.	**Ecological Resources**		
	Flora	i) Forest/ tree cover ii) Crops/ Vegetation iii) Endangered Species	Negative None "
	Fauna	i) Bird Communities/ Habitats ii) Mammal Communities/ Habitats iii) Endangered Species	None " "
3.	**Social & Cultural Resources**		
	Social	i) Resettlement/ Relocation of Population ii) Disruption of Existing Utilities iii) Disruption of Traffic iv) Health & Safety of Workers and Public	Negative " " "
	Cultural	i) Loss Cultural Habitat ii) Loss of Archeological Resources	None "
	Economic	i) Induced Roadside Development ii) Employment iii) Tourism	Positive " "

7.2 Summary of Environmental Impacts

The environmental impacts likely to occur due the implementation of the project have been summarized in Table-7.2.

Table-7.2, Summary of Environmental Impacts

Sr. No.	Resources	Envisaged Impacts	Construction Phase	Operation Phase
1	Physical Resources	i) Land Acquisition	None	-
		ii) Dismantling of Structures	Slight negative	-
		iii) Relocation of Existing Utilities	Insignificant	-
		iv) Change of Landuse	Insignificant	-
		v) Induced Roadside Development	None	Positive
		vi) Soil Erosion and Land Slide	Moderate negative	Positive
		vii) Seismic Impact	-	Moderate negative
		vii) Disposal of Spoil	Slight negative	None
		viii) Impacts on Water Bodies	Slight negative	None
		ix) Flooding	Insignificant	None
		x) Air Pollution	Slight negative	Positive
		xi) Dust	Slight negative	None
		xii) Noise	Slight negative	Insignificant

2	Ecological Resources	i) Loss of vegetation	Slight negative	None
3	Social & Cultural Resources	i) Relocation of Population	None	None
		ii) Disturbance to People	Slight negative	Positive
		iii) Disruption of Existing Utilities	Slight negative	None
		iv) Disruption of Traffic	Moderate negative	Positive
		v) Health & Safety of workers and Public	Slight negative	Insignificant

7.3 Environmental Impacts during Construction Phase

7.3.1 Physical Resources

7.3.1.1 Land Acquisition

The improvement of roads and construction of underpasses along the route involves small piece of land, about 28 marlas for acquisition, as the proposed improvements are to be executed within the right-of-way of existing roads.

a. Environmental Issue

No environmental issue is involved.

b. Mitigation Measures

No mitigation is required.

7.3.1.2 Dismantling of Structures

The existing structures of about 15,500 sq.ft. will require dismantling.

a. Environmental Issue

The dismantling process will result in dust, disturbance to traffic and pedestrians, and disposal of dismantled material.

b. Mitigation Measures

The Contractor will act upon the Mitigation Plan so determined so as to avoid pollution of the environment and inconvenience to public and traffic movement.

7.3.1.3 Relocation of Existing Utilities

Disruption of existing utilities like water supply, electricity and telephone is likely to be caused during the construction stage of the project. Although such type of disruptions shall not be too much and for short time only.

a. Environmental Issue (affected Utility Services)

The process of relocation of existing infrastructure-utility may pose significant negative impacts on the everyday life of the people. The electrical and gas facilities and other underground infrastructure will be affected.

b. Mitigation Measures

The Contractor will act upon the Mitigation Plan so determined so as to avoid pollution of the environment and inconvenience to public and traffic movement.

The shut-off periods for affected utility will be so planned that residents in the vicinity / affected by shut-offs carry minimal adverse impacts.

7.3.1.4 Impact on Land Use and Resources

a. Environmental Issue

Open pits containing water are potential sources of mosquito breeding if left stagnant, and can create health problems.

b. Mitigation Measures

The mitigation measures, which will be carried out in design stage, construction as well as operation stages for land resources are as under:

i. Land Productivity and Use

- As far as possible, waste/barren land i.e. areas not under agricultural, residential or forestation use, and natural areas with a high elevation will be used for borrow material; and

- The excavation of earth fill will be limited to an approximate depth of 50 cm. This practice will be applied uniformly across the entire extent of the farmland unit acquired for borrowing earth material.

ii. Soil Erosion and Land Sliding

Good engineering practices will help control soil erosion both at construction sites and in peripheral areas, particularly in borrow areas. These will include the following measures:

- Growing of creepers and planting local fast growing and deep rooted species will act as sponge and will significantly help in reducing soil erosion; and

- A tree plantation program will be developed all around to reduce the soil erosion.

iii. Soil Contamination

The following practices will be adopted to minimize the risk of soil contamination:

- The proponent will be required to instruct and train their workforce in the storage and handling of materials and chemicals that can potentially cause soil contamination;

- Solid waste generated during construction and at campsites will be properly treated and safely disposed of only in demarcated waste disposal sites; and

- Proper solid waste storage will be adopted for the project such as:

  - Separate bins for recyclable materials should be provided.
  - All garbage or other putrid waste should be securely wrapped in recycled papers or similar material bags.
  - All cans, bottles, or other food containers would be rinsed free of food particles and drained before being placed in collection containers.
  - Collection containers should be kept tightly sealed or covered at all times. Solid waste must not protrude or extend above the top of the container.

7.3.1.5 Induced Roadside Development

The proposed project shall result in improvement in transportation facilities in the area which may result in induced roadside commercial, industrial and residential development.

c. Environmental Issue

No negative impacts are envisaged due to such developments if these are outside the right-of-way of the proposed roads improvement program. In fact it will increase the economic activities in the area resulting in enhancing the socio economic conditions of the local residents.

d. Mitigation Measures

No mitigation measures are involved. However, when there is any encroachment on the ROW, the same will be treated under the local guidelines for removal of encroachments.

7.3.1.6 Soil Erosion and Land Slides

Soil erosion can be potential environmental issue due to construction-improvement of the proposed roads and underpasses. The intensity of this impact will vary at different locations depending on the type of soil, drainage and hydrological pattern of the area.

e. Environmental Issue

Sediment transport to the surface water may increase considerably if not properly taken care. The phenomenon may pose environmental impacts like, slumps, slips and other mass movements in road cuts.

f. Mitigation Measures

The Contractor will follow the Mitigation Plan so as to avoid possibility of any soil erosion.

7.3.1.7 Seismic Impacts

The project site is located in Zone-2A of the Seismic Zoning Plan of the country which is likely to cause moderate earthquakes and shall have insignificant impact.

g. Environmental Issue

The planning and design of structures and roads will be as per the prescribed criteria for the purpose, as such no environmental issues are anticipated except when there is some abnormality on account of earthquake.

h. Mitigation Measures

The designs of structures and roads will be as per applicable criteria.

7.3.1.8 Disposal of Spoil

Disposal of spoil / surplus material is another issue likely to cause negative environmental impacts, if not properly mitigated during construction stage of the project.

i. Environmental Issue

Severe negative impacts may be caused on the receiving lands due to improper disposal of spoil.

j. Mitigation Measures

The Contractor will follow the Mitigation Plan for timely disposal of spoils. The Contractor will be required to depute adequate number of sanitary workers so as to ensure cleanliness of the construction area / its vicinity. It is anticipated that such sanitary workers would be about 50 numbers. The cost of hiring/deputing workers is part of the contract.

7.3.1.9 Flooding

The heavy and intensive precipitation in the project area may result in quick and high runoffs thereby disturbing the construction activity including Contractor's Camp, etc.

k. Environmental Issue

Abnormal surface water runoffs may disturb the construction activity including smooth traffic in the project area, also causing inconvenience to the pedestrians.

l. Mitigation Measures

The Contractor will follow the Mitigation Plan for proper collection and disposal of anticipated surface runoffs.

7.3.1.10 Impacts on Water Bodies

There is a probability that spillage of various types of oils and lubricants used during construction phase of the roads and underpasses, may contaminate the surface water bodies.

m. Environmental Issue

The spillage of various types of oils and lubricants used during construction phase of the roads and underpasses, may contaminate the surface water bodies.

n. Mitigation Measures

The Contractor will follow the Mitigation Plan and maintain its machinery and equipment in order so that possibility of any slippage of oils and lubricants.

7.3.1.11 Air Pollution

The negative impacts due to air quality have not been reported along the proposed route due to non-existence of significant pollution sources. However, keeping in view the magnitude of proposed construction works and the machinery involved, the air quality may be deteriorated considerably due to excessive and uncontrolled emissions during construction stage of the project. Also considerable increase in number of vehicles is anticipated on the upgraded project. Emissions of various gases were calculated using the present and projected traffic volume and the speeds under with and without project condition. The determined traffic volumes, present and future towards end of design period are included in Table-7.3.

Table-7.3, Presented and Projected Daily Traffic

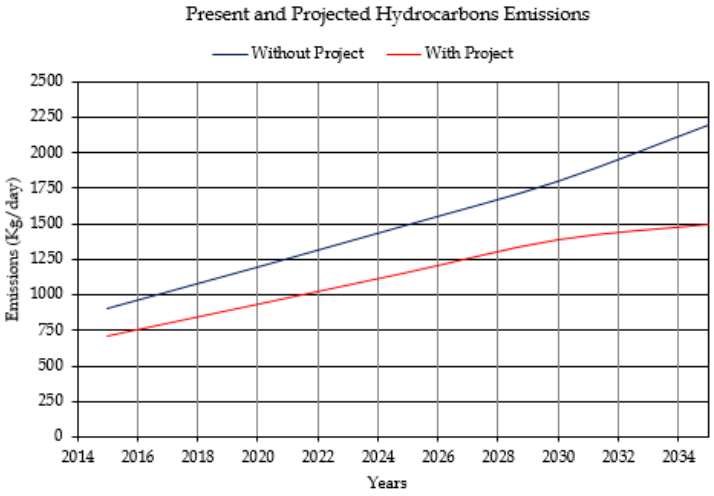
	Motorcycle	Rickshaw / Qingqi	Car	Wagon	Coaster	Large bus	Pick-Up	2-axle Truck	3+-axle Truck	Tractors	Total
2014	2,499	1,624	2,183	3,504	1,080	948	265	130	69	70	12,372
Growth Rate,%	5	5	5	5	5	5	5	5	5	5	50
2020	3,350	2,177	2,925	4,696	1,449	1,271	355	175	92	95	16,585
Growth Rate,%	5	5	5	5	5	5	5	5	5	5	50
2025	4,277	2,778	3,733	5,994	1,849	1,623	455	224	118	122	21,173
Growth Rate,%	5	5	5	5	5	5	5	5	5	5	50
2035	6,969	4,524	6,082	9,765	3,011	2,644	742	365	193	198	34,493

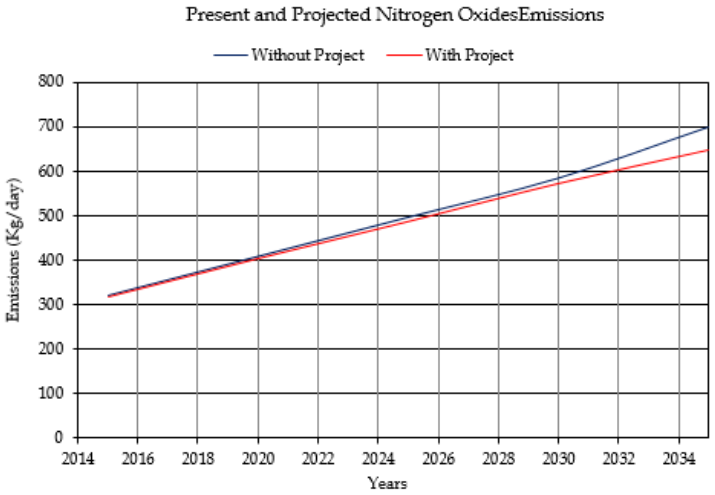
Based on the traffic data as above, and the anticipated emissions from various types of vehicles, the emissions have been determined for various periods and included in Table-7.4 and presented in Exhibit-7.1.

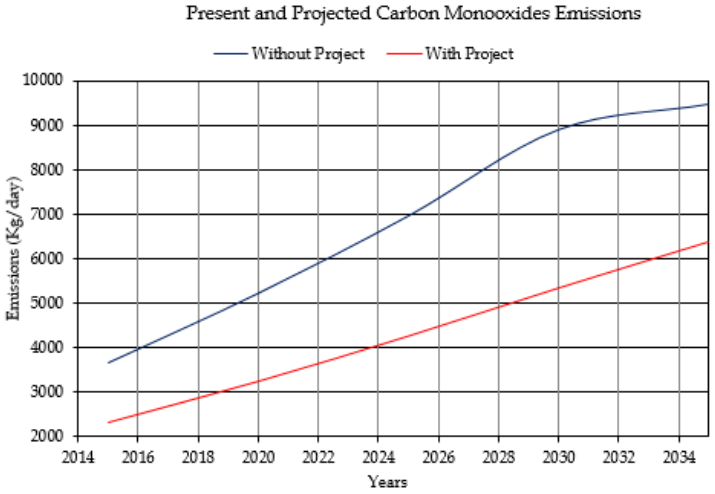
Table-7.4, Present and Anticipated Emissions from Vehicles

Year	Emissions (Kg)					
	Carbon Monoxide		Hydrocarbons		Nitrogen Oxides	
	Without Project	With Project	Without Project	With Project	Without Project	With Project
2014	110	110	57	45	76	89
2020	254	166	80	65	100	118
2025	338	242	104	91	125	147
2035	595	458	181	169	207	225

Exhibit-7.1, Present and Anticipated Emissions from Vehicles







It is noted that a considerable reduction in carbon monoxide (CO) and hydrocarbons (HC) emissions is anticipated under with project conditions due to improvement of speeds and smooth flow of traffic. However, emissions for Nitrogen Oxides increase when the project is implemented. The detailed calculation of emissions is included in Annexure-7.2.

o. Environmental Issue

The increase in emissions during project construction and operation may pose potentially negative impacts on the air quality of the area if not mitigated properly.

Air quality will be affected by the fugitive dust-and emissions from the construction machinery during the construction phase. Emissions may be carried over long distances, depending on wind speed and direction, the temperature of the surrounding air, and atmospheric stability.

Apart from dust, some vehicular emissions are also envisaged as a result of use of vehicles, machinery etc. during the construction activities.

p. Mitigation Measures

Air Quality

Following mitigation measures shall be taken into account in order to combat this problem:

- All vehicles, machinery, equipment and generators used during construction activities shall be in good condition and shall be properly tuned and maintained in good working conditions in order to minimize exhaust emissions;
- Open burning of solid waste from the Contractor's camps shall be strictly banned;
- project site shall be enclosed during construction to control dust;
- Transportation routes for project construction shall be properly selected away from residential areas and other sensitive points. Dust control should be applied to transport operations at construction site; and
- Preventive measures against dust should be adopted for onsite mixing and unloading operations.
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair are needed to minimize emissions.

Dust

The majority of dust problem caused during the construction phase of the project can be effectively mitigated by the implementation of a few simple procedures by the Contractor as under:

- Service roads (used for earthmoving equipment and general transport) should be regularly sprayed with water during dry weather;

- Excavation work should be sprayed with water;
- Construction activities causing dust should not be carried out on excessively windy days;
- Construction workers will be provided with masks for protection against the inhalation of dust and they should be trained for its use;
- Vehicle speed should be controlled within the limit; and
- Emission of exhaust gases from vehicles used for construction should be controlled.

Vehicles and other construction machinery should be properly tuned and maintained, so as not to emit any smoke.

The NEQS applicable to gaseous emissions generated by the construction vehicles, equipment and machinery will be enforced during the construction works.

The Contractor will follow the Mitigation Plan and maintain its machinery in order so that the emissions are minimized during construction stage. However, during operation, the increase in nitrogen oxides and other emissions is to be minimized which may be due to more land scaping and plantation in the green belts of the roads on either side of the en-route.

7.3.1.12Noise

The noise level of heavy construction equipment is high, but is limited to the road surrounding only. Construction activities at the site are likely to cause significant increase in noise levels due to the movement and operation of excavators, compactors, rollers, concrete mixers, welding plants, cranes, vibrators and due to haulage of material and machinery. Generators (to provide onsite electricity) will also be a source of noise in the area.

The General Services Administration Construction Noise Specifications as adopted under the provisions of the US-EPA Noise Control Act, 1972 specify the noise emission standard for the various machinery and equipment, these values are given in Table-7.5.

Table-7.5, General Noise Levels of Various Machinery 1ndustrial Equipment

Nr.	Equipment	Noise-Level in dB (A)
1	Earth Moving Machinery	75-85
2	Material Handling	75
3	Stationery Equipment	75
4	Tools, Hammers and Drivers	80-95

Source: *General Services Administration Construction Noise-Specifications, US-EPA Noise Control Act, 1972.*

The damage risk criteria for hearing as suggested by the Occupational Safety and Health Administration (OSHA) is described in Table.7.6. These levels were established to reduce the hearing loss of the people working on the projects.

Table-7.6, Damage Risk Criteria for Hearing Loss

Sr. No.	Maximum Allowable Duration per day in Hours	Noise-Level in dB (A)
1	8	90
2	6	92
3	4	95
4	3	97
5	2	100
6	1½	102
7	1	105
8	½	110
9	¼ or less	115 (Max.)

The maximum limit of noise levels are given in Table.7.7.

Table-7.7, Maximum Limit Of Noise Levels

Noise Level dB (A)	Situation
194	Lung damage
180	Ear drum rupture
150	Absolute limit with ears protected
150	Maximum of instantaneous noise
135	Absolute maximum with ears unprotected.
100	Prolonged noise causing permanent damage
90	Factory work for an 8-hour day. 5 days a week
85	Ear protection should be worn
80	Noise on building or construction sites
70	Road traffic near residential areas

a. Environmental Issue

Noise generated by the construction machinery during the project construction and subsequently by vehicular traffic during operation stage is likely to affect the project area particularly the sensitive receptors like

schools, hospitals etc. However, no sensitive receptor has been observed within the project area.

The noise levels beyond the permissible limits as above including the following stipulations will cause inconvenience to the population in the vanity and during construction, the workforce working on the project;

- The Proponent will set up a system to monitor the noise levels in the project area near the construction activities; and

- Facilitate the EPD Punjab in enforcing noise standards as prescribed in the NEQS.

b. Mitigation Measures

All mitigation measures mentioned below should be undertaken in order to minimize the impacts of noise on the community. These measures include:

- Selection of up to date and well maintained plant or equipment with reduced noise levels ensured by suitable in built damping techniques or with appropriate muffling devices;
- Confining noisy work to normal working hours in the day, wherever possible;
- Providing the construction workers with suitable hearing protection like ear cap, or earmuffs and training them in its use;
- Restricting construction vehicle movements during nighttime;
- Heavy machinery like percussion hammers and pneumatic drills should not be used during the night without prior approval of the LDA;
- Use of low noise machinery, or machinery with noise shielding and absorption; and
- Contractors should comply with submitted work schedule/ CPM, keeping noisy operations away from sensitive points; implement regular maintenance and repairs; and employ strict implementation of operation procedures.

7.3.2 Impact on Water Resources

The proposed project will not affect the water resources use, contamination of water bodies and groundwater, siltation of surface water resources and alterations in drainage pattern; therefore no mitigation measures are involved.

7.3.3 Biological Environment

7.3.3.1 Loss of Vegetation and Wild Life

Some negative impacts are anticipated on vegetation along road sides for proposed project, however, the impact is insignificant. No trees / plants falling in the right of way, are encountered.

No negative impacts are envisaged on the fauna of the area or any endangered species.

The impact on flora and fauna and corresponding mitigation measures are described in the subsequent parts of the study report.

7.3.3.2 Impacts on Flora and Fauna

a. Flora

Trees & Shrubs

The site has significant number of trees / plants and existing trees comprise fruit frees like Jamin, Shisham, Eucalyptus, etc. The portion of green belts falling under right-of-way of improvement programs contains various types of plants, shrubs, flowers, etc. which will be cut/relocated in the project implementation.

b. Fauna

No adverse effect on Fauna existence as these have already vanished.

7.3.3.3 Mitigation Measures

a. Flora

Trees and Shrubs

None of the tree / plant falls under the right of way, as such disturbance of flora is not involved.

b. Fauna

As already mentioned, there will be no effect on fauna of the area.

7.3.4 Socioeconomic and Cultural Environment

The impact of the proposed project on local communities, construction workers, indigenous and vulnerable people as well as on structures or sites of cultural and religious significance is mentioned in this section of the study.

7.3.4.1 Social Impacts

a. Impacts on Local Communities/Workforce

- Community will have to face the noise and dust problems during the construction phase and air and noise emissions during operation stage;
- Theft problems to the community by the Contractor workers and vice versa; and

- Pollution of community resources during construction and operation stages.

b. Gender Issues

The project area lies within the urban populated location, women activities in the project area/ adjacent is not involved.

c. Indigenous, Vulnerable and Women Headed Households

During the field survey of the project, no indigenous group of people was identified. So, no impact on the indigenous people is envisaged due to the implementation of the project.

d. Safety Hazards

Occurrence of accidents/incidents during the construction and operation stages may occur to the workers.

e. Religious, Cultural and Historical Sites

No such site will be adversely affected.

f. Sensitive Areas, Game Forest Reserves

No such area exists in the vicinity.

7.3.4.2 Mitigation Measures

a. Local Communities/Workforce

The presence of migrant construction workers inevitably causes some degree of social unease and even active disputes with the local community as a result of cultural differences. Potential social conflict will be contained by implementing the measures listed below:

- The Proponent will be required to maintain close liaison with the local communities to ensure that any potential conflicts related to common resource utilization for the project purposes are resolved quickly;

- Proponent will take care of the local community and sensitivity towards the local customs and traditions will be encouraged; and

- Effective construction controls by the Proponent to avoid inconvenience to the locals due to noise, smoke and fugitive dust.

b. Loss of Income

No such problem is foreseen; rather income source will increase through the construction activity.

c. Gender Issues

The Gender issues are unlikely, therefore no mitigation measures are involved.

d. Indigenous, Vulnerable and Women Headed Households

As referred earlier, no indigenous people have been identified in or along the project corridor, so no mitigation is required.

e. Safety Hazards

The safety measures shall include:

- Complying with the safety precautions for construction workers as per International Labour Organization (ILO) Convention No. 62, as far as applicable to the project;
- Training of workers in construction safety procedures, environmental awareness, equipping all construction workers with safety boots, helmets, gloves, and protective masks, and monitoring their proper and sustained usage;
- Contractor will ensure the provision of medicines, first aid kits, vehicle, etc. at the site;
- A contingency plan will be prepared by the Contractor to handle any abnormal situation like fire, storm, etc.

f. Relocation of Private/Public Infrastructure

The relocation of utility lines and one existing structure over about 15,500 sq.ft. require relocation / removal/dismantling. The process will be accomplished as per applicable procedures / laws and to the satisfaction of the involved-affected communities.

g. Cultural and Historical Sites

No such site is located in near vicinity of proposed site.

7.3.5 Environmental and Social Emergency Contingency Plan

The environmental and social issues during construction stage, special emergency contingency plan will be prepared by the Contractor at

construction and operation stages respectively. The plan will be prepared for the following main items:

- Availability of ambulance, first aid box, etc. at project site for carriage of workers to the hospital in case of any accident/incident;
- For firefighting arrangements during construction and operation -stages: in case of any emergency;
- Arrangements for leakage of any hazardous emissions/gasses from industries during operation stage;
- Arrangements to cater for any storm or natural disaster like earthquake, etc.;
- Arrangements for any safety and security risks, etc. and
- Bomb disposal arrangements.

7.3.6 Change of Land use

The negative environmental impacts related to the change of land use would not be involved as the improvement of roads, construction of underpasses, etc. will be at the existing locations-lands. In addition, making provision for plantation of trees and landscaping of the surrounding areas shall minimize this impact. In addition, special attention shall be given to architectural design of these structures to give better aesthetic view and to avoid negative aesthetic impacts. Contractors shall be made bound to adopt similar measures while establishing their construction camps in close interaction with the LDA.

There will be two other main land use changes expected in the project area during construction, one at borrow areas and the other where the spoil/ mucking material will be disposed. In this regard following measures shall be adopted:

- Careful selection and management of the borrow areas to avoid adverse effects, and not to create obvious scars and blemishes on the landscape; and
- Re-vegetation and landscaping of borrow areas/ disposal site consistent with acceptable aesthetics and the surrounding landscape.

7.3.7 Disposal of Mucking Material

The spoil will be carefully examined and disposed in an environmentally acceptable manner by transporting in enclosed containers and filling at appropriate sites approved by the Lahore Development Authority (LDA).

It is also desirable to utilize the muck in such a way that it is consumed for the construction of any other structure within the project or in the near vicinity. Utilization of muck in the vicinity of the project area is considered as the best option.

7.3.8 Vibration

Following mitigation measures should be implemented to combat the potential vibration impacts during the construction stage.

- Use of heavy machinery should be allowed in limited time only from 07.00 a.m. to 10.00 p.m. except for any emergency for which contractor should take prior approval; and

- Low vibration level machinery should be used and a system of regular maintenance and repairs to be employed.

7.4 Socioeconomic Mitigation

7.4.1 Relocation of Population/ Resettlement

In case of relocation of shops and houses, physical and monetary assistance will be given to the affectees to ensure that no significant inconvenience is caused to anyone.

7.4.2 Disturbance to People

Before start of construction activities for the project, LDA will inform residents of the area about detail of work, likely disturbances and their duration and as to whom they should address their complaints. A procedure should be established to enable the public to complain about excessive nuisance, disruption or disturbance due to the said project. Although these disruptions will have short-term impacts but may become severe in nature if not addressed properly.

7.4.3 Traffic Congestion in Nearby Localities

Following measures will be taken to mitigate the Impacts due to disruption of traffic experienced during the construction period:

- Coordinated planning of traffic diversions by the police and the transport authorities and restrictions in accordance with the construction program with advance warnings to the affected residents and road users;
- Availability of continual services of the police in the diversion and control of traffic; and
- The contracting agency will be required to maintain liaison between the Executing Agency, transport authorities and police at an early stage.

7.4.4 Health and Safety of Workers and Public

Implementing the following measures will ensure health and safety of the workers and the public during the construction phase:

- The Contractor will ensure that construction labour is trained in safety procedures for all relevant aspects of construction;

- LDA will make regular checks that the contractor is following safe practices; and
- Formal emergency procedures will be developed for construction site for the event of an accident.

The safety of the public at all stages of the construction will be ensured by appropriate public education and safety measures such as use of sign boards, barriers and flags.

7.4.5 Mitigation of the Perceived Effects

All the business affectees will be provided proper compensation for loss of their businesses. They will be provided proper physical and monetary assistance in settlement of their businesses at new places in order to avoid loss of their incomes. The work shall be completed in minimum possible time adopting 24hr working hours to minimize disturbance and inconvenience to people.

7.5 Environmental Impacts during Operation Phase

The LDA, comprising its staff having experience with environmental issues, shall form a Committee. This Committee should have a regular check on environmental issues and on the parameters mentioned hereunder.

7.5.1 Air Quality

During operational stage, the overall air quality will improve due to smooth flow of
Traffic, however following mitigation measures are recommended to be adopted for minimum deterioration of air quality:

- Vehicles with excessive smoke emissions should not be allowed to enter the project area;
- Permissible limits of air pollution (as specified in the guidelines) should be monitored on regular basis and any deviation should be taken care of; and
- Environment Protection (EPD), Punjab and traffic police will coordinate together for implementation of mitigation measures.

7.5.2 Noise

Following mitigation measures should be taken into account in order to minimize noise pollution:

- Ban on use of pressure horns;
- Proper implementation of inspection and maintenance programme for vehicles;
- Use of the radio during night by the labourers should be checked strictly; and
- Strict check on use of proper silencers especially for motorcycles and auto-rickshaws.

Coordination between traffic police and EPD will be required to achieve the

desired results.

7.5.3 Safety of Pedestrians and Cyclists

To avoid any accidents following safety measures shall be required for the pedestrians and cyclists:

- Roadside footpaths shall be constructed for pedestrians;
- Separate lane shall be allocated for the cyclists;
- Create awareness among the cyclist and pedestrians to use their allocated lanes and avoid moving in lanes allocated for fast vehicles; and
- Provision of signboards, signals and lights.

Suitable signs and barriers will be installed before the start of the project to stop/ divert the vehicles having height more than the clearance of the project.

7.6 Environmental Mitigation Plan

The likely environmental impacts are proposed to be mitigated as mentioned in the above parts of the study report. The proposed plan to this effect is included in Annexure-7.3. The magnitude, nature, mitigation measures and responsibilities of the sponsors, and others at various stage of the project is part of the proposed plan.

Annexure-7.1

Check List Parameters-Construction Stage

Nr.	Environmental Components	Environmental Issues	Impact Yes/ No	Minor Negative	Minor Positive	Moderate Negative	Moderate Positive	Major Negative	Major Positive
1	Land Form	1 Unstable slopes or embankments?	No						
		2 Disruption to or displacement of the soil?	Yes	√					
		3 Impact to land classified as prime (Commercial)?	No					√	
		4 Changes in ground contours, shorelines, stream channels, or river banks?	No						
		5 Destruction, covering, or modification of unique physical features?	Yes	√					
		6 Increased wind or water erosion of soils?	No						
		7 Foreclosure on future usage of site on a long-term basis?	No						
2	Air/ Climatology	1 Air pollutant emissions that will exceed federal or limit province or cause deterioration of ambient air quality (e.g., Radon gas)?	Yes	√					
		2 Objectionable odors?	No						
		3 Alteration of air movements, humidity, or temperature?	No						
		4 Emissions of hazardous air pollutants (NO_x and SO_x)?	Yes			√			
3	Water	1 Discharge to a public water system?	Yes	√					
		2 Changes in currents or water movements in marine or fresh water?	No						
		3 Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?	No						
		4 Alterations to the course or flow of flood waters?	No						

		5	Impoundment, control, or modifications of any water body equal to or greater than Ten (10) acres in surface area?	No						
		6	Discharges into surface water or alteration of surface water quality including, but not limited to, temperature or turbidity?	Yes	√					
		7	Alteration of the **direction** or **rate of flow** of groundwater?	No						
		8	Alterations in groundwater quality?	No						
		9	Contamination of public water supplies?	No						
		10	Violation of Water Quality Standards, if applicable?	No						
		12	Exposure of people or property to water-related hazards such as flooding?	No						
4	Solid Waste	1	Generate significant solid waste or litter?	Yes			√			
5	Noise	1	Increase in existing noise levels?	Yes					√	
		2	Expose people to excessive noise?	Yes					√	
6	Plant life	1	Change the diversity or productivity of species or number of any species of plants (including trees, shrubs, grass, crops, micro flora and aquatic plants)?	Yes	√					
		2	Reduce the numbers or affect the habitat of any Provincial or Federally designated unique, rare, or endangered species of Plants?	No						
		3	Introduce new species of plant into the area or create a barrier to the normal replenishment of existing species? (After consulting Federal and Provincial list)	No						
		4	Reduce acreage or create damage to any agricultural crop?	No						
7	Animal Life	1	Reduce the habitat or numbers of any provincial or federally designated unique, rare, or endangered species of animals?	No						

		2	Introduce new species of animals into an area or create a barrier to the migration or migration or movement of animals or fish	No						
		3	Cause attraction, entrapment, or impingement of animal life?	No						
		4	Harm existing fish and wildlife habitats?	No						
		5	Cause emigration resulting in human–wildlife interaction problems?	No						
8	Land Use	1	Substantially alter the present or planned use of an area?	Yes					√	
9	Natural Resources	1	Increase the rate of usage of any natural resource?	No						
		2	Substantially deplete any non-reusable natural resource?	No						
		3	Be located in an area designated as or being considered for wilderness, wild and scenic river, national park, or ecological preservation?	No					√	
10	Energy	1	Use substantial amounts of fuel or energy?	No						
		2	Substantially increase the demand on existing sources of energy?	No						
11	Transportation and Traffic Circulation	1	Movement of additional vehicles?	Yes			√			
		2	Effects on existing parking facilities or demands for new parking?	No						
		3	Substantial impact on existing transportation system(s)?	Yes					√	
		4	Alterations to present patterns of circulation or movement of people or goods?	Yes					√	
		5	Increased traffic hazards to motor vehicles, bicyclists, or pedestrians?	Yes	√					

12	Public Service	1	Fire protection?	No						
		2	Schools?	No						
		3	Other governmental services?	Yes	√					
13	Utilities	1	Power and Natural gas?	Yes	√					
		2	Communications systems?	Yes	√					
		3	Water?	Yes	√					
		4	Sewer or septic tanks?	No						
		5	Storm sewers?	Yes	√					
14	Population	1	Alter the location or distribution of human population in the area	No						
15	Accident Risk	1	Involve the risk of explosion or release of potentially hazardous substances including oil, pesticides, chemicals, radiation, or other toxic substances in the event of an accident or "upset" conditions?	No						
16	Human Health	1	Create any health hazard or potential health hazard?	Yes	√					
		2	Expose people to potential health hazards?	Yes	√					
17	Economic	1	Have any adverse effect on local or regional economic conditions e.g., tourism, local income levels, land values, or employment?	Yes					√	
18	Community Reaction	1	Potentially controversial?	Yes			√			
		2	In conflict with locally adopted environmental plans and goals?	No						
19	Aesthetics	1	Change any scenic vista or view open to the public?	Yes			√			

		2	Create an aesthetically offensive site open to the public view (e.g. out of place with character or design of surrounding area)?	No						
		3	Significantly change the visual scale or character of the vicinity?	Yes			√			
20	Archaeological, Cultural and Historical	1	Alter archaeological, cultural, or historical sites, structures, objects or buildings, either in or eligible for inclusion in the National Register	Yes			√			
21	Hazardous Waste	1	Involve the generation, transport, storage or disposal of any regulated hazardous waste.	No						

Check List Parameters-Operation Stage

Nr.	Environmental Components	Environmental Issues	Impact	Minor		Moderate		Major	
			Yes/ No	Negative	Positive	Negative	Positive	Negative	Positive
1	Land Form	1 Unstable slopes or embankments?	No						
		2 Disruption to or displacement of the soil?	No						
		3 Impact to land classified as prime (Commercial)?	Yes						√
		4 Changes in ground contours, shorelines, stream channels, or river banks?	No						
		5 Destruction, covering, or modification of unique physical features?	No						
		6 Increased wind or water erosion of soils?	No						
		7 Foreclosure on future usage of site on a long-term basis?	No						
2	Air/ Climatology	1 Air pollutant emissions that will exceed federal or limit province or cause deterioration of ambient air quality (e.g., Radon gas)? (Reduction)	Yes						√
		2 Objectionable odors?	No						
		3 Alteration of air movements, humidity, or temperature?	No						
		4 Emissions of hazardous air pollutants (NO_x and SO_x)? (Reduction)	Yes						√
3	Water	1 Discharge to a public water system?	No	√					
		2 Changes in currents or water movements in marine or fresh water?	No						
		3 Changes in absorption rates, drainage patterns, or the rate and amount of surface water runoff?	Yes	√					
		4 Alterations to the course or flow of flood waters?	Yes			√			

		5	Impoundment, control, or modifications of any water body equal to or greater than Ten (10) acres in surface area?	No						
		6	Discharges into surface water or alteration of surface water quality including, but not limited to, temperature or turbidity?	Yes	√					
		7	Alteration of the **direction** or **rate of flow** of groundwater?	No						
		8	Alterations in groundwater quality?	No						
		9	Contamination of public water supplies?	No						
		10	Violation of Water Quality Standards, if applicable?	No						
4	Solid Waste	1	Generate significant solid waste or litter?	No						
5	Noise	1	Decrease in existing noise levels?	Yes						√
		2	Expose people to excessive noise? (Reduction in time of Exposure)	Yes						√
6	Plant life	1	Change the diversity or productivity of species or number of any species of plants (including trees, shrubs, grass, crops, micro flora and aquatic plants)?	No						
		2	Reduce the numbers or affect the habitat of any Provincial or Federally designated unique, rare, or endangered species of Plants?	No						
		3	Introduce new species of plant into the area or create a barrier to the normal replenishment of existing species? (After consulting Federal and Provincial list)	No						
		4	Reduce acreage or create damage to any agricultural crop?	No						
7	Animal Life	1	Reduce the habitat or numbers of any provincial or federally designated unique, rare, or endangered species of animals?	No						

		2	Introduce new species of animals into an area or create a barrier to the migration or migration or movement of animals or fish	No						
		3	Cause attraction, entrapment, or impingement of animal life?	No						
		4	Harm existing fish and wildlife habitats?	No						
		5	Cause emigration resulting in human–wildlife interaction problems?	No						
8	Land Use	1	Substantially alter the present or planned use of an area? (Commercialization on both sides of the roads)	Yes						√
9	Natural Resources	1	Increase the rate of usage of any natural resource?	No						
		2	Substantially deplete any non-reusable natural resource?	No						
10	Energy	1	Use substantial amounts of fuel or energy?	No						
		2	Substantially increase the demand on existing sources of energy?	No						
11	Transportation and Traffic Circulation	1	Movement of additional vehicles?	Yes						√
		2	Effects on existing parking facilities or demands for new parking?	No						
		3	Substantial impact on existing transportation system(s)?	Yes						√
		4	Alterations to present patterns of circulation or movement of people or goods?	Yes						√
		5	Increased traffic hazards to motor vehicles, bicyclists, or pedestrians?	Yes	√					
12	Public Service	1	Fire protection?	No						
		2	Schools?	Yes						√

		3	Other governmental services?	Yes						√
13	Utilities	1	Power and Natural gas?	No						
		2	Communications systems?	No						
		3	Water?	No						
		4	Sewer or septic tanks?	No						
		5	Storm sewers?	No						
14	Population	1	Alter the location or distribution of human population in the area	Yes		√				
15	Accident Risk	1	Involve the risk of explosion or release of potentially hazardous substances including oil, pesticides, chemicals, radiation, or other toxic substances in the event of an accident or "upset" conditions?	No						
16	Human Health	1	Create any health hazard or potential health hazard?	No						
		2	Expose people to potential health hazards?	No						
17	Economic	1	Have any adverse effect on local or regional economic conditions e.g., tourism, local income levels, land values, or employment?	Yes				√		
18	Community Reaction	1	Potentially controversial?	Yes			√			
		2	In conflict with locally adopted environmental plans and goals?	No						
19	Aesthetics	1	Change any scenic vista or view open to the public?	Yes			√			

		2	Create an aesthetically offensive site open to the public view (e.g. out of place with character or design of surrounding area)?	No						
		3	Significantly change the visual scale or character of the vicinity?	Yes						
20	Archaeological, Cultural and Historical	1	Alter archaeological, cultural, or historical sites, structures, objects or buildings, either in or eligible for inclusion in the National Register	Yes						
21	Hazardous Waste	1	Involve the generation, transport, storage or disposal of any regulated hazardous waste.	No						

Annexure-7.2

Total Emissions from Motor Vehicles for the Year 2015

En-Route (average situation)

Without Project Conditions

Sr. No.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction Factor	Unit (g/km)	Emmisions		Correction Factor	Unit (g/km)	Emmisions (kg)		Correction Factor	Unit (g/km)	Emmisions (kg)	
			Km/hr	1 km/vehicle			Running	Kg.			Running	Total			Running	Total
1	Cars	2183	70	2183	0.4134	22.90	20.67	20.67	0.5702	1.88	2.34	2.34	1.1948	2.83	7.38	7.38
2	Pick-ups	265	60	265	0.4855	22.90	2.95	2.95	0.6190	1.88	0.31	0.31	1.1445	2.83	0.86	0.86
3	Coasters	1080	60	1080	1.0000	13.20	14.26	14.26	1.0000	2.50	2.70	2.70	1.0000	0.99	1.07	1.07
4	Hiace Wagon	3504	60	3504	0.3969	13.20	18.36	18.36	0.6205	2.50	5.44	5.44	1.2630	13.4	59.30	59.30
5	Buses	948	60	948	0.3969	13.20	4.97	4.97	0.6205	2.50	1.4706	1.4706	1.2630	13.4	16.04	16.04
6	Tractor Trolleys	69	40	69	0.6753	13.20	0.62	0.62	0.7957	2.50	0.1373	0.1373	1.1416	13.4	1.06	1.06
7	Trucks	130	50	130	0.5083	13.20	0.87	0.87	0.6906	2.50	0.2244	0.2244	1.2145	13.4	2.12	2.12
8	Trailer	69	50	69	0.5083	13.20	0.46	0.46	0.6906	2.50	0.1191	0.1191	1.2145	13.4	1.12	1.12
9	Rikshaw	1624	40	1624	0.6753	17.00	18.64	18.64	0.7957	9.90	12.7922	12.7922	1.1416	0.075	0.14	0.14
10	Motorcycle	2499	40	2499	0.6753	17.00	28.69	28.69	0.7957	9.90	19.6845	19.6845	1.1416	0.075	0.21	0.21

Total Emissions from Motor Vehicles for the Year 2025

En-Route (average situation)

Without Project Conditions

Sr. No.	Type of Vehicles	No. of Vehicles	Speed	Distance	Carbon Monoxide				Hydrocarbons				Nitrogen Oxides			
					Correction Factor	Unit (g/km)	Emmisions (kg)		Correction Factor	Unit (g/km)	Emmisions (kg)		Correction Factor	Unit (g/km)	Emmisions (kg)	
			Km/hr	1 km/vehicle			Running	Total			Running	Total			Running	Total
1	Cars	3733	60	3733	0.4855	22.90	41.50	41.50	0.6190	1.88	4.34	4.34	1.1445	2.83	12.09	12.09
2	Pick-ups	455	50	455	0.5979	22.90	6.23	6.23	0.7024	1.88	0.60	0.60	1.0943	2.83	1.41	1.41
3	Coasters	1849	50	1849	1.0000	13.20	24.41	24.41	1.0000	2.50	4.62	4.62	1.0000	0.99	1.83	1.83
4	Hiace Wagon	5994	50	5994	0.5083	13.20	40.21	40.21	0.6906	2.50	10.35	10.35	1.2145	13.4	97.55	97.55
5	Buses	1623	50	1623	0.5083	13.20	10.89	10.89	0.6906	2.50	2.8019	2.8019	1.2145	13.4	26.41	26.41
6	Tractor Trolleys	122	30	122	0.9536	13.20	1.54	1.54	0.9708	2.50	0.2961	0.2961	1.0202	13.4	1.67	1.67
7	Trucks	224	40	224	0.6753	13.20	2.00	2.00	0.7957	2.50	0.4456	0.4456	1.1416	13.4	3.43	3.43
8	Trailer	118	40	118	0.6753	13.20	1.05	1.05	0.7957	2.50	0.2347	0.2347	1.1416	13.4	1.81	1.81
9	Rikshaw	2778	30	2778	0.9536	17.00	45.04	45.04	0.9708	9.90	26.6993	26.6993	1.0202	0.075	0.21	0.21
10	Motorcycle	4277	30	4277	0.9536	17.00	69.34	69.34	0.9708	9.90	41.1062	41.1062	1.0202	0.075	0.33	0.33
	Total	21173		21173			242.20	242.20			91.50	91			146.73	147

Annexure-7.3

Environmental Mitigation Plan

Project Activity	Environmental Receptor	Potential Impact	Time & Location of the Impact	Magnitude of the Impact	Mitigation Measures	Responsibility
1. Land Acquisition and Resettlement	Socio-economic	Removal of encroachment, permanent and temporary structures (e.g., houses etc.)	Prior to the construction work	Moderate	Any social issues, if raised, will be duly addressed.	Sponsor was responsible for compensations
2. Establishment of Construction Camp.	Socio-economic	Interference with local communities, hindrance and nuisance for local dwellers, increase in street crime rate and drugs etc.	Start of construction phase/At designated camp site(s)	Minor	Camp site to be selected after careful reconnaissance so as to minimize the social and physical disruption to local communities and road users.	LDA
					Setting up of a complaint office for public complaints registration and advertisement of the grievance redress mechanism.	
					Contractor to appoint a camp site in charge to ensure compliance with instruction from Sponsor.	
	Physical	Generation of solid waste	Construction and operation periods/Camp sites	Minor	Ensure training of all housekeeping staff on waste management	LDA
					Solid waste collection, segregation and disposal	

Project Activity	Environmental Receptor	Potential Impact	Time & Location of the Impact	Magnitude of the Impact	Mitigation Measures	Responsibility
					mechanism to be in place and communicated to all concerned	
					Solid waste generated at campsites will be stored on site temporarily and will be transported out of the project area to designated waste disposal sites	
					Recyclable material will be taken out of the waste stream for recycling. All recyclable waste (e.g., paper, packaging material, plastics, aluminum foils etc.) to be collected, and sold locally for re-use into respective recycling industry	
					Non-recyclable combustible wastes will be collected and properly incinerated at a location away from inhabited area.	
					No open burning to be allowed in the vicinity of the project area.	
					Arrangements for composting of green waste in a properly designed composting facility.	

Project Activity	Environmental Receptor	Potential Impact	Time & Location of the Impact	Magnitude of the Impact	Mitigation Measures	Responsibility
		Generation of liquid waste	Construction and operations periods/Camp sites	Minor	The NEQS limits of disposal into inland waters will be achieved and maintained.	LDA
					Sanitary wastewater to be discharged to the sewerage system and ultimately treated by sewage treatment plant.	
					In the absence of sanitary sewers and sewage treatment plant, engineered facilities including septic tanks and drain fields for disposal of sanitary wastewater will be developed.	
					Wastewater effluent will be passed through gravel/sand beds to remove oil/grease contaminants before discharging it into natural streams	
					All mitigation measures related to water conservation and minimization shall be adhered to during camp operation. This will indirectly result in minimizing wastewater discharge	
2. Clearance of RoW	Biological	Loss of top soil	Construction period/All buildings &	Minor	Topsoil removed from a portion of the green belt to clear RoW will be separately stored.	LDA

Project Activity	Environmental Receptor	Potential Impact	Time & Location of the Impact	Magnitude of the Impact	Mitigation Measures	Responsibility
			service road locations		This topsoil will be re-used during site rehabilitation.	
		Loss of vegetation	Construction period/Green belt	Moderate if mitigated, Significant otherwise	Project design facilitates avoiding tree cutting in the median and along project site. More trees are being planted than have to be removed.	LDA through coordination with Punjab-EPA
					The extent of clearance of RoW to be clearly marked/taped	
					Wherever possible, the existing mature or perennial indigenous species will be relocated on selected sites thereby reducing the total count of tree felling	
					Each indigenous/exotic tree fell to be compensated with indigenous species in a ratio of 1:10	
3. Preparation of Sub grade/sub base and water bound macadam	Physical	Limitations on access to the destinations of road users	Construction period/All along the project road	Minor	As far as possible, construction work will be coordinated such that one carriageway at a time is upgraded on any one section, leaving the other available to serve the dual traffic.	LDA
	Physical	Excessive water abstraction/use	Construction period/All along the project road		Groundwater wells, if installed, will be spaced more than 75 m from surrounding wells	LDA

Project Activity	Environmental Receptor	Potential Impact	Time & Location of the Impact	Magnitude of the Impact	Mitigation Measures	Responsibility
					Individual pumping at household level will be stopped after having centralized water supply system	
					Discharge from ground water wells (if installed) will be measured on monthly basis	
4. Laying of asphalt wearing surface	Physical	Emission of dust and fumes from asphalt plant	Construction Period/All along the project roads	Minor	Equipping asphalt, hot mix and batching plants with dust control equipment such as fabric filters or wet scrubbers to reduce the level of dust emissions.	LDA
					Ensuring that haul-trucks carrying asphalt-concrete mix and/or aggregate fill materials are kept covered with tarpaulin to help contain fumes and dust.	
5. Construction of Underpasses-structures	Physical	Blockage of natural drainage patterns	Construction period	Minor	Drainage structures should be designed at appropriate slopes	LDA
					The structures will be designed at maximum return period to accommodate maximum surface runoff	
					Drainage structures will be of concrete base to avoid any ground water contamination	

Project Activity	Environmental Receptor	Potential Impact	Time & Location of the Impact	Magnitude of the Impact	Mitigation Measures	Responsibility
	Biological	Loss of vegetation	Construction period	Moderate	Drainage structures will be constructed in a manner that loss of vegetation is minimized	LDA
					Restrict project activities and project personnel to work areas only	
					Only marked trees will be cut	
					A re-vegetation plan will be implemented to compensate for the inevitable loss.	
6. Construction of Structures	Biological	Loss of top soil	Construction period	Moderate	Topsoil removed from a project site will be separately stored.	LDA
					This topsoil will be re-used during site rehabilitation.	
	Physical	High levels of dust (SPM), Noise, Generation of Construction Waste	Construction period	Moderate	Reuse the construction material. Ensure use of dust masks by workers	LDA
					Reduce exposure by employing minimum number of personnel during the activity.	
					Sprinkle water during crushing to reduce dust	
					All sign boards, flags, wires, tents etc. will be removed from the camp site	

Project Activity	Environmental Receptor	Potential Impact	Time & Location of the Impact	Magnitude of the Impact	Mitigation Measures	Responsibility
					All temporary waste collection/treatment arrangements to be dismantled	
					Rainwater Harvesting will be introduced at each household level	
					Besides centralized treatment plant, separate septic tank will be ensured to build in each house.	
	Biological	Introduction of invasive species during site restoration	Post Project	Minor	The topsoil will be used for re vegetation of indigenous species	LDA
					Monitoring and reporting of re vegetation plan	
					Implementation of recommendations mentioned in the monitoring reports	
	Socio-economic	Safety issues arising out of increased traffic volume	Post Project	Minor	Impose speed limits for HTV (20 km/hr) and LTV (30 km/hr)	LDA
					Marking of pedestrian crossings	
					Speed breakers will be constructed at critical pedestrian crossings	

SECTION 8
ENVIRONMENTAL MITIGATION AND MONITORING PLAN

8.1 Environmental Management

Management and monitoring of the environment during construction and operation of the project, are inevitable to ensure its un-contamination. For this purpose Environmental Management and Monitoring Committee (EMMC) will be established by LDA. The Committee will develop operational guidelines and implementation schedule as well as will ensure compliance with the National Environmental Quality Standards (NEQs) during the construction and operation stages. Qualified personnel will man LDA with the adequate experience. The committee will function under the management of the EMMC.

For effective management, LDA shall assign responsibilities to Environmental Management and Monitoring Committee (LDA), who shall be responsible for Environmental Monitoring of the Project.

The Contractor will be responsible for execution of the Project under supervision of the LDA. The Contractor shall be obliged to follow the contract documents and apply good construction techniques and methodology without harming the environment. Obligation of the contractor to safeguard, mitigate and rehabilitate the environment should be addressed seriously.

8.2 Environmental, & Social Management

8.2.1 Monitoring Framework Guidelines

The proposed guidelines are included in Table-8.1.

Table-8.1, Environmental and Social Management and Monitoring Framework Guidelines

Environmental Guidelines	Responsibility
• **Water and Waste Water** • Install a separate drinking water storage tank of at least 4 hours supply, based on consumption pattern / needs • Carryout periodic cleaning and disinfection of the drinking water storage tank, at least after every 6 months • Use recommended disinfectants only • Carryout regular and periodic laboratory testing of groundwater /drinking water quality • Install water filters, if required on the basis laboratory testing • Ensure proper working of the septic tank for treatment of toilets/wastewater.	• Proponent / Environmental Manger

• **Solid waste**
  • Avoid spillage of feed onto the floor. Any spillage be immediately picked and disposed into a proper receptacle
  • Install a receptacle of -appropriate capacity- for the stage of spilled feed
  • Pace garbage collection bins at appropriate places in the office block and the residential colony.
  • The organic waste be securely disposed of into a nearby compost trench,
  • If any composting trench available, then a new one be constructed.
  • Carryout disinfection of the garbage collection bins by regularly sprinkle with powered lime.
  • Solid waste/ manure from the sheds be disposed of in a secure manner by sale to intended buyers.
	• Proponent / Environmental Manger

• **Air quality and landscape etc.**
  • Sweep the floors and the outer sheds areas after light sprinkling with water
  • Develop green areas by carrying out grassing and planting of shrubs and flowering plants at open spaces
  • Liaise with the Forest Department for obtaining and planting trees and Proponent / Environmental Manger vegetative cover during / each plantation season. Protect saplings by observing the recommended water schedule and trimming
  • Avoid open burning and open dumping of solid waste either in the farms premises or in the vicinity.
  • Ensure proper functioning of the effluent and wastewater drainage system.
	• Proponent / Environmental Manger

• **Worksite Safety, Health, and Hygiene** • Ensure leaning of the water dips and presence of water up to desired level therein • Keep the firefighting arrangements handing and periodically check then adequacy. • Educate and train the workers for dealing with an emergency as per management plan. • Store the medicines, and diesel for generators securely and designated laces.	• Proponent / Environmental Manger
Environmental Guidelines	**Responsibility**
• Carry out regular medical checkups of the works especially those working inside the hatchery. • Ensure personal hygiene of the works by asking the Medical Doctor by inspecting their nails, hair, clothing, washing habits and appearance. • Display telephone numbers of the local rescue agency at prominent places. • Direct the workers to observe necessary security precautions while working on any machine or electricity equipment.	

8.2.2 Environmental Management and Monitoring Plan

The proposed plan is included in Table-8.2. and Table-8.3

Table-8.2, Environmental Management Plan (Construction Stage)

Nr.	*Project Component or Impact*	*Target*	*Action*	*Responsibility*
A. Construction Stage				
1.	Disturbance to the people	Minimum disturbance to everyday life of people	▪ Inform residents of the area about detail of work, likely disturbances, and their duration and to whom they should address their complaints. ▪ Establishing good community relationship so that any disruption can be resolved with due consideration of community	CC and LDA
2.	Surface and ground water contamination	Minimize surface and ground water contamination from oil base products	▪ Proper arrangement for collection of oil base products	CC and LDA
3.	Wastewater discharges	Minimize wastewater discharges at worker's camps and due to sanitary waste at site	▪ Proper treatment before its disposal into water courses	CC and LDA
4	Disposal of mucking material	To dispose of excavated material in an environmentally acceptable manner	▪ Transporting in enclosed containers ▪ The mucking material should be filled in layers and properly rolled and sprinkled to avoid any negative environmental impacts ▪ Utilization of mucking material for construction of temporary access roads/ passage	CC and LDA

5	Dust	Dust problems are avoided	▪ Construction activities causing dust will not be carried out on excessively windy days. ▪ Excavation work will be sprayed with water ▪ To cover stockpiles of excavated material with tarpaulins ▪ Provide construction workers with masks and train them for their use	CC and LDA
6.	Air Pollution	To minimize the degradation of ambient air quality	▪ Waste not to be burnt on site ▪ Minimize exhaust emissions from Construction machinery, vehicles and generators.	CC and LDA
7.	Noise	Noise nuisance is avoided	▪ Selection of up to date, well maintained plant with reduced noise levels ensured by suitable in built devices ▪ Confining noisy work to normal working hours in the day. ▪ Providing the construction workers with suitable hearing protection and training them in its use.	CC and LDA
8.	Flora	Re-vegetation	▪ Re-vegetation of trees that were cut during the project should be carried out.	CC, LDA and PHA

Notes:

CC	Construction Contractor
LDA.	Lahore Development Authority
PLDC	Punjab Land Development Company
EPD	Environment Protection Department
PHA	Parks and Horticulture Authority

Table- 8.3, Environmental Management Plan (Operation Stage)

Nr.	*Project Component or Impact*	*Target*	*Action*	*Responsibility*
B. Operation Stage				
1.	Air Quality	Ensure that the pollution level does not exceed the limit	▪ Regular monitoring of vehicular emissions ▪ Impose fine on vehicles emitting gaseous emissions beyond the prescribed limit	EPD
2.	Noise	To minimize noise levels	▪ Ban use of pressure horns ▪ Proper implementation of inspection and maintenance program for vehicles ▪ Strict check on use of proper silencers especially for motor cycles and rickshaws	EPD
3.	Safety of pedestrians and Cyclists	To avoid chances of accidents	▪ Provide roadside footpaths ▪ To provide separate lanes for the cyclists ▪ To provide safety measures in case of emergency ▪ To create social awareness among cyclists and pedestrians; for proper usage of footpaths and lanes allocated for both of them to avoid any accidents with fast moving vehicles	LDA

Notes:

CC	Construction Contractor
LDA.	Communication and Works Department Government of Punjab
EPD	Environment Protection Department
PHA	Parks and Horticulture Authority

8.3 Management and Monitoring

8.3.1 During Construction Phase

At the outset of construction, plans will be made by LDA for the conservation of the existing environmental resources and abatement of the pollution in the area, which will occur due to the constructional activities. These plans will be implemented during the construction. Simultaneously, it will be ensured that significant negative and adverse impacts of the construction are satisfactorily mitigated by monitoring environmental parameters, including mentioned hereunder.

a. Air Quality

Air quality will be monitored regularly by direct measurement of sensitive air pollution parameters like particulate matters, NOx and SOx. The particulate matters will be specifically monitored. Dust will be generated by site cleaning, leveling, grading, excavation, backfilling, and movement of traffic and handling of construction materials. Whenever the quantity of particulate matters is found higher than the NEQ limits, it will be controlled by sprinkling of water on open surfaces and covering of materials, etc.

b. Noise

Incidence of noise will also be monitored, and proper measures will be taken to keep it within NEQ standard limits. When the noise cannot be avoided or controlled, hearing protection devices will be provided to the workers exposed to high level of noise exceeding 85 dB(A) or damage risk criteria for hearing loss mentioned in Section (4).

c. Water and Effluent Quality

Chemical and microbiological tests will be carried out on water and effluent samples to determine the requirement and extent of treatment. Adequate treatment will be given to maintain the quality as per NEQ standards, and to ensure that potable water is supplied for drinking purposes and effluents produced are hygienically disposed.

d. Solid Waste

Collection, transportation and disposal of solid waste, generated during construction will be monitored by LDA to see that the environment is not adversely affected. LDA will also monitor handling, storage, transportation and disposal of hazardous solid wastes during and immediately after construction activities.

e. Human Health and Safety

Inexperience coupled with unawareness of mechanical and electrical equipment and waste products scattered on the site can cause injuries to the workers, LDA will monitor training program for the workers for emergency situations. Provision of first aid facilities and use of personal protection devices like helmets and long boots will be ensured. Entry of persons not wearing the protection devices, or of unauthorized person and animals within the construction site will not be allowed.

The management and monitoring program during construction phase is given in Table 5.1, which should be coordinated by LDA with other agencies before start of the construction work.

f. Aesthetics and Natural Environment

The LDA will monitor that the construction activities do not disturb the aesthetics and natural environment, to the extent avoidable, trees will not be cut, vegetation will not be damaged. Any activities of the nearly residents, which are likely to affect the environment, will be brought to the knowledge of competent authority for necessary action.

8.3.2 During Operation Phase

The LDA will compile and maintain the environmental data and records gathered during the construction phase for reference during the operation phase. The LDA will coordinate with government departments and agencies like Traffic Engineering and Planning Agency (TEPA), Lahore, City District Government, Environmental Protection Agency (EPA) Punjab, etc. for management and monitoring with respect to air quality, noise and traffic. A comprehensive record of all the measurements made and actions taken will be compiled and maintained.

a. Air Quality

The LDA will organize monitoring of air quality and effects of exhaust from vehicles using the project, in collaboration with the Environmental Protection Agency (EPA), Punjab. Sensitive parameters including NOx, SOx and particulate matters will be monitored and measures, as necessary, will be taken to keep them within the limits set by National Environmental Quality Standards (NEQs).

b. Noise

Noise will be generated due to the vehicular movement and blowing of pressure horns.

The noise levels will be monitored to see whether they are within NEQ standard limits. When they are found to exceed NEQ limits and disturb nearby settlements,

noise abatement measures, like plantation of trees, installation of noise dampening and absorbing media and construction of wall barriers will be taken. Blowing of horns will be controlled through mass awareness programs and by the local police.

The movement of traffic will be monitored at the entering and leaving points of project. Records of traffic movement will be maintained which will help in correlating the noise and air pollution with traffic type and intensity.

The management and monitoring program during the operation of project is given in Table 5.2.

c. Aesthetics and Natural Environment

The LDA will monitor that aesthetics and natural environment in the area. Tree plantation will be done as per the directives of the Ministry of Environment and Urban Affairs. Plants and shrubs with minimum water requirements will be selected. Any activity of the nearby residents, like disposal of waste in the area, which affects the environment, will be brought to the knowledge of the competent authority for necessary action.

8.4 Staff and Training

Environmental Management and Monitoring Committee and Its Responsibilities

Lahore Development Authority, Lahore will set up an Environmental Management and Monitoring Committee and will have full-time environment protection management staff, responsible for the environment protection management and supervision affairs during construction and operation phase of the project.

The responsibilities of the Environmental and Management and Monitoring Committee (LDA) are as follows:

- To organize routine monitoring of motor vehicle emissions, traffic noise and vibration;
- To develop operational guidelines and implementation schedule;
- To recommend further scientific research projects and treatment engineering based on the problems emerged during the operation of the Project;
- Assisting Government Agencies to deal with the emergency response for traffic accidents related to pollution, e.g. hazardous chemical spills; and
- Receiving complaints from residents and institutions and assisting the local environmental authority.

8.5 Equipment and Instruments

Facilities for monitoring of the air quality are available with Environmental Protection Department of Punjab and will be utilized for comprehensive monitoring during different stages of the Project.

8.6 Technical Training Programs

In order to raise the level of professional and managerial staff, they need to upgrade their knowledge in the related areas.

Contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP because without appropriate environmental awareness and knowledge and skills required for the implementation of the mitigation measures, it would be difficult for contractor(s) to implement effective environmental protection measures. A domestic training program is proposed to train contractors who will be involved in the construction and professional staff from managerial organization involving in operation.

8.7 Environmental Monitoring Plan

Environmental Management Plan (EMP) has been prepared for the effective implementation and management of the mitigation measures, Table-8. The EMP satisfied the requirement of the Pakistan Initial Environmental Examination and Environmental Impact Assessment Regulations (Rules), 2000.

Environmental Monitoring is normally undertaken during both construction and operation phases to ensure the effectiveness of the proposed mitigation measures. Response to unanticipated environmental concerns at an early stage and to determine the accuracy of impact predictions is also required. Specific monitoring program are outlined below as well as responsibilities for the collection and analysis of data and the reporting requirements.

The purposes of the environmental monitoring plan comprise:

a. To evaluate the effectiveness of mitigation measures;
b. Respond to unanticipated environmental impacts when the Project is under construction; and
c. Make regulations and improve traffic management and environmental controls, based on monitoring data. Environmental Protection Department Punjab will undertake the monitoring.

8.7.1 Construction Phase

Monitoring frequency will be once in a season in the construction phase at the representative locations for each site. The following parameters shall be monitored.

1. Noise
2. CO
3. HC
4. NMETH-HC
5. NO_X
6. Ozone
7. SO_2
8. Total Suspended Particle

8.7.2 Operation Phase

Monitoring frequency will be after every 3 months in the operation phase. The same parameters is as given above will be monitored, Table-8.4.

Table-8.4, Environmental Monitoring Plan

Env. Component	Project Stage	Parameters	Special Guidance	Standards	Monitoring			Institutional Responsibility
					Location	Frequency	Duration	
Air	Pre-Construction	PM10 SO2 NO, CO, HC,O3	Monitoring at 15 m from the edge of pavement downwind	WHO Air Quality Guideline, USEPA NAAQS	Project site	3 8-hr Samples per day, once per fortnight for 1 month.	Continuous 24 hours/or. for 1 full working day	Contractor through approved monitoring agency
	Construction Stage	PM10 SO2 NO, CO, HC,O3	High volume sampler to be located 50 m from the plant in the downwind direction. Use method specified by USEPA for analysis.	WHO Air Quality Guideline, USEPA NAAQS	Project site	3 8-hr samples per day, once every season during construction period.	Continuous 24 hours or for 1 full working day	Contractor through approved monitoring agency
		PM10	High volume sampler to be located 40 m from the plant in the downwind direction. Use method specified by USEPA for analysis.	WHO Air Quality Guideline, USEPA NAAQS	Project site	3 samples per week, once every month During construction period.	Continuous 24 hours/or for 1 full working day	Contractor through approved monitoring agency
	Operation Stage	PM10 SO2 NO2, CO, HO	High volume sampler to be located 15 m from the edge of pavement.	WHO Air Quality Guideline, USEPA NAAQS	Project site	3 sample per week for each section every 4 month until 2025.	Continuous 24 hours	Environmental Unit

Environ. Component	Project Stage	Parameters	Special Guidance	Standards	Monitoring			Institutional Responsibility
					Location	Frequency	Duration	
Water Quality	Pre-Construction	pH, BOD, COD, TDS, TSS, DO, Oil & Grease, Pb, Chlorides, zinc, cadmium, total coliforms, and faecal coliforms	Grab sample collected from source and analyze as per Standard Methods for Examination of Water and Wastewater	WHO Drinking Water quality Guidelines	Near project site	Once a fortnight Before construction starts	-	Contractor through approved monitoring agency
	Construction stage	pH, BOD, COD, TDS, TSS, DO, Oil & Grease, Pb, Chlorides, zinc, cadmium, total coliforms, and faecal coliforms	Grab sample collected from source and analyze as per Standard Methods for Examination of Water and Wastewater	WHO Drinking Water quality Guidelines	Project site	Once every month during of construction period.	-	Contractor through approved monitoring agency
	Operation stage	pH, BOD, COD, TDS, TSS, DO, Oil & Grease, Pb, Chlorides, zinc, cadmium, total coliforms, and faecal coliforms	Grab sample collected from source and analyze as per Standard Methods for Examination of Water and Wastewater	WHO Drinking Water quality Guidelines	Project site	End of summer before the onset of Monsoon every year.	-	Proponent

Env. Component	Project Stage	Parameters	Special Guidance	Standards	Monitoring			Institutional Responsibility
					Location	Frequency	Duration	
Noise Levels	Pre-Construction	Noise levels on dB(A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 15 from edge of pavement	WHO Noise Guidelines.	Project site	24 hours, 1 to 2 weeks before start of construction.	Reading to be taken at 15 seconds interval for 15 minutes every hour and then Averaged.	Contractor through approved monitoring agency
	Construction Stage	Noise levels on dB(A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 15m.	WHO Noise Guidelines PEPA	Project site	24 hours every four month during construction phase.	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged.	Contractor through approved monitoring agency
	Operation Stage	Noise levels on dB(A) scale	Equivalent noise levels using an integrated noise level meter kept at a distance of 15 m from edge of pavement	WHO Noise Guidelines.	Project site	Once every year.	Reading to be taken at 15 seconds interval for 15 minutes every hour and then averaged.	Proponent

Soil	Construction Stage	Monitoring of Pb, Cr, Cd	Sample of soil collected, acidified and analyzed using atomic absorption spectrophotometry	Threshold for each contaminant set by IRIS database of USEPA until national standards are promulgated	Project site	Max. 5 locations During construction		Contractor through an approved monitoring agency

8.8 Responsibilities for Monitoring and Reporting

The EPD will be responsible for Environmental Monitoring and reporting throughout the construction and operation phases. Other institutions responsible for aspects related to monitoring and legal action include the EPD and they will provide relevant input to the monitoring reports.

A report will be prepared quarterly and one comprehensive report will be produced annually. Contents of the report will include results of environmental monitoring in comparison to standards for the various parameter, location and sampling time, statistics, analysis and evaluation, and signature. One report will be submitted to each of the following authorities and institutions:

- LDA
- EPD
- PHA

8.9 Environmental Action Plan

The Environmental Action Plan provides the framework for the implementation of mitigating measures and environmental management and monitoring during the construction and operation of the project. This document detail all commitments made in the EIA Report and can be used as a reference document to ensure all environmental protection measures are implemented. This annotated outline demonstrates the type of information, which will be included in the proposed Environmental Action Plan.

SECTION 9

CONCLUSIONS AND RECOMMENDATIONS

9.1 Environmental Issues & Mitigations

The EIA report concludes that the project of Improvement of Roads and Crossings along the alignment may result in some temporary negative environmental impacts during construction stage. The likely negative impacts including nuisance hazards to neighboring areas:

- Air pollution due to particulate material on account of dust, emissions from machinery, etc. thereby affecting adversely the air quality with bad impacts on the nearby population and commuters;
- Noise issues due to working of construction machinery on the project;
- Impacts related to Contractor's camp(s);
- Storage of construction material;
- Accident Risks; and
- Health and safety of workmen and neighbors etc.

The mitigation measures for the said likely negative impacts have been suggested.

The study concludes that the project does not involve any long term irreversible negative impacts. Most of the negative impacts identified in the study are temporary and manageable through:

- Implementing Environmental Management Plan; and
- Providing monitoring arrangements and resources during design, construction and operation stages of the project.

9.2 Benefits of the Project

The project will have several benefits including;

- Savings in time due to un-interrupted traffic flow;
- Savings in Vehicle Operating Costs;
- Generation of direct and indirect job opportunities benefiting the local labour by increasing their per capita income;
- Improvement in the present environmental conditions;
- Enhancement of standard of living of people and socio economic conditions in the area/city; and
- Expanded and upgraded urban environmental infrastructure in respect of roads thereby fulfilling the requirements of increasing traffic volumes in the city in general and the project area in particular.

9.3 LDA's / Consultants' Obligations

The LDA through its Consultants will ensure that implementation of Environmental Management Plan is achieved so as to minimize the negative

impacts of the project during its implementation, therefore proper monitoring would be necessitated.

In addition, the Environment Department will frequently monitor that the management plan is working as prescribed.

9.4 Contractor's Obligations

The obligations of the Contract which would be part of the Contract stipulation include:

a. Environmental Mitigation Measures

The Contractor should carry out the mitigation measures according to the guidelines and satisfaction of the LDA/its Consultants. In addition, the Environmental Management and Monitoring will achieved as per Environmental Management and Monitoring Plans.

b. Existing Infrastructure / Utilities

The Contractor should make necessary arrangements to protect the existing Infrastructure / Utilities and if not avoidable should make good at his own expense damage done to the existing utilities.

c. First Aid facilities

The Contractor should arrange first aid facilities at site for emergency purpose. Contractor should designate one of the staff members to act as lead person for emergency response and safety issues.

d. Health and Safety of Workers

The Contractor should make arrangements for the health and safety of the workers and general public by; providing safety equipment such as helmets, gloves, safety harnesses etc.; erection of safety signage at potentially dangerous working areas; making proper lighting arrangements should for night shift working; providing insurance against accidental death and injuries to workers and public; restricting public and animal access to construction site by providing fence on the periphery.

e. Employment of Local Personnel

The Contractor should, subject to availability and workability, employ maximum number of workers from local area.

f. Disposal of Waste

The Contractor should in consultation with and with the approval of Resident Engineer (RE) of the Sub-project select and abide by the selection, sites for disposal of waste construction material, solid waste and waste water.

g. Location of Camps, etc.

The Contractor shall locate Labor Camps, Material Depots, Equipment and Machinery Yards, approach roads and routes etc. As per the site situation that does not affect the normal life of the end users.

h. Socio-economic and Cultural Values and Heritage

The Contractor is required to:

i. Ensure that no damage or disruption is caused to the social infrastructure or public services presently available to the people e.g., education, health, electricity supply, drinking water supply facilities for public gathering or religious congregations.
ii. Ensure that existing ownership of land around the project is respected.
iii. Ensure that if some construction material, has to be procured from or through a member of local community, it must be by a proper Social Framework Agreement.
iv. Ensure that no damage or adverse effect is caused to archaeological (present or chance find) sites, graveyards and burial places.
v. Ensure that privacy of local women is respected and any violator is strictly disciplined

The said obligations will of course be part of the Contract documents.

Appendix-A

World Bank OP 4.01

These policies were prepared for use by World Bank staff and are not necessarily a complete treatment of the subject.

Content of an Environmental Assessment Report for a Category A Project

1. An environmental assessment (EA) report for a Category A project[1] focuses on the significant environmental issues of a project. The report's scope and level of detail should be commensurate with the project's potential impacts. The report submitted to the Bank is prepared in English, French, or Spanish, and the executive summary in English.

2. The EA report should include the following items (not necessarily in the order shown):

(a) *Executive summary*. Concisely discusses significant findings and recommended actions.

(b) *Policy, legal, and administrative framework*. Discusses the policy, legal, and administrative framework within which the EA is carried out. Explains the environmental requirements of any cofinanciers. Identifies relevant international environmental agreements to which the country is a party.

(c) *Project description*. Concisely describes the proposed project and its geographic, ecological, social, and temporal context, including any offsite investments that may be required (e.g., dedicated pipelines, access roads, power plants, water supply, housing, and raw material and product storage facilities). Indicates the need for any resettlement plan or indigenous peoples development plan[2] (see also subpara. (h)(v) below). Normally includes a map showing the project site and the project's area of influence.

(d) *Baseline data*. Assesses the dimensions of the study area and describes relevant physical, biological, and socioeconomic conditions, including any changes anticipated before the project commences. Also takes into account current and proposed development activities within the project area but not directly connected to the project. Data should be relevant to decisions about project location, design, operation, or mitigatory measures. The section indicates the accuracy, reliability, and sources of the data.

(e) *Environmental impacts*. Predicts and assesses the project's likely positive and negative impacts, in quantitative terms to the extent possible. Identifies mitigation measures and any residual negative impacts that cannot be mitigated. Explores opportunities for environmental enhancement. Identifies and estimates the extent and quality of available data, key data gaps, and uncertainties associated with predictions, and specifies topics that do not require further attention.

(f) *Analysis of alternatives*.[3] Systematically compares feasible alternatives to the

proposed project site, technology, design, and operation—including the "without project" situation—in terms of their potential environmental impacts; the feasibility of mitigating these impacts; their capital and recurrent costs; their suitability under local conditions; and their institutional, training, and monitoring requirements. For each of the alternatives, quantifies the environmental impacts to the extent possible, and attaches economic values where feasible. States the basis for selecting the particular project design proposed and justifies recommended emission levels and approaches to pollution prevention and abatement.

(g) *Environmental management plan (EMP)*. Covers mitigation measures, monitoring, and institutional strengthening; see outline in **OP 4.01.**

(h) *Appendixes*

(i) List of EA report preparers—individuals and organizations.

(ii) References—written materials both published and unpublished, used in study preparation.
(iii) Record of interagency and consultation meetings, including consultations for obtaining the informed views of the affected people and local nongovernmental organizations (NGOs). The record specifies any means other than consultations (e.g., surveys) that were used to obtain the views of affected groups and local NGOs.
(iv) Tables presenting the relevant data referred to or summarized in the main text.
(v) List of associated reports (e.g., resettlement plan or indigenous peoples development plan).

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1. The EA report for a Category A project is normally an environmental impact assessment, with elements of other instruments included as appropriate. Any report for a Category A operation uses the components described in this annex, but Category A sectoral and regional EA require a different perspective and emphasis among the components. The Environment Sector Board can provide detailed guidance on the focus and components of the various EA instruments.
2. See OP/BP 4.12, *Involuntary Resettlement* (forthcoming), and **OD 4.20**, *Indigenous Peoples*.

3. Environmental implications of broad development options for a sector (e.g., alternative ways of meeting projected electric power demand) are best analyzed in least-cost planning or sectoral EA. Environmental implications of broad development options for a region (e.g., alternative strategies for improving standards of living in a rural area) are best addressed through a regional development plan or a regional EA. EIA is normally best suited to the analysis of alternatives within a given project concept (e.g., a geothermal power plant, or a project aimed at meeting local energy demand), including detailed site, technology, design, and operational alternatives.

Appenxidx-B

EXTRAORDINARY
PUBLISHED BY AUTHORITY
1SLAMABAD, SATURDAY, DECEMBER 6, 1997
PART 1
Acts, Ordinances, President's Orders and Regulations
SENATE SECRETARIAT
Islamabad, the 6th December, 1997

No. F. 9(46)/97-Legis.-The following Acts of Majlis-e-Shoora (Parliament) received the assent of the Acting President on the 3rd December, 1997, are hereby published for general information:

Act No. XXXIV of 1997

An Act to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution and promotion of sustainable development

Whereas, it expedient to provide for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution, promotion of sustainable development, and for matters connected therewith and incidental thereto;

It is hereby enacted as follows:

1. **Short title, extent and commencement.**

This Act may be called the Pakistan Environmental Protection Act, 1 997.
It extends to the whole of Pakistan.
It shall come into force at once.

2. **Definitions.** In 'this Act, unless there is anything repugnant in the subject or context,

i. "Adverse environmental effect" means impairment of, or damage to, the environment and includes_

a). Impairment of or damage to, human health and safety or to biodiversity or property;
b). Pollution; and
c). Any adverse environmental effect as may be specified in the regulations;

ii. "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry, residues from the use of fertilizers, pesticides and other farm chemicals;

iii. "air pollution" means any substance that causes pollution of air and includes soot, smoke, dust particles, odor, light, electro-magnetic,

radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;

iv. "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes or which they are part; this includes diversity within, species, between species and of ecosystems

v. "Council" means the Pakistan Environmental Protection Council established under section 3

vi. "discharge" means spilling, leaking, pumping, depositing, seeping, releasing, flowing out pouring, emitting, emptying or dumping;

vii. "ecosystem" means a dynamic complex of plant animal and microorganism communities and their non-living environment interacting as a functional unit;

viii. "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;

ix. "emission standards" means the permissible standards established by the Federal Agency or a Provincial Agency for emission of air pollutants and noise and for discharge of effluents and waste;

x. "environment" means ;

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 inter-relationships between any of the factors in sub-clauses (a) to (f)

xi. "environmental impact assessment" means an environmental study comprising collect ion of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, migratory and compensatory measures, formulation of environmental management and training plans and monitoring arrangement, and framing of recommendations and such other components as may be prescribed

xii. "Environmental Magistrate" means the Magistrate of the First Class appointed under section 24

xiii. "Environmental Tribunal" means the Environmental Tribunal constituted under section 20

xiv. "Exclusive Economic Zone" shall have the same meaning as defined in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976)

xv. "factory" means any premises in which industrial activity is being undertaken

xvi. "Federal Agency" means the Pakistan Environmental Protection Agency established under section 5, or any Government Agency, local council or local authority exercising the powers and functions of the Federal Agency;

xvii. "Government Agency" includes

a) a division, department, attached department, bureau, section, commission, board, office or unit of the Federal Government or a Provincial Government;
b) a developmental or a local authority, company or corporation established or controlled by the Federal Government or Provincial Government;
c) a Provincial Environmental Protection Agency; and
d) Any other body defined and listed in the Rules of Business of the Federal Government or a Provincial Government.

xviii. "hazardous substance" means

a) a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971(11 of 1971). which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics causes, or is likely to cause, directly or in combination with other matters, an adverse environmental effect and
b) any substance which may be prescribed as a hazardous substance

xix. "hazardous waste" means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste, and includes hospitals waste and nuclear waste;

xx. "historic waters" means such limits of the waters adjacent to the land territory of Pakistan as may be specified by notification under section 7 of the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976);

xxi. "hospital waste" includes waste medical supplies and materials of all kinds, and waste blood, issue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;

xxii. "industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purposes

xxiii. "industrial waste" means waste resulting from an industrial activity

xxiv. "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;

xxv. "local authority" means any agency set-up or designated by the Federal government or a Provincial Government by notification in the official gazette to be a local authority for the purposes of this Act

xxvi. "local council" means a local council constituted or established under a law relating to local government;

xxvii. "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails

xxviii. "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like

xxix. "National Environmental Quality Standards" means standards established by the Federal Agency under clause (e) of sub-section (1) of section 6 and approved by the Council under clause (c) of sub-section (1) of section 4

xxx. "noise" means the intensity, duration and character of sounds from all sources, and includes vibration

xxxi. "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive

xxxii. "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, Company, corporation, co-operative society, Government Agency. Non-governmental organization, community based organization, village

organization, local council or local authority and, in the case of a vessels, the master or other person having for the time being the charge or control of the vessel

xxxiii. "pollution" means the contamination of air, land or water by the discharge or emission of effluents or wastes or air pollutants or noise or other matter which either directly or indirectly or in combination with other discharges or substances alters unfavourably the chemical, physical, biological, radiational, thermal or radiological or aesthetic properties of the air, land or water or which may, or is likely to make the air, land or water unclean, noxious or impure or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity

xxxiv. "prescribed" means prescribed by rules made under this Act

xxxv. "project" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes

a) construction or use of buildings or other works
b) construct ton or use of roads or other transport systems
c) construction or operation of factories or other installations
d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;
e) any change of land use or water use; and
f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems factories or other installations

xxxvi. "proponent" means the person who proposes or intends to undertake a project ;

xxxvii. "Provincial Agency" means a Provincial Environmental Protection Agency established under section 8

xxxviii. "regulations" means regulations made under this Act

xxxix. "rules" means rules made under this Act

xl. sewage" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works

xli. "standards"' means qualitative and quantitative standards for discharge of effluents and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the National Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulation made thereunder

xlii. "sustainable development" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs

xliii. "territorial waters" shall have the same meaning as defined in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976)

xliv. "vessel" includes anything made for the conveyance by water of human beings or of goods ; and

xlv. "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.

3. Establishment of the Pakistan Environmental Protection Council.

The Federal Government shall, by notification in the official Gazette, established a council to be known as the Pakistan Environmental Protection Council consisting of

i. Prime Minister or such other person as the Prime Minister may nominate in this behalf. Chairperson

ii. Minister Incharge of the Ministry or Division dealing with the subject of environment. Vice Chairperson

iii. Chief Ministers of the provinces. Member

iv. Ministers Incharge of the subject of environment in the Provinces. Member

v. Such other persons not exceeding thirty-five as the Federal Government may appoint, of which at least twenty shall be non-official including five representatives of the Chambers of Commerce and Industry and industrial associations and one or more representatives of the Chamber of Agriculture, the medical and legal professions, trade unions, and nongovernmental organizations concerned with the environment and development, and scientists, technical experts and educationists. Member

vi. Secretary to the Government of Pakistan, in-charge of the Ministry or Division dealing with the subject of environment. Member Secretary

The Members of the Council, other than ex-officio members, shall be appointed in accordance with the prescribed procedure and shall hold office for a term of three years.

The Council shall frame its own rules of procedure.

The Council shall hold meetings as and when necessary, but not less than two meetings shall be held in a year.

The Council may constitute committees of its members and entrust them with such functions at it may deem fit, and the recommendations of the committees shall be submitted to the council for approval.

The Council or any of its committees may invite any technical expert or representative of any Government Agency or non-governmental organization or other person possessing specialized knowledge of any subject for assistance in performance of its functions.

4. Functions and powers of the Council.

1. The Council shall

   a). co-ordinate and supervise enforcement of the provisions of this Act:
   b). approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time:
   c). approve the National Environmental Quality Standards.
   d). provide guidelines for the protection and conservation of species, habitats and biodiversity in general, and for the conservation of renewable and non-renewable resources
   e). coordinate integration of the principles and concerns of sustainable development into national development plans and policies : and
   f). consider the National Environment Report and give appropriate directions thereon.

2. The Council may, either itself or on the request of any person or organisation, direct the Federal Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources, or to undertake research in any specified aspect of environment.

5. Establishment of the Pakistan Environmental Protection Agency:

1 The Federal Government shall, by notification in the official Gazette establish the Pakistan environmental Protection Agency to exercise the powers and perform the functions assigned to it under the provisions of this Act and the rules and regulations made thereunder.

2 The Federal Agency shall be headed by a Director-General, who shall be appointed by the Federal Government on such terms and conditions as it may determine.

3 The Federal Agency shall have such administrative, technical and legal staff as the Federal Government may specify, to be appointed in accordance with such procedure as may be prescribed.

4 The powers and functions of the Federal Agency shall be exercised and performed by the Director-General.

5 The Director-General may, be general or special order, delegate any of these powers and functions to staff appointed under sub-section (3).

6 For assisting the Federal Agency in the discharge of its functions, the Federal Government shall establish Advisory Committees for various sectors, and appoint as members thereof eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

6. Functions of the Federal Agency.

1 The Federal Agency shall

administer and implement the provisions of this Act and the rules and regulations made thereunder

- prepare, in coordination with the appropriate Government Agency and in consultation with the concerned sectoral advisory Committees, national environmental policies for approval by the Council;
- take all necessary measures fort the implementation of the national environmental policies approved by the Council
- prepare and publish an annual National Environment Report on the state of the environment
- prepare or revise, and establish the national Environmental Quality Standards with approval of the Council

- Provided that before seeking approval of the Council, the Federal Agency shall publish the proposed. National Environmental Quality Standards for public opinion in accordance with the prescribed procedure ;and

- ensure enforcement of the National Environmental Quality Standards: establish standards for the quality of the ambient air, water and land by notification in the official Gazette, in consultation with the Provincial Agency concerned

Provided that

I. different standards for discharge or emission from different source and for different areas and conditions may be specified
II. where standards are less stringent than the National Environmental Quality Standards prior approval of the Council shall he obtained
III. certain areas, with the approval of the Council, may exclude from carrying out specific activities, projects from the application of such standards.

coordinate environmental policies and programmes nationally and internationally;

establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution, and to estimate the costs of cleaning up pollution and rehabilitating the environment in various sectors

take measures to promote research and the development of science and technology which may contribute to the prevention of pollution, protection of the environment, and sustainable development

certify one or more laboratories as approved laboratories for conducting tests and analysis and one or more research institutes as environmental research institutes for conducting research and investigation for the purposes of this Act

identify the needs for, an initiate legislation in various sectors of the environment

render advice and assistance in environmental matters, including such information and data available with it as may be required for carrying out the purposes of this Act;

Provided that the disclosure of such information shall be subject to the restrictions contained in the proviso to sub-section (3) of section 12;

assist the local councils, local authorities, Government Agencies and other persons to implement schemes for the proper disposal of wastes Society as to ensure compliance with the standards established by it;

provide information and guidance to the public on environmental matters;

recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;

specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and coordinate implementation of such plans

encourage the formation and working of non-governmental organizations, community organizations village organizations to prevent and control pollution and promote sustainable development:

take or cause to be taken all necessary measures for the protection conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development ; and

Perform any function which the Council may assign to it.

2 The Federal Agency may

undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organisation:

request any person to furnish any information or data relevant to its functions

initiate with the approval of the Federal Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings

recommend to the Federal Government the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purpose of this Act, including

incentives, prizes awards, subsidies, tax exemptions, rebates and depreciation allowances and taxes, duties, cesses and other levies

establish and maintain laboratories to help in the performance of its I functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for establishment of similar laboratories in the private sector ; and

provide or arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate the discharge of its functions.

7. Powers of the Federal Agency

Subject to the provisions of this Act, the federal Agency may

a). lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both movable and immovable

b). sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;

c). fix and realize fees, rates, and charges for rendering any service or providing any facility information or data under this Act or the rules and regulations made thereunder;

d). Enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business.

e). appoint with the approval of the Federal Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit

f). summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue

g). enter and inspect and under the authority of a search warrant issued by the Environmental Tribunal or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which, there are reasonable grounds to believe that an offence under this Act has been or is being committed;

h). take samples of any materials, products, articles or substances or of the effluents, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission

i). arrange for test and analyses of the samples at a certified laboratory;

j). confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time

provided that the power under clauses (f), (h), (I) and (j) shall be exercised in accordance with the provisions of the Code of Criminal procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Tribunal or Environmental Magistrate ; and

k). establish a National Environmental Co-ordination Committee comprising the Director-General as its chairman and the Director Generals of the Provincial Environmental Protection Agencies and such other persons as the Federal Government may appoint as its members to exercise such powers and perform such functions as may be delegated or assigned to it by the Federal Government for carrying out the purposes of this Act and for ensuring inter provincial co-ordination in environmental policies.

8. Establishment, powers and functions of the provincial Environmental Protection Agencies.

Every Provincial Government shall, by notification in the official Gazette, establish an Environmental Protection Agency, to exercise such powers and perform such functions as may be delegated to it by the Provincial Government under sub-section (2) of section 26.

The Provincial Agency shall be headed by a Director-General who shall be appointed by the Provincial Government on such terms and conditions as it may determine.

The Provincial Agency shall have such administrative, technical and legal staff as the Provincial Government may specify, to be appointed in accordance with such procedure as may be prescribed.

The powers and functions of the Provincial Agency shall be exercised and performed by the Director General.

The Director-General may, by general or special order, delegate any of these powers and functions to staff appointed under sub-section (3)

For assistance of the Provincial Agency in the discharge of its functions the provincial Government shall establish sectoral Advisory Committees for various sectors and appoint members from amongst eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.

9. Establishment of the Provincial Sustainable Development Funds.

There shall be established in each Province a Sustainable Development Fund.

The Provincial Sustainable Development Fund shall be derived from the following sources, namely

grants made or loans advanced by the Federal Government or the Provincial Governments;

aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and non-governmental organizations ; and

contributions from private organizations, and other persons.

The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for

a. providing financial assistance to the projects designed for the protection conservation, rehabilitation and improvement of the

environment, the prevention, and control of pollution, the sustainable development of resources and for research in any specified aspect of environment .; and

b. any other purpose which, in the opinion of the Board will help achieve environmental objectives and the purposes of this Act.

10. Management of the Provincial Sustainable Development Fund.

The Provincial Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of

Chairman, Planning and Development Board/Additional Chief Secretary Planning and Development Department. Chairperson

Such officers of the Provincial Governments not exceeding six as the Provincial Government may appoint, including Secretaries in charge of the Finance, Industries and Environment Departments. Members

Such non-official person not exceeding ten as the Provincial Government may appoint including representatives of the Provincial Chamber of Commerce and Industry, non-government organization and major donors.

Members
Director-General of the Provincial Agency. Member/Secretary

In accordance with such procedure and such criteria as may be prescribed the Board shall have the power to sanction financial assistance for eligible projects;

invest moneys held in the Provincial Sustainable Development Fund in such profit-bearing Government bonds, savings schemes and securities as it may deem suitable ; and

Take such measures and exercise such powers as may be necessary for utilization of the Provincial Sustainable Development Fund for the purposes specified in sub-section (3) of section 9.

The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Provincial Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts and performance evaluation based on the progress reports.

11. Prohibition of certain discharges or emissions

Subject to the provision of this Act and the rules and regulations made thereunder no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount,

concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the, standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6.

The Federal Government levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

The provisions of sub-section (3) shall not apply to projects which commenced industrial activity on or after the thirtieth day of June. 1994.

12. Initial environmental examination and environmental impact assessment.

No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Federal Agency approval in respect thereof.

The Federal Agency shall.

Review the initial environmental examination and accord its approval or require submission of an environmental impact assessment by the proponent; or

review the environmental impact assessment and accord its approval subject to such conditions as it may deem fit to impose, or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated, or reject the project as being contrary to environmental objectives.

Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to

I. trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential unless 'for reasons to be recorded in writing, the Director-General of the Federal Agency is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent ; or

II. international relations, national security or maintenance of law and order except with the consent of the Federal Government ; or

III. Matter covered by legal professional privilege.

The Federal Agency shall communicate its approval or otherwise within a period of four months from the date 'the initial environmental examination or environmental impact assessment is filed complete in all respects in accordance with the prescribed procedure, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved to the extent to which it does not contravene the provisions of this Act and the rules and regulations made thereunder:

Subject to sub-section (4) the Federal Government may in a particular case extend the aforementioned period of four months if the nature of the project So warrants.

The provisions of sub-sections (1), (2), (3), (4) and (5) shall apply to such categories of projects and in such manner as may be prescribed.

The Federal Agency shall maintain separate Registers for initial environmental examination and environmental impact assessment projects, which shall contain brier particulars of each project- and a summary of decisions taken thereon, and which shall be open to inspection by the public at all reasonable hours and the disclosure of information in such Registers shall be subject to the restrictions specified in subsection (3).

13. Prohibition of import of hazardous waste.

No person shall import hazardous waste into Pakistan and its territorial waters, Exclusive Economic Zone and historic waters.

14. Handling of hazardous substances.

Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except

under a licence issued by the Federal Agency and in such manner as may be prescribed ; or

in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, an agreement or other instrument to which Pakistan is a party.

15. Regulation of motor vehicles.

1. Subject to the provisions of this Act and the rules and regulations made thereunder, no person shall operate a motor vehicle from

which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the National Environmental Quality Standards, or where applicable the standards established under clause (g) of sub-section (1) of section 6.

2. For ensuring compliance with the standards mentioned in sub-section (1), the Federal Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as may be prescribed.

3. Where a direction has been issued by the Federal Agency under sub-section

4. in respect of any motor vehicles or class of motor vehicles, no person shall operate any such vehicle till such direction has been complied with.

16. Environmental protection order

Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring or has occurred in violation of. the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or, as the case may be, the Provincial Agency may, after giving the person responsible for such discharge emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal agency or Provincial Agency may consider necessary within such period as may be specified in the order.

In particular and without prejudice to the generality of the foregoing power such measures may include

a). immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect

b). installation, replacement or alteration of any equipment or thing to eliminate or control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission

c). action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances ; and

d). action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the

circumstances, to the satisfaction of the Federal Agency or, Provincial Agency.

Where the person, to whom direction under sub-section (1) are given does not comply therewith, the Federal Agency or Provincial Agency may, in addition to the proceeding initiated against him under this Act or the rules and regulations itself take or cause to be taken such measures specified in the order as it may deems necessary and may recover the costs of taking such measures from such person as arrears of land revenue.

17. Penalties

Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13, or section 16 or any order issued thereunder shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues and where such contravention or failure continues

Provided that if contravention of the provisions of section 11 also constitutes contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2) only.

Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction issued by the Council or by the Federal Agency or Provincial Agency shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

Where an accused has been convicted of an offence under sub-section (1) and (2), the Environmental Tribunal and Environmental Magistrate shall, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence, and the attendant circumstances.

Where an accused has been convicted of an offence under sub-section (1) and the Environmental Tribunal is satisfied that as a result of the commission of the offence monetary benefits have accrued to the offender, the Environmental Tribunal may order the offender to pay, in addition to the fines under sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

Where a person convicted under sub-section (1) or sub-section (2); and had been previously convicted for any contravention under this Act, the Environmental Tribunal or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder

endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and industry

- sentence him to imprisonment for a term which may extend up to two years

- order the closure of the factory

- order confiscation of the factory, machinery and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act

Provided that for a period of three years from the date of commencement of this Act, the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of section 11, 13, 14, or 16 involving hazardous waste

order such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Federal Agency or, as the case may be, Provincial Agency ; and

Order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

The Director-General of the Federal Agency or of a Provincial Agency or an officer generally or specially authorised by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunal or Environmental Magistrate in accordance with such procedure as may be prescribed.

Where the Director-General of the Federal Agency or of a Provincial Agency is of the opinion that a person has contravened any provision of this Act, he may subject to the rules, by notice in writing to that person require him to pay to the Federal Agency or, as the case may be, Provincial Agency an administrative penalty in the amount set out in 'the notice for each day the contravention continues and a person who pays an administrative penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

The provisions of sub-section (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act or who has paid an administrative penalty for a contravention of any provision of this Act.

18. Offences by bodies corporate

Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance or, or is attributed to any negligence on the part of any director, partner, manager, secretary or other officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly

Provided that in the case of a company as defined under the companies Ordinance, I 984 (XLVII of 1984 only the chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation for the purposes of this section, "body corporate" includes a firm association of persons and a society registered under the Societies registration Act 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

19. Offences by Government Agencies, local authorities or local councils

Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such, contravention has been committed with the consent or connivance of or is attributable to any negligence on the part of the Head or any other officer of the Government Agency, local authority or local along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

20. Environmental Tribunals

The Federal Government may by notification in the official gazette, establish as many Environmental Tribunals as it considers necessary and, where it establishes more than one Environmental Tribunal it shall specify territorial limits within which, or the class of cases in respect of which each OIIC oh them shall exercise jurisdiction under this Act.

An Environmental Tribunal shall consist of a Chairperson who is or has been or is qualified for appointment as a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the Federal Government of which at least one shall be a technical member with suitable professional qualification and experience in the environmental field as may be prescribed.

For every sitting of the Environmental Tribunal, the presence of the chairperson and not less than one Member shall be necessary.

A decision of an Environmental Tribunal shall be expressed in terms of, the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision

of the Environmental Tribunal shall be expressed in terms of the opinion of the Chairperson.

An Environmental Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by or produced, before it.

An Environmental Tribunal may hold its: sittings at such places within its territorial jurisdiction as the Chairperson may decide.

No act or proceeding of an Environmental Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution of the Environmental Tribunal.

The terms and conditions of service of the Chairperson and members of the Environmental Tribunal shall be such as may be prescribed.

21. Jurisdiction and powers of Environmental Tribunal

1. An Environmental Tribunal shall exercise such powers and perform such functions as are or may be conferred upon or assigned to it by or under this Act, or the rules and regulations made thereunder.

2. All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

3. An Environmental Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by

   a). the Federal Agency or any Government agency or local council ; and

   b). Any aggrieved person, who has given notice of not less than thirty days to the Federal Agency or the Provincial Agency concerned of the alleged contravention and of his intention to make a complaint to the Environmental Tribunal.

4. In exercise of its criminal jurisdiction, the Environmental Tribunal shall have the same powers as are vested in the Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).

5. In exercise of the appellate jurisdiction under section 22 the Environmental Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

6. In all matters with respect to which no procedure has been provided for in this Ordinance, the Environmental Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

7. An Environmental Tribunal may, on application filed by any officer duly authorised in this behalf by the Director-General of the Federal Agency or Provincial Agency, issue bailable warrant for the arrest of any person against whom reasonable suspicion exists of his having been involved in contravention punishable under subsection (l)of section 17:

   Provided that such warrant shall be applied for issued and executed in accordance with the provisions of the Code of Criminal Procedure 1 898 (Act V of 1898):

   Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant, he shall be released from custody, failing which he shall be taken or sent without delay to the officer-in-charge of the nearest police station.

8. All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Pakistan Penal Code (Act XLV of 1860) and the Environmental Tribunal shall be deemed to be a court for the purposes of sections 480 and 482 of the code of Criminal procedure, 1898 (Act V of 1898).

9. No court other than an Environmental Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act or the rules and regulations made thereunder.

Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant it may by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

22. Appeals to the Environmental Tribunal

Any person aggrieved by any order or direction of the Federal Agency or any Provincial Agency under any provision of this Act and rules or regulations made thereunder may prefer an appeal with the Environmental Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

An appeal to the Environmental Tribunal shall be, in such form, contain such particulars and' be accompanied by such fees as may be prescribed.

23. Appeals from orders of the Environmental Tribunal

Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of

communication of such order or sentence, prefer an appeal to the High Court.

An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24. Jurisdiction of Environmental Magistrates

1. Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contraventions punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial. Magistrate or the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

2. An Environmental Magistrate shall be competent to impose any punishment specified in sub-section (2) and (4) of section 17.

3. An Environmental Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by

a. the Federal Agency, Provincial Agency, or Government Agency or local council; and
b. any aggrieved person.

25. Appeals from orders of Environment Magistrate

Any person convicted of any contravention of this Act or the rules or regulations by an Environment Magistrate may, within thirty days from the date of his conviction appeal to the Court of Sessions, whose decision thereon shall be final.

26. Power to delegate

1. The Federal Government may, by notification in the official Gazette, delegate any of its or of the Federal Agency's powers and functions under this Act and the rules and regulations made thereunder to any Provincial Government, any Government Agency, local council or local authority.

2. The Provincial Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency's powers or functions under this Act and the rules and regulations made thereunder to any Government Agency of such Provincial Government or any local council or local authority in the Province.

27. Power to give directions

In the performance of their functions under this Act the Federal Agency and Provincial Agencies shall be bound by the directions given to them in writing by the Federal Government ; and

A Provincial Agency shall be bound by the directions given to it in writing by the Provincial Government.

28. Indemnity

No suit, prosecution or other legal proceedings shall lie against the Federal or Provincial Government, the Council, the Federal Agency or Provincial Agencies, the Director-Generals of the Federal Agency and the Provincial Agency, members, officers, employees, experts, advisors, committees or consultants of the Federal or Provincial Agencies or the Environmental Tribunal or Environmental Magistrates or any other person for anything which is in good faith done or intended to be done under this Act or the rules or regulations made thereunder.

29. Dues recoverable as arrears of laud revenue

Any dues recoverable by the Federal Agency or Provincial Agency under this Act or the rules or regulations made thereunder shall be recoverable as arrears of land revenue.

30. Act to override other laws

The provisions of this Act shall have, effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force.

31. Power to make rules

The Federal Government may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules for implementing the provisions of the international environmental agreements specified in the Schedule to this Act.

32. Power to amend the Schedule

The Federal Government, may by notification in the official Gazette, amend the Schedule so as to add any entry thereto or modify or omit any entry therein.

33. Power to make regulations

1. For carrying out the purposes of this Act, the Federal Agency may, by notification in the official Gazette and with the approval of the Federal Government, make regulations not inconsistent with the provisions of this Act or the rules made thereunder.

2. In particular and without prejudice to the generality of the foregoing power, such regulations may provide for

a). submission of periodical reports, data or information by any Government agency, local authority or local council in respect or environmental matters;

b). preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities

c). appointment of officers, advisors, experts, consultants and employees

d). levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented

e). monitoring and measurement of discharges and emissions;

f). categorization of projects to which, and the manner in which, section 12 applies

g). laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filing, review and approval

h). providing procedures for handling hazardous substances; and

i). Installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34. Repeal, savings and succession

The Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983) is hereby repealed.

Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983), any rules or regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act, be deemed to have been made, passed, issued delegated , entered into, commenced, acquired, incurred, levied, done or taken under this Act.

On the establishment of the Federal Agency and Provincial Agencies under this Act, all properties, assets and liabilities pertaining to the Federal Agency and Provincial Agencies established under that Ordinance shall vest in and be the properties, assets and liabilities, as the case may be, of the Federal Agency and Provincial Agency established under this Act.

SCHEDULE

(See section 31)

a. International Plant protection Convention, Rome, 1951.
b. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome, 1956.
c. Agreement for the Establishment of a commission for Controlling the Desert Locust in the Eastern Region of its Distribution Area in South-West Asia (as amended), Rome, 1963.
d. Convention on Wetlands of International Importance Especially as Waterfowl Habitat, Ramsar, 1971 and its amending Protocol, Paris, 1982.
e. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), Paris, 1972
f. Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Washington, 1973.
g. Convention on the Conservation of Migratory Species of Wild Animals. Bonn, 1979.
h. Convention on the Law of the Sea, Montego Bay, 1982.
i. Vienna Convention for the Protection of the Ozone Layer Vienna, 1985.
j. Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, 1987 and amendments thereto.
k. Agreement on the Network of Aquaculture Centres in Asia and the Pacific Bangkok, 1988.
l. Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal, Basel, 1989.
m. Convention on Biological Diversity, Rio De Janiero, 1992.
n. United Nations Framework Convention on Climate Change, Rio De Janiero, 1992.

Appendix-B.1

THE GAZETTE OF PAKISTAN
EXTRAORDINARY
PUBLISHED BY AUTHORITY
ISLAMABAD, SUNDAY, AUGUST 29, 1993
PART 11
Statutory Notifications (S.R.O.)
GQVERNMENT OF PAKISTAN
ENVIRONMENT AND URBAN AFFAIRS DIVISION
(Pakistan Environmental Protection Agency)

NOTIFICATION

Islamabad, the 24th August 1993

S.R.O.742(I)/93 In pursuance of the power conferred by clause (d) of section of the Pakistan Environmental Protection Ordinance, 1983 (XXXVII of 1983), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, hereby established the National Environmental Quality Standards as contained in the Annexes to this notification.

2. These National Environmental Quality Standards relating to municipal and liquid industrial effluents (Annex I), industrial gaseous emissions (Annex II) and motor vehicle exhaust and noise (Annex III), shall come into force with immediate effect, except in the case of industrial units to which the following schedule shall apply.

Existing industrial units i.e. those units already in production 01 July, 1996

New industrial units i.e. those units that will come into production on or after 30th June, 1994 - 01 July, 1994.

Appendix-B.2

NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (mg/L, unless otherwise defined)

S.NO Parameters	Standards
Temperature	40° C
pH Value (acidity/basicity)	6-10 pH
5-days Biochemical Oxygen Demand (BOD) at 20o	80 mg/L
Chemical Oxygen Demand (COD)	150 mg/L
Total suspended solids	150 mg/L
Total dissolved solids	3500 mg/L
Grease and oil	10 mg/L
Phenolic compounds (as phenol)	0.1 mg/L
Chloride (as CI)	1000 mg/L
Flouride (as F)	20 mg/L
Cyanide (as CN)	2 mg/L
An-ionic detergents2 (as MABAS)3	20 mg/L
Sulphate (SO4)	600 mg/L
Sulphide (S)	1.0 mg/L
Ammonia (NH3).	40 mg/L
Pesticides, herbicides, fungicides and insecticides	0.15 mg/L
Cadimium4	0.1 mg/L
Chromium4 (trivalent and hoxvalent)	1.0 mg/L
Copper4	1.0 mg/L
Lead4	0.5 mg/L
Mercury4	0.01 mg/L
Selenium4	0.5 mg/L
Nicklel4	1.0 mg/L
Silver4	1.0 mg/L
Total Toxic metals	2.0 mg/L
Zinc	5.0 mg/L
Arsenic	1.0 mg/L
Barium	1.5 mg/L
Iron	2.0 mg/L
Manganese	1.5 mg/L
Boron	6.0 mg/L
Chlorine	1.0 mg/L

Explanations:

1. Assuming minimum dilution 1:10 on discharge. Lower rations would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency.
2. Assuming surfactant as bio-degradable.
3. MBAS means Modified Benzene Alkyl Sulphates.
4. Subject to total toxic metals discharge as at S.NO. 25

NATIONAL ENVIRONMENTAL QUALITY STANDARDS FOR INDUSTRIAL GAS EOUS EMISSIONS (mg/Nm^3, UNLESS OTLIIERWISE DEFINED)

S.NO	Parameter Standards	Source of emission	
1	2	3	4
1	Smoke	Smoke opacity not to exceed:- (Ringlemann Scale)	40% or 2
2	Particulate	Boilers and furnaces:	
	1. Using Oil		300
	2. Using Coal		500
	3. Cement Kilns		200

Appendix-B.3

NATIONAL ENVIRONMENTAL QUALITY STANDARDS

S. R. O. 742 (I)/93.--In pursuance of the powers conferred by clause (d) of section 6 of the Pakistan Environmental Protection Agency Ordinance. 1983 (XXXVII of 1983), the Pakistan Environmental Protection Agency. With the prior approval of the Pakistan Environmental Protection Council, hereby establishes the National Environmental Quality Standards as contained in the Annexes to this notification.

2. These National Environmental Quality Standards relating to municipal and liquid industrial effluents(Annex I), industrial gaseous emissions (Annex II) and motor vehicle exhaust and noise (Annex III), shall come into force with immediate effect, except in the case of industrial units to which the following schedule shall apply:

Existing industrial units i.e. those units already in production _____ 01 July, 1996

New industrial units i.e. those units that will come into production on or after 30th June, 1994 _____ 01 July, 1994

National Environmental Quality Standards for Municipal and Liquid Industrial Effluents (mg/L, Unless Otherwise Defined)

S.No	Parameter	Standards
1.	Temperature	40°C
2.	pH value (acidity/ basicity)	6-10 pH
3.	5-days Biochemical Oxygen Demand (BOD) at 20°C	80 mg/l.
4.	Chemical Oxygen Demand (COD)	150 mg/l.
5.	Total suspended solids	150 mg/l.
6.	Total dissolved solids	3500 mg/l.
7.	Grease and oil	10 mg/l.
8.	Phenolic compounds (as phenol)	0.1 mg/l.
9.	Chloride (as Cl)	1000 mg/l.
10.	Fluoride (as F)	20 mg/l.
11.	Cyanide (as CN)	2 mg/l.
12.	An-ionic detergents [2](as MBAS)[3]	20 mg/l.
13.	Sulphate (SO_4)	600 mg/l.
14.	Sulphide (S)	1.0 mg/l.
15.	Ammonia (NH_3)	40 mg/l.
16.	Pesticides, herbicides, fungicides and insecticides	0.15 mg/l.
17.	Cadmium[4]	0.1 mg/l.
18.	Chromium[4] (trivalent and hexavalent).	1.0 mg/l.
19.	Copper[4]	1.0 mg/l.
20.	Lead[4]	0.5 mg/l.
21.	Murcuy[4]	0.01 mg/l.
22.	Selenium[4]	0.5 mg/l.
23.	Nickel[4]	1.0 mg/l.
24.	Silver[4]	1.0 mg/l.
25.	Total toxic metals	2.0 mg/l.
26.	Zinc	5.0 mg/l.
27.	Arsenic	1.0 mg/l.
28.	Barium	1.5 mg/l.
29.	Iron	2.0 mg/l.
30.	Manganese	1.5 mg/l.
31.	Boron	6.0 mg/l.
32.	Chlorine	1.0 mg/l.

Explanations :

1 Assuming minimum dilution 1 : 10 on discharge. Lower ratios would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency.
2 Assuming surfactant as bio-degradable.
3 MBAS means Modified Benzene Alkyl Sulphates.
4 Subject to total toxic metals discharge as at S . No. 25.

Annexure-II

National Environmental Quality Standards for Industrial Gaseous Emissions (mg/Nm3, Unless Otherwise Defined)

S.No.	Parameter	Source of emission	Standards
1.	Smoke	Smoke opacity not to exceed:-	40% or 2 (Ringlemann Scale).
2.	Particulate matter.[1]	Boilers and furnaces:	
		(I) Using Oil.	300
		(ii) Using Coal.	500
		(iii) Cement Kilns.	200
		Grinding, crushing, clinker coolers and related processes, metallurgical processes, convertors, blast furnaces and cupolas.	500
3.	Hydrogen Chloride	Any.	400
4.	Chlorine	Any.	150
5.	Hydrogen Fluoride	Any.	150
6.	Hydrogen Sulphide	Any.	10
7.	Sulphur Oxides	Sulfuric Acid Plants. Others.	400 400
8.	Carbon Monoxide	Any.	800
9.	Lead	Any.	50
10.	Mercury	Any.	10
11.	Cadmium	Any.	20
12.	Arsenic	Any.	20
13.	Copper	Any.	50
14.	Antimony	Any.	20
15.	Zinc	Any.	200
16.	Oxides of Nitrogen (NOx)	(i) Any Nitric Acid manufacturing unit. (Ii) other sources	400 400

Explanations :

Based on the assumption that the size of the particles is 10 microns or more.

Annexure-III

National Environmental Quality Standards for Motor Vehicle Exhaust and Noise

S.No	Parameter	Standards (maximum permissible limit)	Measuring method
1.	Smoke	40% or 2 on the Ringlemann Scale during engine acceleration mode.	To be compared with Ringlemann Chart at a distance of 6 meters or more.
2.	Carbon Monoxide.	Emission Standards : New Vehicles. 4.5 % Used Vehicles. 6 %	Under idling conditions: Non dispersive infrared detection through gas analyzer.
3.	Noise.	85 db (A).	Sound-meter at 7.5 meters from the source.

Source:
The content of this document has been taken from:
The Gazette of Pakistan, Extraordinary, Published By Authority, Islamabad, Sunday, August 29, 1993, Part II, Statutory Notification (S. R. O.), Government of Pakistan; Environmental and Urban Affairs Division (Pakistan Environmental Protection Agency);
Notifications; *Islamabad, The 24th August, 1993*

REVISED NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS)

Background

- PEPC in its first meeting held on 10th May 1993 approved the NEQS.
- The approved NEQS were uniform standards applicable to all kind of industrial and municipal effluent.
- There are 32 parameters prescribing permissible levels of pollutants in liquid effluent while 16 parameters for gaseous emission.
- In April 1996, the PEPC set up an Environmental Standards Committee (ESC) headed by Mr. Shams Kasim Lakha to review, inter alia, the NEQS and suggest changes where necessary, based on conditions in Pakistan.
- The committee realized that some of the parameters were more stringent than other countries of the region, so the task of the rationalization of NEQS was referred to an Expert Advisory committee to review and suggest changes, if and where required.
- Before initiating the task, the Expert Committee was expanded to include representatives of trade and industry.
- The Expert Committee identified ten parameters – eight (8) liquid effluent viz. BOD; COD; TDS; Chloride; Sulphide; Chromium; Ammonia; and Temperature, and two (2) gaseous emissions viz. SO2 (Sulphur di oxide) and Oxides of Nitrogen for review.
- After consultation with various organizations the NEQS Expert Advisory Committee completed its task and proposed it to the ESC.
- Finally after the Environmental Standards Committee endorsed the proposed revised NEQS, the Pakistan Environmental Protection Council was recommended to approve the revised draft NEQS.
- In December 28, 1999. PEPC approved the revised NEQS.

National Environmental Quality Standards for Municipal and Liquid Industrial Effluents (mg/L, Unless Otherwise Defined)

S.No	Parameter	Existing Standards	Revised Standards		
			Into Inland Water	Into Sewage Treatment[5]	Into Sea[6]
1.	Temperature or Temperature increase*	40°C	=<3 °C	=< 3 ° C	=<3 °C
2.	pH value	6-10 pH	6 - 9	6 - 9	6 - 9
3.	5-days Biochemical Oxygen Demand (BOD_1) at 20°C[1]	80 mg/l.	80	250	80**
4.	Chemical Oxygen Demand (COD)[1]	150 mg/l.	150	400	400
5.	Total suspended solids	150 mg/l.	200	400	200
6.	Total dissolved solids	3500 mg/l.	3500	3500	3500
7.	Grease and oil	10 mg/l.	10	10	10
8.	Phenolic compounds (as phenol)	0.1 mg/l.	0.1	0.3	0.3
9.	Chloride (as Cl)	1000 mg/l.	1000	1000	SC
10.	Fluoride (as F)	20 mg/l.	10	10	10
11.	Cyanide (as CN) total	2 mg/l.	1.0	1.0	1.0
12.	An-ionic detergents[2] (as MBAS)	20 mg/l.	20	20	20
13.	Sulphate (SO_4)	600 mg/l.	600	1000	SC
14.	Sulphide (S)	1.0 mg/l.	1.0	1.0	1.0
15.	Ammonia (NH_3)	40 mg/l.	40	40	40
16.	Pesticides, herbicides, fungicides and insecticides[3]	0.15 mg/l.	0.15	0.15	0.15
17.	Cadmium[4]	0.1 mg/l.	0.1	0.1	0.1
18.	Chromium[4] (trivalent and hexavalent).	1.0 mg/l.	1.0	1.0	1.0
19.	Copper[4]	1.0 mg/l.	1.0	1.0	1.0
20.	Lead[4]	0.5 mg/l.	0.5	0.5	0.5
21.	Mercuy[4]	0.01 mg/l.	0.01	0.01	0.01
22.	Selenium[4]	0.5 mg/l.	0.5	0.5	0.5
23.	Nickel[4]	1.0 mg/l.	1.0	1.0	1.0
24.	Silver[4]	1.0 mg/l.	1.0	1.0	1.0
25.	Total toxic metals	2.0 mg/l.	2.0	2.0	2.0
26.	Zinc	5.0 mg/l.	5.0	5.0	5.0
27.	Arsenic	1.0 mg/l.	1.0	1.0	1.0
28.	Barium	1.5 mg/l.	1.5	1.5	1.5
29.	Iron	2.0 mg/l.	8.0	8.0	8.0
30.	Manganese	1.5 mg/l.	1.5	1.5	1.5
31.	Boron	6.0 mg/l.	6.0	6.0	6.0
32.	Chlorine	1.0 mg/l.	1.0	1.0	1.0

Explanations:

1. Summing minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1:10 dilution means for example, that for each one cubic meter of treated effluent the recipient water body should have 10 cubic meter of water for dilution of this effluent.
2. Modified Benzene Alkyl Sulphate; assuming surfactant as bio-degradable.
3. Pesticides herbicides, fungicides, and insecticides.
4. Subject to total toxic metal discharge as at S. No.25
5. Applicable only when and where sewage treatment is operational and BOD5=80 mg/l. is achieved by the sewer treatment system.
6. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries

* The effluent should not result in temperature increase of more than 3C at the edge of the zone where initial mixing and dilution take place in the receiving water body. In case zone is not defined, use 100 meters from the point of discharge.

** The value for industry is 200 mg/l.

Note: Dilution of gaseous emissions and liquid effluents to bring them to the NEQS limiting value is not permissible through excess air mixing blowing in to the gaseous emissions or through fresh water mixing with the effluent before discharge into environment.

National Environmental Quality Standards for Industrial Gaseous Emissions (mg/Nm3, Unless Otherwise Defined)

S.No.	Parameter	Source of emission	Standards	Revised Standards
1.	Smoke	Smoke opacity not to exceed:-	40% or 2 (Ringlemann Scale).	40% or 2 Ringlemann Scale or equivalent smoke number
2.	Particulate Matter[1]	(a) Boilers and furnaces:		
		(I) Oil fired.	300	300
		(ii) Coal fired.	500	500
		(iii) Cement Kilns.	200	300
		(b) Grinding, crushing, clinker coolers and related processes, metallurgical processes, convertors, blast furnaces and cupolas.	500	500
3.	Hydrogen Chloride[2]	Any.	400	400
4.	Chlorine[2]	Any.	150	150
5.	Hydrogen Fluoride[2]	Any.	150	150
6.	Hydrogen Sulphide[2]	Any.	10	10
7.	Sulphur Oxides	Sulfuric Acid / Sulfuric Acid Plants. Others Plants. [3]	400 400	5000 1700
8.	Carbon Monoxide[4]	Any.	800	800
9.	Lead [2]	Any.	50	50
10.	Mercury [2]	Any.	10	10
11.	Cadmium [2]	Any.	20	20
12.	Arsenic [2]	Any.	20	20
13.	Copper [2]	Any.	50	50
14.	Antimony [2]	Any.	20	20
15.	Zinc [2]	Any.	200	200
16.	Oxides of Nitrogen (NOx) [4]	(i) Nitric Acid manufacturing unit. (ii) Gas fired (iii) Oil fired (iv) Coal fired	400 400 - -	3000 400 600 1200

Explanations :
1. Based on the assumption that the size of the particles is 10 microns or more.
2. Any source.
3. Based on 1% sulphure content in fuel oil. Higher content of sulphure will cause standards to be pro-rated.
4. In respect of emissions of sulphure dioxide and nitrogen oxides, the power plants operating on oil or coal as fuel shall, in addition to National Environmental Quality Standards (NEQS) specified above, comply with the following standards.

Sulphur Dioxide

Sulphur Dioxide Background Levels (ug/m3)			Standards	
			Criterion I	Criterion II
Background Air Quality	Annual Average	Max. 24 hours	Max. SO_2 Emission	Max. allowable ground level
($S0^2$ Basis)		Interval	(Tons per day per Plant)	Increment to ambient (ug//m^3) (One year average)
Unpolluted	< 50	< 200	500	50
Moderately Polluted *				
Low	50	200	500	50
High	100	400	100	10
Very Polluted **	> 100	> 400	100	10

* For intermediate values between 50 and 100 ug/m3 linear interpolations should be used.
** No project with sulphure dioxide emissions will be recommended.

Nitrogen Oxide

Annual Arithmetic Mean	100 ug/m3 (0.05 ppm)

Emission levels for stationary sources discharges, before mixing with the atmosphere, should be maintained as follows:-

For fuel fired steam generations, as nanogram (10E-9 gram) per joule of heat input:

Liquid fossil fuel	130
Solid fossil fuel	300
Lignite fossil fuel	260

National Environmental Quality Standards for Motor Vehicle Exhaust and Noise S.No Parameter Standards (maximum permissible limit)

S.No	Parameter	Standards (maximum permissible limit)	Measuring method
1.	Smoke	40% or 2 on the Ringlemann Scale or equivalent smoke number at end of exhaust pipe during engine acceleration mode.	To be compared with Ringlemann Chart at a distance of 6 meters or more.
2.	Carbon Monoxide.	Emission Standards : New Vehicles. 4.5 % Used* Vehicles. 6 %	Under idling conditions. Non dispersive infrared detection through gas analyzer.
3.	Noise.	85 db (A).	Sound-meter at 7.5 meters from the source.

* 10 year or older model.

Appendix-B.5

PART II

Statutory Notifications (S. R. O.)
GOVERNMENT OF PAKISTAN
MINISTRY OF ENVIRONMENT LOCAL GOVERNMENT AND RURAL DEVELOPMENT
NOTIFICATION
Islamabad, the 13th June, 2000

S.R.O. 339 (I)/2000. In exercise of the powers conferred by section 33 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the approval of the Federal Government, is pleased to make the following regulations, namely

1. Short title and commencement

These regulations may be called the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000.

They shall come into force at once.

2. Definitions.

1. In these regulations, unless there is anything repugnant in the subject or context

   a). "Act" means the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997)
   b). " Director General " means the Director General of the Federal Agency
   c). "EIA " means an environmental impact assessment as defined in clause (xi) section 2 of the Act, 1997
   d). "IEE" means an initial environmental examination as defined in clause (xxiv) section 2 of the Act, 1997
   e). " Schedule " means a schedule to these regulations ; and
   f). "Section" means a section of the Act, 1997.

2. All other wards and expressions used in these regulations but Rot defined herein shall have the same meaning as are assigned to them in the Act.

3. Projects requiring and IEE

A proponent of a project falling in any category specified in Schedule I shall file an IEE with the Federal Agency, and the provisions of section 12 shall apply to such project.

4. Projects requiring an EIA

A proponent of a project falling in any category specified in Schedule 1I shall file an EIA with the Federal Agency and the provisions of section 12 of the Act shall apply to such project.

5. Other projects requiting an IEE or EIA

1. In addition to any category specified in Schedules 1 and 11, a proponent of any of the following projects shall file an EIA, if the project is likely to cause an adverse environmental effect or for projects not specified in Schedules I and 11 but in respect of which the Federal Agency has issued guidelines for construction and operation an application for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be fully complied with.

2. Subject to regulation 3, the Federal Agency may direct the proponent of a project, whether or not listed in Schedule I or II, to file an IEE or EIA, for reasons to be recorded in such direction.

3. No direction under sub-regulation (2) shall be issued without the recommendation, in writing of environmental Assessment Advisory Committee constituted under regulation 23.

4. The provisions of section 12 shall apply to project in respect of which an IEE or EIA is filed under sub-regulation (1) or (2).

6. Preparation of IEE and EIA

1. The Federal Agency may issue guidelines for preparation of an IEE or EIA including guidelines of general applicability and sectoral guidelines indicating specific assessment requirements for planning construction and operation of projects relating to a particular sector.

2. Where guidelines have been issued under sub-regulation (1) an IEE or EIA shall be prepared, to the extent practicable, in accordance therewith and the proposed shall justify in the IEE or, as the case may be, EIA and departure therefrom.

7. Review of fees

The proponent shall pay, at the time of submission of an IEE or EIA, a non-refundable review fee to the Federal Agency, in accordance with rates specified in Schedule III.

8. Filling of IEE and EIA

Ten paper copies and two electronic copies of an IEE or EIA shall be filed With the Federal Agency.

Every IEE and EIA shall be accompanied by.

An application, in the form set out in Schedule IV; and
Copy of receipt showing payment of the review fee.

9. Preliminary security

Within ten working days of filing of the IEE or EIA, the Federal Agency shall confirm that the IEE or EIA is complete for purposes of initiation of the review process require the proponent to submit such additional information as may be specified; or return the IEE or EIA to the proponent for revision, clearly listing the points requiring further study and discussion.

Notwithstanding anything contained in sub-regulation (1) the Federal Agency may require the proponent to submit additional information at any stage during the review process.

10. Public participation

In the case of an EIA, the Federal Agency shall, simultaneously with issue of confirmation of completeness under clause (a) of sub-regulation (1) of regulation 9, cause to be published, in any English or Urdu national newspaper, a public notice mentioning therein the type of project, its exact location, the name and address of the proponent and the places at which the EIA of the project can, subject to the restrictions specified in sub-section (3) of section 12, be accessed.

The notice issued under sub-regulation (1) shall fix a date, time and place for public hearing of any comments on the project or its EIA.

The date fixed under sub-regulation (2) shall not be earlier than thirty days from the date of publication of the notice.

The Federal Agency shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.

All comments received by the Federal Agency from the public or any concerned Government Agency shall be collated, tabulated and duly considered by it before its decision on the EIA.

The Federal Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

11. Review

The Federal Agency shall make every effort to carry out its review of the IEE within forty-five days, and of the EIA within ninety days, of issue of confirmation of completeness under clause (a) of sub-regulation (I) of regulation 9

In reviewing the IEE or EIA, the Federal Agency shall consult such Committee of Experts as may be constituted for the purpose by the Director-General, and may also solicit .views of the concerned Advisory Committee, if any, constituted by the Federal Government under sub-section (6) of section 5.

The Director-General may, where he considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified by him.

The review of the IEE or EIA by the Federal Agency shall be based on quantitative and qualitative assessment of the and data furnished by the proponent, comments from the public and the concerned Government agencies received under regulation 10, and views of the committees mentioned in sub-regulations (2) and (3).

12. Decision

On completion of the review, the decision of the Federal Agency shall be communicated to the proponent in the form set out in Schedule V in the case of an IEE, and in the form set out in Schedule VI in the case of an EIA.

13. Conditions of approval

Every approval of an IEE or EIA shall, in addition to such conditions as may be imposed by the Federal Agency, be subject to the condition that the project shall by designed and constructed, and mitigatory and other measures adopted, strictly in accordance with the IEE or, as time case may be, EIA, unless any variation thereto have been specified in the approval by the Federal Agency.

Where the Federal Agency accords its approval subject to certain conditions, the proponent shall before commencing construction of the project, acknowledge acceptance of the stipulated conditions by executing an undertaking in the form set out in Schedule VII ; and

Before commencing operation of the project, obtain from the Federal Agency a written confirmation of compliance that the conditions of the approval, and the requirements given in the IEE or EIA relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

14. Confirmation of compliance

1. The request for obtaining a written confirmation of compliance under clause (b) of sub-regulation (2) of regulation 13 shall be accompanied by an Environmental Management Plan - indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the life of the project, including provisions for monitoring reporting and auditing.

2. Where a request for confirmation of compliance is received from a proponent, the Federal Agency may carry out such inspection of the site and plant and machinery and seek such additional information from the proponent as it may deem fit.

3. The Federal Agency shall issue the written confirmation of compliance or otherwise within fifteen days of receipt of the request and such additional information, from the proponent as may be required under sub-regulation (2).

4. The Federal Agency may. while issuing the written confirmation of compliance, impose such other conditions as to the Environmental Management Plan, and the operation, maintenance and monitoring of the project as it may deem fit, and such conditions shall he deemed to be included in the conditions to which approval of the project is subject.

15. Extension in review period

Where the Federal Government in any particular case extends the period of four months for communication of its approval under sub-section (5) of section 12, it shall, in consultation with the Federal Agency, indicate the various steps of the review process to be taken during the extended period, and the estimated time required for each step.

16. Validity period of approval

1. The approval accorded by time Federal Agency under section 12 read with regulation 12 shall be valid for commencement of construction for a period of three years from the date of issue.

2. If construction is commenced during the initial three years validity period, the validity of the approval shall stand extended for a further period of three years from the expiry of period specified in sub-regulation (I).

3. After issue of confirmation of compliance, time approval shall he valid for a period of three years from the date thereof.

4. Subject to sub-regulation (5), the proponent may apply to the Federal Agency for extension in the validity periods mentioned in sub-regulations (1), (2) and (3), which may be granted by the Federal Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change.

5. For the purposes of sub-regulation (4), the Federal Agency may require the proponent to submit a fresh IEE or, as the case may be,

EIA, if in its opinion changes in location, design, construction and operation of the project so warrant.

17. Entry and inspection

1. For tile purposes of verification of any matter relating to the review or the conditions of approval of an IEE or EIA prior to, during or after tile commencement of construction or operation of a project, duly authorized stall of the Federal Agency may enter and inspect the project site, factory building and plant and equipment installed therein.

2. The proponent shah take steps to ensure full co-operation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Federal Agency for the purpose of such inspection and pursuant thereto.

18. Monitoring

After issue of aim approval, the proponent shall submit a report to the Federal Agency after completion of construction of the project

After issue of confirmation of compliance, the proponent shall submit an annual report summarizing operational performance of the project, with reference to the conditions of the approval and maintenance and mitigatory measures adopted for the project.

To enable the Federal Agency to effectively monitor compliance with the conditions of the approval, the proponent shall furnish such additional information as the Federal Agency may require.

19. Cancellation of approval

In case, at any time, on the basis of information or report received or inspection carried out, the Federal Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved IEE or EIA is incorrect if shall issue notice to the proponent to show cause, within two weeks of receipt thereof as to why the approval should not be cancelled.

In case no reply is received, or the reply is considered unsatisfactory, the Federal Agency may, after giving the proponent an opportunity of being heard

Require the proponent to take such measures and to comply with such conditions within such, period as if may specify, failing which the approval shall stand cancelled or

Cancel the approval

On cancellation of time approval, the proponent shall cease construction or operation of the project forthwith.

Any action taken under this regulation shall be without prejudice to any other action that may be taken against the proponent under the Act, rules, regulations or any other law for the time being in force.

20. Registers for IEE and EIA projects

Separate Registers shall be maintained by the Federal Agency for IEE and EIA projects under sub-section (7) of section 12 in the form set out in Schedule VIII.

21. Environmentally sensitive areas

The Federal Agency may, by notification in the Official Gazette, designate an area to be an environmentally sensitive area.

Notwithstanding anything contained in regulations 3 arid 4, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Federal Agency.

The Federal Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessment process to plan and prepare projects located in environmentally sensitive areas.

Where guidelines have been issued under sub-regulation (3), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure there from justified in the EIA pertaining to the project.

22. Environmental Assessment Advisory Committee

For the purposes of rendering advice on all aspects of environmental assessment including guidelines, procedures and categorization of projects, the Director General shall constitute and environmental assessment Advisory Committee consisting of the following persons, namely

a. Director EIA. Federal Agency
   Chairman
b. One representative each of the Provincial Agencies
   Members
c. One representative each of the Federal Planning commission and the provincial planning and Development Departments
   Members

d. Four representatives one each of industry, non-Governmental, organizations, legal and other experts
Members

23. Other Approval

Issue of an approval under section 12 read with regulation 12 shall not absolve the proponent of the duty to obtain any other approval or consent that may be required under any law for the time being in force.

Appendix-B.6

SCHEDULE 1
(See regulation 3)

LIST OF PROJECTS REQUIR1NG AN IEE

A. Agriculture, livestock and fisheries, etc.

1. Poultry, livestock, stud and fish farms with total cost of more than ten million
2. Projects involving repacking, formulation or warehousing of agricultural produce

B. Energy

Hydroelectric power generation less than 50 MW.
Thermal power generation less than 200 MW.
Transmission lines less than 11 KV, and large distribution projects.
Oil and gas transmission systems.
Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
Waste-to-energy generation projects.

C. Manufacturing and processing

1. Ceramics and glass units with total cost of more than fifty million rupees.
2. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost of less than one hundred million rupees.
3. Man-made fibres and resin projects with total cost of less than one hundred million rupees.
4. Manufacturing of apparel including dyeing and printing, with total cost of more than twenty-five million rupees.
5. Wood products with total cost of more than twenty-five million rupees.

D. Mining and mineral processing

1. Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule II with total cost of less than one hundred million rupees.
2. Crushing, grinding and separation processes.
3. Smelting plants with total cost of less than fifty million rupees.

E. Transport

1 Federal or Provincial highways (except maintenance, rebuilding or reconstruction of existing metalled roads) with total cost of less than fifty million rupees.

2 Ports and harbor development for ships less than five hundred gross tons.

F. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than fifty million cubic meters or surface area less than eight square kilometres,
2. Irrigation and drainage projects serving less than fifteen thousand hectares.
3. Small scale irrigation systems with total cost less than fifty million rupees.

G. Water supply and treatment

Water supply schemes and treatment plants with total cost of less than twenty five million rupees.

H. Waste disposal

Waste disposal facility for domestic or industrial wastes, with annual capacity less than ten thousand cubic meters.

I. Urban development and tourism

1. Housing schemes.
2. Public facilities with significant off-site impacts e.g. hospital wastes.
3. Urban development projects.

J. Other Projects

Any other project for which filing of an IEE is required by the Federal Agency under sub-regulation (2) of regulation 5.

Appendix-B.7

SCHEDULE II
(See regulation 4)

LIST OF PROJECTS REQUIRING AN EIA

A. Energy

1. Hydroelectric power generation over fifty megawatts.
2. Thermal power generation over two hundred megawatts.
3. Transmission lines (eleven kilovolts and above) and grid stations.
4. Nuclear power plants.
5. Petroleum refineries.

B. Manufacturing and processing

1. Cement plants.
2. Chemical projects.
3. Fertilizer plants.
4. Food processing industries including sugar mills, beverages, milk and (jail-V products, with total cost of one hundred million rupees and above.
5. Industrial estates (including export processing zones).
6. Man-made fibres and resin projects with total cost of one hundred million rupees and above.
7. Pesticides (manufacture Or formulations)
8. Petrochemicals complex.
9. Synthetic resins, plastics and man-made fibres, paper and paperboard paper pulping, plastic products, textiles (except apparel) printing and publishing, paints and dyes, oils and fats and vegetable ghee projects with total cost more than ten million rupees
10. Tanning and leather finishing projects.

C. Mining and mineral processing

1. Mining and processing of coal, gold, copper, sulphur and precious stones.
2. Mining and processing of major non-ferrous metals, iron and steel rolling.
3. Smelting plants with total cost of fifty million rupees and above.

D. Transport

Airports.
Federal or Provincial highways or major roads (except maintenance, rebuilding or reconstruction of existing roads) with total cost (fifty million rupees and above.
Ports and harbor development for ships of five hundred gross tons and above.
Railway works.

E. Water management, dams, irrigation and flood protection

Dams and reservoirs with storage volume of fifty million cubic meters and above or surface area of eight square kilometres and above.

Irrigation and drainage projects serving fifteen thousand hectares and above.

F. Water supply and treatment

Water supply schemes and treatment plants with total cost twenty-five million rupees and above.

G. Waste Disposal

Waste disposal and storage of hazardous or toxic wastes including landfill sites and incineration of hospital toxic waste.
Waste disposal facilities for domestic or industrial wastes, with annual capacity more than ten thousand cubic meters.

H. Urban development and tourism

Land use studies and urban plans in large cities
Large-scale tourism development projects with total cost more than fifty million rupees.

I. Environmentally sensitive areas

All projects situated in environmentally sensitive areas.

J. Other projects

Any other project for which filing of an EIA is required by the Federal Agency under sub-regulation (2) of regulation 5.
Any other project likely to cause an adverse environmental effect.

Appendix-B.8

SCHEDULE III
(See regulation 7)

IEE/EIA REVIEW FEES

Total Project Cost	IEE	EIA
1	2	3
Up to Rs. 5,000,000	Nil	Nil
From Rs. 5,000,001 to 10,000,000	Rs. 10,000	Rs. 15,000
Greater than Rs. 10,000,000	Rs. 15,000	Rs. 30,000

Appendix-B.8

SCHEDULE IV
[See regulation 8 (2) (a)]

APPLICATION FORM

Name & address of proponent: Phone:

Description of Project: Fax:

Location of project Telex:

Objection of Project

IEE/EIA attached? IEE/EIA Yes/No

Have alternative sites been Considered and reported in the TEE/EIA? Yes/No

Existing land use Land requirement

Is basic site data available or has it been measured? (only tick yes if the Data is reported in the IEE/EIA

	Available
Measured	
Meteorology (including rainfall)	Yes/No Yes/No
Ambient air quality:	Yes/No Yes/No
Ambient water quality	Yes/No Yes/No
Ground water quality:	Yes/No Yes/No

Have estimates of the following been reported	Estimated	Reported
Water balance.	Yes/No	Yes/No
Solid waste disposal.	Yes/No	Yes/No
Liquid waste treatment.	Yes/No	Yes/No

Source of power: Power requirement

Labour force: Construction
operation
(number).

Verification. - I do solemnly affirm and declare that the information given above and contained in the attached IEE/EIA is true and corrected the best of my knowledge and belief.

Date. _____

Signature: _____
Name &
Designation of proponent: _____
Official stamp/seal: _____

Appendix-B.9

SCHEDULE V
(See regulation 12)

DECISION IEE

Name and address of proponent: _____
Description of project: _____
Location of project: _____
Date of filing of AEE: _____
After careful review of the IEE, the Federal Agency has decided

to accord its approval, subject to the following conditions
_____
_____
or
that the proponent should submit an EIA with the following reasons
_____
_____

[Delete (a) or (b), whichever is inapplicable]

Date: _____
Tracking No: _____

Direcror General
Federal Agency
(Official stamp/ Seal)

Appendix-B.10

SCHEDULE VI
(See regulation 12)

DECISION ON EIA

Name and address of proponent: _____
Description of project: _____
Location of project: _____
Date of filing of TEE
After careful review of the IEE, the Federal Agency has decided

to accord its approval, subject to the following conditions:

_____
_____
or

that the proponent should submit an EIA with the following modification

_____
_____
or

to reject the project, being contrary Io environmental objectives, for the following reasons

[Delete (a)/ (b)/(c) whichever is inapplicable

Date: _____
Tracking No: _____

Director General
Federal Agency
(Official stamp/ Seal)

Appendix-B.11

SCHEDULE VII
[See regulation 13(2)]

UNDERTAKING

I ……..…… (full name and address) as proponent for ……..(name description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions contained in the approval accorded by the Federal Agency bearing tracking no …… dated ……..., and undertake
to design, construct and operate the project strictly in accordance with the said conditions and the IEE/EIA.

Date: _____

Signature: _____

Name and Designation of proponent: _____

(Official stamp/seal): _____

Witnesses
(full names and addresses)

_____
_____

Appendix-B.12

SCHEDULE VIII
(See regulation 20)

FORM OF REGISTERS FOR IEE AND EIA PROJECTS

S. No.	Description	Relevant information
1	2	3

Tracking number.
Category type (as per Schedules I and II).
Name of proponent.
Name and designation of contact person
Name of consultant
Description of project.
Location of project.
Project capital cost.
Date of receipt of IEE/EIA.
Date of confirmation of completeness.
Approval granted (Yes/No).
Date of approval granted or refused.
Conditions of approval/reasons for refusal.
Date of Undertaking.
Date of extension of approval validity
Period of extension.
Date of commencement of construction.
Date of issue of confirmation of compliance.
Date of commencement of operations.
Dates of filing of monitoring reports.
Date, of cancellation, if applicable.

HAFIZ ABDULLAH AWAN
Deputy Secretary (A)