Appendix-6
Environmental Impact Assessment

Environmental Impact Assessment for Coal Transportation between Port Qasim Coal Unloading Terminal and Pakistan Railway Main Line

Hagler Bailly Pakistan (Pvt.) Ltd.

April 4, 2016

Draft Final (D6V03QRP)

Executive Summary

The Government of Pakistan (GoP) is planning to set up a 660 MW ultra-supercritical coal fired power plant at Lakhra to be financed by the Japan International Cooperation Agency (JICA) and other potential donors. JICA has commissioned the study "Preparatory Survey on Lakhra Coal Fired Thermal Power Plant Construction Project" (the "Lakhra Study") to support the construction of high efficiency, ultra-supercritical, Lakhra Coal Fired Thermal Power Plant (LCPP) of 600 megawatt (MW) net capacity at Lakhra in Jamshoro District of Sindh.

The LCPP project plans to import 2 million tons of coal annually at Pakistan International Bulk Terminal (PIBT) located at Port Qasim. The coal will be then transported to LCPP by the existing railway main line of Pakistan Railway (PR). The nearest railway station on the main line is the Bin Qasim Station located about 9 kilometer (km) from Port Qasim. In anticipation of the new imported coal-based power plants being developed in Jamshoro and in Punjab, PR is planning the improvements at Bin Qasim Station and of the spur line between Port Qasim and Bin Qasim Station. However, currently there is no infrastructure to transport coal between coal unloading terminals at PIBT and the Bin Qasim Station. In this regard, JICA has initiated a feasibility study through Nippon Koei Company (or JICA Study Team, JST) for development of coal transportation between PIBT and PR main line (the “Project”).

JST acquired the services of Hagler Bailly Pakistan (Pvt.) Limited for undertaking Environmental Impact Assessment (EIA) of the proposed Project. This report documents the EIA process and its results.

Project Location

The proposed Coal Transport Project is located in the North Western Industrial Zone (NWIZ) of Port Qasim (PQ) in Karachi (**Figure I**). The coal will be transported through a conveyor belt, with total length of 4–4.5 km and loaded onto the railway main line from the coal loading terminal as shown in **Figure II**. The coal loading terminal contains infrastructure such as unloading facilities, coal stockpiles and a coal loading facility for loading of coal onto trains as shown in **Figure III**.

Statement of Need

The proposed Coal Transport Project will play a lifeline role in the operation of proposed coal fired thermal power plants throughout the country. Annually, the conveyer belt is planned to handle 20.26 million tons of coal that will be supplied to 9 power plants across Sindh and Punjab that have a combined capacity of 6664 MW.

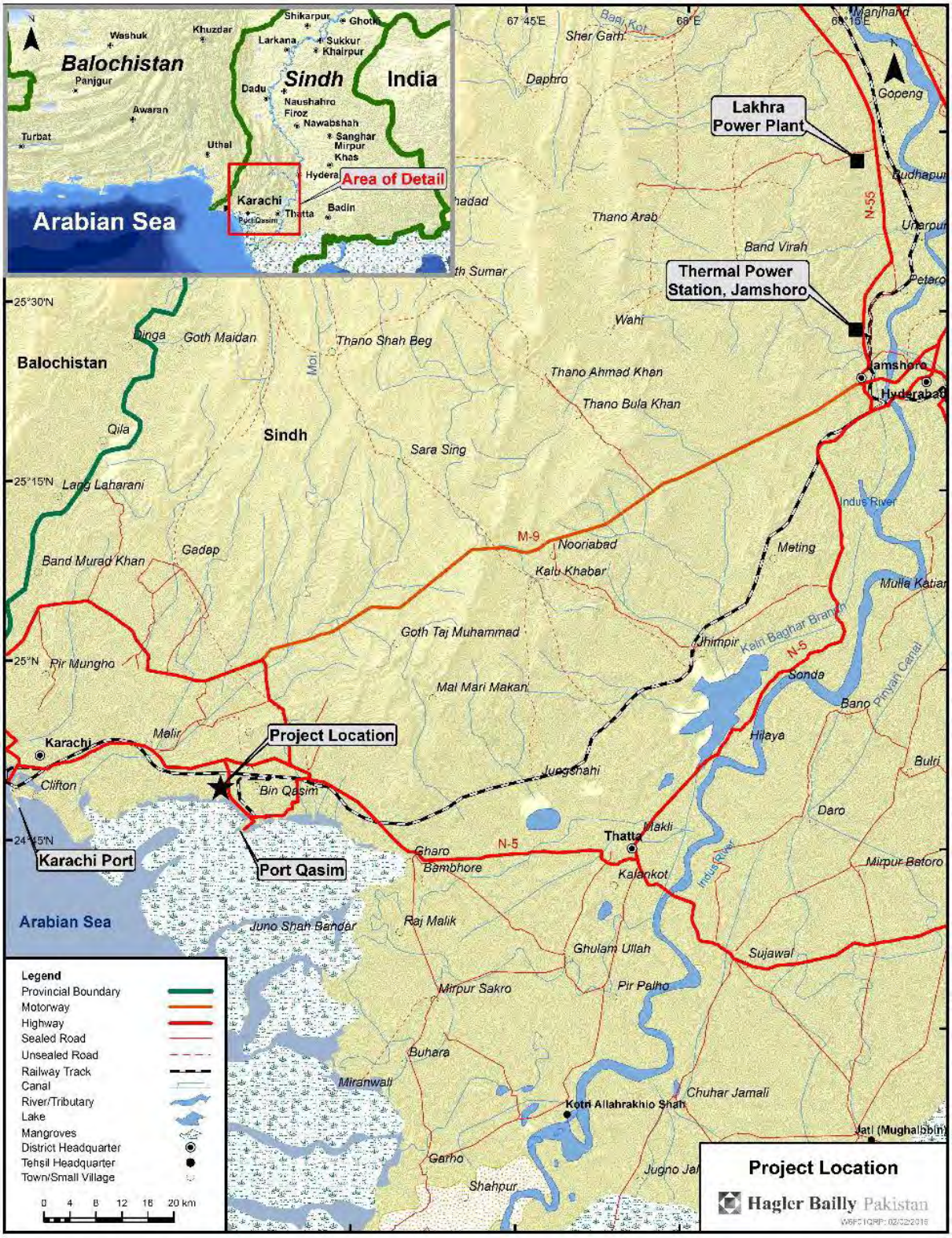


Figure I: Location of Proposed Project

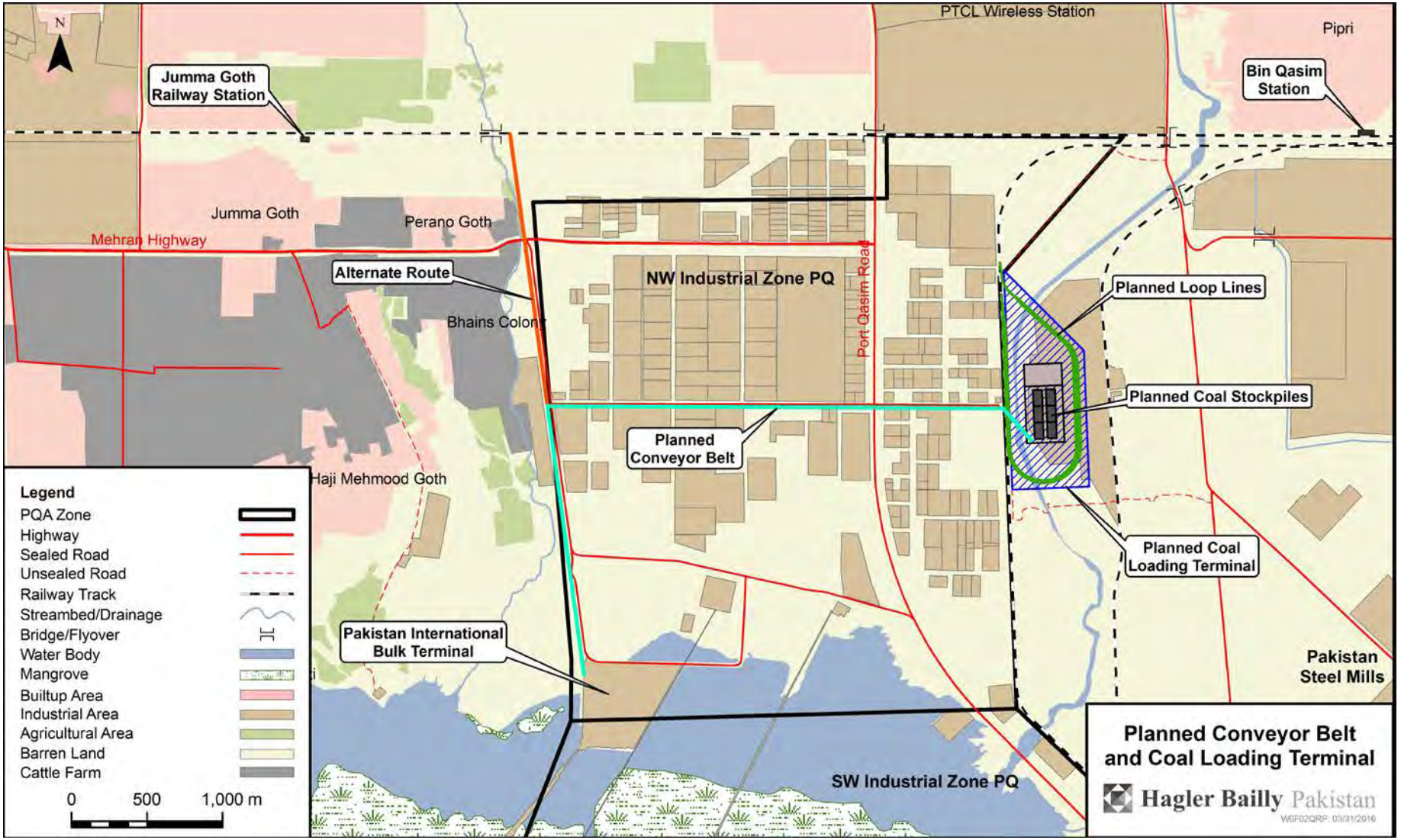


Figure II: Location of Proposed Project and Surroundings

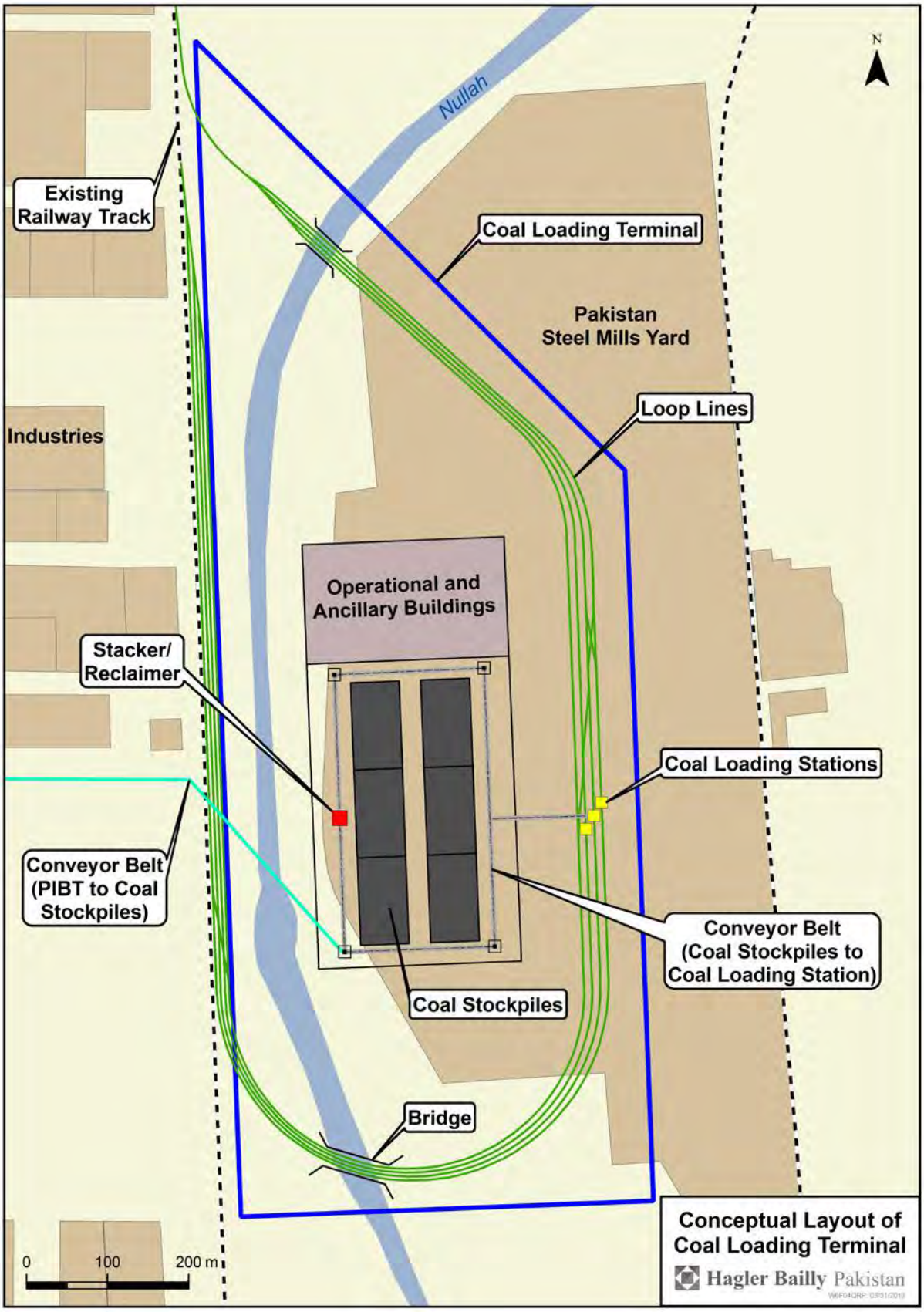


Figure III: Conceptual Layout of Project Infrastructure at the Coal Loading Terminal

Project Outline

Annually, the conveyer belt is expected to handle approximately 20 million tons of coal. Coal will be transported from PIBT via a conveyer belt. The conveyer belt will be constructed on the center meridian of existing roads. The conveyer belt will be 1.8 m wide and the covering enclosure will be 4 m wide. The required Right of Way (ROW) will be 10 m and height clearance will be 10 m. The conveyor belt will transport coal to a coal stockyard at the coal loading terminal for storage. A sprinkler system will be installed at the coal stockyard for coal dust suppression. The coal loading terminal will have coal stockpiles with a holding capacity of 55,000 tons of coal each. Each stockpile will have a height not more than 15 m. The total coal storage capacity of the completed coal stockyard will be 440,000 tons. Coal will be dumped onto the stockpiles using a stacker with a capacity of 3,600 tons per hour. For loading onto trains a combined stacker/reclaimer with a capacity of 2,400 tons per hour will reclaim coal from the stockyard and load it onto a second conveyer belt which will transport the coal to the loading facility. The loading facility will be located on the loop lines that will run around the coal stockyard.

A summary of the coal transport process that is included in the scope of this EIA is presented in **Figure V**I.

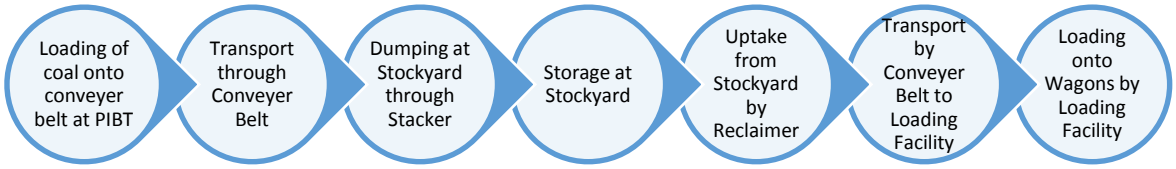


Figure VI: Summary of the Coal Transport Process

Description of the Environment

The existing physical, biological and socioeconomic conditions of the surrounding areas of the Project are described in the EIA report. For this, a study area of 500 meters around the Project footprint was delineated, to assess the baseline conditions in the areas likely to be affected by the Project due to its proximity to the Project site. This information was collected from field surveys, previous EIAs conducted in the Project area and other published literature.

Physical Environment

The regional climate, topography, geology, seismology, air quality, water resource, soils, noise, waste of the Study Area are described below.

Climate

The climate at Port Qasim is characterized as hot and dry during summer, and mild during winter with heavy, sporadic, rainfall during the monsoon. The southwest monsoon prevails from April to October in the Study Area. The monsoon is

characterized by a reversal in wind direction during the remaining months; and, heavy rainfall over most of the Indian Subcontinent.

Topography, Geology and Seismic Hazards

The topography is relatively gentle, increasing in elevation at approximately 10 meters per km towards the north of the Study Area. Elevation in the Study Area is between 5 meters and 35 meters above mean sea level.

The lithological units within the Study Area, and in the region, are shown in Figure 4.3. According to the Geological Map of Pakistan, the Study Area is uniformly Tpm (tertiary, Pliocene and Miocene) sedimentary rocks associated with the southern extension of the Kirthar Range. It is in Manchar formation, mostly Pliocene in age consisting of shale, sandstone and conglomerate with thickness up to 4500 feet.

Port Qasim is located adjacent to an active tectonic setting, and is approximately 190 km east of the triple continental junction between the Arabian, Eurasian and Indian plates.

Air Quality

Ambient air quality sampling was carried out on Jan 11- 12, 2016 and was supplemented from from previous EIAs.

The following conclusions can be drawn from the sampling results:

- All sampled points are within limits of the NEQS and SEQS guidelines for ambient air quality for all pollutants sampled. Average NO_2 and SO_2 concentrations are well below standards. However particulate matter readings (TSP, PM_{10} and $PM_{2.5}$) are elevated.
- The results are fairly homogenous across the Study Area reflecting similar air quality across the North Western Industrial Zone (NWIZ).

Water Resources

Major water bodies in the Study Area include two surface drains: the westward water channel or the Bhains Colony drain and the eastward water channel or the Steel Town drain. Groundwater is not major source of drinking water in the Study Area due to high amount of salinity in the groundwater. The quality of the water resources are briefly described below.Water was sampled from these two drains on January 13, 2016. The following conclusions can be drawn from the sampling results:

- Turbidity was very high in all samples
- Total suspended solids of the eastern channel were very high and are above the SEQS guidelines for liquid effluents. This is because of the direct discharge and lack of regulations on the cattle farms by which this channel passes.
- There was no major metal contamination (for metals tested) in the water for which there exist SEQS guidelines in the water channel near the proposed coal stockpile.

Soils

The soil map of Sindh[1] categorizes the area of the Project Site and its surrounding as mainly loamy part gravelly soil (camborthids and calciorthids with soam torrifluvents).

Two soil samples were tested from the Study Area. There are no national standard or international guidelines for screening of soil parameters. The tests are compared to the New York State Department of Environmental Conservation (NYS DEC) guidelines for soils. The key results are:

- Selenium levels were high in the soils in the area.
- No other metals were elevated above the NES-DEC standards.
- Both soil samples can be classified as sandy based on their particle size distribution.

Waste

It was observed that much solid waste was disposed on barren lands surrounding the industrial area. This included both industrial waste (such as used insulation, cloth and other materials) as well domestic waste. Burning seemed to be the common method of disposal. Dung from cattle farms is dumped onto roads and is picked up by trucks for use as manure. Liquid effluent from cattle farms is discharged into open drains which leads to surface water drains.

Noise

Sound level surveys were undertaken between Jan 11, and Jan 13 2016 to gauge the baseline noise levels of the area. As the area is a major industrial zone the sound levels were high due to the industrial and vehicular noise from large trucks. However, as the area is zoned as an industrial zone the sound levels were well below the standards.

Traffic

Traffic surveys were conducted between the 11th and 13th of January, 2016 at four locations. Most traffic was on the major roads with very less traffic near the proposed coal loading terminal location.

Ecology

Ecological surveys at selected sampling points within the Study Area were carried out on the 4th and 5th of January 2016. In addition to these surveys, literature reviews were carried out and information from the most recent past surveys was used. Members of the local community were also consulted regarding species observations. The results are presented below.

Habitat

A review of the Study Area using the latest ***Google Earth™*** Imagery shows that, based on differences in land use, the following classifications can be determined:

[1] Soil Map of Sind 1:1,000,000. Soil Survey of Pakistan, Lahore. 1978.

- Vegetation Cluster
- Built Up Area (Settlement)
- Industrial Area
- Barren Land (with cleared vegetation)
- Agricultural Land
- Water Channel
- Coastal Area

Flora

The vegetation is characteristics of xerophytic[2] plant communities. During the January 2016 survey a total of 8 plant species were observed in the terrestrial habitat. Two of these were observed in the limited aquatic bodies found within the terrestrial habitat.

Fauna

During the survey conducted in January 2016 evidence of Asiatic Jackal *Canis aureus* and Indian Hare *Lepus nigricollis* was observed. Pug marks of both species were observed at sampling point E-4 and anecdotal evidence of locals hearing sounds of the Asiatic Jackal was also recorded at the same location.

Birds can travel long distances especially compared to mammals and reptiles. Furthermore, a number of bird species use both terrestrial and marine habitats. Therefore, the avi-fauna within the Study Area is not limited to the marine and terrestrial habitats; all bird species observed have been reported

During the survey conducted in January 2015 no reptile or amphibian species were observed in the Study Area. During the survey conducted in July 2013 a low abundance and diversity of reptile species was reported; a total of two species were observed including the Short-toed Sand Swimmer *Ophiomorus brevipes* and Sind Gecko *Crossobamon orientalis*. No amphibian species were observed.[3]

Protected Area

The Study Area is located well within a developed area and the nearest Protected Area, the Haleji Wildlife Sanctuary, is 43 km away.

Social and Cultural Characteristics

A socioeconomic survey was undertaken by HBP's social team on January 28 and 29, 2016, with the objective of understanding the socioeconomic setting of the settlements and communities that may potentially be affected by the Project activities.

Current Land-Use

---

[2] Any plant adapted to life in a dry or physiologically dry habitat (salt marsh, saline soil, or acid bog) by means of mechanisms to prevent water loss or to store available water (from Encyclopedia Britannica)

[3] Hagler Bailly Pakistan (HBP), Environmental Impact Assessment of CSP Project Bun Qasim Fertilizer Complex for Fauji Fertilizer Bin Qasim Limited (FFBL), Rawalpindi, 2013

The majority of the Study Area falls under a notified industrial area – the Port Qasim Industrial Zone. The conveyer belt passes through the extensively developed North Western Industrial Zone which has a total area of 2920 acres of which 904 acres are reserved for port services and the remaining 2016 acres for industrial units. Industrial units include automotive assembly, pharmaceutical, food and edible oil processing among others.

A large portion of the Study Area consists of barren land. Certain portions of the land are vegetated which are used by goat herders as grazing land. A large portion of this barren land is within the industrial zone and it is expected that industrial units will be developed on it in the future.

While only accounting for 4% of land use, cattle farms are a dominant feature of the communities in the Study Area. Milk processing and transport is done using very basic technology and in poor hygienic conditions.

Limited agricultural activities are practiced in and around the Study Area. Water is obtained from surface drains that receive liquid effluent from cattle farms which is rich in nutrients.

The two major residential areas in the vicinity of the Project are Jumma Goth and Bhains Colony. These settlements consist of urban communities that are mixed with cattle farms. Bhains Colony is dominated by cattle farms whereas Jumma Goth is mostly residential with some farms present as well. Construction is almost exclusively masonry.

Cultural Heritage

There are no major known heritage sites within or in close proximity of the Study Area. Jumma Goth has a large Sindhi population and so Sindhi culture is present in the settlement. However, in Bhains colony houses are scattered due to the heavy presence of cattle farms. Furthermore, the large influx of day laborers from across the country which live on these farms has resulted in a mixed identity of the community. Most of the population is Muslim.

Health and Health Facilities

It was reported that cold and flu were the most common ailments followed by diarrhea and other stomach diseases. There is a dearth of health facilities, the only ones being in Jumma Goth was reported by the communities. The government dispensary in Jumma Goth provides free healthcare whereas private doctors charged Rs. 300 per consultation.

Educational Institutions

Primary schools were present in all surveyed communities and middle schools in two of the four. As the communities are close together they use educational facilities interchangeably. Furthermore, children travel to Korangi and Malir, about 2-3 km away, to attend college. Madrassas are also present in the community where religious instruction is administered to children.

Decision-Making Institutions

Respondents stated that since there were many different communities living in the area there was no tribal or spiritual leader of the settlement and community leaders emerged due to power, wealth and political connections. Influence of these leaders ranges from a few streets to a few hundred households. Inhabitants preferred to resolve conflicts through the local leader who settled disputes in the presence of both parties, at times deciding fines to be paid as compensation. Locals approach the police only if this local mechanism does not resolve their dispute.

Environmental Impacts Identification

An in-depth assessment of the following potential impacts was carried out. These were identified as having medium or high significance in a scoping exercise carried out and included in the EIA report.

- **Land Acquisition:** Acquisition of land from private owners, if required can potentially affect their livelihood due to loss of land.
- **Construction Activities:** Potential environmental impacts of construction activities include: spills and leakages of oil and contamination of soil and potentially surface water; construction camp waste and wastewater disposal. Construction activities pose an occupational health and safety risk to the workers especially those working at a height on the conveyer belt. Improper management of this aspect can lead to fatalities and health issues.
- **Coal Dust Emissions:** Emission of dust particulates from coal handling and storage will deteriorate air quality and can impact nearby industries and communities.
- **Liquid Effluents:** Leachates from rainwater and dust–suppression water system runoffs containing coal powder and minute amounts of heavy metals may contaminate soils and surface water. Contamination of water resources due to system failure and accidental spills during coal transportation

Land Acquisition

The land occupied by Port Qasim Authority (PQA) or government will be utilized for construction of conveyor belt and coal loading terminal so no private land required to acquire for the project construction.

Construction Activities

Construction activities if not managed properly can lead to a significant, albeit temporary, disturbance of the local environment. However, if measures presented in the Environmental Management Plan (Chapter 7) are followed construction impacts will be mitigated to acceptable levels.

Coal Dust Emissions

The predominant air pollutant from the proposed coal stockyard and conveyor belt facility will be particulate matter. The fugitive dust emitted from the activities above

will comprise of a wide variety of size fractions. The larger deposited dust is the material generally greater than 50 µm in diameter. It poses a nuisance potential due to soiling of surfaces and can cause irritation to eyes and nose. Due to the large size of deposited material it usually falls out of the air within short distance of approximately 100 meters of the source.

The United States Environmental Protection Agency approved regulatory air quality model AERMOD[4] was used to model dispersion of the total pollutant loads. The following conclusions can be drawn:

- Similar amounts of total coal dust emission originate from the conveyer belt and coal stockyard but incremental dust concentrations around the stockyard are more concentrated.
- Air dispersion modelling shows that industries located close to conveyor belt will not be exposed to more than 10 µg/m^3 of PM_{10} and 2 µg/m^3 of $PM_{2.5}$ emissions. This exposure denotes the 24 hour concentrations, which represents the maximum expected concentration during the entire year. Furthermore, the conveyer belt is modelled as an open air belt as a worst case scenario. The predicted emissions will reduce significantly as the conveyor belt is enclosed and coupled with the water sprinkler system.
- The background concentrations are already very high hence the total concentration exceeds the limit on certain days. Therefore, strict adherence to the mitigation measures described in the EIA is advised.

Liquid Effluents

Leachates from rainwater and dust–suppression water system runoffs containing coal powder and traces of heavy metals may contaminate soils and surface water. Water resources may be contaminated due to system failure and accidental spills during coal transportation.

Based upon the above analysis, the following mitigation measures will be adopted:

- Effluents being discharged will meet the SEQS limits for liquid effluents. The incremental impact from the Project on water resources will be minor and is unlikely to have significant impacts on creek ecology downstream.
- The possibility of using recycled water for dust suppression will be explored

Analysis of Alternatives (by JICA Study Team)

A comparison of alternatives for the coal transportation at Port Qasim (between coal unloading terminal and coal loading station) was undertaken and is described below. It was concluded that using PIBT and conveyor belt is the best option among the alternatives.

[4] US Environmental Protection Agency, "Support Center for Regulatory Atmospheric Modeling, Recommended Models," last modified on April 8, 2015, http://www.epa.gov/scram001/dispersion_prefrec.htm.

Alternatives for Coal Handling Facilities

From coal handling view, PQA does not have any dedicated coal handling facility at present. However, a limited quantity of coal is being handled at Marginal Wharf berths. Pakistan Steel is handling coal for its own use through Iron Ore and Coal Berth (IOCB). A new facility is being developed at PIBT for handling coal, clinker & cement.

Alternatives for Coal Transfer to PR Main Line

The transportation mode to the Coal Stockyard is either to use trucks or conveyor belt.

A large number of trucks required to transport coal to the coal stockyard would significantly increase truck traffic in the port area adding to congestion on the roads, increasing the chances of accidents and having an adverse impact on the environment.

Coal is delivered from PIBT to the coal stockyard near the coal loading terminal through single line of elevated conveyor belt of 4500 m long with a transfer tower. The conveyer belt option has been discussed in detail in this report. Alternate conveyer belt coal stockyard locations are discussed in the following section.

No Action Scenario

If the coal stockyard is not provided in Port Qasim or nearby area, and Lakhra Coal Fire Thermal Plant is in service, a numerous number of dump truck will be engaged in the transportation purpose which will cause traffic congestion in Port Qasim area and National Highway, increase CO_2 gas emissions and disturbance to the business activities of industrial zones in Port Qasim.

Environmental Management Plan

A detailed Environmental Management Plan (EMP) was developed and is presented in the EIA. It presents mitigation measures for construction and operational impacts of the project. In addition to the environment mitigation plan and environmental monitoring plan, specific management plans have been developed for areas of concern, including the following:

- Waste Management Plan
- Construction Management Plan
- Coal Dust Management Plan
- Spill Management Plan

The EMP also describes a framework for developing a grievance redress mechanism for the Project.

Public Consultations and Disclosure

As part of the Environmental Impact Assessment process, consultations were undertaken with communities and institutions that may have interest in the proposed project or may be affected by it.

Based on the varying roles and political backgrounds, stakeholders can be divided into the following target groups:

- Communities
- Institutions

A summary of the concerns raised in the consultations is presented in **Table I.**

Conclusion

The Project will allow the smooth transport of 20 million tons of coal that will fuel coal fired power plants throughout the country resulting in positive impacts on the socioeconomic environment through the increased availability of cheap electricity. Furthermore, transport of coal via conveyer belt is better than the alternative of transport via truck which will clog the roads in Port Qasim and lead to the deterioration in the air quality of the area.

Among the potential negative impacts of the Project, the main concern is the generation of coal dust from the conveyer belt and coal stockpiles. Due to gaps in the project description as described in **Chapter 3** of the EIA report, these impacts and their mitigation measures could not be accurately identified. However, if strict coal dust suppression measures are incorporated in the design, the conveyer belt is fully covered, with a sprinkling system installed for coal dust suppression, the coal stockpile has sprinkling systems installed and all liquid effluents generated from the sprinkler systems comply with NEQS guidelines then the negative impacts can be mitigated to an acceptable degree.

If the field activities, including the implementation of all mitigation measures and monitoring requirements as outlined in the Environmental Management Plan (**Chapter 7**), are carried out as described in this report, the anticipated impact of the Project on the area's natural and socioeconomic environment will be well within acceptable limits. The project will also comply with all the statutory requirements and standards listed in **Chapter 2** of the EIA report.

Table I: Summary of Consultations

Aspect	*Concerns*
Institutional Consultation	
Cost Dust Generation	The industries in the area shared concerns regarding the impact of coal dust on their operations. Sensitive receptors identified by the industry included the following: • Car storage area and ambulance and bullet proof car manufacturing unit of Indus Motors • Medicine manufacturing facilities and HVAC equipment of PharmaEvo • Food processing and edible oil industries • Feeding operations of the meat industry BQATI noted that edible oil was contaminated at KPT due to coal transport and something similar could happen at PQ.
Analysis of Alternatives	Industry representatives wanted to know what alternatives had been considered during the design phase. Specially they asked whether: • Coal could be transported directly via train without the conveyer belt going through the industrial area • Coal could be loaded onto trains, without intermittent storage at the stockyard. • Coal could be imported using other jetties such as those at the Sinohydro plant or at PSM.
Community Consultation	
Coal unloading at PIBT	The fishermen community had their concerns regarding the ships that will bring the coal to the Port as the ships may pollute the sea. The ships sometimes have the problem of oil spillage that is harmful for the marine life. There is also the problem of blackwater which is actually the waste from toilets and medical facilities that contain harmful bacteria which will also damage the marine life.
Employment opportunities	Demand of employment in both skilled and unskilled labor. The employment rate in the area is very low and any sort of work will be gladly welcomed. There will be protests if labor is hired from other areas.
Transportation of coal	The coal transportation on the conveyor belt may cause hindrance in the way of the overloaded trucks of green grass that move around in the area. The conveyor belt may disrupt the smooth flow of the trucks.

Contents

Table

Figure

List of Abbreviations

BOT	Build Operate and Transfer
CEA	Cumulative Environmental Assessment
CMP	Construction Management Plan
EIA	Environmental Impact Assessment
EMP	Environment Management Plan
FFBL	Fauji Fertilizer Bin Qasim Limited
GFPs	Grievance Focal Points
GoP	The Government of Pakistan
GRC	Grievance Redress Committee
GSHAP	Global Seismic Hazard Map Project
HBP	Hagler Bailly Pakistan
HTV	Heavy Traffic Vehicle
IEE	Initial environmental examinations
IFAP	Indus for All Program
IFC	International Finance Corporation
JICA	Japan International Cooperation Agency
JPGP	Jamshoro Power Generation Project
LCPP	Lakhra Coal Fired Thermal Power Plant
LTV	Light Transport Vehicle
MBIs	Marine benthic invertebrates
MFD	Marine Fisheries Department
MW	megawatt
NEQS	National Environmental Quality Standards
NWIZ	North Western Industrial Zone
Pak–EPA	Pakistan Environmental Protection Agency
PCU	passenger car units
PCU	Public Complaints Unit
PGA	peak ground acceleration
PIBT	Pakistan International Bulk Terminal
PIC	Project Implementation Consultant
PPE	Personal Protective Equipment

TSP	Total Suspended Particles
PM	Particulate Matter
PQ	Port Qasim
PQA	Port Qasim Authority
PR	Pakistan Railway
SEPA	Sindh Environmental Protection Agency
SEQS	Sindh environmental quality standards
SFD	Sindh Forest Department
SPMP	Spill Prevention and Mitigation Plan
WWF	World Wide Fund

Units

Cm	Centimeter
ha	Hectare
km	Kilometer
kW	Kilo-Watt
m	Meter
mg/kg	Milligram per kilogram
Cusec	Cubic feet per second
mg/l	Milligram per liter
^{o}C	Centigrade Celsius
m/s	meters per second
mm	Millimeter
mS/cm	Millisiemen per centimeter
NTU	Nephelometric Turbidity Unit
dB A	Decibel on 'A' scale
LAeq	Level of Equivalent on 'A' scale
$\mu g/m^3$	Microgram per cubic meter

CHAPTER 1. Introduction

The Government of Pakistan (GoP) is planning to set up a 660 MW ultra-supercritical coal fired power plant at Lakhra to be financed by the Japan International Cooperation Agency (JICA) and other potential donors. JICA has commissioned the study "Preparatory Survey on Lakhra Coal Fired Thermal Power Plant Construction Project" (the "Lakhra Study") to support the construction of high efficiency, ultra-supercritical, Lakhra Coal Fired Thermal Power Plant (LCPP) of 600 megawatt (MW) net capacity at Lakhra in Jamshoro District of Sindh.

The LCPP project plans to import 2 million tons of coal annually at Pakistan International Bulk Terminal (PIBT) located at Port Qasim. The coal will be then transported to LCPP by the existing railway main line of Pakistan Railway (PR). The nearest railway station on the main line is the Bin Qasim Station located about 9 kilometer (km) from Port Qasim. In anticipation of the new imported coal-based power plants being developed in Jamshoro and in Punjab, PR is planning the improvements at Bin Qasim Station and of the spur line between Port Qasim and Bin Qasim Station. However, currently there is no infrastructure to transport coal between coal unloading terminals at PIBT and the Bin Qasim Station. In this regard, JICA has initiated a feasibility study through Nippon Koei Company (or JICA Study Team, JST) for development of coal transportation between PIBT and PR main line (the “Project”).

JST acquired the services of Hagler Bailly Pakistan (Pvt.) Limited for undertaking Environmental Impact Assessment (EIA) of the proposed Project. This report documents the EIA process and its results.

1.1 Project Location

The proposed Coal Transport Project is located in the North Western Industrial Zone (NWIZ) of Port Qasim (PQ) in Karachi (**Figure 1.1**). The coal will be transported through a conveyor belt, with total length of 4–4.5 km. Two options are under consideration, as shown in **Figure 1.2**. The Project also includes a coal loading terminal that contains infrastructure such as unloading facilities, coal stockpiles and a coal loading facility for loading of coal onto trains.

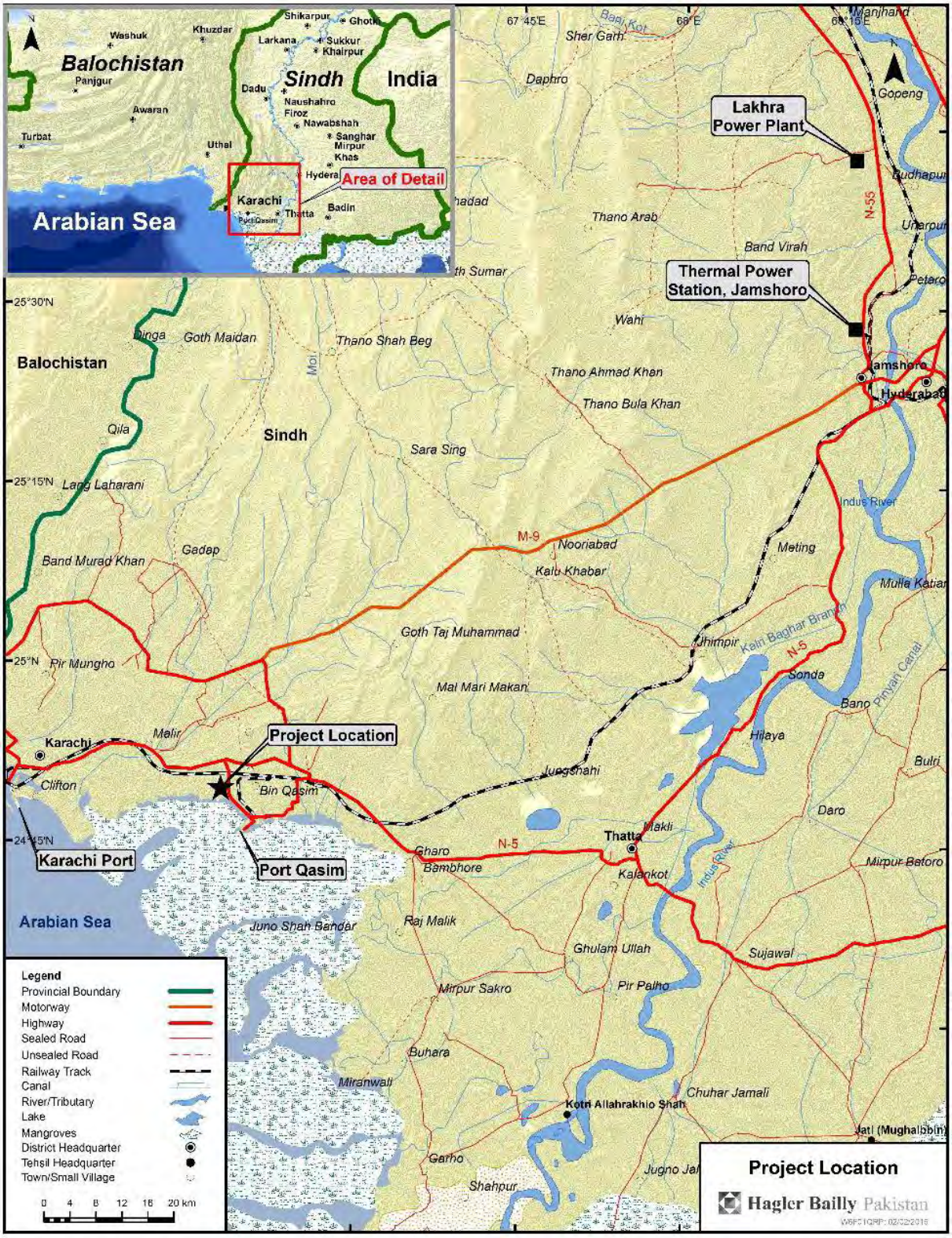


Figure 1.1: Location of Proposed Project

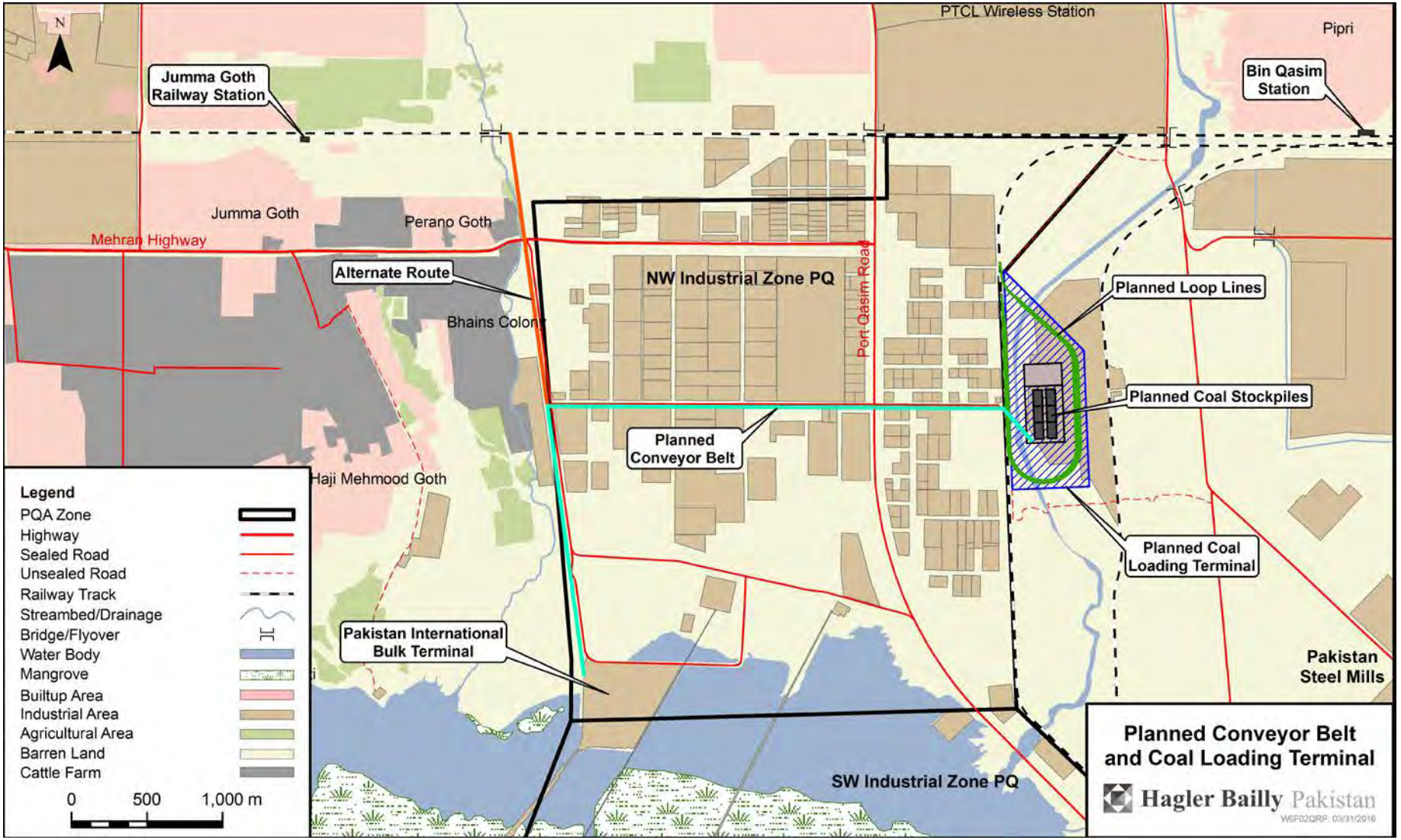


Figure 1.2: Location of Proposed Project and Surroundings

1.2 Importance of the Project

The proposed Coal Transport Project will play a lifeline role in the operation of proposed coal fired thermal power plants throughout the country. Annually, the conveyer belt is planned to handle 20.26 million tons of coal that will be supplied to 9 power plants across Sindh and Punjab that have a combined capacity of 6664 MW.

1.3 Objectives of the Project

The primary objective of the Project is to construct an environmentally and economically viable option for transportation of imported coal from PIBT to nearby main rail line of Pakistan Railways. The project will be constructed and operated in compliance to the principles of sustainable development and applicable national environmental and social standards and laws.

1.4 Introduction to the EIA

This Environmental Impact Assessment (EIA) was conducted to meet the regulatory requirements of Pakistan contained in the Pakistan Environmental Protection Act, 1997 and its associated rules and regulations.

1.4.1 Scope of the EIA

The aspects of coal transport included and excluded from the scope of the EIA are as follows:

Within Scope of the EIA

The following segments of coal transport are included in this EIA:

1. The construction of the conveyer belt and coal loading terminal.
2. The operation of the Project which includes loading of coal onto the conveyer belt, transport of coal via conveyer belt, storage at coal stockyard, reclaiming from the stockyard and loading of coal onto railway wagons.

Exclusion from Scope of the EIA

The scope of this EIA does not cover the following:

1. The impact of transportation of coal from the country of origin to Port Qasim (by bulk shipping carrier)
2. Activities at PIBT including unloading, storage of coal.
3. Transportation of coal from Bin Qasim Station to Lakhra or other power plants

1.5 The Project Proponents

The Project proponent is the Port Qasim Authority (PQA). PQA was established through an act of parliament on June 29, 1973. PQA is the 2nd deep sea industrial-cum-commercial port operating under landlord concept. The Port is situated in the Indus delta region at a distance of 28 nautical miles in the south-east of Karachi.

The port currently caters for more than 40% of seaborne trade requirements of the country.

The Port is under the administrative control of Ministry of Ports Shipping, Government of Pakistan. All policy decisions are vested in the PQA Board comprising of seven members and headed by Chairman, PQA. The Board is a blend of public and private sector participation. The Chairman is also the Chief Executive of the Port

1.6 Organization of the Report

The EIA report contains 9 chapters as follows: After the *Executive Summary* and *Introduction* (this chapter), the *Regulatory and Administrative Framework* (**Chapter 2**) discusses the environmental laws of the country. The project is described in *Project Description* (**Chapter 3**). The physical, ecological and socioeconomic baseline is presented in *Existing Environment of the Project Area* (**Chapter 4**). The core of the EIA is the *Environmental Impacts Identification* (**Chapter 5**) which identifies the potential environmental and social impacts of the proposed Project, predicts their magnitude, evaluates the significance of impacts, and proposes mitigation measures, where required. This chapter is followed by the *Analysis of Alternatives* (**by JST**) (**Chapter 6**). The *Environmental Management Plan* (**Chapter 7**) identifies various implementing mechanisms, institutional arrangements, monitoring mechanisms, and other plans to ensure effective implementation of the proposed mitigation measures. The *Mechanism of Public Consultation and Disclosure* (**Chapter 8**) proposes the mechanism for consultation with concern agencies and local stakeholders. Finally, *Conclusions* (**Chapter 9**) concludes the report. The background information and detailed data is provided in the appendices.

CHAPTER 2. Regulatory and Administrative Framework

In Pakistan, the history of legislation drafted specifically to protect the environment dates back to 1980s. This section provides a brief historical and constitutional context followed by a detailed discussion of relevant laws.

2.1 Historical and Constitutional Context

The development of statutory and other instruments for environmental management has steadily gained priority in Pakistan since the late 1970s. The Pakistan Environmental Protection Ordinance, 1983 was the first piece of legislation designed specifically for the protection of the environment. The promulgation of this ordinance was followed, in 1984, by the establishment of the Pakistan Environmental Protection Agency (Pak–EPA), the primary government institution at that time dealing with environmental issues. Significant work on developing environmental policy was carried out in the late 1980s, which culminated in the drafting of the Pakistan National Conservation Strategy. Provincial environmental protection agencies were also established at about the same time. The National Environmental Quality Standards (NEQS) were established in 1993. In 1997, the Pakistan Environmental Protection Act (PEPA) 1997 was enacted to replace the 1930 Ordinance. PEPA conferred broad–based enforcement powers to the environmental protection agencies. This was followed by the publication of the *Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations 2000* which provided the necessary details on the preparation, submission, and review of initial environmental examinations (IEE) and environmental impact assessments (EIA).

Prior to the 18th Amendment to the Constitution of Pakistan in 2010, the legislative powers were distributed between the federal and provincial governments through two 'lists' attached to the Constitution as Schedules. The Federal list covered the subjects over which the federal government had exclusive legislative power, while the 'Concurrent List' contained subjects regarding which both the federal and provincial governments could enact laws. The subject of 'environmental pollution and ecology' was included in the Concurrent List and hence allowed both the national and provincial governments to enact laws on the subject. However, as a result of the 18th Amendment this subject is now in the exclusive domain of the provincial government. The main consequences of this change were as follows:

- The Ministry of Environment at the federal level was abolished. Its functions related to the national environmental management were transferred to the provinces. To manage the international obligations in the context of environment, a new ministry—the Ministry of Climate Change—was created at the federal level.
- The PEPA 1997 was technically no longer applicable to the provinces. The provinces were required to enact their own legislation for environmental protection. However, to ensure legal continuity PEPA 1997 continued to be the

legal instrument for environmental protection in the provinces till enactment of provincial law.

All four provinces have enacted their own environmental protection laws. These provincial laws are largely based on PEPA 1997 and, hence, provide the same level of environmental protection as the parent law.

2.2 Sindh Environmental Protection Act 2014

The Sindh Environmental Protection Act 2014 (Sindh Act 2014) is the basic legislative tool empowering the government to frame regulations for the protection of the environment. As per the law, the Sindh Environmental Protection Agency (SEPA) is responsible to implement the provisions of this Act in Sindh. The Sindh Act 2014 is applicable to a broad range of issues and extends to air, water, industrial liquid effluent, marine, and noise pollution, as well as to the handling of hazardous wastes. The articles of Sindh Act 2014 that have a direct bearing on the proposed Project are listed below. The details are discussed in the following sections.

- Article 11 that deals with the Sindh environmental quality standards (SEQS) and its application
- Article 13 that deals with hazardous substances
- Article 14 that prohibits various acts detrimental to the environment
- Article 17 that establishes the requirement for environmental impact assessment.
- To implement the provisions of the Sindh Act 2014, *rules* and *regulations* are required.[5] The key rules and regulations are:
    - National Environmental Quality Standards (Self–Monitoring and Reporting by Industries) Rules, 2001
    - Environmental Samples Rules, 2001
    - Sindh Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2014 (IEE–EIA Regulations 2014)

Guidelines are issued by the Pak–EPA for preparation of environmental assessment. The relevant guidelines are discussed in **Section 2.3**. All the rules, regulations, and guidelines issued under PEPA 1997 and discussed above remain valid after promulgation of Sindh Act 2014.

[5] Rules and regulations are similar instruments but differ in their hierarchy. The power to make rules and regulations is given in the enabling law, PEPA 1997 and Sindh Act 2014 in this case. The rules are made by the government (federal or provincial, as the case may be) and require publication in the official gazette. Regulations are made by the government agency which is empowered by the law, environmental protection agencies in this case, and are not always published in the official gazette. Rules deal with relatively important matters such as delegation of powers and authorities, whereas regulations usually deal with procedural matters.

2.3 Requirements for Environmental Impact Assessment

The articles of Sindh Act 2014 that have a direct bearing on the environmental assessment of the proposed Project are:

- Article 17(1): 'No proponent of a project shall commence construction or operation unless he has filed with the Agency[6] an initial environmental examination or an environmental impact assessment, and has obtained from the Agency approval in respect thereof.'
- Article 17(3): 'Every review of an environmental impact assessment shall be carried out with public participation…'

The IEE-EIA Regulations 2014 provides the necessary details on the preparation, submission, and review of the IEE and the EIA. Categorization of projects for IEE and EIA is one of the main components of the IEE-EIA Regulations 2014. Projects have been classified on the basis of expected degree of adverse environmental impact. Project types included in Schedule II of the regulations those that are likely to have potentially significant impact on the environment and thus an EIA is required for such projects, whereas those included in Schedule I as having potentially less adverse effects and therefore require an IEE. Coal fired power plants with capacity less than 50 MW is included in Schedule I (List of Projects requiring an IEE) whereas Coal power projects above 50 MW is included in Schedule II (List of Projects requiring an EIA). As the project involves development of a power plant of more than 50 MW, it falls within the category of Schedule II and an EIA has been prepared for it.

The word 'project' as defined in the Sindh Act 2014 includes new developments as well as modifications, expansions and rehabilitations of the existing projects. The proposed Project is considered a new development and not a modification to the existing Project because it will have its own separate staff, resources, financing, accounting, utilities, and administrative control. None of these items will be shared. Hence the existing project is not the subject of this EIA.

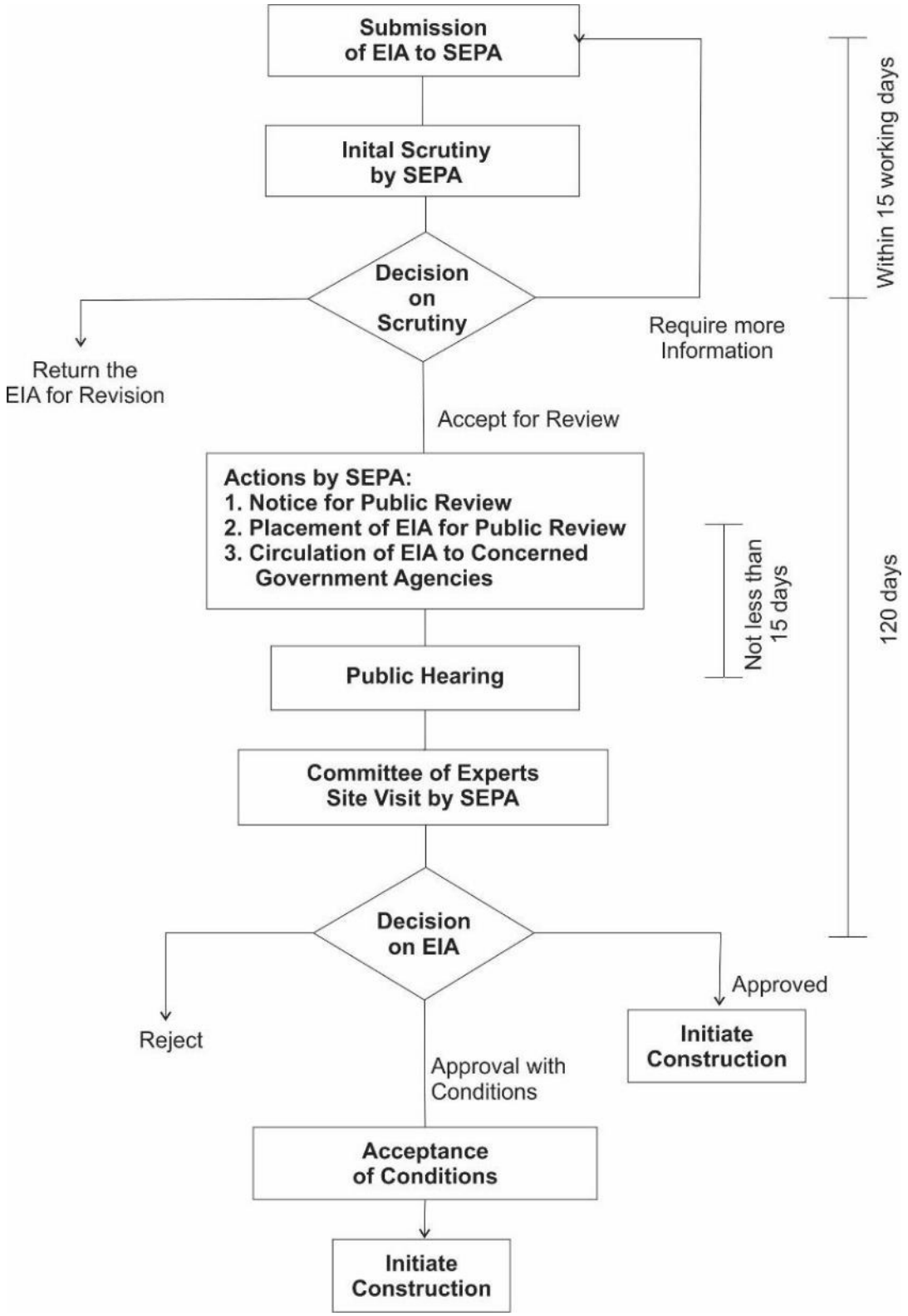
Regulation 9 of the IEE-EIA Regulations 2014 requires that '(1) Ten paper copies and two electronic copies of an IEE or EIA shall be filed with the Federal Agency; (2) Every IEE and EIA shall be accompanied by (a) an application, in the form set out in Schedule V; (b) copy of receipt showing payment of the review fee; (c) no objection certificates from the relevant departments in case of EIA shall be the part of reports; and (d) the environmental check list as per its guidelines.

The prescribed procedure for review of EIA by the EPA is described in Regulations 10–17 and is depicted in **Figure 2.1**. The key features are:

- On acceptance of the EIA for review, EPA will place a public notice in national English and Urdu newspapers and in local language newspaper informing the public about the project and where it's EIA can be accessed. It will also set a date for public hearing which shall be at least 30 days after the publication of the notice.

[6] The term 'Agency' refers to the Sindh Environmental Protection Agency.

- If it considers necessary, the EPA can form a Committee of Experts to assist the EPA in the review of the EIA. The EPA may also decide to inspect the project site.



Source: JICA Survey Team

Figure 2.1: EIA Review and Approval Procedure

Article 17(4) of SEPA Act 2014 binds the SEPA to ‘communicate its approval or otherwise … within a period of four months from the date the environmental impact assessment is filed complete in all respects in accordance with the regulations, failing which … 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’.

Regulation 7 of the IEE-EIA Regulations 2014 pertains to the guidelines. It states that: ‘(1) The Agency may issue guidelines for preparation of an IEE or EIA or an environmental checklist, 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 proponent shall justify in the IEE or EIA or in environmental checklist any departure therefrom.’ An EIA is required for railway projects.

The relevant guidelines are the follows:

- Policy and Procedures for the filling, review, and approval of environmental assessments sets out the key policy and procedural requirement. It contains a brief policy statement on the purpose of environmental assessment and the goal of sustainable development and also states that environmental assessment be integrated with feasibility studies.
- Guidelines for the preparation and review of environmental reports which cover the following:
    - Scoping, alternatives, site selection, and format of environmental reports;
    - Identification, analysis and prediction, baseline data, and significance of impacts;
    - Mitigation and impact management and preparing an environmental management plan;
    - Reporting;
    - Review and decision making;
    - Monitoring and auditing;
    - Project management.
- Guidelines for Public Consultation which covers the following:
    - Consultation, involvement and participation;
    - Identifying stakeholders;
    - Techniques for public consultation (principles, levels of involvement, tools, building trust);
    - Effective public consultation (planning, stages of EIA where consultation is appropriate);

- Consensus building and dispute resolution;
- Facilitating involvement (including the poor, women, building community, and NGO capacity)

- Guidelines for sensitive areas which identifies the sensitive areas

Environmental Standards

Article 11(1) of the Sindh Act 2014 states that: 'Subject to the provisions of this Act and the rules and regulations, no person shall discharge or emit or allow the discharge or emission of any effluent, waste, pollutant, noise or any other matter that may cause or likely to cause pollution or adverse environmental effects, as defined in Section 2 of this Act, in an amount, concentration or level which is in excess to that specified in Sindh Environmental Quality Standards…'

The Sindh EPA has promulgated several standards, the SEQS, which were applicable to the entire province of Sindh. These include:

- Ambient air quality (9 parameters)
- Drinking water (32 parameters)
- Ambient noise
- Industrial effluents (32 parameters)
- Industrial gaseous emissions (18 parameters).

2.4 Administrative Framework on Environmental Issues

The proposed project is legally required to comply with the SEQS. The environmental standards applicable in Sindh are NEQS as developed by Pakistan Environmental Protection Agency prior to 18th Amendment. The only exception is the ambient air quality standards which Sindh Environmental Protection Agency has notified separately. In **Table 2.1** through **Table 2.3**, SEQS Guidelines for key parameters of ambient air quality, effluents and noise are provided for reference.

Table 2.1: SEQS Limits for Ambient Air Quality

Pollutants	*Time–weighted Average*	*Sindh Standards (µg/m3)*
Sulfur Dioxide (SO_2)	Annual	80
	24 hours	120
Oxide of Nitrogen as (NO)	Annual	40
	24 hours	40
Oxide of Nitrogen as (NO_2)	Annual	40
	24 hours	80
Ozone (O_3)	1 hour	130
Suspended Particulate Matter (SPM)	Annual	360
	24 hours	500

Pollutants	*Time–weighted Average*	*Sindh Standards (µg/m3)*
Respirable particulate Matter. PM_{10}	Annual	120
	24 hours	150
Respirable Particulate Matter. $PM_{2.5}$	24 hours	75
	Annual Average	40
Lead (Pb)	Annual Average	1
	24 hours	1.5
Carbon Monoxide (CO)	8 hours	5,000
	1 hour	10,000

Table 2.2: SEQS Limits for Effluents (mg/l, unless otherwise defined)

Parameter	*SEQS (Into Inland Waters)*
Temperature increase	=<3°C
pH value	6 to 9
Five–day bio–chemical oxygen demand (BOD) at 20°C	80
Chemical oxygen demand (COD)	150
Total suspended solids (TSS)	200
Total dissolved solids (TDS)	3,500
Grease and oil	10
Phenolic compounds (as phenol)	0.1
Chlorides (as Cl')	1,000
Fluorides (as F')	10
Cyanide total (as CN')	1.0
Anionic detergents (as MBAS)	20
Sulfates (SO_4)	600
Sulfides (s')	1.0
Ammonia (NH_3)	40
Pesticides	0.15
Cadmium	0.1
Chromium (trivalent and hexavalent)	1.0
Copper	1.0
Lead	0.5
Mercury	0.01
Selenium	0.5
Nickel	1.0
Silver	1.0

Parameter	*SEQS (Into Inland Waters)*
Total toxic metals	2.0
Zinc	5.0
Arsenic	1.0
Barium	1.5
Iron	8.0
Manganese	1.5
Boron]	6.0
Chlorine	1.0

Table 2.3: Sindh Environmental Quality Standards for Noise

No.	*Category of Area/Zone*	*Effective from 1st July, 2010*		*Effective from 1st July, 2012*	
		*Limit in dB(A) Leq**			
		Day Time	*Night Time*	*Day Time*	*Night Time*
1.	Residential are (A)	65	50	55	45
2.	Commercial are (B)	70	60	65	55
3.	Industrial area (C)	80	75	75	65
4.	Silence zone (D)	55	45	50	45

Note:

1. Day time hours: 6 .00 am to 10.00 pm
2. Night Time hours: 10.00 pm to 6.00 am
3. Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts and courts.
4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.
5. dB(A) Leq: time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

CHAPTER 3. Project Description

The proposed Project entails the construction and operation of a conveyer belt over a 4.5 kilometer (km) route that would transport coal from the PIBT to the PQA coal stockyard for transfer onto trains on the Pakistan Railway Main line. The layout of the project is shown in **Figure 1.2**.

3.1 Quantity of Coal Transfer

Annually, the conveyer belt is expected to handle approximately 20 million tons of coal, with the breakdown given in **Table 3.1**.

Table 3.1: Expected Transport of Coal by Railway from PIBT

Project Name	*Location*	*Capacity (MW)*	*Coal consumption (Mt/y)*
Lakhra Power Plant	Lakhra, Sindh	660	2.00
Jamshoro Power Plant	Jamshoro, Sindh	1,320	4.20
Sahiwal Imported Coal Based Project	Sahiwal, Punjab	1,320	4.20
NEL Project	Rahim Yar Khan, Punjab	660	2.00
NECL Project	Rahim Yar Khan, Punjab	660	2.00
KAPCO Coal Fired Power Project	Muzaffargarh, Punjab	660	2.00
CME Coal Fired Power Project	Muzaffargarh, Punjab	660	2.00
AES Lalpir	Muzaffargarh, Punjab	362	0.93
Pakgen	Muzaffargarh, Punjab	362	0.93
Total		**6,664**	**20.26**

3.2 Coal Transfer Process

The following steps are important in the coal transport process:

3.2.1 Import of Coal through Pakistan International Bulk Terminal (PIBT)

This dirty cargo terminal is being constructed by the Marine Group of Companies, at a cost of $175 million on a 30 year Build Operate and Transfer (BOT) basis in conjunction with the Port Qasim Authority. The proposed facility will handle coal, cement and clinker. The jetty will have a depth of 15 meters with the capacity of handling large ships of up to 75,000 Dead Weight Tonnage[7] (DWT). It is expected that coal would be transported in ships with capacity up to 55,000 DWT. The length of the jetty would be around 460 meters (m) which will be connected to the back area of 25 hectares (ha) with a 2.5 km long trestle bridge.

PIBT is being financed by the International Finance Corporation (IFC). Thus the project has striven to base itself on IFC principles. The terminal is being developed

[7] The total weight a ship can carry safely. This weight includes cargo, crew, passenger, provisions, fuel, fresh water, and ballast water.

based on an Environment Management Plan (EMP) prepared in compliance with section 12 of the Pakistan Environmental Protection Act (PEPA) of 1997. It is also reported that the

IFC performance standards and World Bank Group environmental health and safety guidelines are being met.[8]

Coal transport to PIBT, unloading and storage at PIBT are not considered as part of this EIA. Further details regarding PIBT can be found in the EIA of PIBT[9].

3.2.2 Transport of Coal via Conveyor belt

Coal will be transported from PIBT via a conveyer belt. The conveyer belt will be constructed on the center meridian of existing roads. The conveyer belt will be 1.8 m wide and the covering enclosure will be 4 m wide. The required Right of Way (ROW) will be 10 m and height clearance will be 10 m. The proposed capacity of the conveyor belt is 3,600 tons per hour and it is expected to transport 20 million tons of coal per year.

The following measures would be incorporated to prevent dust generation from the conveyer belt:

1. The conveyer belt will be fully enclosed.
2. A water sprinkler based coal dust suppression system will be installed on the roof and side wall of the conveyer belt.
3. Wastewater from the coal dust suppression system will be treated to meet National Environmental Quality Standards (NEQS) for liquid effluents before discharge.
4. The use of recycled water or sea water will be explored where possible for use in the coal dust suppression system.

3.2.3 Storage of Coal at the Coal Loading Terminal

The conveyor belt will transport coal to the coal loading terminal for storage. A sprinkler system will be installed at the coal stockyard for coal dust suppression.

The possible locations of the coal loading terminal are:

- On the Pakistan Steel Mill yard east of the PQ Northwestern Industrial Zone. This is referred to as the ‘planned coal loading terminal’.
- Towards the northeast of the Northwestern Industrial Zone. This is referred to as the ‘alternate coal loading terminal’.

---

[8] IUCN Private Sector Engagement “Due Diligence Report”, Pakistan International Bulk Terminal Limited, May 2012

[9] Environmental Management Consultants, “Environmental and Social Impact Assessment of Proposed Coal Clinker and Cement Import/Export Terminal at Port Qasim Karachi”, Pakistan International Bulk Terminal, July 2011

While the boundary of the first option has been delineated it is undecided as yet for the other option.

The coal loading terminal yard will have coal stockpiles with a holding capacity of 55,000 tons of coal each. Each stockpile will have a height not more than 15 m. The total coal storage capacity of the completed coal stockyard will be 440,000 tons. An example of a coal stockyard is shown in **Figure 3.1**.

Source: JST

Figure 3.1: Coal Stock Yard

Coal will be dumped onto the stockpiles using a stacker with a capacity of 3,600 tons per hour. For loading onto trains a combined stacker/reclaimer with a capacity of 2,400 tons per hour will reclaim coal from the stockyard and load it onto a second conveyer belt which will transport the coal to the loading facility. The loading facility will be located on the loop lines that will run around the coal stockyard. The planned capacity of the loading facility is 2,400 tons per hour, loading accuracy is 0.1% for a single wagon, and 0.01% for the whole train. Expected loading time is less than 50 seconds per wagon and less than an hour for a train with 40 wagons. A coal loading facility is shown in **Figure 3.2**.

Source: JST

Figure 3.2: Loading of Hopper Wagons by Coal Loading Facility

A summary of the coal transport process that is included in the scope of this EIA is presented in **Figure** . A conceptual layout of the stockyard facilities is shown in Figure

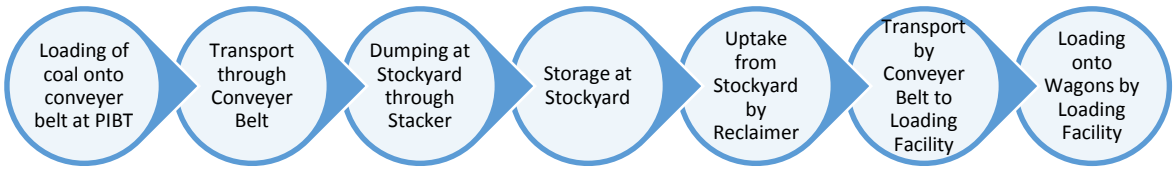


Figure 3.3: Summary of the Coal Transport Process

3.3 Other Project Details

Other Project details include:

Waste Generation

Wastewater will be generated from the coal dust suppression system and is expected to contain coal dust and minute amounts of heavy metals. It will be treated in a sedimentation pond before discharge. Coal dust is expected to be generated during loading, transport, unloading and storage.

Material Use

Current roads will be used for construction and maintenance and no access roads will be constructed. It will use existing municipal electricity and water supplies.

Employment

Employment will approximately 66,000 man days per year for 18 months during the construction phase and 23,100 man days per year for operations and maintenance during its lifetime.

Timeline

Construction of the conveyer belt and loading facility for train wagons is expected to take 18 months. Project life in operation phase has been estimated 30 years.

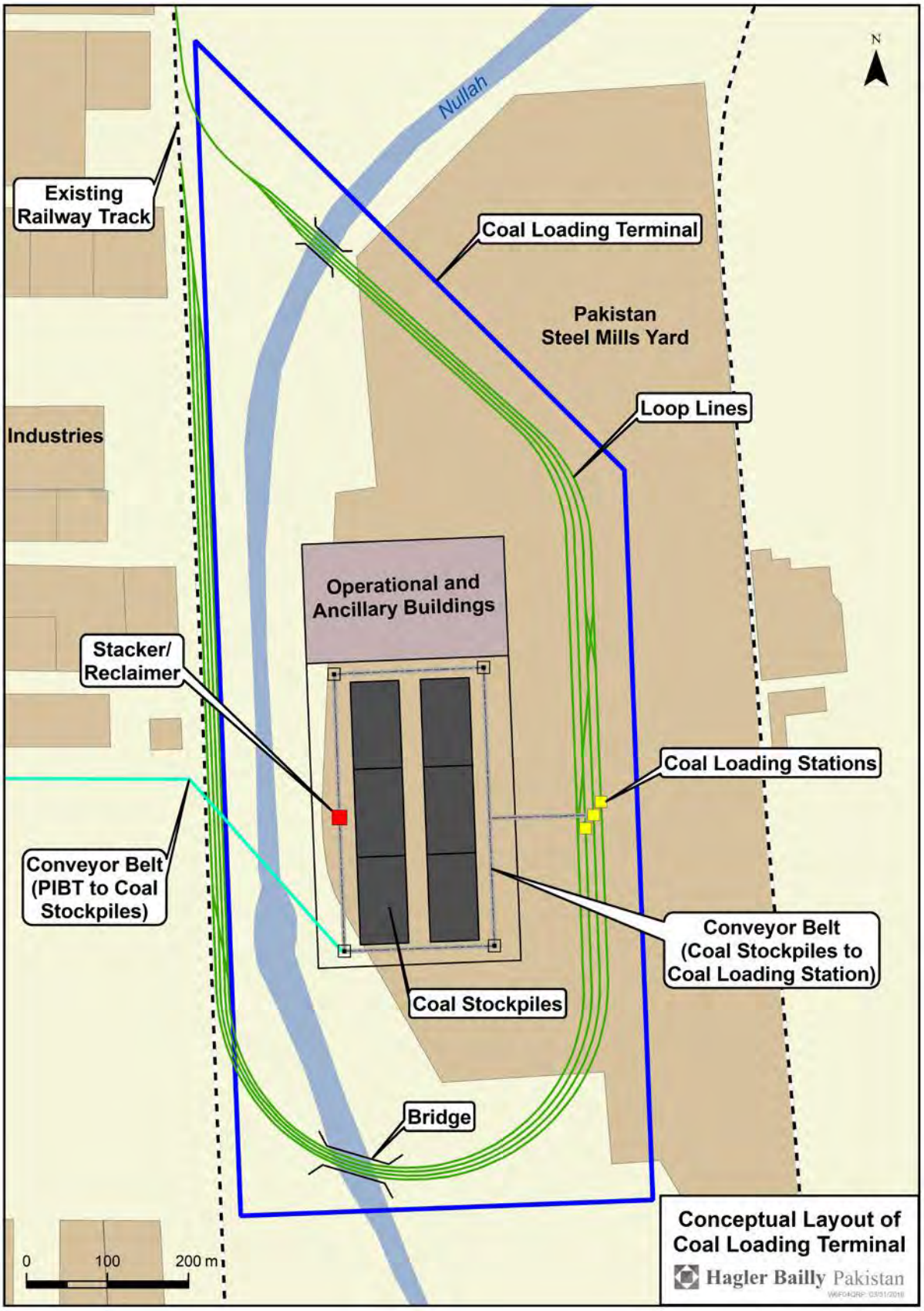


Figure 3.4: Conceptual Layout of Project Infrastructure at the Coal Loading Terminal

Gaps in this Section

Detailed design specifications of the following components have not been specified:

1. Outside enclosure of the conveyer belt,
2. Dust suppression system for the coal dust from conveyer belt,
3. Dust suppression system for the coal dust at the coal stockyard,
4. Effluent collection, treatment and disposal system for sprinkled water from coal stockyard and conveyer belt (if employed),
5. Storm water runoff collection system at the coal stockyard, and
6. Dust collection system from the conveyor belt (alternate to sprinkling system). The location of dust collection bags, efficiency of filter bags, air flow of rate and dust concentration

CHAPTER 4. Existing Environment of the Project Area

This section describes the baseline environmental conditions in the Area of Influence of the Project. Physical, Ecological and Socioeconomic conditions of the area are discussed.

4.1 Area of Influence

The potential impacts of the Project on its surrounding physical and biological environments include air and water quality impacts, noise generation and land transformation. These are expected to reduce with increased distance from the Project facilities. For this, a study area of 500 meters around the Project footprint was delineated, to assess the baseline conditions in the areas likely to be affected by the Project due to its proximity to the Project site. This is referred to as the "Study Area" (**Figure 4.1**) in this report.

4.2 Physical Environment

The regional climate, topography, geology, and seismology of the Port Qasim Area are discussed in the following sections. This followed by a discussion of air quality, water resource, soils, noise, waste of the Study Area. Finally, the ecology of the area are also described.

4.2.1 Climate

The climate at Port Qasim is characterized as hot and dry during summer, and mild during winter with heavy, sporadic, rainfall during the monsoon. The southwest monsoon prevails from April to October in the Study Area. The monsoon is characterized by a reversal in wind direction during the remaining months; and, heavy rainfall over most of the Indian Subcontinent.

The hottest months are between mid - March to June. The winters are mild with temperature dropping to 10 C in January. Karachi receives approximately 217.3 mm of rain annually. Almost 80% of the rain is concentrated in the monsoon season. **Table 4.2** shows the monthly weather parameters based on the long term data (1961-1990) measured at Karachi Airport Meteorological Station[10], 15 kilometers from the Project Site.

[10] Station: Karachi Airport, Location: 24d 54m N, 67d 08m E, Elevation (barometer): 22m Data Coverage 1961 – 1990 (30 years) for temperature, humidity and rainfall, 1975-1978 (4 years) for wind **Source:** Pakistan Meteorological Department

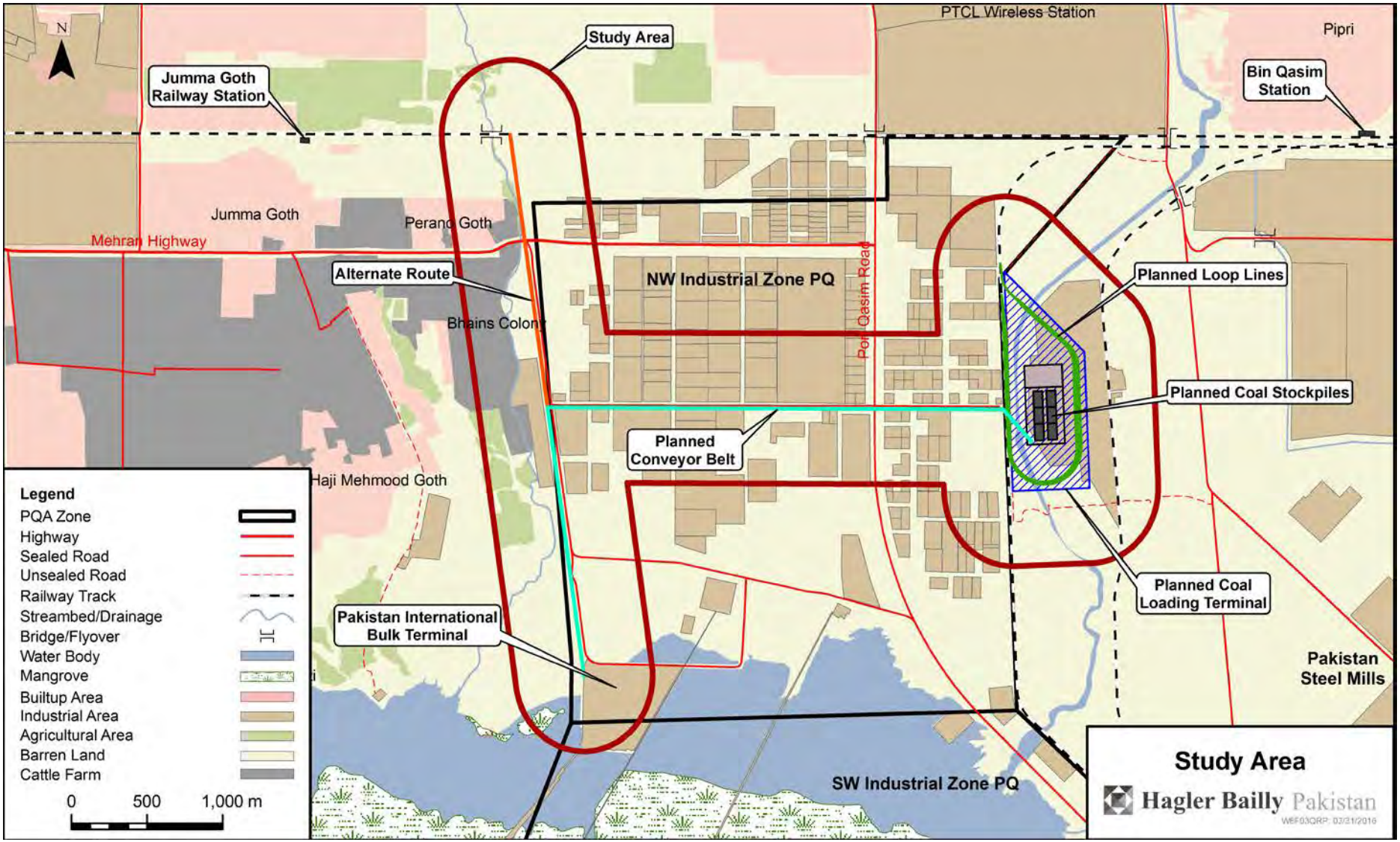


Figure 4.1: The Study Area

Table 4.1: Mean Climatic Data of Karachi

Month	*Temperature (°C)*			*Relative Humidity*		*Rainfall*	*Mean Wind*	
	Mean	*Max*	*Min*	*5:00 AM*	*5:00 PM*	*(mm)*	*Speed (m/s)*	*Direction (degree)*
January	18.1	25.8	10.4	66	36	6.0	1.3	36
February	20.2	27.7	12.7	71	39	9.8	1.6	320
March	24.5	31.5	17.6	78	44	11.7	2.0	263
April	28.3	34.3	22.3	83	49	4.4	3.0	259
May	30.5	35.2	25.9	84	60	0.0	4.4	256
June	31.4	34.8	27.9	83	65	5.5	4.2	249
July	30.3	33.1	27.4	82	71	85.5	4.0	255
August	28.9	31.7	26.1	86	73	67.4	4.3	263
September	28.9	32.6	25.2	85	66	19.9	3.5	265
October	27.9	34.7	21.0	80	48	10.0	1.6	259
November	23.9	31.9	15.9	70	40	1.8	1.4	34
December	19.5	27.4	11.6	66	38	4.4	1.0	47

The general characteristics of the seasons based on this data is described as follows:

Summer (mid-March to mid-June)

Characterized by high temperatures, moderate rainfalls with moderate atmospheric humidity and high speed-winds that blow from southwest towards northeast.

Summer Monsoon (mid-June to mid-September)

Characterized by high temperatures, high rainfalls with high atmospheric humidity and high speed-winds that blow from southwest towards northeast.

Post-Monsoon summer (mid-September to mid-November)

Characterized by moderate temperatures, low rainfalls and low speed-winds that normally blows from southwest towards northeast with direction of wind changing in the end of post-monsoon summer from southwest to northeast.

Winter (mid-November to mid-March)

Characterized by low temperatures, dry conditions with low atmospheric humidity and significant reduction in wind speeds that blows from northeast to southwest with the direction of wind changing in the end of winter from northeast to northwest.

4.2.2 Topography, Geology and Seismic Hazards

Topography

The topography is relatively gentle, increasing in elevation at approximately 10 meters per km towards the north of the Study Area. Elevation in the Study Area is between 5

meters and 35 meters above mean sea level. The topography in the Study Area is shown in **Figure 4.2**.

Geology

The lithological units within the Study Area, and in the region, are shown in **Figure 4.3**. According to the Geological Map of Pakistan, the Study Area is uniformly Tpm (tertiary, Pliocene and Miocene) sedimentary rocks associated with the southern extension of the Kirthar Range. It is in Manchar formation, mostly Pliocene in age consisting of shale, sandstone and conglomerate with thickness up to 4500 feet.

Faults, Earthquakes and Seismic Hazards

Port Qasim is located adjacent to an active tectonic setting, and is approximately 190 km east of the triple continental junction between the Arabian, Eurasian and Indian plates.

The Global Seismic Hazard Map Project (GSHAP) is shown in **Figure 4.4**. The peak ground acceleration (PGA) with 10% probability of exceedance in 50 years is between 0.8 and 1.6 m/s^2.

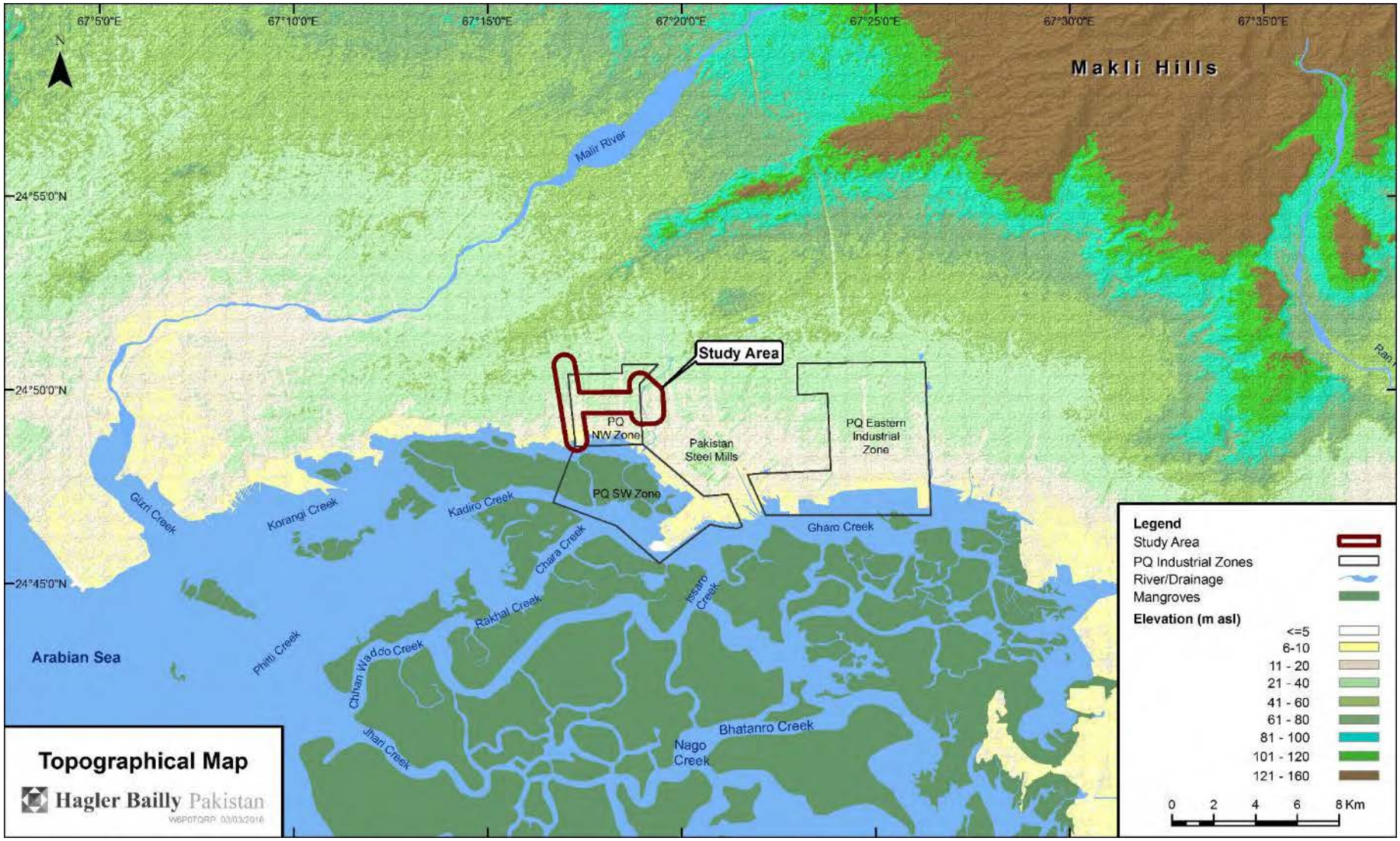


Figure 4.2: Topography in the Study Area

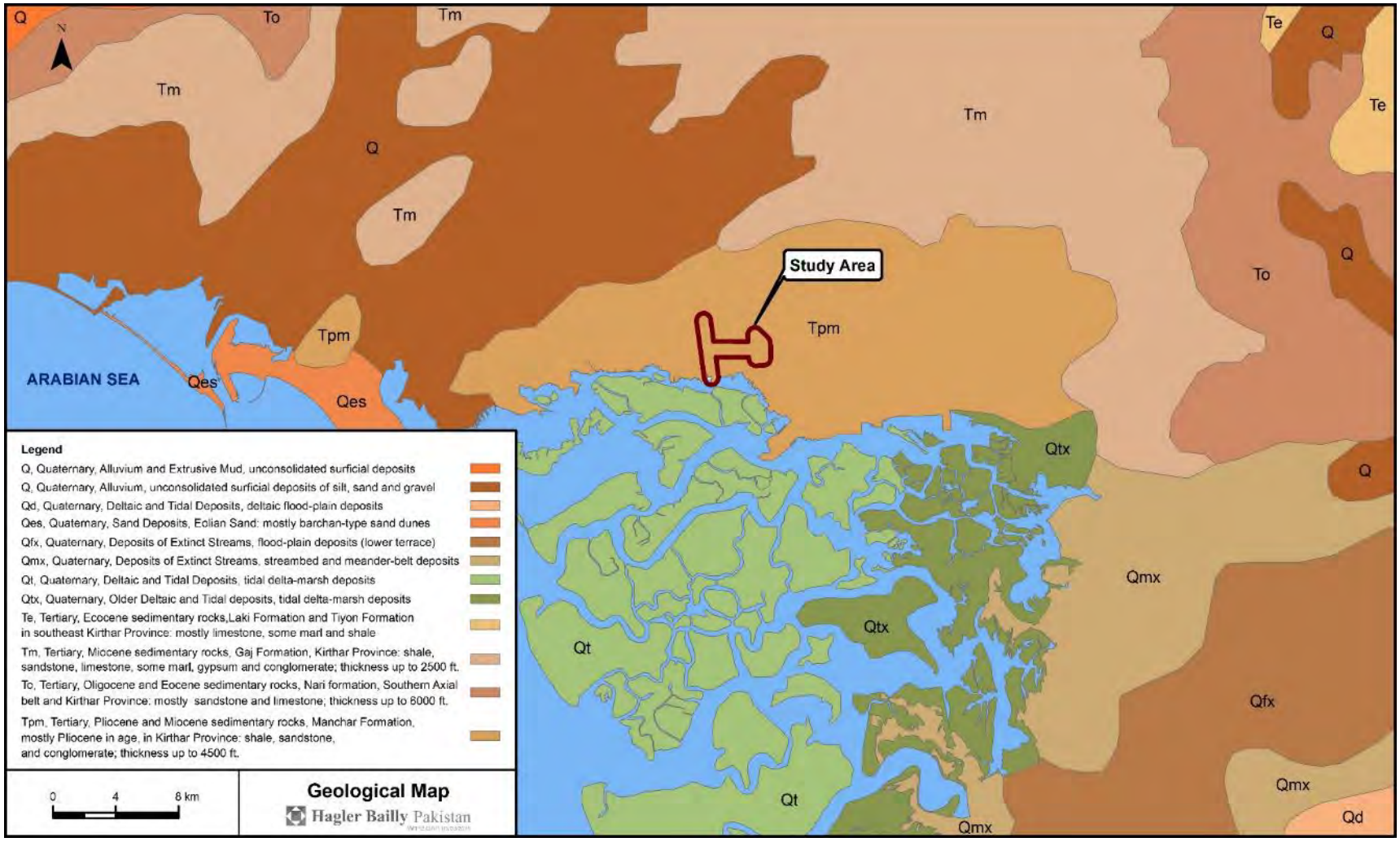


Figure 4.3: Lithology in the Study Area[11]

[11] Geological Survey of Pakistan (GSoP) and United States Geological Survey (USGS). "Geological Map of Pakistan [Scale: 1:2,000,000]" (1964)

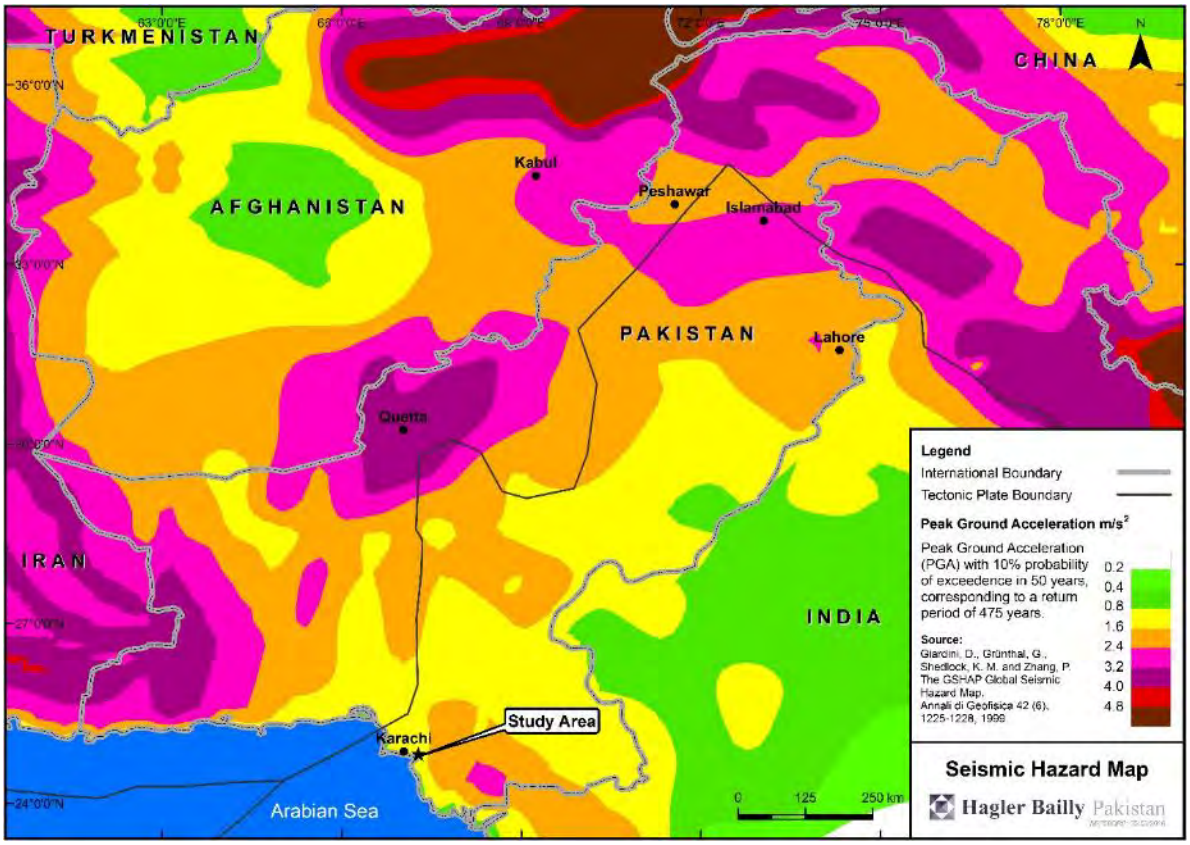


Figure 4.4: Seismic Hazard Map of Pakistan[12]

4.2.3 Air Quality

Ambient air quality data for the Study Area was collected to document the level of air pollutants in the vicinity of the Project before the initiation of the project activities. This data would give a comparison of the ambient air quality before and after the start of the Project. The results of the baseline ambient conditions will therefore help to predict the air quality impacts after the commission of the Project and help evaluate the effectiveness of the mitigation measures implemented.

Sampling Methodology

The air quality surveys were carried out on January 11th and 12th, 2016. Ambient air quality was sampled and analyzed at two locations for 8 hours at each location. These locations were selected considering their proximity to the Project site and surrounding settlements. The details of the sampling locations are listed in **Table 4.2.**

[12] Giardini, D., Grünthal, G., Shedlock, K. M. and Zhang, P.: The GSHAP Global Seismic Hazard Map. Annali di Geofisica 42 (6), 1225-1228, 1999.

Table 4.2: Description of Ambient Air Quality Sampling Locations

Sample ID	*Coordinates*	*Date and Duration*	*Location*	*Rationale for Location*
A01	67°17'09.43" E 24°49'40.15" N	Jan 11th 2016 1230 – 2030	On east of Bhains colony	Turning point of conveyor belt
A02	67°18'55.56" E 24°49'40.68" N	Jan 12th 2016 0730 – 1530	Adjacent to PSM stockyard	Proposed location of coal loading terminal

A summary of parameters analyzed, and method used is presented in **Table 4.3**. Sampling site photographs are shown in **Figure 4.5**.

Table 4.3: Ambient Air Quality Measurement Methods

Parameter	*Method*
Nitrogen Oxide	Gas phase luminescence
Nitrogen dioxide (NO_2)	Gas phase luminescence
Carbon Monoxide (CO)	GFC spectroscopy
Carbon-Dioxide (CO_2)	GFC filter correlation
Sulphur Dioxide (SO_2)	Fluorescence
Ozone (O_3)	Non dispersive UV absorption
Particulate Matter ($PM_{2.5}$)	Beta source
Particulate Matter (PM_{10})	Beta source
Total Suspended Particles (TSP)	Gravimetric analysis

Ambient air quality measurement truck at A01. Bhains Colony can be seen in the background.

Ambient air quality measurement truck at A02. Area for the proposed coal loading terminal next to PSM can be seen in the background.

Figure 4.5: Ambient Air Quality Sampling Site Photographs

Literature Review

Ambient air quality has been measured close to the Project in three previous studies. The measurement locations are shown in **Table 4.4.**

Table 4.4: Ambient Air Quality Measurements in Literature

Sample ID	*Coordinates*	*Source*	*Report Date*
AP01	67°17'29.40" E 24°48'58.68" N	ESIA of Coal Clinker and Cement Terminal[13]	July 1, 2011
AP02	67°19'12.00" E 24°48'24.48" N	EIA of Sinohydro's 2×660 MW Coal Power Plant[14]	March 31 ,2014
AP03	67°20'07.08" E 24°49'19.92" N	ESIA of Reinforcement of 220kV KCR – Lalazar Transmission Lines[15]	May 1, 2015
AP04	67°18'29.88" E 24°50'17.88" N		

Sampling locations for the current survey and from literature are shown in **Table 4.6**.

[13] Environmental Management Consultants (July 2011). "Environmental and Social Impact Assessment of Proposed Coal Clinker and Cement Import/Export Terminal at Port Qasim Karachi", Pakistan International Bulk Terminal.

[14] Hagler Bailly Pakistan (March 2014). "Environmental Impact Assessment of Sinohydro's 2×660 MW Coal Power Plant, Bin Qasim, Karachi", Sinohydro Holding Ltd., Hong Kong.

[15] Global Environmental Management Services (May 2015). "Environmental and Social Impact Assessment of Reinforcement of 220kV KCR - Lalazar Transmission Lines Circuit 1 and 2 and 132kV Port Qasim Pipri west RECP-Gharo Transmission Lines", K-Electric Ltd.

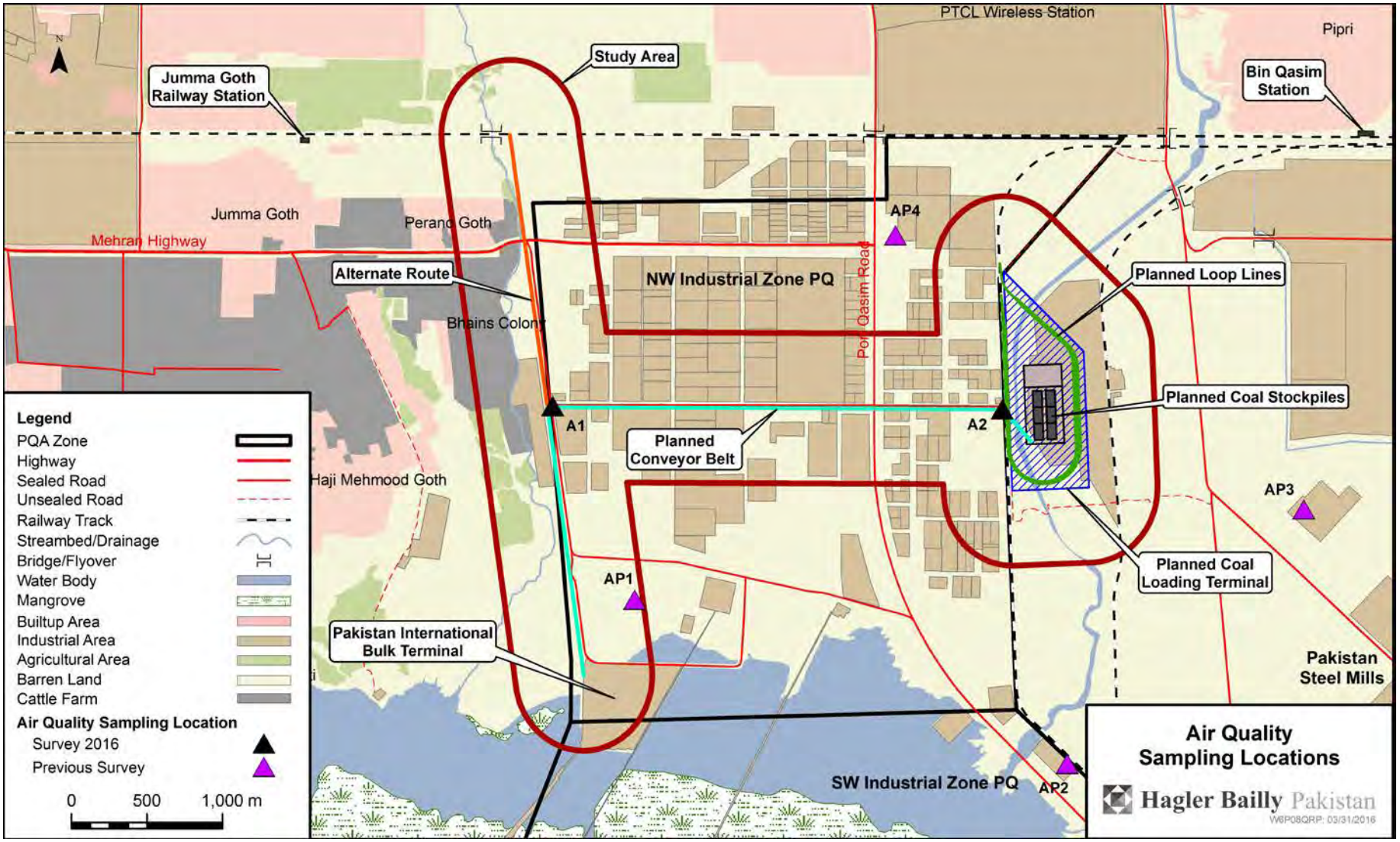


Figure 4.6: Ambient Air Quality Sampling Locations

Results and Analysis

The results of ambient air quality sampling are tabulated in **Table 4.5.** The results are compared with National Environmental Quality Standards (NEQS) and Sindh Environmental Quality Standards (SEQS).

Table 4.5: Ambient Air Quality Sampling Results

Sample ID	*NO_2*	*NO*	*SO_2*	*CO*	*CO_2*	*O_3*	*$PM_{2.5}$*	*PM_{10}*	*TSP*
	$\mu g/m^3$	*$\mu g/m^3$*	*$\mu g/m^3$*	*mg/m^3*	*mg/m^3*	*$\mu g/m^3$*	*$\mu g/m^3$*	*$\mu g/m^3$*	*$\mu g/m^3$*
A1	14.18	6.76	14.18	1.71	323.47	12.18	26.06	118	362
A2	14.12	7.06	20.12	1.63	338.71	16.76	27.53	133	371
AP1	18.27	8.10	30.92	1.73	na	na	na	124	na
AP2	10.10	6.10	11.80	na	na	na	20.80	89	216
AP3	na	na	na	2.00	na	na	na	144	na
AP4	na	na	na	1.00	na	na	na	91	na
Average	**14.17**	**7.01**	**19.26**	**1.61**	**331.09**	**14.47**	**24.80**	**117**	**316**
NEQS (24-hour)	80		120	-	-		35		400
NEQS (8-hour)	-		-	5	-		-		-
SEQS (24-hour)	80		120	-	-		75	150	500
SEQS (8-hour)	-		-	5	-		-		-

Note: - indicates that the pollutant limit was not available for this time period.

na indicates that the pollutant concentration was not available

The following conclusions can be drawn from the sampling results:

- All sampled points are within limits of the NEQS and SEQS guidelines for ambient air quality for all pollutants sampled. Average NO_2 and SO_2 concentrations are well below standards. However particulate matter readings (TSP, PM_{10} and $PM_{2.5}$) are elevated.
- The results are fairly homogenous across the Study Area reflecting similar air quality across the North Western Industrial Zone (NWIZ).
- AP3 has the highest PM_{10} reading of 144 $\mu g/m^3$ which is very close to the standard of 150 $\mu g/m^3$. The likely cause is its proximity to the Pakistan Steel Mills. A2 has the second highest PM_{10} of 133 $\mu g/m^3$ possibly because of its closeness to the railway track, dry barren, land and disturbed PSM yard.

4.2.4 Water Resources

Major water bodies in the Study Area include two surface drains: the westward water channel or the Bhains Colony drain and the eastward water channel or the Steel Town drain. Groundwater is not major source of drinking water in the Study Area due to high

amount of salinity in the groundwater. The quality of the water resources are briefly described below.

Surface Water

The two surface water channels were tested for basic water quality parameters and selected metals. Sampling was conducted on Jan 13th 2016, and lab analysis was performed by SUPARCO. Photographs of the sampling sites are shown in **Figure 4.7**. The sampling locations are presented in **Table 4.6** and shown in **Figure 4.8**.

Water sampling location W1.

Water sampling location W2

Water sampling location W3.

Figure 4.7: Photographs of Surface Water Quality Sampling Locations

Table 4.6: Surface Water Quality Sampling Locations

Sample ID	*Coordinates*	*Location*	*Rationale for Location*
W1	24° 50' 39.0" N 67° 16' 56.3" E	Eastward water channel	Current water quality of water going into Bhains colony which may be used for in the colony
W2	24° 49' 10.6" N 67° 17' 10.2" E	Eastward water channel	Current water quality of water leaving Bhains colony and entering the sea
W3	24° 49' 48.7" N 67° 18' 58.4" E	Westward water channel	Water quality of water channel near proposed stockpile

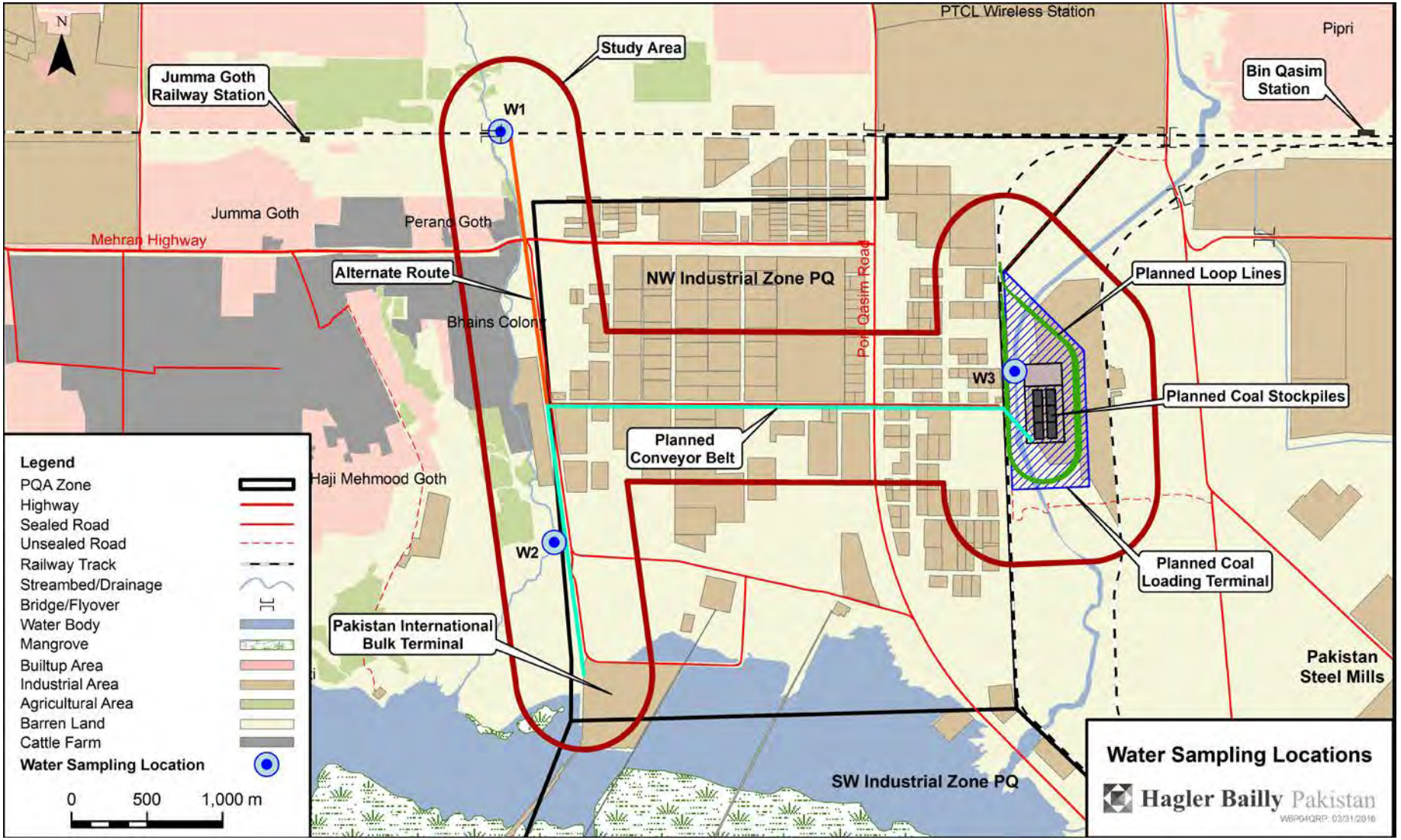


Figure 4.8: Water Quality Sampling Locations

Results and Analysis

The results are compared against liquid effluent standards. Water quality sampling results are presented in **Table 4.7**. Some key takeaways are:

- Turbidity is very high in all samples
- Total suspended solids of the eastern channel (W1 and W2) are very high and are above the SEQS guidelines for liquid effluents. This is because of the direct discharge and lack of regulations on the cattle farms by which this channel passes.
- There is no major metal contamination (for metals tested) in the water for which there exist SEQS guidelines in the water channel near the proposed coal stockpile.

Table 4.7: Surface Water Quality Sampling Results

Parameter	*Unit*	*LOR*	*SEQS Guideline Values for Liquid Effluents*	*Sample ID*		
				W1	*W2*	*W3*
General parameters						
Temperature	°C	0.1	–	28.6*	27.8*	22.8*
DO	%	0.1	–	2.1*	15.3*	14.5*
BOD	mg/l	1.0		5072	109	53
Conductivity	mS/cm	1.0	–	8.91 6.5*	20.90 OL*	2.17 2.10*
Turbidity	NTU	1	–	719	120	14
pH		0.1	6 to 9	6.74 6.99*	8.50 8.54*	8.27 8.45*
TSS	mg/l	1.0	200	1670	217	9
Metals						
Arsenic	mg/l	0.001	1.0			0.013
Boron	mg/l	0.001	6.0			0.044
Cadmium	mg/l	0.001	0.1			<0.001
Calcium	mg/l	1.0	–			286.358
Magnesium	mg/l	1.0	–			194.001
Copper	mg/l	0.001	1.0			0.037
Iron	mg/l	0.001	8.0			0.192
Nickel	mg/l	0.001	1.0			0.028
Potassium	mg/l	0.001	–			0.016
Sodium	mg/l	0.001	–			24.142
Strontium	mg/l	0.001	–			253.818
Zinc	mg/l	0.001	5.0			0.371

Note: * indicates readings performed onsite with a portable multimeter.

OL indicates that the measurement was above the limit of the portable instrument

4.2.5 Soils

The soil map of Sindh[16] categorizes the area of the Project Site and its surrounding as mainly loamy part gravelly soil (camborthids and calciorthids with soam torrifluvents). Soil quality surveys were conducted to determine if there were any contamination of the soils near the proposed coal loading terminal.

Sampling Methodology

Two surface soil samples were collected form the Study Area. The sampling locations are listed in **Table 4.8** and shown in **Figure 4.9**. Analysis was performed at SUPARCO, Karachi using analytical method US EPA 200.8. Analysis of particle size distribution (PSD) was done at HBP labs using ASTM standard sieves.

Table 4.8: Soil Sampling Locations

Sample ID	*Coordinates*	*Location*	*Rationale for Location*
S01	24° 49' 57.2" N 67° 18' 57.2" E	Near Pakistan Steel Mill yard	Location for proposed coal loading terminal
S02	24° 50' 37.9" N 67° 16' 51.2" E	Near Jumma Goth Station	Location for alternate coal loading terminal

[16] Soil Map of Sind 1:1,000,000. Soil Survey of Pakistan, Lahore. 1978.

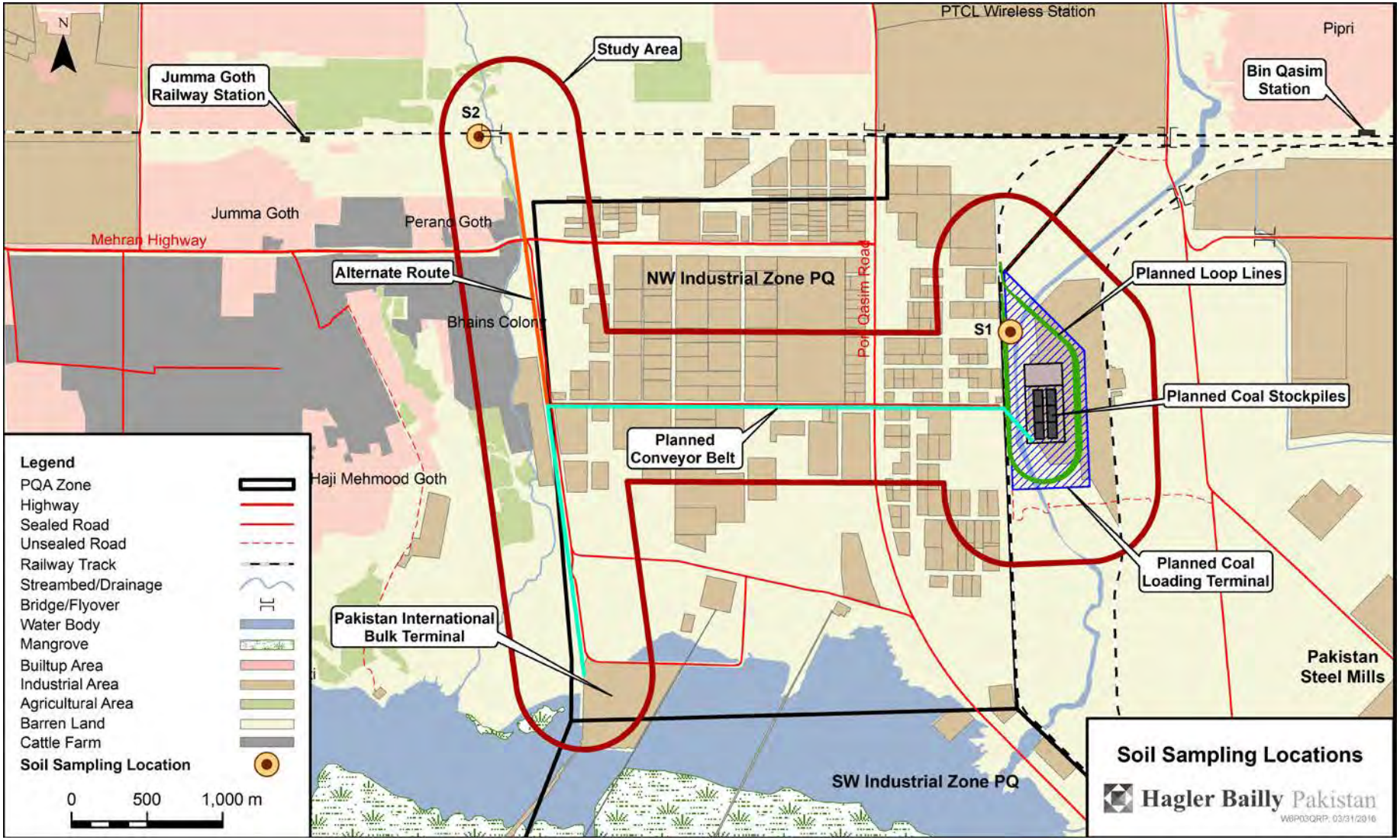


Figure 4.9: Soil Sampling Locations

Results and Conclusions

There are no national standard or international guidelines for screening of soil parameters. The tests are compared to the New York State Department of Environmental Conservation (NYS DEC) guidelines for soils[17]. NYS DEC levels are based on removing human health risks. The standards for unrestricted use (including agriculture) and the results of the soil tests are presented in **Table 4.9** and the results for PSD in **Figure 4.10.** The key results are:

- Selenium levels are high in the soils in the area. They are higher than the standards at S2 and very close to the standard at S1.
- No other metals are elevated above the NES-DEC standards.
- S1 has finer soils than S2. Both soils are sandy and the complete particle size distribution is given in **Figure 4.10**.

Furthermore, soils at the proposed coal loading terminal were dark and had a pungent smell, especially on the banks of the eastward water channel. This can be seen in **Figure 4.10**. It is likely that the water channel has deposited layers of waste on the ground over the years.

Table 4.9: Soil Analysis Results (mg/kg)

Parameter	*S1*	*S2*	*NYS DEC*
Arsenic	1.084	1.364	13
Barium	26.945	23.981	350
Boron	4.089	4.396	
Cadmium	0.018	0.024	2.5
Chromium	3.975	4.283	
Copper	2.864	2.463	50
Iron	7.693	9.084	
Lead	1.668	1.837	63
Nickel	1.824	1.401	30
Selenium	3.821	4.073	3.9
Silver	0.826	0.73	2
Zinc	35.7	39.202	109
Mercury	0.021	0.019	0.18

[17] Division of Environmental Remediation, 2016. 6 NYCRR PART 375 Environmental Remediation Programs. Subparts 375-1 To 375- 4 & 375-6. New York State Department of Environmental Conservation.

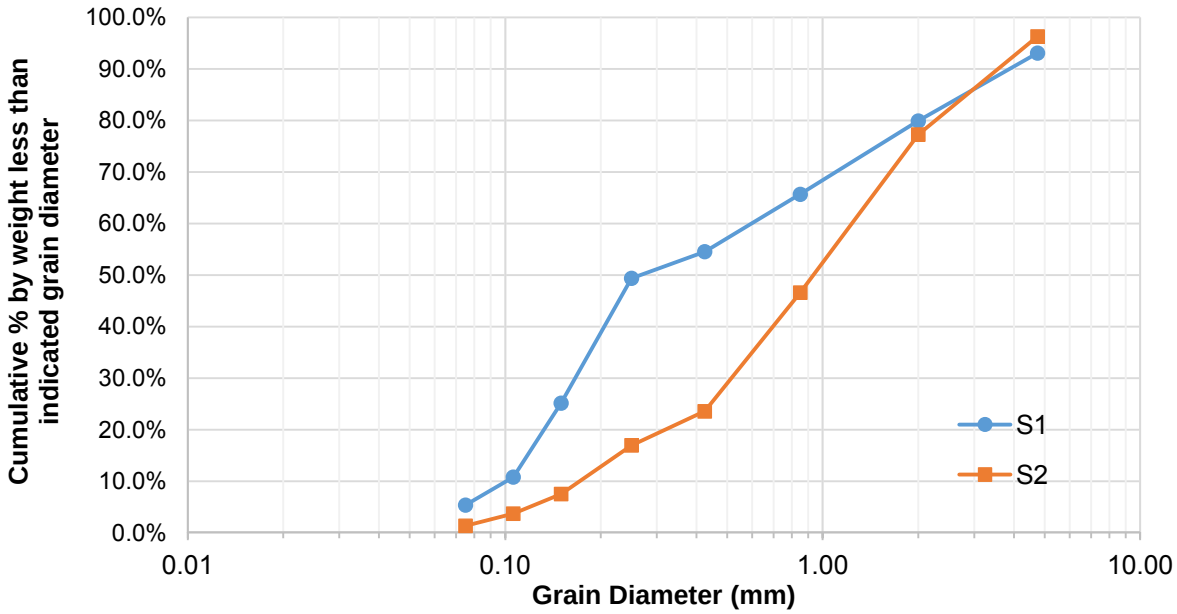


Figure 4.10: Particle Size Distribution

Soils at several locations at the proposed coal loading terminal was dark and had a bad odor.

Dark smelly soils visible around the length of the channel.

Figure 4.11: Soil Contamination

4.2.6 Waste

It was observed that much solid waste was disposed on barren lands surrounding the industrial area. This included both industrial waste (such as used insulation, cloth and other materials) as well domestic waste. Burning seemed to be the common method of disposal. Burning waste and piles of burnt and unburnt waste can be seen in **Figure 4.11**. Dung from cattle farms is dumped onto roads and is picked up by trucks for use as manure. Liquid effluent from cattle farms is discharged into open drains which leads to surface water drains. Photographs of waste disposal from cattle farms is shown in **Figure 4.12**.

Burning waste in Bhains Colony can be observed.

Waste dumps towards the north of the Study Area.

Figure 4.12: Waste Disposal in the Study Area

Dumping of cattle dung onto the road

Direct discharge of effluent into open drains

Figure 4.13: Waste Disposal Method of Cattle Farms

4.2.7 Noise and Vibrations

Most of the Study Area falls under the PQ NWIZ, which is a designated industrial area. Under the SEQS, given in **Table 2.3**, noise level standards for industrial areas are significantly higher than other zones.

Sampling Methodology

A sound level survey was between January 11th and 13th at 3 locations for 8 hours at each location. Corresponding traffic counts were also conducted to gauge what level of noise was originating from the traffic. Details of sampling locations are presented in **Table 4.10** and mapped in **Figure 4.12**.

Table 4.10: Sound Level Survey Locations and Durations

Sample ID	*Coordinate vvs*	*Location*	*Rationale for Location*	*Date and Duration*
N1	24° 50' 15.8" N 67° 17' 02.8" E	Intersection of Mehran highway and corner of NWIZ	Near receptor (Jumma Goth)	Jan 13th 2016 0900 - 1700
N2	24° 49' 40.5" N 67° 17' 09.0" E	Intersection of road toward PIBT and NWIZ main road	Near receptor (Bhains Colony)	Jan 12th 2016 1000 – 1800
N3	24° 49' 40.7" N 67° 18' 55.6" E	Road near proposed coal loading terminal	Possible site of coal loading terminal	Jan 11th 2016 1000 – 1800

The survey was conducted with Cirrus Research plc.'s sound level meter, Model CR:1720. The instrument meets the International standards IEC 61672-1:2002, IEC 660651:1979, IEC 60804:2001, IEC 61260:1995, IEC 60942:1997, IEC 61252:1993, ANSI S1.4-1983, ANSI S1.11-1986, and ANSI S1.43-1997 where applicable. The instruments have a resolution of 0.1 dB.

The meter was calibrated at the start of measurement at each site, using Cirrus Research plc.'s acoustic calibrator, Model: CR: 514. The sound meter and calibrator were factory calibrated on September 28, 2015. The instrument was mounted on a tripod, to avoid interference from reflecting surfaces within the immediate neighborhood, and a wind shield was used in all measurements. Photographs of the sampling equipment setup are provided in **Figure 4.13**.

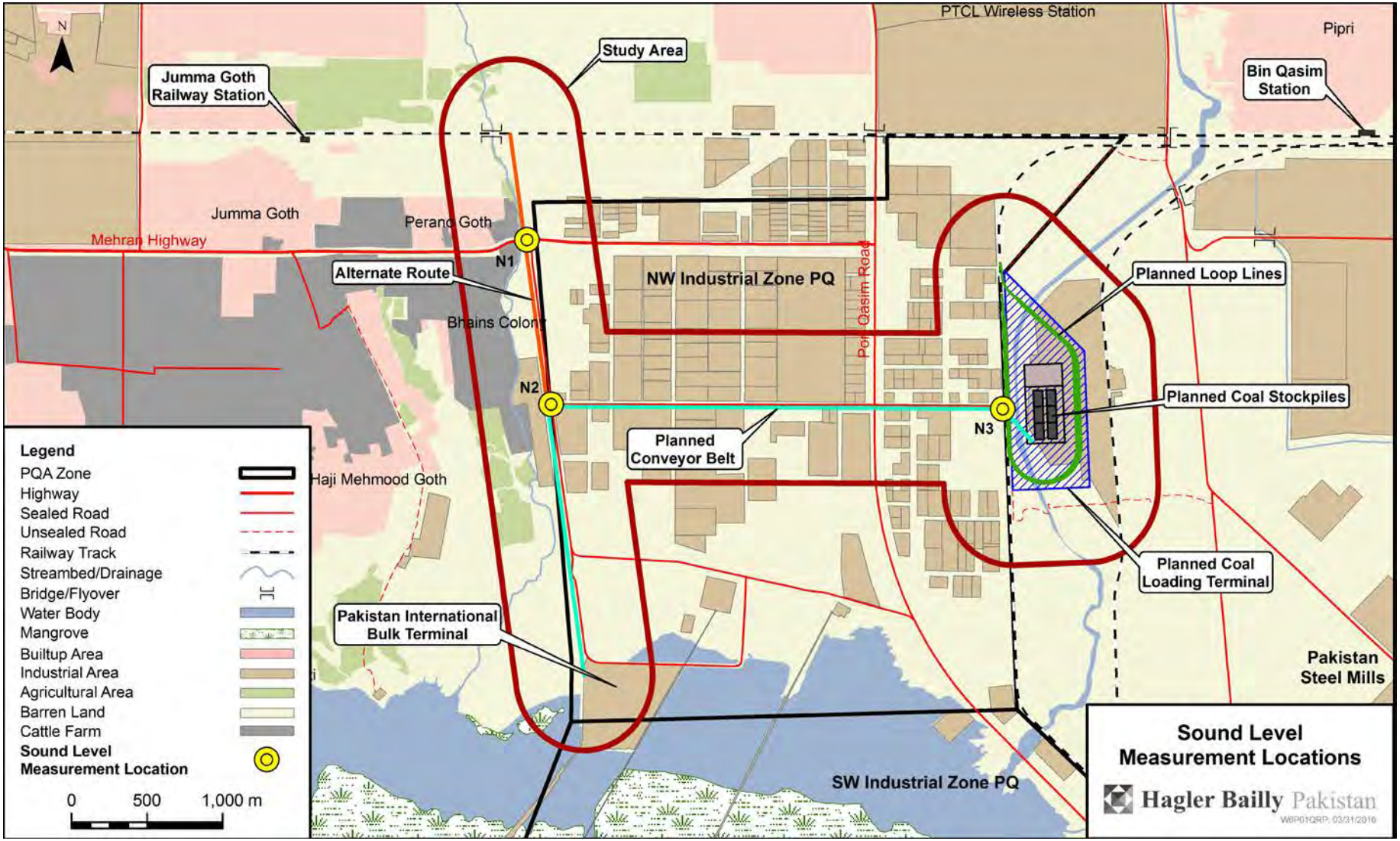


Figure 4.14: Sound Level Measurement Locations

Sound meter at N1

Sound meter at N2

Sound meter at N3

Figure 4.15: Sound Sampling Site Photographs

Results and Analysis

A summary of the results and SEQS noise standards are provided in **Table 4.11**. Reported results include:

- L_{90} is the sound level that is exceeded 90% of the time. It is representative of the background sound levels.
- L_{10} is the sound level that is only exceeded 10% of the time (higher than L_{90}).
- LA_{eq} is the average of the total sound level in decibels.

Table 4.11: Summary of Sound Levels during the Survey

Sample ID	*N1*	*N2*	*N3*	*SEQS Limits for Industrial areas*
LA_{eq}, 8 hour (dB A)	65.9	63.4	56.4	75
L_{90}, 8 hour (dB A)	55.9	50.7	50.7	
L_{10}, 8 hour (dB A)	69.2	65.9	56.8	

Hourly LA_{eq}, and corresponding vehicle counts are presented and discussed in **Appendix 1**.

The key results from the survey include:

- Noise levels are well within SEQS limits as the area is zoned for industrial activity.

- N2 and N3 lie on the east and west of NWIZ. The L_{90} value is 50.7 db A at both these locations and represents the background noise level in the industrial zone.
- N1 and N2 have similar LA_{eq} of 65.9 and 63.4 db A respectively. Both these readings were taken on intersections that experience a high volume of traffic. During the 8 hour survey 1944 and 1266 heavy transport vehicles passed N1 and N2 respectively.
- N3, near the proposed coal loading terminal has a LA_{eq} of 56.4 db A, which is the lowest of the three locations. The area is empty towards the south, and has warehouses to the north. There is very little traffic. Other noise sources include trains on the nearby track. Two trains were observed during the survey period.

4.2.8 Traffic

The traffic baseline is developed to understand the baseline traffic conditions in the area.

Sampling Methodology

Traffic surveys were conducted between the 11th and 13th of January, 2016 at four locations given in **Table 4.12** and shown in **Figure 4.16**. A schematic of traffic directions surveyed is given in **Table 4.16**. 8 hour traffic counts were conducted and they took place under normal working conditions. Traffic surveys were conducted on these access routes on points that intersect with the proposed conveyer belt. Results are presented in terms of passenger car units (PCU). Details on PCU calculations are given in **Appendix 2**.

Table 4.12: Traffic Survey Locations

Sample ID	*Coordinates*	*Location*	*Date and Duration*
T1	24° 50' 15.805" N 67° 17' 02.818" E	Intersection of Mehran highway and corner of NWIZ	Jan 13th 2016 0900 - 1700
T2	24° 49' 40.485" N 67° 17' 09.018" E	Intersection of road toward PIBT and NWIZ main road	Jan 12th 2016 1000 – 1800
T3	24° 49' 41.162" N 67° 18' 25.259" E	Intersection of main PQA Access road and NWIZ main road	Jan 13th 2016 0900 - 1700
T4	24° 49' 41.030" N 67° 18' 53.935" E	Road near proposed coal loading terminal	Jan 11th 2016 1000 – 1800

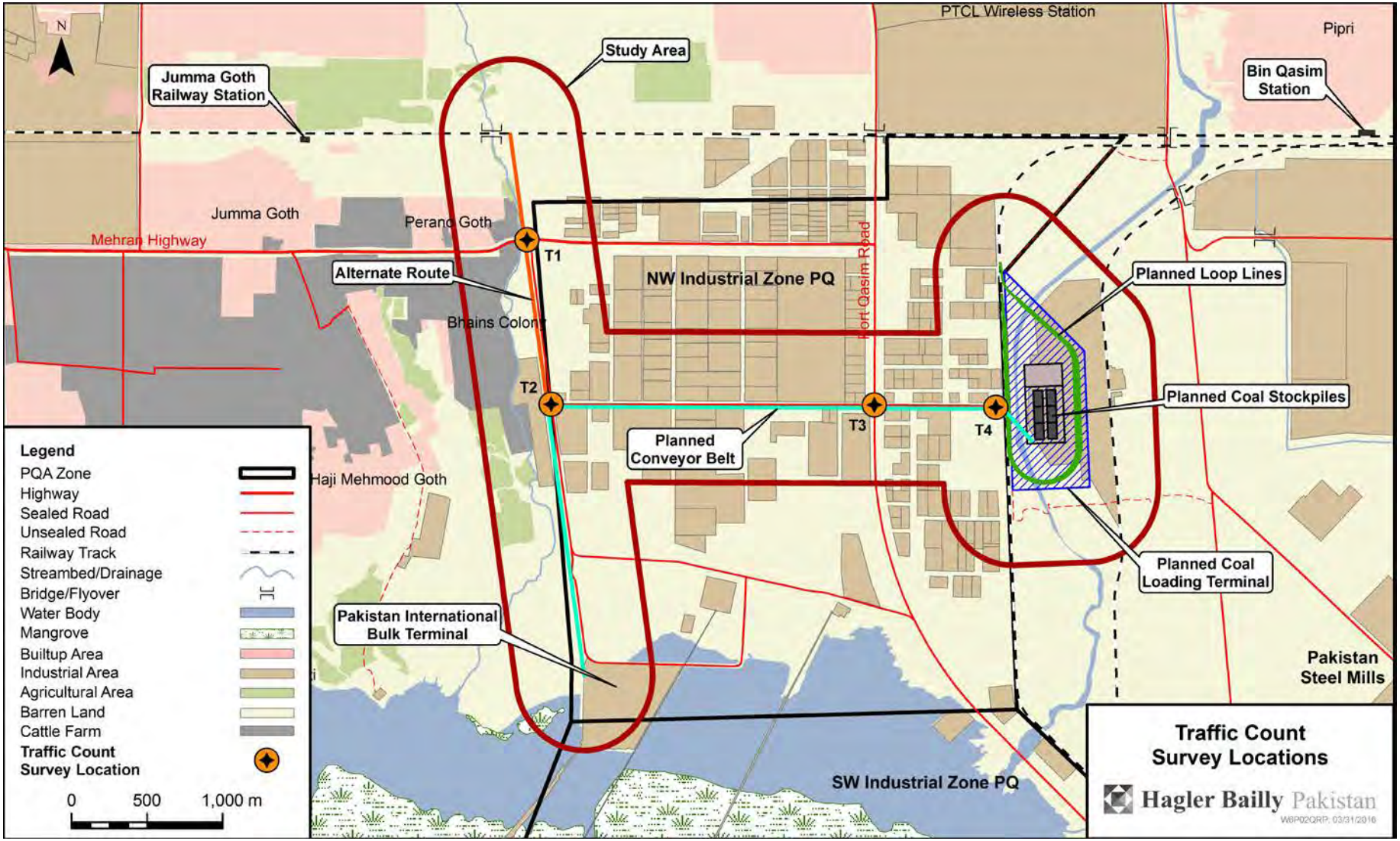


Figure 4.16: Traffic Survey Locations

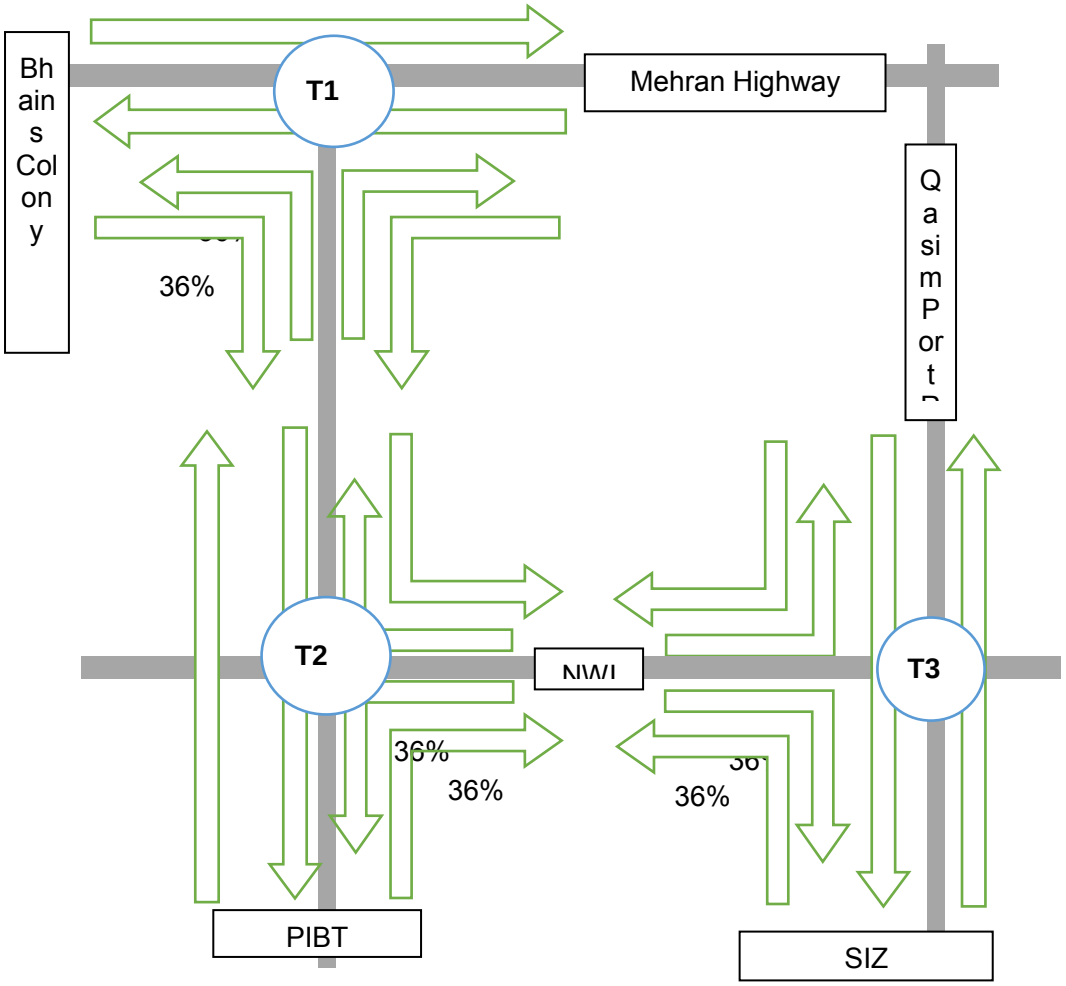


Figure 4.17: Traffic Survey Directions

Results and Analysis

Observed traffic trends at the various intersections are discussed below: Complete results of the traffic survey are presented in **Appendix 2.**

Location T1: Intersection of Mehran highway and corner of NWIZ

Traffic flows on T1 are shown in **Figure 4.18**. Approximately half of the traffic at this intersection goes straight on the highway whereas the remaining half is between NWIZ and the highways. Traffic on other directions is minimal. A large fraction of the traffic consists of LTVs.

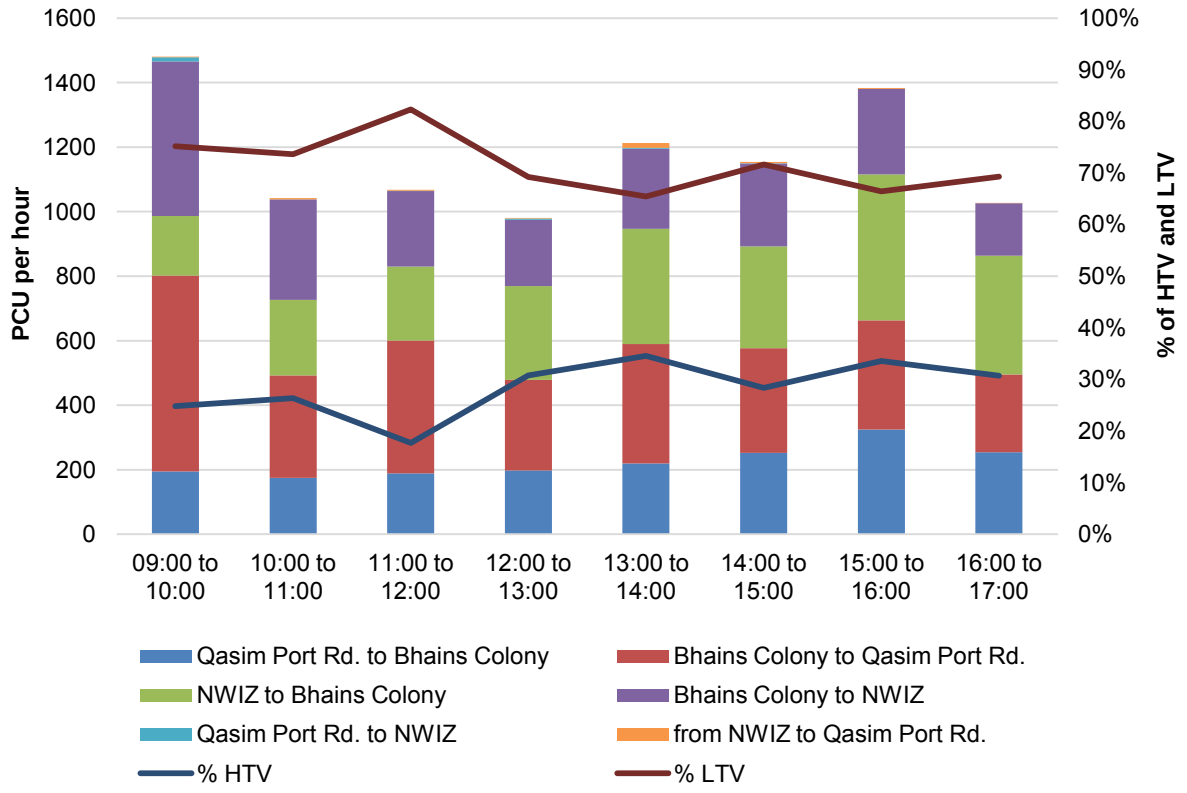


Figure 4.18: Traffic Flows at Location T1

Location T2: Intersection of road toward PIBT and NWIZ main road

The bulk of the traffic on this intersection is between NWIZ and the Mehran Highway. It is a major access route for the NWIZ. Minor traffic goes towards PIBT (which is still under construction).

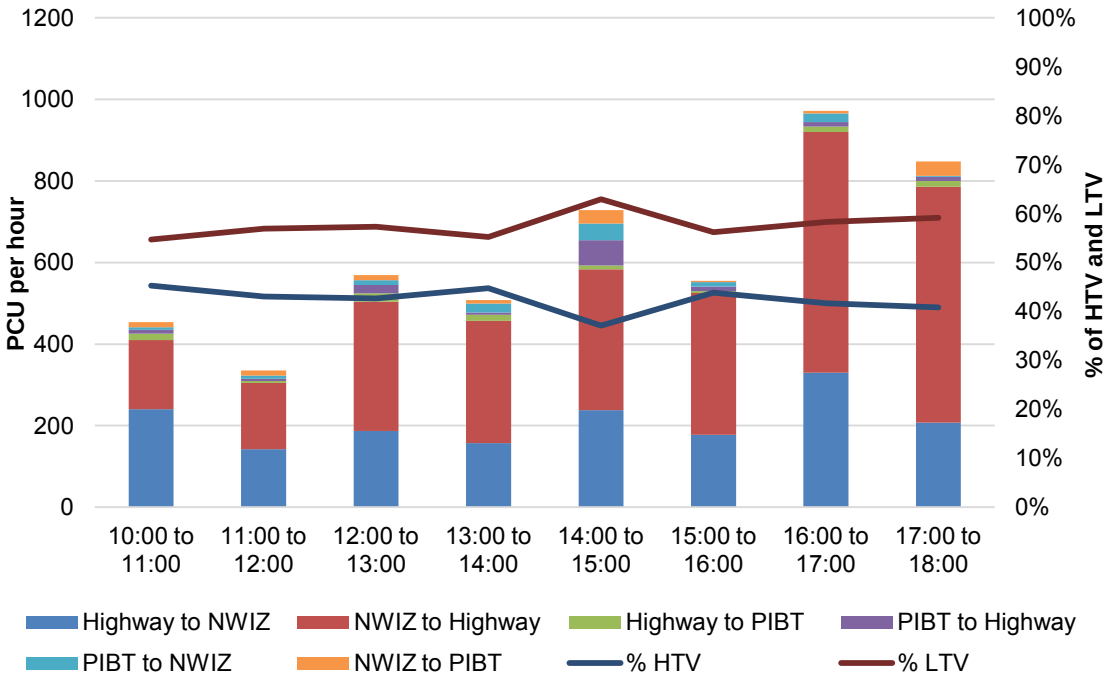


Figure 4.19: Traffic Flows at Location T2

Location T3: Intersection of main PQA Access road and NWIZ main road

Traffic going on to the port area predominantly uses this route. Significant inter zone traffic, between NWIZ and Southern Industrial Zone (SIZ), is also observed at this intersection as well. Almost equal fractions of HTV and LTV vehicles use this route. Traffic volumes almost doubled near the evening as compared to the morning.

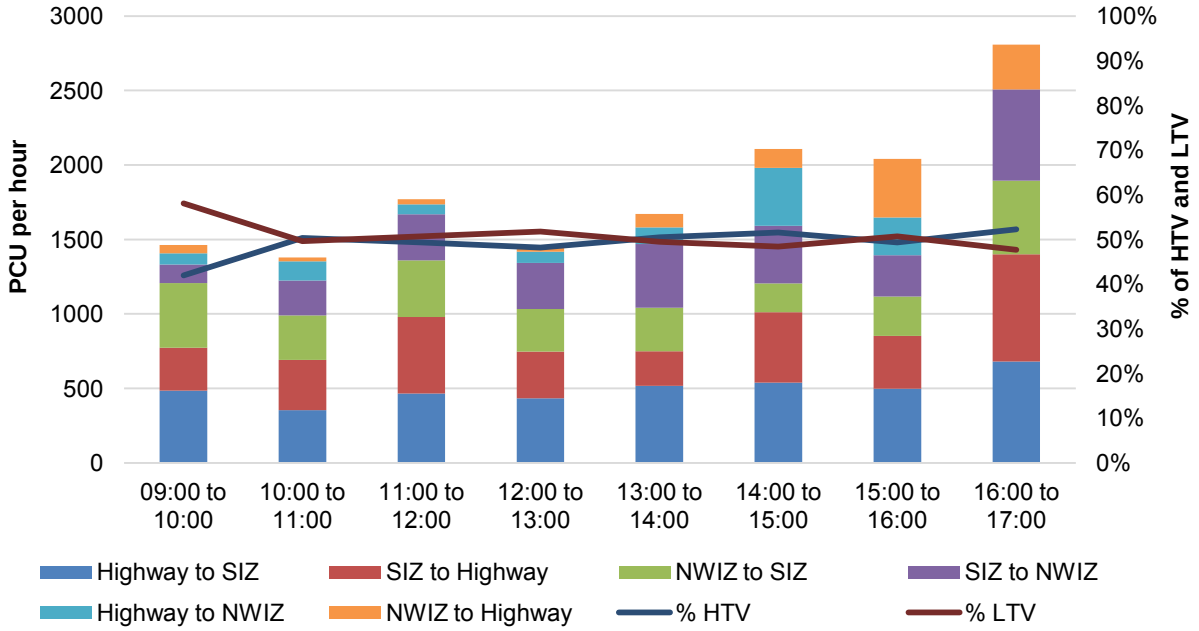


Figure 4.20: Traffic Flows at Location T3

Location T4: Road near proposed coal loading terminal

Only 12 vehicles used this road during the entire day.

Expected Developments of Traffic Routes

The majority of trips in the Study Area are external trips to and PQ. There are two major routes used for vehicles accessing the Northwestern and Southern Industrial zones in PQ:

- **Main Route:** approach to PQ is via the National highway (N5), approximately 3km north of NWIZ. The PQA main access road connects the N5 to NWIZ and then goes on to SIZ.
- **Alternate Route:** approach to PQ is via the Mehran highway which passes through Bhains Colony and reaches the boundary of the NWIZ.

The Port Qasim Strategic Plan, 2000 discusses only the main route. Based on traffic projections, it lays out expansion and up gradation plans as follows:

- Construction of additional two-lanes along PQA main access road from National Highway up to Pak Steel service road (approx. 8 km) by year 2007;
- Construction of additional two-lanes along PQA main access road to make it a six-lane dual carriageway (3 lanes in each direction) by the year 2050.

There are no conveyer belt options along this route. It does not specify any needs for upgrades of any of the internal routes that the conveyer belt is planned on.

However, the traffic survey shows that while 2736 vehicles used the main access road to enter NWIZ and SIZ and 1986 vehicles left the industrial zones towards the highway, an additional 1433 vehicles entered the industrial area and 1793 left the industrial area from the Mehran Highway which is approximately 68% of the flows of the main road.

A further 2517 vehicles went straight on the Mehran Highway and 1783 returned, of which a bulk of the traffic also likely ends up in the northern part of NWIZ.

If this trend grows it is possible that focus on upgrade will shift to this alternate route. However, if the main route is maintained and upgraded it is possible that traffic shifts onto the main route.

4.2.9 Offensive Odor

Characteristic odors near industrial units are prevalent depending on the type of industry. The smell of manure is common near Bhains colony. The smell of the sea is present near the south of the Study Area.

4.2.10 Fauna and Flora

Ecological surveys at selected sampling points within the Study Area were carried out on the 4th and 5th of January 2016. In addition to these surveys, literature reviews were carried out and information from the most recent past surveys was used. Members of the local community were also consulted regarding species observations.

Scope

The specific objectives of the ecological baseline study are as follows:

- A review of the available literature on the biodiversity of the Project site and vicinity
- Qualitative assessment of terrestrial ecological resources including vegetation, mammals, reptiles, and birds
- Qualitative assessment of marine ecological habitats
- Reports of wildlife sightings in the Study Area and vicinity by the resident communities.
- Identification of key species and determination if there is any potential critical habitat and ecosystem services in the Project facility and surroundings.

Literature Reviews

The most recent past surveys conducted in areas which overlap with the Study Area were used to supplement the ecological surveys carried out within the Study Area. These included surveys carried out for the following studies:

- EIA of Coal Power Plant (CPP) Project for Fauji Fertilizer Bin Qasim Complex, February 19, 2014

- EIA of Coal Jetty, Shipping Lane and Ash Disposal Site for Pakistan Port Qasim Electric Power Project, August 28, 2014
- CEA for Industrial and Port Development at Port Qasim for the International Finance Corporation, January 7, 2016

The overlap between study areas and the proximate timing of the past surveys means that information from these studies will be representative of ecological conditions within the present Study Area.

Habitat Classification and Description of the Study Area

The use of the term habitat, in the most general sense for animals, is where an animal can live.[18] As this is a highly modified environment, mainly in terms of land use; habitats have been classified mainly based on land use.

A review of the Study Area using the latest ***Google Earth™*** Imagery shows that, based on differences in land use, the following classifications can be determined:

- Vegetation Cluster
- Built Up Area (Settlement)
- Industrial Area
- Barren Land (with cleared vegetation)
- Agricultural Land
- Water Channel
- Coastal Area

These land use classifications are marked in **Figure 4.21.**

[18] Morrison, M.L, Marcot, B., Mannan, W. Wildlife-Habitat Relationships: Concepts and Applications. Island Press, Washington, D.C., 2006

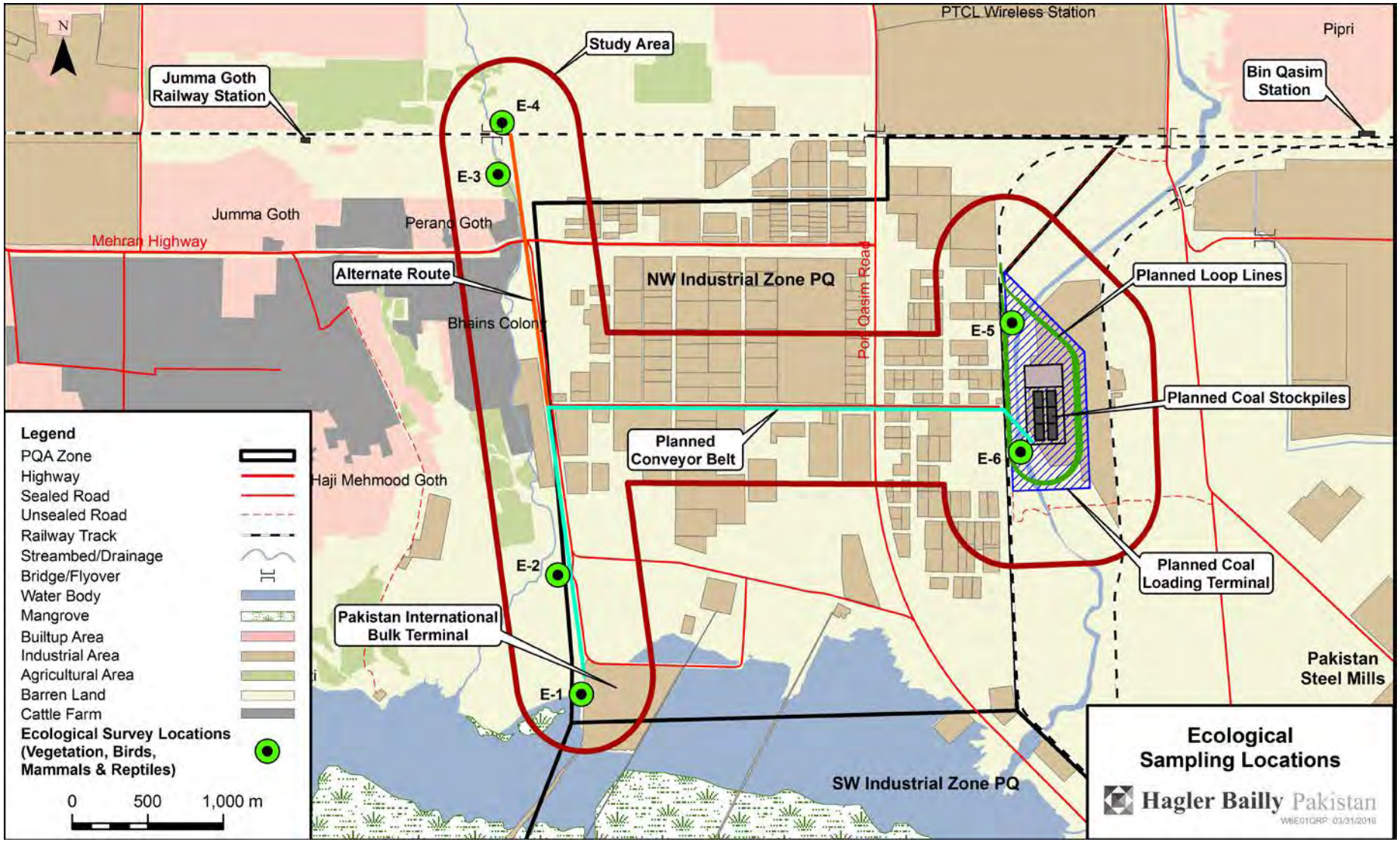


Figure 4.21: Ecological Sampling Points

Sampling Locations for Ecological Surveys

Sampling locations for ecological surveys were selected based on coverage of the different types of habitats. The focus was on locations where Project-related developments are most likely to take place. These areas include the sea and associated coastal habitat near the Pakistan International Bulk Terminal (PIBT), vegetation near the loading of coal onto the conveyer belt, areas which may be affected by coal dust and storage and areas which will most likely be cleared for the coal loading terminal.

A total of 6 sampling locations have been identified. The land use classification, coordinates and justification for selection of each sampling point is given in **Table 4.13**. The sampling locations have been shown in **Figure 4.21**.

A part of the Study Area covers marine and the associated mangrove habitat along the coastline. Taking into consideration the recent surveys and sampling exercises carried out by HBP for the CEA of Port Qasim, detailed information about the marine ecological environment, including the mangroves, is available from September 2015. This information has been used to develop an understanding of the ecology associated with the marine environmental resources within the Study Area.

Table 4.13: Sampling Points, Associated Habitat Classifications and Justifications for Selection

Sampling Point ID	*Classification by Habitat Type*	*Coordinates*	*Justification*
E-1	Sea and associated Coastal Area	24°48'38.3" 67°17'16.9"	Area may be affected by construction and operational activities, mainly pollution. Already disturbed by industrial activity
E-2	Vegetation Cluster	24°49'03.9" 67°17'11.0"	Area may be affected due to loading of coal onto conveyer belt
E-3	Vegetation Cluster near Built Up Area (Settlement)	24°50'30.01" 67°16'55.75"	Area may be affected due to coal dust generation
E-4	Relatively thick Vegetation Cluster near Agricultural Fields	24°50'41.1 67°16'56.5"	Vegetation may be cleared for coal loading terminal and water may be affected due to coal storage
E-5	Westward Water Channel and Vegetation Cluster	24°49'59.4 67°18'57.5"	Vegetation may be cleared for coal loading terminal and water may be polluted due to (improper) coal storage
E-6	Westward Water Channel and Vegetation Cluster	24°49'31.6 67°18'59.9"	Vegetation may be cleared for coal loading terminal and water may be polluted due to (improper) coal storage

Survey Methodology

The ecological resources within the Study Area have been divided into two categories, terrestrial and marine. Recent survey and sampling information on both types of ecological resources is available from the studies carried out in 2014 and 2015. For

terrestrial ecological resources further surveys were carried out focusing on vegetation, mammals, birds and herpetofauna.

At each sampling location the information collected included general site information as well as surveys for vegetation, mammals, reptiles and birds.

General Site Information

General site information was collected at each sampling location to enable the documentation of site specific conditions which cannot be observed using ***Google Earth™*** satellite imagery.

Terrestrial Ecological Resources

Terrestrial ecological resources were surveyed including vegetation, mammals, reptiles and birds. The methodologies used have been presented below.

Vegetation: The quadrate method was used to survey vegetation. A total of 3 quadrats of 10m x 10m were used at each sampling location. Vegetation species observed in the quadrats were counted and noted.

Mammals and Reptiles: Line transects of 200 m by 20 m were used at each sampling location to record mammal signs (foot marks, droppings, dens).

Birds: Line transects of 200 m by 50 m were used at each sampling location. All bird species observed were recorded.

In all cases the most recent keys available in the literature were used to identify the species.

Marine Ecological Resources

Detailed sampling exercises for the marine ecological resources in the area, covering mangrove habitat, mudflats, marine benthic invertebrates, burrowing forms and the fish fauna were carried out in June and September 2015 for the CEA of Port Qasim. Furthermore, extensive literature reviews for the presence and behavior of migratory and congregatory bird species, fish species of conservation importance which have been reported from or may occur in the Study Area (as well as the wider marine environment) were carried out in the latter half of 2015 (as part of the CEA of Port Qasim). Therefore, up to date information on the marine ecological resources within the Study Area is available.

Ecological Survey Results and Discussion

This section summarizes the results and discussion of the January 2016 ecological survey as well as the information gathered from the most recent past ecological surveys, literature sources and anecdotal evidence from members of the local community.

Terrestrial Ecology

The majority of the Study Area consists of terrestrial habitat. It is composed mainly of dry plain land with some water bodies. The results of the information collected for

terrestrial vegetation, mammals, reptiles and amphibians and birds is presented below.

Vegetation: The vegetation is characteristics of xerophytic[19] plant communities. During the January 2016 survey a total of 8 plant species were observed in the terrestrial habitat. Two of these were observed in the limited aquatic bodies found within the terrestrial habitat. A complete list of plant species observed in terrestrial habitat along with their dispersion has also been given in **Table 4.14**.

Table 4.14: Mean Plant Density, Species Observed and Species Dispersion

Sampling Point	*Mean Plant Density*	*Species Observed*	*Species Dispersion*
E1[20]	–	None	N/A
E2	7	*Prosopis juliflora*	Aggregated
		Tamarix sp	Random
E3	6	*Prosopis juliflora*	Aggregated
E4	11	*Prosopis juliflora*	Aggregated
		Euphorbia caducifolia	Random
		Arundo donax	Random
		Capparis decidua	Random
E5	12	*Prosopis juliflora*	Aggregated
E6	8	Grass in aquatic habitat[21]	Aggregated
		Prosopis juliflora	Aggregated
		Arundo donax	Random
		Boerhavia procumbens	Random
		Capparis decidua	Random

The most abundant plant species was *Prosopis juliflora*. Other abundant plant species observed included *Euphorbia caducifolia, Calotropis procera* and *Capparis deciduas*.

Aquatic habitats were found to be located at sampling point E-6. The same aquatic habitat extends towards sampling point E-5. Plant species found in these habitats were *Arundo donax* and a grass, the species of which could not be identified (**Figure 4.22**). The presence *Arundo donax* at sampling point E-4 suggests that there is aquatic micro habitat persistent at this location. **Figure 4.21** shows the presence of

[19] Any plant adapted to life in a dry or physiologically dry habitat (salt marsh, saline soil, or acid bog) by means of mechanisms to prevent water loss or to store available water (from Encyclopedia Britannica)

[20] This area had been cleared, therefore, there were no plants present. The plant density of the nearby mangroves is estimated to be approximately 30 trees per 100m^2 based on ecological surveys carried out in September 2015 for CEA

[21] Plant (grass) observed growing in aquatic habitat. The species could not be identified.

a relatively narrow eastward Water Channel. Under ***Google Earth™*** satellite imagery this is visible in some parts of the Study Area.

Aquatic sites were observed to be present as can be seen from **Figure 4.22**.

Aquatic habitat at sampling point E-6 with grass of unknown species visible

Arundo donax at sampling point E-6

Arundo donax at sampling point E-4

Potential Aquatic habitat at sampling point E-4

Source: Survey carried out in the current Study, January 2016

Figure 4.22: Aquatic Habitat

The presence of aquatic habitat and damp soils away from the coastline has enabled the growth and persistence of species that typically survive in damp soil, such as *Arundo donax*.[22]

[22] The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. accessed 14 January 2015

The species *Prosopis juliflora* is harvested by the locals and sold in the local timber market for fire and construction of local huts (**Figure 4.20**).[23]

Source: EIA of Coal Jetty, Shipping Lane and Ash Disposal Site for Pakistan Port Qasim Electric Power Project, August 28, 2014

Figure 4.23: Loading of Timber by Locals

Terrestrial plant species are a source of food for livestock owned by the locals in the area. Herds of goat were frequently observed at multiple sampling points during the January 2016 survey (**Figure 4.24**). Foot marks of herds in areas with relatively dense vegetation along with paths cut for access to vegetation were observed. This clearly indicates that locals use the terrestrial vegetation within the Study Area for grazing of their livestock.

Source: Survey carried out in the current Study, January 2016

[23] Hagler Bailly Pakistan (HBP), Cumulative Effects Assessment of Industrial and Port Developments at Port Qasim for the International Finance Corporation (IFC), Washington D.C, January 2016

Figure 4.24: Goats being herded, observed at sampling point E-2

Based on information available from past ESIAs for projects where there is overlap with the current Study Area, no threatened or endemic terrestrial plant species have been reported from this area. The distribution of these plant species is not limited to any specific site or habitat type and they are widespread. However, it should be kept in focus that certain plant species are dependent on aquatic sites within terrestrial areas or on the presence of damp soils for growth. The use of the areas with aquatic sites for Project-related activities could result in the reduction of species dependent on them.

***Mammals*:** During the survey conducted in January 2016 evidence of Asiatic Jackal *Canis aureus* and Indian Hare *Lepus nigricollis* was observed. Pug marks of both species were observed at sampling point E-4 and anecdotal evidence of locals hearing sounds of the Asiatic Jackal was also recorded at the same location. An ecological survey carried out in July 2013 also found pug marks of the Asiatic Jackal as well as that of the Fox *Vulpes vulpes*.[24]

Locals have also reported occasional sightings of wolf, hyena and wild boars in the area. However, these mammals are rarely observed. Small mammals such as rodents, hare and squirrels have also been observed in the area. Small mammal burrows were observed during at sampling point E-4 during the January 2016 survey.

None of the mammals reported from the Study Area are of conservation importance based on the IUCN Red List of Threatened.[25] The Asiatic Jackal and the Fox are included Appendix III of the CITES Species List and listed as Near Threatened in Pakistan Mammals National Red List 2005.[26] None of the mammal species reported to be present in the area are endemic and their distribution is widespread.

Birds: Birds can travel long distances especially compared to mammals and reptiles. Furthermore, a number of bird species use both terrestrial and marine habitats. Therefore, the avi-fauna within the Study Area is not limited to the marine and terrestrial habitats; all bird species observed have been reported.

During the survey conducted in January 2016 a total of 5 bird species were observed. These included the House Crow *Corvus splendens*, Indian Roller *Coracias benghalensis*, Common Myna *Acridotheres tristis*, Black Kite *Milvus migrans* and House Sparrow *Passer domesticus*. In addition to this, the presence of foot marks of birds near aquatic sites within terrestrial habitat, at sampling point E-6, indicated that birds use these sites as a source of water. Bird species classified as Plovers and Lapwings, belonging to the Subfamily Charadriinae, were also observed at sampling point E-1, near the marine habitat.

Figure 4.25 shows the presence of Black Kites at a site within the Study Area.

---

[24] Hagler Bailly Pakistan (HBP), Environmental Impact Assessment of CSP Project Bun Qasim Fertilizer Complex for Fauji Fertilizer Bin Qasim Limited (FFBL), Rawalpindi, 2013

[25] The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. accessed 14 January 2015

[26] Sheikh, K.M. & Molur, S. (Eds.) Status and Red List of Pakistan's Mammals. Based on Pakistan's Conservation Assessment and Management Plan for Mammals. 344 pp. IUCN, Pakistan. 2005.

The Black Kite was a commonly observed bird species within and around the Study Area.

Source: Survey carried out in the current Study, January 2016

Figure 4.25: Presence of Black Kites at a site within the Study Area

During the survey carried out in July 2013, in an area overlapping with this Study Area, a total of 9 bird species were observed. These included the Little Cormorant *Phalacrocorax niger,* the Grey Heron *Ardea cinerea*, the Indian Pond Heron *Ardeola grayii*, the Great Egret *Casmerodius albus*, the Little Egret *Egretta garzetta*, the Common Myna *Acridotheres tristis,* the Indian Robin *Saxicoloides fulicatus*, the House Sparrow *Passer domesticus* and the House crow *Corvus splendens*.[27]

Birds generally have relatively large ranges compared to mammals and reptiles, therefore, it is possible that part of the Study Area is used by bird species of the wider Indus Delta. The Indus Delta consists of both resident and migratory bird species, some of which show congregatory behavior[28] as well. Based on an analysis carried out for the Cumulative Impact Assessment of Port Qasim in November 2015[29], it was found that a total of 65 bird species known to occur in the Indus Delta show congregatory behavior while 62 of these showing both migratory and congregatory behavior. However, considering that the entire Study Area comprises habitat which is extremely disturbed by human activity it is highly unlikely that any congregatory sites will be affected by the Project and Project-related activities.

Pakistan is host to a large number of guest birds from Europe, Central Asian States and India every year. These birds originally reside in the northern states and spend winters in various wetlands and deserts of Pakistan from the high Himalayas to coastal mangroves and mud flats in the Indus delta. After the winter season, they go back to their native habitats.

---

[27] Hagler Bailly Pakistan (HBP), Environmental Impact Assessment of CSP Project Bun Qasim Fertilizer Complex for Fauji Fertilizer Bin Qasim Limited (FFBL), Rawalpindi, 2013

[28] Congregatory behavior is a feature of many bird families and often occurs at particular stages of the life- cycle. It occurs across a wide taxonomic range. Conservation of each congregatory site is vital for the species' continued survival. Destruction or degradation of key sites can have serious impacts on congregatory birds at the population level.

[29] Hagler Bailly Pakistan (HBP), Cumulative Effects Assessment of Industrial and Port Developments at Port Qasim for the International Finance Corporation (IFC), Washington D.C, January 2016

This famous route from Siberia to various destinations in Pakistan over Karakorum, Hindu Kush, and Suleiman Ranges along Indus River down to the delta is known as International Migratory Bird Route Number 4. It is also known as the Green Route or, more commonly, as the Indus Flyway and is one of the important migratory routes in the Central Asian - Indian Flyway [30] (**Figure 4.26**). As per an estimate based on regular counts at different Pakistani wetlands, between 700,000 and 1,200,000 birds arrive in Pakistan through Indus Flyway every year.[31] Some of these birds stay in the lakes but majority migrate to coastal areas.

Source: U.S. Fish and Wildlife Service 2008. Available at:http://alaska.fws.gov/media/avian influenza/ak-flyway2.gif U.S. Fish and Wildlife Service/Alaska

Figure 4.26: Asian Migratory Bird Flyways

Of the bird species observed in the Study Area none are of conservation importance based on the IUCN Red list of Threatened Species. The bird species of potential concern include those associated with the marine habitat and the associated mangrove habitat. However, this makes up a very small part of the Study Area. Furthermore, due to the proximity of industrial development and activity to this habitat within the Study Area, it is unlikely that bird species of conservation importance use the habitat within the Study Area or near it.

Reptiles and Amphibians: During the survey conducted in January 2015 no reptile or amphibian species were observed in the Study Area. During the survey conducted in July 2013 a low abundance and diversity of reptile species was reported; a total of two

[30] Convention on the Conservation of Migratory Species. Central Asian Flyway Action Plan for the Conservation of Migratory Waterbirds and their Habitats. New Delhi, 10-12 June 2005: UNEP/CMS Secretariat, 1 February 2006.

[31] Pakistan Wetlands Programme, Migratory Birds Census Report, 2012

species were observed including the Short-toed Sand Swimmer *Ophiomorus brevipes* and Sind Gecko *Crossobamon orientalis*. No amphibian species were observed.[32]

Based on a literature review as well as information from past ESIAs none of the reptile species reported from the Study Area and its vicinity are of conservation importance. This conclusion is based on information available on the IUCN Red list of Threatened Species[33] as well as information on endemism of reptile species in Pakistan.

Marine Ecology

A very small part of the Study Area consists of marine habitat. This is mostly composed of sandy shores and mudflats with a small part covered by mangroves. The results of the information collected relevant to the marine ecology within the Study Area has been presented below.

Coastal intertidal areas have a diverse range of. The substrate has very fine sediments (mud, clay and silt) and the faunal communities present are dominated by faunal assemblages representing soft sediments. The sediment substrates are generally found to be high in organic content and with black mud just below the substrate.[34] Bird species belonging to the Subfamily of Plovers and Lapwings (Charadriinae) were observed foraging near sampling point E-1 during the January 2016 survey. Coastal invertebrate fauna and marine benthic invertebrates (MBIs) makes up most of the biodiversity present within the marine habitat part of this Study Area.

Mangrove Habitat: A very small population of mangroves is found within the Study Area. The Project and related activities are not expected to have any significant impact on the mangrove ecosystem because of the limited mangrove population within the Study Area.

Mangroves are important for providing the base of the food chain and for primary productivity.[35] They provide protection by stabilization of intertidal sediments, from wave and wind erosion and as bio-chemical depositors, acting as a sink for heavy metals.[36]

Mangroves in the Study Area are most likely to be affected by marine pollution considering their proximity to the coastline. However, based on a mangrove sampling exercise carried out in September 2015[37], they are probably supporting biodiversity such as crab species.

---

[32] Hagler Bailly Pakistan (HBP), Environmental Impact Assessment of CSP Project Bun Qasim Fertilizer Complex for Fauji Fertilizer Bin Qasim Limited (FFBL), Rawalpindi, 2013

[33] The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. accessed 14 January 2015

[34] Akhter, N Sustainable Fisheries The Pakistan National Conservation Strategy, Government of Pakistan Environment and Urban Affairs Division in collaboration with IUCN – The World Conservation Union, 1995

[35] Indus for All Program (IFAP). "Mangroves of Pakistan WWF- Pakistan", Karachi, pp16. 2008

[36] Ibid

[37] Hagler Bailly Pakistan (HBP), Cumulative Effects Assessment of Industrial and Port Developments at Port Qasim for the International Finance Corporation (IFC), Washington D.C, January 2016

A total of 344,870 ha of mangroves under the Sindh Forest Department (SFD) were declared as 'Protected Forests' under the Forest Act of 1927. A part of this area was transferred to the Port Qasim Authority in 1973 for development of the port. Even though one source maintains that the mangroves continue to be Protected Forests, the environmental regulator, SEPA, has not questioned this right in the EIAs for port developments submitted to it for review.

Coastal Invertebrate Fauna: The surface and burrowing marine invertebrates play an important role in mixing the organically enriched bottom sediments and are the key linkages in transferring the energy from lower trophic level to the next higher trophic level in the food chain.

The marine benthic invertebrate community includes the microbes: detritus feeders, small and large herbivores, and small and large carnivores. The marine invertebrates play an important role in mixing the organically enriched bottom sediments and are the key linkages in transferring the energy from the lower trophic level to the next higher trophic level in the food chain.

MBI organisms (like those shown in are a good indicator of ecological disturbances. Sampling for Marine Benthic Invertebrates carried out in June 2015 for the Cumulative Effects Assessment of Port Qasim was used for the application of the Shannon Weiner diversity index, to measure the health of the ecosystem. The results showed that higher MBI biodiversity was found away from the main land where impacts of pollution from industrial and residential areas is expected to be low. The species showed a relatively uneven distribution at the sampling point located closest to the present Study Area. The conclusions of the study carried out in September 2015[38] were that overall the Port Qasim Area creeks are a disturbed area, and therefore both species diversity and species richness are relatively low. It was not possible to conclusively establish any relationship of MBI biodiversity with dredging activities, as with other factors such as turbidity and pollution.

Based on information available in previous ESIAs and secondary liteature, none of the marine invertebrates species reported from the Study Area are threatened according to the IUCN Red List of Threatened Species.[39] Moreover, their distribution is not limited to any specific site or habitat type and are widespread.

Coastal Marine Fisheries:

A very high diversity of fish species (approximately 200) has been recorded from the Indus Delta region.[40] Common larvae of fish described for Korangi Creek (located at a distance of 7.5 km west of sampling point E-1) and adjoining creeks in Indus Delta belong to the families Mugilidae, Gerreidae, Clupeidae, Nemipteridae, Gobiidae,

---

[38] Hagler Bailly Pakistan (HBP), Cumulative Effects Assessment of Industrial and Port Developments at Port Qasim for the International Finance Corporation (IFC), Washington D.C, January 2016

[39] The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. accessed 02 May 2015

[40] WWF. Indus Delta: A Vanishing Ecosystem. Indus for All Programme. Programme Management Unit, WWF [not dated]

Sciaenidae, Engraulidae, Sillaginidae and Lutjanidae.[41] Some juvenile sharks have been reported from Issaro Creek.[42]

Sampling for fish was carried out within the Port Qasim Area as part of the Cumulative Impact Assessment of Port Qasim.[43] The results of the sampling exercise showed a lower number of species at the two sampling locations close to the coastal areas. This can be attributed to more pollution, higher level of disturbance, and industrial and domestic sewerage at sampling locations proximal to the coastline compared to those distal from it.

Heavy Metal Contamination: Based on three separate surveys carried out in 2008, 2014 and 2015, heavy metal contamination was detected in fish, shrimp and crab species. The heavy metals of concern included arsenic, cadmium, zinc and copper, as they were found to be above the permissible limits. In the most recent survey carried out in June 2015, only arsenic was found to be above the permissible limit; concentrations of other heavy metals including copper, lead, mercury and zinc were found to be below the permissible limits.

Marine Mammals and Reptiles: There is very little published information available on the number of cetaceans that visit the Port Qasim Area. Anecdotal evidence suggests that they have been observed in the shallow waters of creeks within the study area, but very rarely.

Among the reptiles, Beaked Sea Snake *Enhydrina schistose*, Annulated Sea Snake, *Hydrophis cyanocinctus*, Yellow Sea Snake *Hydrophis spiralis*, Dwarf Sea Snake *Hydrophis caerulescens*, Small headed Sea Snake *Hydrophis fasciatus* and Pelagic Sea Snake *Pelamis platurus* have been recorded from the mangroves in the Indus Delta.[44] All of these species are listed as Least Concern in the IUCN Red List of Threatened Species.

Based on the information above these marine mammal and reptile species of conservation importance are not normally present in the part of the Study Area located within the marine habitat.

4.2.11 Protected Area

The Protected Areas around the Study Area have been shown in **Figure 4.27**. It can be observed that the Study Area is located well within a developed area. The nearest Protected Area, the Haleji Wildlife Sanctuary, is 43 km away from the Study Area.

---

[41] Ibid

[42] Based on surveys carried out by WWF Pakistan and Marine Fisheries Department and as reported by WWF and MFD.

[43] Hagler Bailly Pakistan (HBP), Cumulative Effects Assessment of Industrial and Port Developments at Port Qasim for the International Finance Corporation (IFC), Washington D.C, January 2016

[44] Ahmad, MF.,Ghalib, SA., Niazi, MS., Perveen Z. and Hassan, A. Study of the Vertebrate Fauna of Mangrove Swamps of Sindh Coast. PARC Final Report Zoological Survey Department, Karachi, 1989 (Unpublished Report).

Figure 4.27: Relative Locations of Protected Areas and the Study Area

4.3 Social and Cultural Characteristics

A socioeconomic survey was undertaken by HBP's social team on January 28 and 29, 2016, with the objective of understanding the socioeconomic setting of the settlements and communities that may potentially be affected by the Project activities. The process

followed for collecting the baseline information and the key findings of the field visit are documented in this section.

Methods of Data Collection

Information on the socioeconomic conditions prevailing within the Study Area was collected through a combination of settlement level surveys and focus group discussions. The information was obtained from key informants: literate people, knowledgeable of the socioeconomic conditions of their communities. Data collection for settlement surveys was carried out using standardized questionnaires along with a cattle farm specific survey that was conducted due to the mixed nature of the settlements. Standardized questionnaires used for the survey are provided in **Appendix 3**.

Two large semi-urban communities inhabit the Study Area. These are Jumma Goth to the northwest and Bhains Colony to the southwest of the Study Area. Both colonies extend further to the west of the Study Area. For each settlement a survey location was chosen within the Study Area and a second location within the respective settlement was chosen further west towards the center of these colonies. The list of surveyed settlements along with their coordinates and the dates of the survey are shown in **Table 4.15** and the locations of the surveyed settlements are shown in **Figure 4.28**. Perano Goth and Haji Mahmood Goth are a subset of Jumma Goth and Bhains Colony respectively.

Table 4.15: List of Surveyed Settlements

Date	*Location*	*Sample ID*	*Coordinates*	
Jan 28, 2016	Perano Goth (Jumma Goth)	S1	24° 50' 21.2" N	67° 16' 57.3" E
Jan 28, 2016	Jumma Goth	S2	24° 50' 14.3" N	67° 16' 05.5" E
Jan 28, 2016	Bhains Colony (Shahryar Town)	S3	24° 49' 45.6" N	67° 16' 54.2" E
Jan 29, 2016	Bhains Colony (near Haji Mahmood Goth)	S4	24° 49' 23.5" N	67° 16' 22.0" E

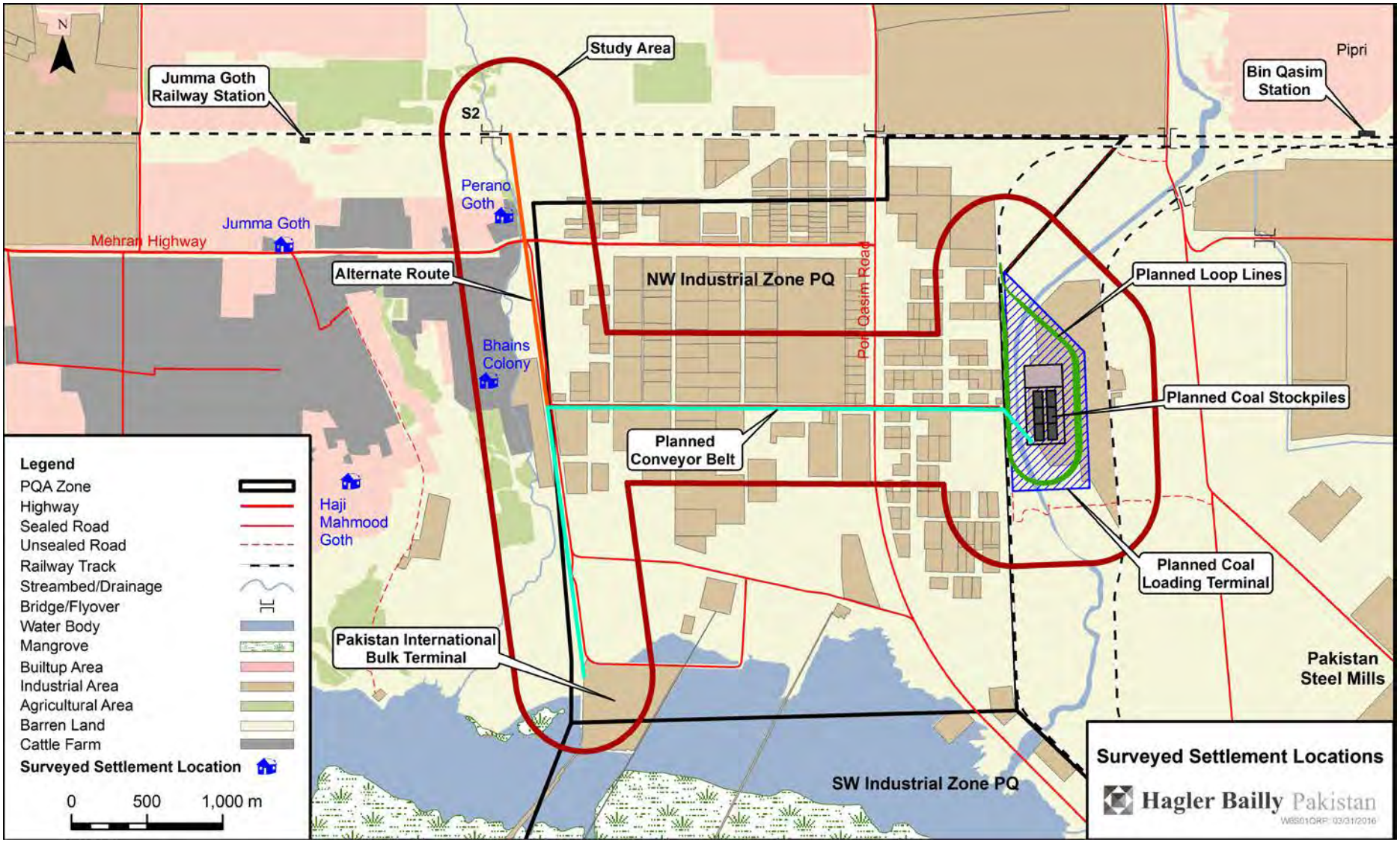


Figure 4.28: Location of Surveyed Settlements

4.3.1 Current Land-Use

Land in the Study Area consists mainly of used as industrial land with a large amount of barren land still barren as can be seen in **Figure 4.28**. The distribution of the land use within the Study Area is given in **Figure 4.29**. The various land uses are explained further in this section. Photographs of the land uses are shown in **Figure 4.30**.

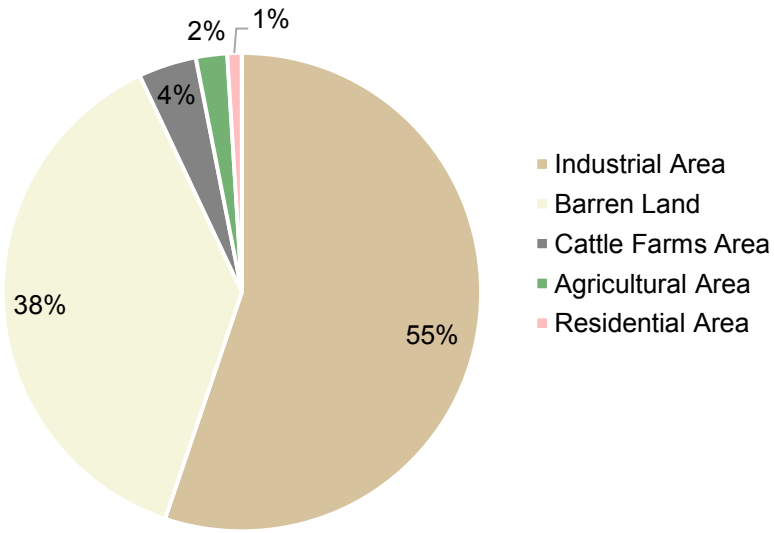


Figure 4.29: Summary of Land use in the Study Area

Industrial area

Barren land

Cattle farms

Agricultural farms

Figure 4.30: Photographs of Land Use in the Study Area

Industrial Area (55%)

The majority of the Study Area falls under a notified industrial area – the Port Qasim Industrial Zone. The conveyer belt passes through the extensively developed North Western Industrial Zone which has a total area of 2920 acres of which 904 acres are reserved for port services and the remaining 2016 acres for industrial units. Industrial units include automotive assembly, pharmaceutical, food and edible oil processing among others.

Barren Land (38%)

A large portion of the Study Area consists of barren land. Certain portions of the land are vegetated which are used by goat herders as grazing land (see **Section 4.2.11**). A large portion of this barren land is within the industrial zone and it is expected that industrial units will be developed on it in the future.

Cattle Farms (4%)

While only accounting for 4% of land use, cattle farms are a dominant feature of the communities in the Study Area. Some key findings from the survey about these farms include:

- Buffalos produce between 8 and 10 liters of milk per day.
- Farms sell milk for Rs. 65 to 67 per liter
- No other dairy products are made
- Reported buffalo diseases include mastitis, foot and mouth disease, infections and flu but buffalos rarely die due to disease or other natural causes. All surveyed farms reported that they get their cattle vaccinated.
- Water is supplied from the Karachi Water Supply Board line and waste is discharged into nearby water bodies.
- Buffalos are kept for one lactation cycle after which most are sold for meat. This results in about 10 percent of the animal population being replaced each month.

Milk processing and transport is done using very basic technology and in poor hygienic conditions. Milk containers being washed before milk transport is shown in **Figure 4.31.** A summary of the scale of operations of different types of cattle farms is given in **Table 4.16**.

Figure 4.31: Milk Transport Containers

Table 4.16: Typical Sizes of Cattle Farm Operations

Farm Size	*Buffalos*	*Fodder consumption*	*Milk production*	*Milk sale revenue*
	number	*Rs/month*	*Liters/day*	*Rs./month*
Small	54	675,000	515	1,004,250
Medium	120	1,504,800	1000	1,950,000
Large	150	2,100,000	1200	2,412,000

Agricultural Area (2%)

Limited agricultural activities are practiced in and around the Study Area. Water is obtained from surface drains that receive liquid effluent from cattle farms which is rich in nutrients.

Residential Area (1%)

The two major residential areas in the vicinity of the Project are Jumma Goth and Bhains Colony. These settlements consist of urban communities that are mixed with cattle farms. Bhains Colony is dominated by cattle farms whereas Jumma Goth is mostly residential with some farms present as well. Construction is almost exclusively masonry. Typical masonry homes are shown in **Figure 4.32**. An estimated size of the settlements is given in **Table 4.17**. The average household size was reported to be 6.5 persons per house.

Single story home

Double story homes and partially paved streets

Figure 4.32: Construction in the Study Area

Table 4.17: Estimated Settlement Size

Settlement	*Households*	*Estimated Population*
Perano Goth (Jumma Goth)	300	2000
Jumma Goth	2000	13000
Bhains Colony (Shahryar Town)	120	745
Bhains Colony (near Haji Mehmood Goth)	1350	8775

4.3.2 Cultural Heritage

There are no major known heritage sites within or in close proximity of the Study Area. Jumma Goth has a large Sindhi population and so Sindhi culture is present in the settlement. However, in Bhains colony houses are scattered due to the heavy presence of cattle farms. Furthermore, the large influx of day laborers from across the country which live on these farms has resulted in a mixed identity of the community. Most of the population is Muslim. There are several mosques in the area such as the one shown in **Figure 4.34**. A shrine is also shown in the same figure.

4.3.3 Indigenous or Ethnic Minorities

The distribution by ethnicity and language of the surveyed communities is shown in **Figure 4.33**. Almost half of the inhabitants are Sindhi. Many of the buffalos in Bhains Colony are brought from Punjab, which is the key reason behind the presence of people of Punjab in the Study Area. A Christian community was present but in minority, at about 6% of the population. Presence of indigenous peoples was not reported in the Study Area.

The proportion of Sindhi speakers in the Study Area correspond to their population at 45% whereas it was reported that only 2% of the population spoke Punjabi. The second most popular language was Urdu at 35% as it is often the language of choice in Karachi. This was followed by Pushto and Balochi at 10% and 8% respectively.

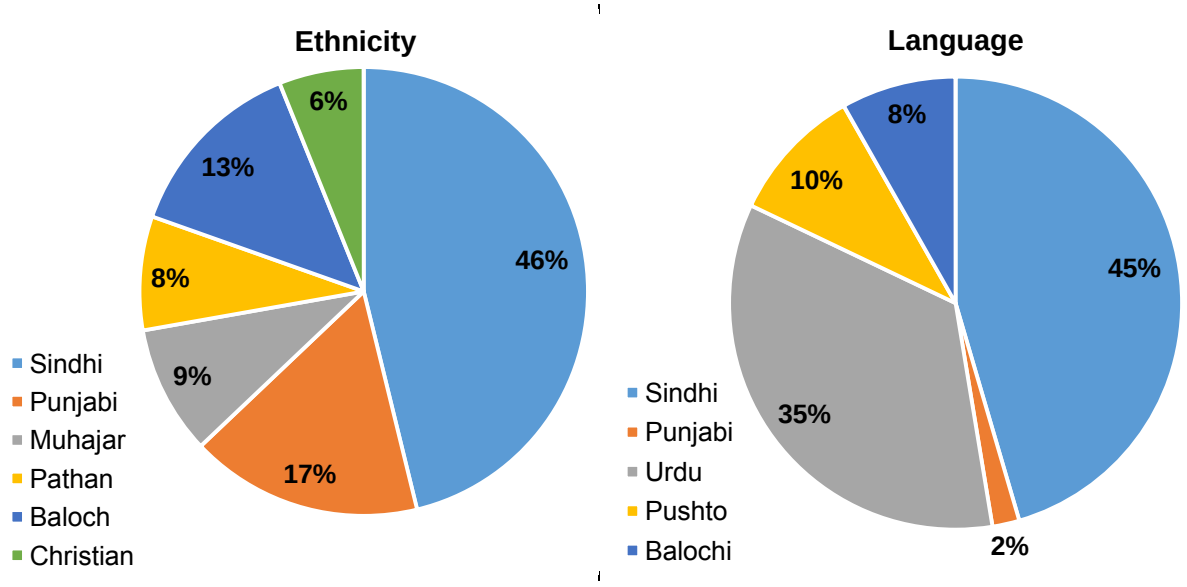


Figure 4.33: Ethnicity and Languages Spoken in the Study Area

4.3.4 Health and Health Facilities

It was reported that cold and flu were the most common ailments followed by diarrhea and other stomach diseases. The frequency of occurrence of diseases as reported by key informants is presented in **Table 4.17**. A dearth of health facilities, the only ones being in Jumma Goth was reported by the communities. The government dispensary in Jumma Goth provides free healthcare whereas private doctors charged Rs. 300 per consultation. A photograph of a private clinic and the government hospital is shown in **Figure 4.34.**

Table 4.18: Yearly Occurrence of Disease in the Study Area

Common Ailments	*Percentage occurrence*	
	Men	*Women*
Diarrhea	50%	50%
Breathing problems	33%	13%
Jaundice	28%	8%
Cold and Flu	74%	68%
Stomach diseases	36%	41%
Joint Aches	30%	13%
Diabetes	13%	5%
Heart problems	4%	2%

4.3.5 Educational Institutions

Primary schools were present in all surveyed communities and middle schools in two of the four (**Table 4.18**). As the communities are close together they use educational facilities interchangeably. Furthermore, children travel to Korangi and Malir, about 2-3 km away, to attend college. Madrassas are also present in the community where religious instruction is administered to children. A school and madrassa are shown in **Figure 4.34**. Girls can be seen studying alongside boys in the madrassa.

Table 4.19: Access to Educational Institutions

	Primary	*Middle*	*High*
Perano Goth	Yes	No	No
Jumma Goth	Yes	Yes	Yes
Shehryar Town	Yes	No	No
Bhains Colony	Yes	Yes	No

4.3.6 Social Infrastructures and Decision-Making Institutions

Respondents stated that since there were many different communities living in the area there was no tribal or spiritual leader of the settlement and community leaders emerged due to power, wealth and political connections. Influence of these leaders

ranges from a few streets to a few hundred households. Inhabitants preferred to resolve conflicts through the local leader who settled disputes in the presence of both parties, at times deciding fines to be paid as compensation. Locals approach the police only if this local mechanism does not resolve their dispute.

Private Clinic

Government Hospital

Madrassa

High School

Mosque

Shrine

Figure 4.34: Social Infrastructure in the Study Area

CHAPTER 5. Environmental Impacts Identification

This section discusses the potential environmental and social impacts of the proposed Project. It predicts the magnitude of the impacts, assesses their significance, identifies mitigation measures to minimize adverse impacts, and evaluates the residual impacts, if any, of the Project.

Risk is defined qualitatively in terms of consequence and probability. Consequence is defined in terms of magnitude, duration, and spatial scale. Thus, the three categories are defined as follows:

- H—Definite impact, major deterioration and/or long–term impact and/or large footprint
- M—Possible impact, moderate deterioration and/or medium–term impact and/or intermediate footprint
- L—Unlikely (or low likelihood) impact, minor deterioration and/or short–term impact and/or small footprint

The significant issues are then further discussed in the following sections.

5.1 Impact Identification and Scoping Matrix

Impacts are identified using a scoping matrix presented in **Table 5.1.** Major impacts are discussed in detail and depth further in this section.

Table 5.1: Screening of Environmental and Social Impacts of the Proposed Activities

Project Activity	*Impacts*	*Risk*	*Discussion*
Design Phase			
Land Acquisition	Acquisition of land from private owners, if required can potentially affect their livelihood due to loss of land	M	No significant private land required to acquire for the project construction
Conveyer belt design	Improper design increases risk of collapse	L	Area is not in a significant earthquake risk zone. Building code requirements will be met.
	Conveyer belt will be constructed onto the center median of the existing road which may block future road expansion plans resulting in congestion and may also cause for traffic accidents	L	The conveyor belt will be constructed by an overhead trestle in the center median The conveyor belt will be designed as per the principles of traffic engineering so minimize interference in existing traffic flow; and ensuring that the incoming traffic has full visibility of approaching traffic on the intersection
	Conveyer belt is 10 meter high along the center median of the road. It may result in visual obstruction and decline in aesthetic value of the area	L	The project construction land is fall in an area designated for industrial development
Construction Phase			
Construction impact : Construction activities include construction and operation of staff camp, storage of equipment, civil works, and installation of equipment.	Potential environmental impacts of construction activities include: spills and leakages of oil and contamination of soil and potentially surface water.	M	As the project is located in a designated industrial zone, the risk of impact is low. The impacts are further discussed in **Chapter 5.3.**
Construction waste impact: Construction activities can generated significant waste.	Potential environmental impacts are: Camp waste disposal; disposal of camp wastewater; disposal of contaminated soil	M	Discussed in **Chapter 5.3.**
Construction Noise: Noise generated by construction machinery can affect the noise levels in nearby community	Disturbance to the community	L	As the project is located in a designated industrial zone, the risk of impact is low. The impacts are further discussed in **Section 5.3.**

Project Activity	*Impacts*	*Risk*	*Discussion*
Transportation of material and equipment: Part of the equipment will be imported via Karachi Port or Port Qasim. Other equipment and material will be procured from in–country sources. The equipment and material will then be moved to project site the main highways, such as M–9 or N–5.	During the main phase of material and equipment transportation, the additional traffic generated on the road can potentially result in the following types of impact: road congestion and inconvenience to existing road users, additional noise and emissions and impact on the nearby community, and community safety issues.	L	All the roads that will be used for the transportation of project material and equipment are national highways, and in most cases have at least 4 lanes. The current volume of traffic on any of the highways ranges from 8,000 to 21,000 vehicles per day. In comparison the volume of traffic generated by the movement of project material and equipment is likely to be less than few trucks, spread over several weeks. The incremental traffic and consequently the impact will therefore be insignificant. Environmental management measures have been included in the EMP.
Occupational health and safety: During the construction phase, the proposed Project can also increase the risk of exposing the workers and employees of the construction team and their contractors to occupational and safety hazards.	Construction activities pose an occupational health and safety risk to the workers. Improper management of this aspect can lead to fatalities and health issues.	M	Discussed in **Section 5.3.**
Operation Phase			
Dust emission during Coal handling activities (loading, unloading and transport via conveyer belt) and coal storage at the stockyard.	Emission of dust particulates from coal handling and storage will deteriorate air quality and can impact nearby industries and communities.	H	Dry and windy conditions will aid the dispersion of dust particles from the coal yard. The area already has existing high levels of dust. Dust particles may settle on flat surfaces in the surrounding area. A covered conveyor belt with water based sprinkler

Project Activity	*Impacts*	*Risk*	*Discussion*
			system is included in the design for dust suppression and fire–fighting. The impacts are further discussed in **Section 5.3.**
Coal dust suppression Accidental Spills	Leachates from rainwater and dust–suppression water system runoffs containing coal powder and minute amounts of heavy metals may contaminate soils and surface water. Contamination of water resources due to system failure and accidental spills during coal transportation	M	Since there are no ground water resources in the vicinity of the site, therefore, risk of ground water contamination is low. Surface water and soils may be contaminated Waste water will be treated in a sedimentation pond before disposal. The impacts are further discussed in **Section 5.3.**
Project Water Consumption	Project water consumption from local water resources may be compromised the requirement of local community water needs	L	The project water requirement will be met by water supply from PQA, therefore, risk of water crisis due to the project for local communities is low.

5.2 Possible Impacts in Planning Stage

5.2.1 Land acquisition

Impact: Acquisition of land from private owners, if required can potentially affect their livelihood due to loss of land.

Discussion: The land occupied by Port Qasim Authority (PQA) or government will be utilized for construction of conveyor belt and coal loading terminal so no private land required to acquire for the project construction.

5.2.2 Visual Impact

Impact: Conveyer belt is 10 meter high along the center median of the road. It may result in visual obstruction and decline in aesthetic value of the area.

Discussion: The construction land of the project is fall in an area designated for industrial development and meant for such structures to be developed so no or minimal visual obstruction and decline in aesthetic value of the area is expected.

5.2.3 Traffic

Impact: Conveyer belt will be constructed onto the center median of the existing road which may block future road expansion plans resulting in traffic congestions.

Discussion: The conveyor belt will be constructed by an overhead trestle in the center median in a way that interrupt minimal on expansion plans of the existing roads.

5.3 Construction Phase Impacts

5.3.1 Possible Impacts and Mitigation Measures

Some construction impacts relate to activities at the construction site where as others relate to the setting up and operation of the construction crew camp. Typical issues include:

- Site clearance leading to dust emission
- Erosion and sedimentation
- Air quality impact from operation of construction machinery
- Noise and vibration
- Waste management
- Off–site impacts such as those related to borrow pits
- Effluent from construction camp
- Safety
- Cultural impact

Many of the construction impacts are temporary and end with the completion of the construction activity. However, poor management can result in permanent damage to the environment during construction activities.

To avoid adverse impact of the construction activities on the environment, following measures will be taken:

1. The camps of the construction contractor(s) will be located at least 250 m of any community.

2. The construction contractor will be required to develop a site–specific construction management plan (CMP) based on the CMP Framework included in the EMP (**Chapter 7**). The CMP will be submitted to PQA and Project Implementation Consultant (PIC) for approval.

3. Each CMP will contain a site plan of the construction site. The site plan will cover all areas that will be utilized during construction for various purposes. The will include, for example, the following:

    a. Areas where construction will take place.
    b. Areas where wearing personal protective equipment (PPE) is mandatory
    c. Areas used for camp and offices
    d. Storage areas for raw material and equipment
    e. Waste yard
    f. Location of any potentially hazardous material such as oil
    g. Parking area
    h. Area reserved for loading and unloading of material
    i. Septic tanks, and
    j. Storm water run–off direction and control measures.

5.3.2 Generation and Disposal of Waste

Solid Waste

The construction activities may generate considerable amount of waste. A detailed inventory of the waste will be prepared. The waste will include metals (mainly iron and copper), concrete, wood, cotton, plastic, packing materials, electronic, and insulation material. Several types of hazards are associated with the wastes. For example:

- Sharp edges in metals
- Tripping hazards if material is left in the pathways
- Soil contamination from leaking oil from equipment
- Slipping hazard from oil on floors
- Potentially toxic content
- Respiratory disorders due to dust

A comprehensive waste management plan (**Appendix 4**) will be instituted during which re–use opportunities for waste generated from the project will be actively

investigated. Used oil and other waste will be identified, and if any, it will be stored in separate designated and contained facility.

As a standard practice all metal (mainly iron and copper) or wooden parts generated as waste during the rehabilitation project will be recycled or stored in dedicated existing scrap yard for auction.

Even after implementation of the control measures, it is possible that some littering may take place. Periodic monitoring and cleanup will be undertaken to minimize the residual impact.

Camp Effluent

The staff and labor camps for construction of the Project will be a source of wastewater generated from the toilets, washrooms, and the kitchen, etc. All sanitary effluent will, however, be routed to existing system of PQA after passing through septic tanks and soakage pits.

5.3.3 Soil and Water Impact

Possible sources of soil and water impacts include:

- Spills during refueling, discharges during vehicle and equipment maintenance, traffic accidents, handling of chemicals and leakages from equipment and vehicles often result in contamination of soil during construction;
- Runoff after a storm from the construction site may contain oil that may pollute the surrounding lands. Earthwork may also alter the drainage pattern and affect the storm water flow and result in possible flooding of sections of surrounding land;
- Various types of wastes such as packing waste; metal scrap, and excess materials, uprooted vegetation, and excess soil will be generated during the construction phase. Besides being an eyesore, the waste can be a health hazard and pollute waterways, if disposed improperly.
- Mitigation measures for these impacts are detailed in the WMP, CMP and Spill Management Plan found in **Appendix 4.**

5.3.4 Clearing of Vegetation

Clearance of vegetation will eliminate potential habitat for the bird and mammal species present in the Study Area (see **Section 4.2.10**). However, none of the species are of conservation importance according to the IUCN Red list of Threatened Species. Furthermore, their distribution is widespread; they are not limited to any specific type of habitat or area within the Study Area. Birds of conservation importance typically found at or near the coastal areas are unlikely to be affected because of the limited marine and coastal habitat located in the Study Area.

5.4 Possible Impacts in Operation Phase

Major environmental impacts during operations will result from fugitive dust emissions from transport and handling coal and the discharge of liquid effluent from dust

suppression. All major potential environmental impacts during operation phase are discussed in this section.

5.4.1 Impacts on Water Resources

Impacts due to project wastewater discharge

Leachates from rainwater and dust–suppression water system runoffs containing coal powder and traces of heavy metals may contaminate soils and surface water.

Water resources may be contaminated due to system failure and accidental spills during coal transportation.

Impact on Local Water Resources

Project water consumption from local water resources may compromise the requirement of local community needs.

Mitigation Measures

Based upon the above analysis, the following mitigation measures will be adopted:

- Effluents being discharged will meet the SEQS limits for liquid effluents. The incremental impact from the Project on water resources will be minor and is unlikely to have significant impacts on creek ecology downstream.
- The possibility of using recycled water for dust suppression will be explored
- The operational water requirements for the Project will be met by a supply connection provided by PQA.

5.4.2 Impacts on Air Quality

The predominant air pollutant from the proposed coal stockyard and conveyor belt facility will be particulate matter. The fugitive dust emissions will result from several key activities that include:

- **Reclaimer/Stacker:** Addition and removal of aggregate material from the storage piles involves dropping the material onto a receiving surface. Adding material to the belt by reclaimer and transferring material from one conveyor belt to another are examples of a continuous drop operation.
- **Conveyor:** Fugitive emissions will be generated from conveying and transferring of material on conveyor belts due to wind, belt vibration, scrapers and brushes.
- **Stockpile:** Wind erosion of coal stockpile surfaces and ground areas around piles.

The fugitive dust emitted from the activities above will comprise of a wide variety of size fractions. The larger deposited dust is the material generally greater than 50 µm in diameter. It poses a nuisance potential due to soiling of surfaces and can cause irritation to eyes and nose. Due to the large size of deposited material it usually falls out of the air within short distance of approximately 100 meters of the source. The eastward and westward water channels are within 100 meters of the proposed location

of the coal stockyards. Furthermore, there are farms, warehouses and industrial units near the proposed location as well.

The finer material, generally less than 20 µm, can travel large distances downwind. Therefore, air dispersion modelling was used to calculate the impact of the Project on fine dust concentrations (specifically PM_{10} and $PM_{2.5}$) at sensitive receptors.

Emission Estimation Methodology

The methodology for calculating emissions was taken from Texas Commission Document on Environmental Quality[45] and AP-42 documentation[46]. The parameters used in calculating emissions are given in **Table 5.2** and the total calculated annual emissions from each key activity is summarized in **Table 5.3**.

The following are the key elements of the methodology:

- The reclaimer and stacker are modelled as drop points (additionally, the coal loading station is also modelled as a drop point). The wind speed, coal moisture content, operating capacity of the equipment, and total coal processed are taken into account.
- The conveyer belt is modelled as an open air conveyer belt as a worst case scenario. The conveyer belt is modelled as a drop point for every 1000 feet of the belt. The closed conveyor belt, coupled with the water sprinkler system should have minimal coal dust generation as compared to this model.
- Dust generation from the coal stockpile is modelled based on the area of the pile and the number of days of activity (taken as 365 days) at the stockpile. A control factor for coal dust suppression using water sprinklers is also incorporated.

Table 5.2: Parameters used for Analysis

Parameter	*Units*	*Value*
Conveyer Belt Parameters		
Planned quantity of coal handling by conveyer belt[47]	tons per year	20,000,000
Conveyor capacity[48]	tons per hour	3,600
Loading rate for stacker /reclaimer[49]	tons per hour	3,600
Active days[50]	days per year	231

[45] Texas Commission on Air Quality, May 2008, https://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/emiss_calc_coke.pdf

[46] This include AP-42, Chapter 13-Miscellenous Sources, "Section 13.2.4 for Aggregate Handling and Storage Piles"; http://www3.epa.gov/ttn/chief/ap42/ch13/final/c13s0204.pdf

[47] Feasibility Study on Coal Transportation between Port Qasim Coal Unloading Terminal and Pakistan Railway Main Line in Pakistan, Japan International Cooperation Agency (JICA), February 2016

[48] Ibid.

[49] Ibid.

Parameter	*Units*	*Value*
Height of conveyor belt[51]	m	10
Length of conveyor belt[52]	km	4.5
Width of conveyor belt[53]	m	1.8
Particle size multiplier[54]	-	PM_{10} – 0.35 $PM_{2.5}$ – 0.053
Coal Stockpile Parameters		
Length of each stockpile[55]	m	60
Width of each stockpile[56]	m	110
Height of each stockpile[57]	m	15
Proposed number of stockpiles	-	6
Coal storage capacity of each stockpile	ton	55,000
$PM_{2.5}/PM_{10}$ for wind erosion from stockpiles[58]	-	0.15
Control Factor for sprayed material[59]	-	0.3
General Parameters		
Coal moisture content[60]	%	14.3
Average wind speed[61]	m/s	2.7

Table 5.3: Total Annual Emissions from Key Project Activities

Emission sources	*Total emissions (tons/year)*

[50] Calculated by dividing the annual requirement of the coal per the conveyor capacity.

[51] Design value

[52] Feasibility Study on Coal Transportation between Port Qasim Coal Unloading Terminal and Pakistan Railway Main Line in Pakistan, Japan International Cooperation Agency (JICA), February 2016

[53] Ibid.

[54] Texas Commission on Air Quality, May 2008, https://www.tceq.texas.gov/assets/public/permitting/air/Guidance/NewSourceReview/emiss_calc_coke.pdf

[55] Feasibility Study on Coal Transportation between Port Qasim Coal Unloading Terminal and Pakistan Railway Main Line in Pakistan, Japan International Cooperation Agency (JICA), February 2016.

[56] Ibid.

[57] Ibid

[58] Cowherd et al., “Proposed Revisions to Fine Fraction Ratios Used for AP-42 Fugitive Dust Emission Factors”.

[59] Texas Commission on Air Quality, May, 2008.

[60] EIA of 660 MW Coal Fired Power Plant Construction Project at Lakhra, 2014

[61] Station: Karachi Airport, Location: 24d 54m N, 67d 08m E, Elevation (barometer): 22m Data Coverage 1961 – 1990 (30 years) for temperature, humidity and rainfall, 1975-1978 (4 years) for wind **Source:** Pakistan Meteorological Department

	PM_{10}	$PM_{2.5}$
Conveyer Belt Activities		
Reclaimer	0.8	0.1
Conveyor belt	12.0	1.8
Stockyard Activities		
Stacker	0.8	0.1
Stockpile	11.9	1.8
Reclaimer	0.8	0.1
Conveyer Belt to Coal Loading Station	0.9	0.1
Coal Loading	0.8	0.1
Total	**28.0**	**4.1**

Dispersion Modeling

The United States Environmental Protection Agency approved regulatory air quality model AERMOD[62] was used to model dispersion of the total pollutant loads. Weather data was taken from the Karachi weather station for 2011.

The air quality modeling area was defined as 5 km by 5 km and centered at the point 24°49'59.12" N, 67°18'4.52" E. This area was taken to assess the impacts of the Project on industries located in the northwestern industrial zone, and nearby residential areas.

Modeling Results and Analysis

The modeling results (predicted incremental concentrations) are presented in **Table 5.4**. These were compared against Sindh Environmental Quality Standards (SEQS). Contour maps of pollutant concentrations are shown in **Figure 5.1** to **Figure 5.4**.

Table 5.4: Particulate Matter Predicted Incremental Concentrations (µg/m^3)

Pollutant	*Averaging period*	*Average Background Concentration*[63]	*Predicted Incremental Concentration*	*Predicted Ambient Concentration*	*SEQS*
PM_{10}	24-hour (98th percentile)	117	10.3	127.3	150
	Annual (Max)		5.6	122.6	120
$PM_{2.5}$	24-hour (98th percentile)	24	1.5	25.5	75
	Annual (Max)		0.8	24.8	33[64]

[62] US Environmental Protection Agency, "Support Center for Regulatory Atmospheric Modeling, Recommended Models," last modified on April 8, 2015, http://www.epa.gov/scram001/dispersion_prefrec.htm.

[63] See Section 4.2.3

The following conclusions can be drawn:

- Similar amounts of total coal dust emission originate from the conveyer belt and coal stockyard but incremental dust concentrations around the stockyard are more concentrated.
- The predicted 24-hour and annual incremental concentration of PM_{10} is approximately 8% and 5% of average background concentration respectively and is well below the standards. The predicted 24-hour ambient concentration[65] comply with the SEQS whereas predicted annual ambient concentration slightly exceeds the standards.
- The predicted 24-hour and annual incremental concentration of $PM_{2.5}$ is approximately 6% and 3% of average background concentration respectively and is well below the standards. The predicted 24-hour and annual ambient concentration[66] comply with the SEQS.
- Air dispersion modelling shows that industries located close to conveyor belt will not be exposed to more than 10 $\mu g/m^3$ of PM_{10} and 2 $\mu g/m^3$ of $PM_{2.5}$ emissions. This exposure denotes the 24 hour concentrations, which represents the maximum expected concentration during the entire year. Furthermore, the conveyer belt is modelled as an open air belt as a worst case scenario. The predicted emissions will reduce significantly as the conveyor belt is enclosed and coupled with the water sprinkler system.
- The background concentrations are already very high hence the total concentration exceeds the limit on certain days. Therefore, strict adherence to the mitigation measures described below is advised.
- Total particulate matter has not been modelled in these scenarios and has been discussed earlier in this chapter.

---

[64] The annual limit in SEQS for PM2.5 is 40 µg/m3 or annual average background concentration plus 9 µg/m3 whichever is low. Here the annual average background concentration plus 9 µg/m3 is 33 µg/m3 which is lower than 40 µg/m3.

[65] Predicted ambient concentration is calculated as the sum of average background concentration plus the predicted incremental concentration.

[66] Predicted ambient concentration is calculated as the sum of average background concentration plus the predicted incremental concentration.

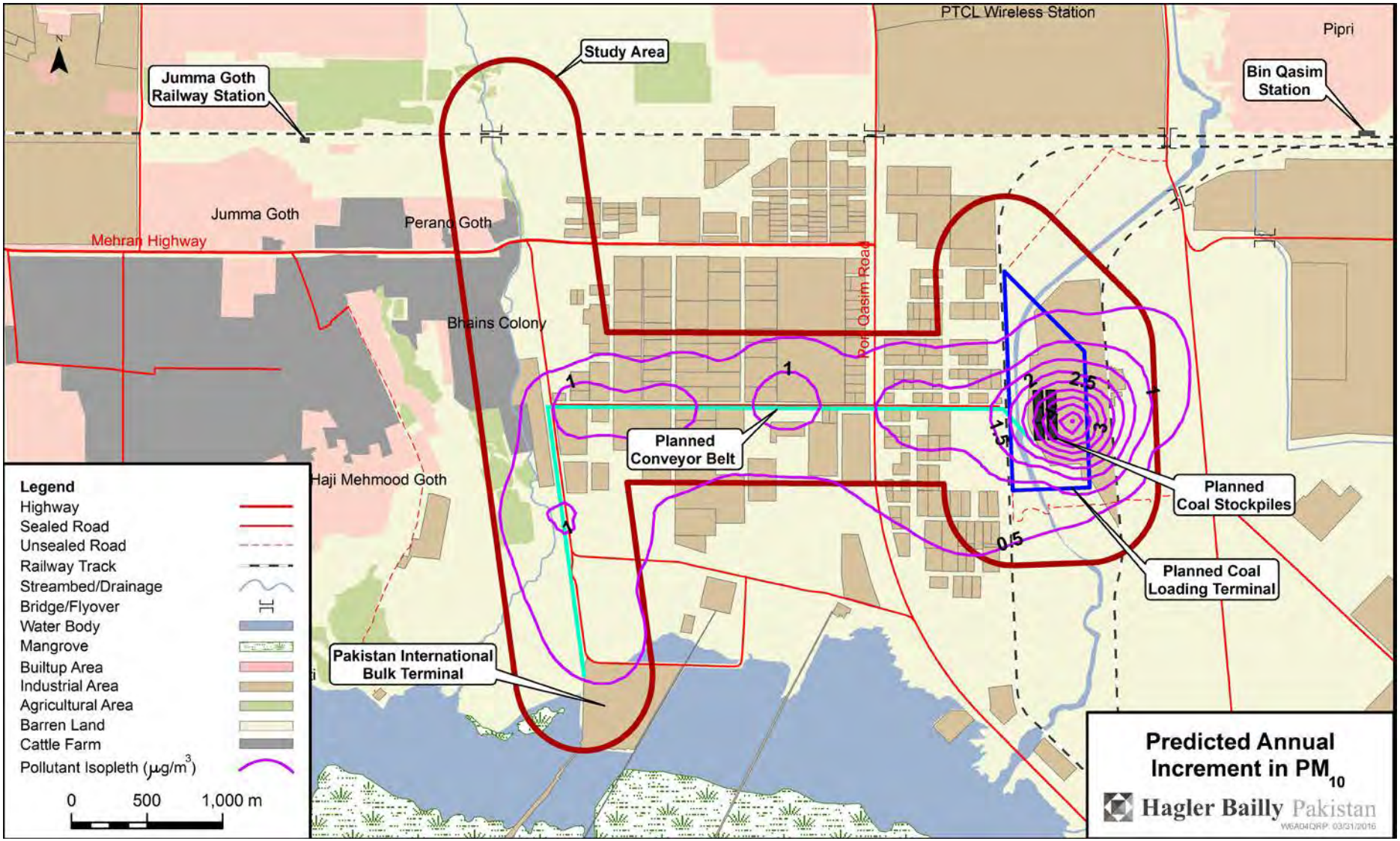


Figure 5.1: Predicted Annual Increment in PM_{10} Concentrations

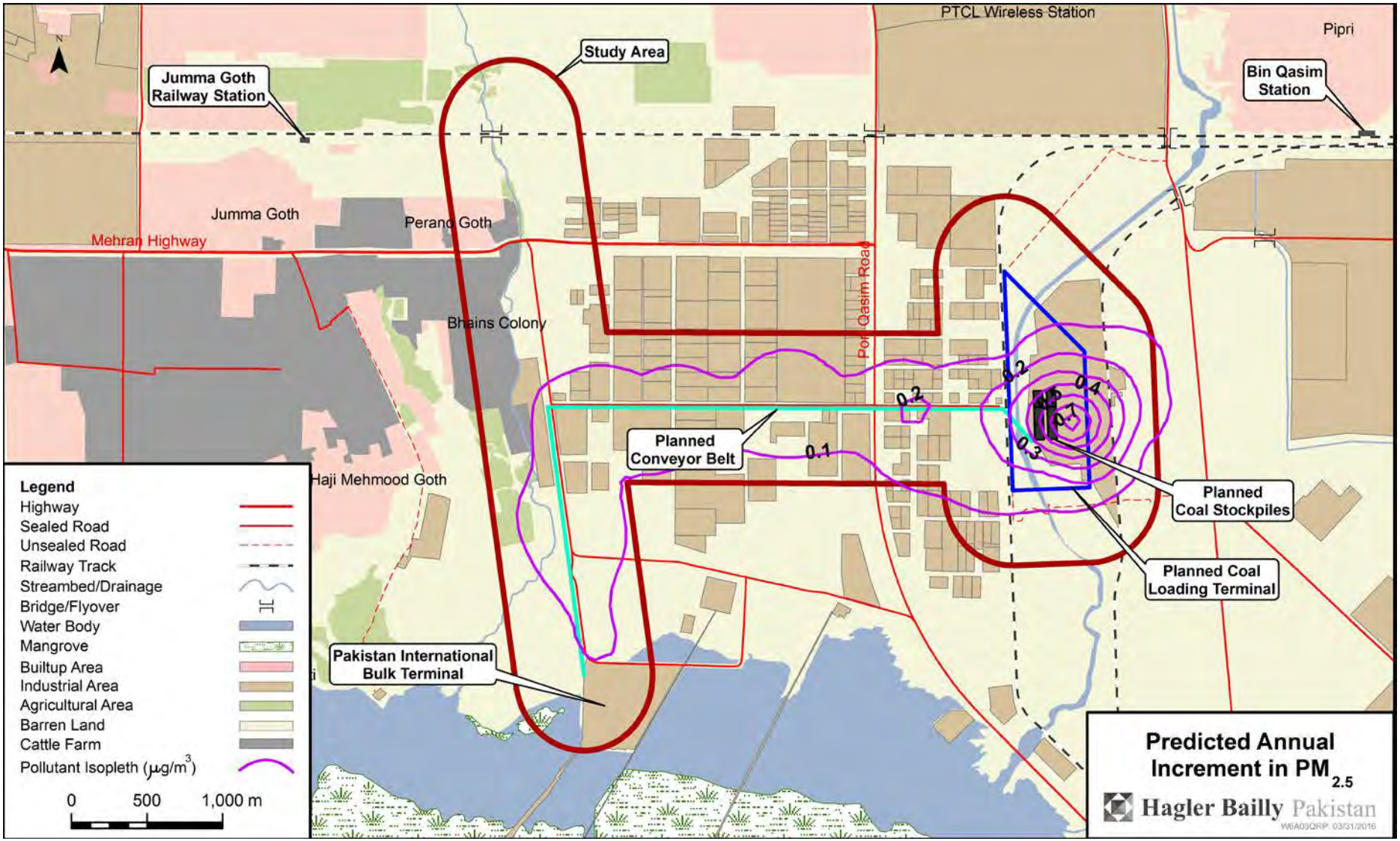


Figure 5.2: Predicted Annual Increment in $PM_{2.5}$ Concentrations

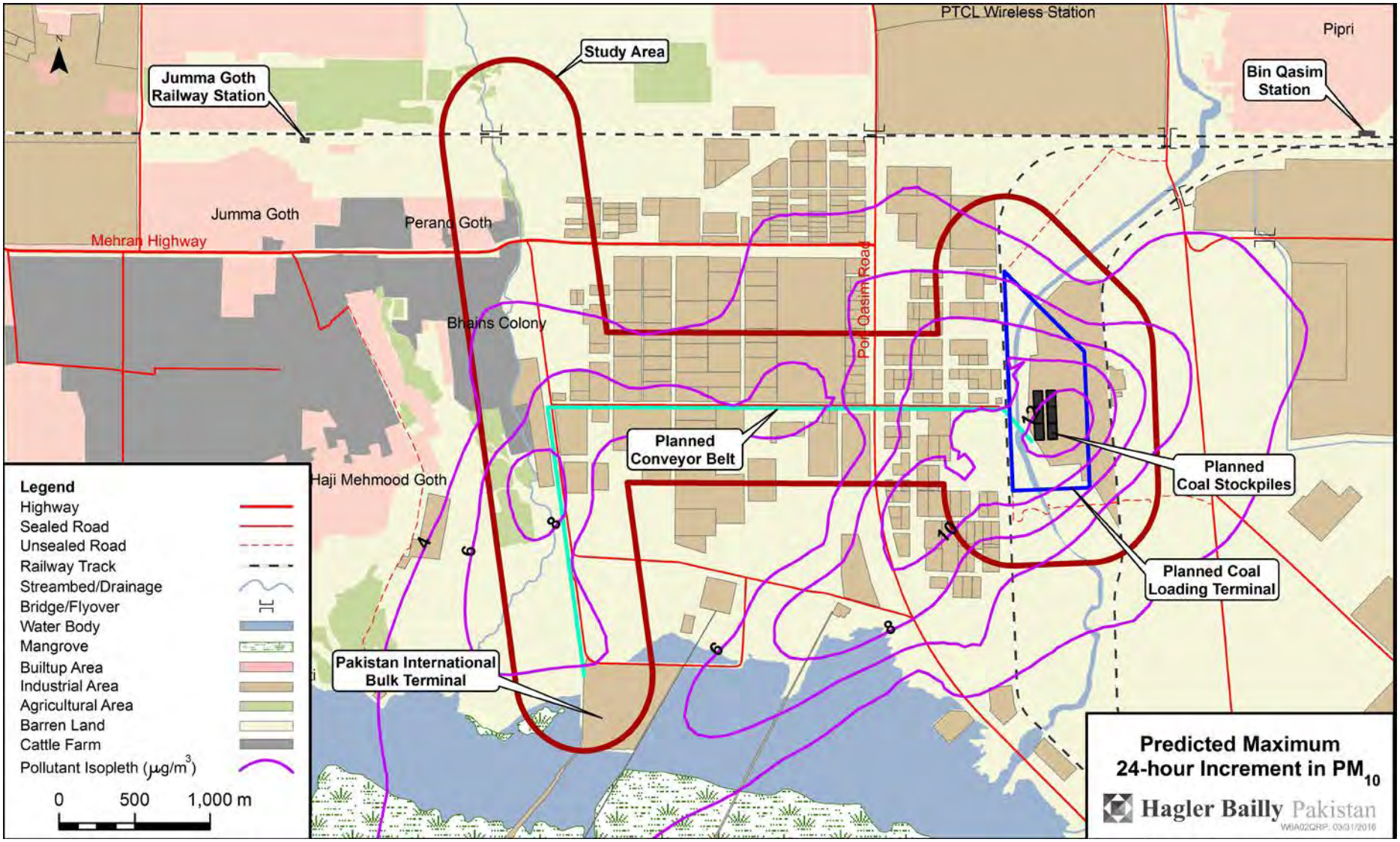


Figure 5.3: Predicted Maximum 24 hour Increment in PM_{10} Concentrations

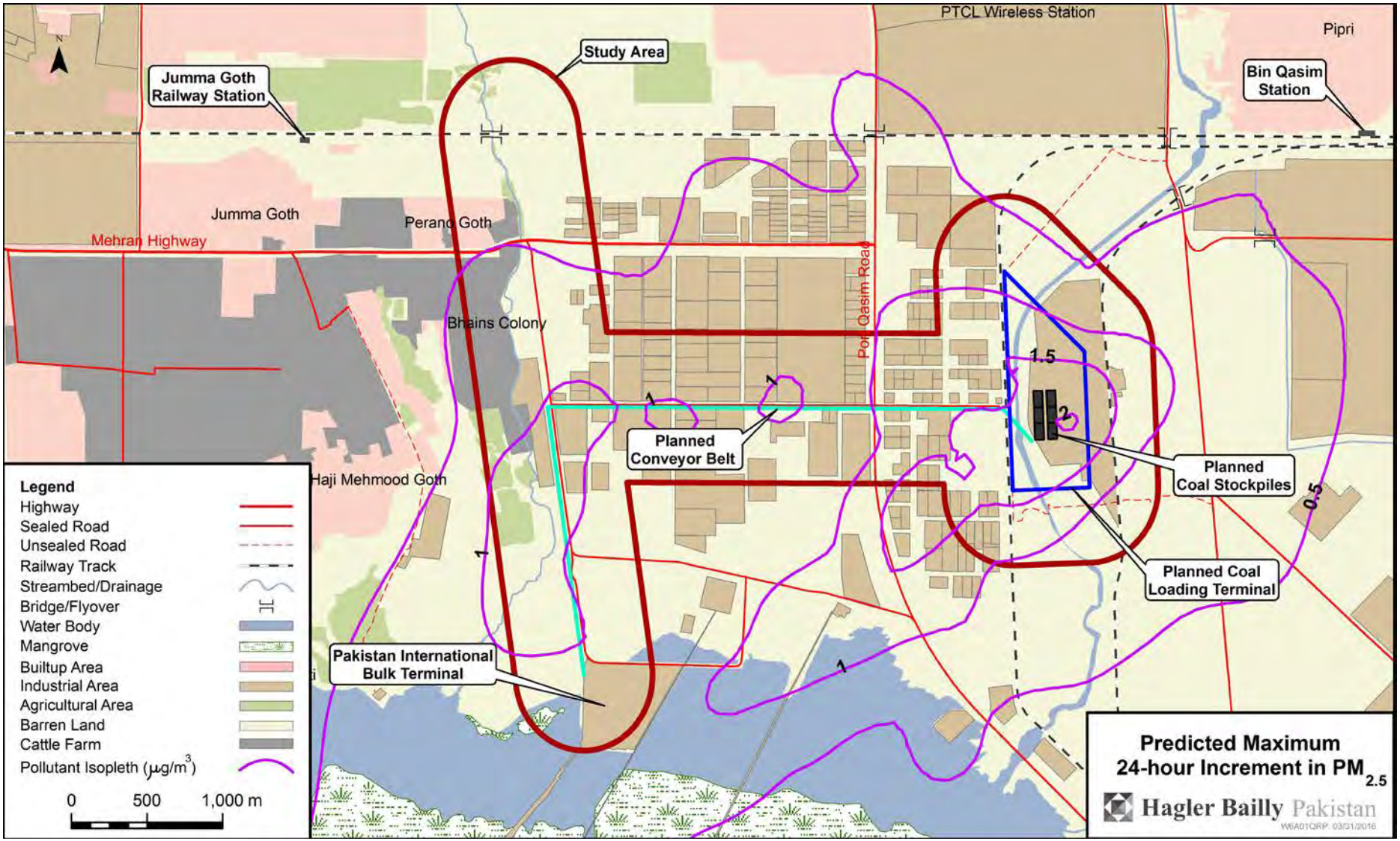


Figure 5.4: Predicted Maximum 24 hour Increment in $PM_{2.5}$ Concentrations

Mitigation Measures

If standard dust control techniques are used the emissions can be reduced significantly. The smaller the particle size of the material on the surface of the belt or the stockpile, the more easily it will be picked up and entrained in the wind. Moisture binds particles together preventing them from being disturbed by wind. Each coal type and grade has a unique moisture content above which dust emissions are substantially reduced. The moisture content of the coal will be maintained as required throughout the coal handling process from the point it arrives at the port, to loading onto trains to minimize dust emissions.

PQA's coal–handling operations will have dust-suppression systems spraying water on the coal at the conveyer belt and prior to unloading at coal stockyard-site and being exposed to the sun and wind in order to cater for some evaporation and seepage.

Furthermore, a coal dust management plan as given in **Appendix 4** will be implemented

The methods proposed to mitigate the potential sources of particulate emissions are summarized below:

Yard Areas and Roads

Vehicle traffic on access roads and vehicle traffic around the stockpile all have the potential to be significant sources of dust. Dust from yard areas and roads will be controlled primarily by limiting the amount of fine particles exposed to the wind and, keeping surfaces damp.

On areas of the yard and roads that are crossed by vehicles any coal deposited onto the surface can be ground into small particles which are particularly susceptible to pick up by the wind. This will be controlled by removing the buildup of fine material on a regular basis and replacing the surface of the area with coarser grade material.

Yard areas, disturbed areas, and roads used frequently will be watered regularly. It is also recommended that a controlled vehicle speed should be implement in the vicinity of the coal stockpile. Limiting the speed of vehicles reduces the turbulent wake behind moving vehicles and reduces the amount of material picked up and entrained by the wind.

The coal stockpile area will be designed to minimize haul distances between the stockpile and the train loading area and the number of vehicle movements. Bunds will be built strategically to shelter the yard area from the wind, providing a significant barrier to dust being carried beyond the stockyard.

In summary the following dust mitigation methods will be adopted:

- Coal stockpile to be inside bund area,
- Vehicle speeds to be controlled in the vicinity of the stockpile,
- Road and yard surfaces to be cleaned or kept damp when required,
- Internal haul roads and yard areas to be maintained by removal of fine material and the laying of fresh gravel.

- Travel distances be minimized by using conveyors to load coal onto the stockpiles and by locating the stockpile in close proximity to the boilers.

Loading and Unloading of Materials

Coal falling onto a stockpile and at conveyor transfer points is a potential source of dust as is wind picking up fine dry particles of coal from the surface of the conveyors. Coal falling off conveyors due to blockages and dropping from return belts can result in a buildup of coal under conveyors. This material can become a source of dust if not removed.

Transfer points to the yard conveyor will be covered, however, some parts, such as the transfer point between the yard conveyor and the stacker may not be able to be covered due to the design of the equipment. Dust suppression systems will be installed in those parts.

Elevated stacker conveyors will be provided with covers or windshields to shelter the coal from the wind and reduce dust potential. The coal will be damp when it is loaded onto the stockpile and water will be available to dampen the coal plume falling onto the stockpile to reduce dust formation. This will be required especially when thermal coal is being stockpiled given the high percentage of fine material in the coal.

Conveyor belts will be fitted with belt scrapers to remove coal build up on the return belts. Coal dropping onto the ground as a result of spillages will be regularly removed. Coal being reclaimed from the stockpile for loading onto trains will also lead to possible spillage. Such loading areas will be cleared of any spilled coal regularly and bunds surrounding the stockpile area will shelter the load out activities from the wind and water used to dampen surfaces.

To control dust from the loading and unloading of coal the following methods will be adopted:

- A conveyor and travelling stacker be used to transfer material to the stockpiles,
- Water will be used to dampen any dust produced from the coal falling onto the stockpiles,
- Transfer points on the yard conveyors will be covered,
- The elevated stacker conveyor will be provided with wind shields or covers,
- Conveyors will be fitted with belt scrapers,
- Coal deposits under the conveyors and at unloading areas will be regularly removed,
- Bunds will be strategically located around points of frequent handling of coal at the stockpile to shelter the loading and unloading activities from the wind.

Dust Control System

Dust control is achieved by dust suppression and extraction system. Dust suppression is achieved by two methods; Plain Water Dust Suppression System and Dry Fog Type Dust Suppression System. Design and construction features of Dust control system

shall be generally in conformity with the recommendation of “American Conference of Governmental Industrial Hygienists” or applicable international standards.

Coal Stockpiles

Wind blowing across the stockpile and vehicle movements disturbing the surface of the stockpile has the potential to generate dust. The amount of dust generated from surfaces such as stockpiles is dependent on the wind speed across the surface and the proportion of fine material on the surface of the pile exposed to the wind. Inactive stockpiles develop a crusty surface that effectively minimizes dust emissions.

The principal means of controlling dust from stockpiles is the use of water as a dust suppressant and minimizing the disturbance of the surface with vehicles. The coal will have inherently high moisture content when it is loaded onto the stockpile. Moisture loss from evaporation will reduce the surface moisture content quickly and increase the dust potential if it is not replaced.

Considering the dry and windy conditions for the bulk of the year at the PQA industrial area, PQA will install a dust-suppression watering system to maintain the moisture content of the stockpile surfaces all year around.

Monitoring

If the mitigation measures proposed above are set in place, there is no significant risk to the environment. However, considering occupational health and safety standards for workers at the coal stockyard and those working in industries in the vicinity of the Project, dust from the coal yard has a high potential for causing respiratory ailments. The high winds, along with the hot and dry climate for most of the year in PQ will constantly contribute to dust generation and emission from the coal handling activities at the coal yard.

PQA will therefore install a monitoring system in place to regulate all the dust suppression systems and monitor TPM samples at different locations within the PQA coal stockyard site to check dust levels are in control (**Chapter 7: Environmental Management Plan**).

5.4.3 Impacts on Ecology

The Project is located in an industrial area where the natural habitat is highly disturbed. No terrestrial floral or faunal species listed as Endangered or Critically Endangered in the IUCN Red list of Threatened Species has been reported from the Study Area or vicinity. Furthermore, the project is not expected to have any significant impact on unmodified habitats.

The impact on the ecology and biodiversity of the Study Area and vicinity is likely to come from the clearing of the chosen coal stockyard and construction project facilities (construction phase) well as potential coal dust generation during coal transportation and storage (operation phase). The impact of each Project-related activity has been described below.

Use of the chosen dumping site

This will mean that vegetation and habitat suitable for animal life will be absent from it and the site will be unavailable for biodiversity. The vegetation at this site is present within a wider area that is already highly disturbed by human activity. Furthermore, it does not contain any species of conservation importance. Therefore, the use of the chosen dumping site is unlikely to have significant ecological impacts.

Transportation of the coal via the conveyer belt

May cause pollution. This could affect vegetation, birds and mammals in the wider area, not just at the sites where Project-related activities will be carried out. Measures need to be taken to prevent pollution of flora, in particular, as it is immobile. The coal dust is most likely to affect flora whilst the noise pollution is likely to result in the avoidance of the area by bird and mammal species. As reptile and amphibian species are uncommon in the area, it is unlikely that they will be affected by Project-related activities

The presence of aquatic habitat at both potential dumping sites means that there is some possibility that reptile and amphibian species, if present at these sites, will be affected. In light of the evidence that these sites are used by grazing animals and birds, it is likely that they are also used by wild mammals in the area although knowledge of the dependence of animal species on these aquatic sites for a source of water is unknown.

During the life the Project there is expected to be noise pollution and if measures are not taken then coal dust pollution. Furthermore, the chosen dumping site will be unavailable for animal life during this period. The sampling point with the highest biodiversity was E-4. Use of this as the dumping site is likely to have an adverse impact on the biodiversity observed.

The analysis presented above highlights that the main concern with respect to ecological impacts is the generation of waste during both the construction and operation phases of the proposed Project. In addition to this, it is prudent to consider the consequences in the event of accidents such as during construction of Project-related infrastructure, during waste disposal and during the transport of coal.

Generation of Pollution from Project-related Activities

Generation of pollution from Project-related activities during both construction and operation phases is likely to result in impacts on the ecological resources. Pollution can be generated from both waste generation and from operation of the project via coal dust, if proper measures to control it are not taken.

It can be expected that the biodiversity within the Study Area and the wider area will decrease in future as human activity, especially industrial and infrastructure growth increases. The conditions will, however, be favorable for certain species such as Black Kite. This species was observed to be abundant within the Study Area and is likely to continue to increase with increase in human activity and associated waste generating food for it as well as the presence of adequate habitat for this species to breed and rest.

5.5 Socioeconomic Impact

The Project activities will result in a positive impact on the existing socioeconomic environment of the area covered in the socioeconomic study as well as the rest of the country. These impacts are further discussed below.

5.5.1 Positive Economic Impact of Coal Transport Project

Pakistan currently generates a large proportion of its electricity using furnace oil which places a large burden on the national exchequer. Recently, there has been a shift in focus in electricity generation from furnace oil to coal, with several thousand megawatts of coal power planned for construction.

This coal transport project will be part of a coal import supply chain that is planned to transport an estimated 10 million tons of coal per annum which will boost the generation of cheap electricity in the country. It will also diversify the countries energy portfolio and reduce the impact of oil price volatility.

5.5.2 Employment Opportunities

The Project will create additional job opportunities for unskilled, semi–skilled and skilled laborers in construction, erection, operation, and maintenance phases.

The construction phase will generate temporary employment, approximately, 66,000 man days per year, for a period of one and a half year. Project operation will generate long–term employment of 23,100 of man days per year, including skilled and semi–skilled laborers.

Semi–skilled manpower from nearby communities will be utilized where they meet the required criteria. Sourcing of local goods and services will also be prioritized wherever feasible. This will create business opportunities and strengthen linkages between the national, regional, and local economy.

In an area that is suffering from underemployment and low wage employment, the Project's direct and indirect employment opportunities represent a positive development for beneficiaries and their families who will see an increase in incomes and reduction in poverty.

Gaps in this Section

Due to lack of information on the project design, the following impacts are not assessed, or discussed only qualitatively:

1. Dust emission from conveyor belt (post dust suppression system) and coal yard and its impact on the surround area air quality
2. Impact of effluent on the receiving water body

CHAPTER 6. Analysis of Alternatives

A comparison of alternatives for the coal transportation at Port Qasim (between coal unloading terminal and coal loading station) is presented in this section.

6.1 Alternatives for Coal Handling Facilities

From coal handling view, PQA does not have any dedicated coal handling facility at present. However, a limited quantity of coal is being handled at Marginal Wharf berths. Pakistan Steel is handling coal for its own use through Iron Ore and Coal Berth (IOCB). A new facility is being developed at PIBT for handling coal, clinker & cement. The description of each candidate is presented as follows.

Marginal Wharf Berth Facility

Marginal Wharf berths 1 to 4 have shallow draft (up to 9m) and as such, only small vessels of 25,000 to 35,000 DWT can be berthed. No facility is available to transport the coal to existing railway siding located to the north of the Marginal Wharf Berths 1 to 4.

The coal from Marginal Wharf is transported to a temporary stock pile located in Term Storage Area-A&B of Port Operation Zone. From the stock piles, the coal is being transported to up-country through trucks.

Coal from Marginal Wharf is also being transported to up-country through railway as reported by Pakistan Railway. However, due to low draft and non-availability of requisite equipment, coal cargo handling capacity at Marginal Wharf is constrained and bulk handling cannot take place.

Iron Ore Coal Berth (IOCB)

Ships up to 50,000 DWT can be berthed at the Iron Ore and Coal Berth. This berth can handle cargo of up to 3.03 MTPA with ship to shore un-loaders of 1,000 tonnes/hr.

Coal from IOCB is transported to Steel Mill Plant through 3.9 km long conveyor belt. The berth needs necessary rehabilitation work for efficient usage and coal handling by other consumers.

Pakistan International Bulk Terminal (PIBT)

A dedicated terminal is being constructed at Port Qasim to handle coal, clinker and cement by M/s. PIBT on build operate and transfer (BOT) Basis. Under the present Implementation Agreement, PIBT will handle cargo including coal, up to 8.0 MTPA. However, PIBT has plans to expand its terminal for handling cargo up to 12.0 MTPA. In the backup area of the terminal, 1.0 million tonnes of coal can be stacked.

Two ships of up to 55,000 tonnes will be able to simultaneously berth at PIBT. The facility will be capable of accommodating large ships up to 75,000 DWT after widening and deepening of PQA Navigation Channel. At present, PIBT plans to transport coal from its stockyard to power plants by using trucks for which it is developing the requisite facility.

Since, Pakistan Railway has informed PIBT that railway link cannot be constructed up to PIBT Terminal, PIBT currently has no plan to transport the coal from its stockyard through railway network hence, no facility for coal loading into railway wagons is being provided at the terminal.

FOTCO

Although FOTCO has an advantage of location close to Port Qasim station, they have no intention to join in coal handling business at present. Therefore, FOTCO will not be considered for this study.

6.2 Alternatives for Coal Transfer to PR Main Line

The transportation mode to the Coal Stockyard is either to use trucks or conveyor belt.

By Trucks

A large number of trucks required to transport coal to the coal stockyard would significantly increase truck traffic in the port area adding to congestion on the roads, increasing the chances of accidents and having an adverse impact on the environment.

By Conveyor Belt

Coal is delivered from PIBT to the coal stockyard near the coal loading terminal through single line of elevated conveyor belt of 4500 m long with a transfer tower. The conveyer belt option has been discussed in detail in this report. Alternate conveyer belt coal stockyard locations are discussed in the following section.

6.3 No Action Scenario

If the coal stockyard is not provided in Port Qasim or nearby area, and Lakhra Coal Fire Thermal Plant is in service, a numerous number of dump truck will be engaged in the transportation purpose which will cause:

1. Traffic congestion in Port Qasim area and national highway;
2. Increase CO_2 gas emissions; and
3. Disturbance to the business activities of industrial zones in Port Qasim.

Therefore, the No Action Scenario is not practical.

6.4 Conclusion

Considering the above, comparison of 4 alternatives are scored and it is concluded that using PIBT and conveyor belt is the best option among the alternatives. The comparison is presented in **Table 6.1**.

Gaps in this Section

The analysis of alternatives as provided by JICA Study Team focuses on alternates for the unloading terminal and does not look at alternates for the following:

3. Routes for the conveyer belt;
4. Locations for the coal stockyard terminal;
5. Transport options other than conveyer belt, such as extending railway track to PIBT; and
6. Alternatives to dust suppression technology used at the coal stockyard and conveyer belt.

Table 6.1: Comparison of Alternatives

Unloading Terminal	*PIBT*		*FOTCO*	*IOCB*				*Marginal Wharf*		
Overview of unloading terminal	Utilize the wasteland between Port Qasim spur line and PSM. Provide box culvert prior to filling the wadi for levelling the ground		FOTCO has no intention to handle coal transportation	Facilities of IOCB are specialized for handling of raw materials imports of PSM. PQA owns jetty infrastructure, PSM owns and operates unloaders, conveyer belt and other cargo handling facilities.				Marginal wharf comprises four multipurpose berths with 200m length each and no berth is equipped with unloading machine. All cargos are handling with self-unloading machine by ships.		
Sub evaluation 1	3	3	0	2	2	2	2	1	1	1
Loading Railway Station	New Station	New Station	PQ Station	PQ Station	New Station	PQ Station	New Station	PQ Station	PQ Station	New Station
Sub evaluation 2	3	3	2	2	3	2	3	2	2	3
Technical Issue (difficulty)										
Sub evaluation 3	2	3	2	2	2	3	3	3	3	3
Project Cost (civil work)										
Sub evaluation 4	2	1	1	1	1	1	1	3	2	2
E&S consideration	Conveyer belt	Dump truck	Conveyer belt	Conveyer belt		Dump truck		Conveyer belt	Dump truck	
Sub evaluation 5	3	0	2	2	2	0	0	1	0	0
Total Evaluation	**13**	**10**	**7**	**9**	**10**	**8**	**9**	**10**	**8**	**9**

Note: Figure A, B, C and D in the above table, and 3, 2, 1 and zero point are given to each figure, relatively.

Source JICA Study Team

CHAPTER 7. Environmental Management Plan

This chapter provides the environmental management plan (EMP) of the proposed project. The primary objectives are to:

- Facilitate the implementation of the identified mitigation measures in the environmental assessment
- Define the responsibilities of the project proponent and contractor, and provide a means of effective communication of environmental issues between them.
- Identify monitoring parameters in order to ensure the effectiveness of the mitigation measures.
- Provide a mechanism for taking timely action in the face of unanticipated environmental situations.
- Identify training requirements at various levels.

The EMP is prepared on the basis of detail currently available on the construction phase of the project. As a construction contractor is appointed and further information is available, the EMP will be amended to reflect the changes. However, no mitigation measures committed in the EMP can be changed.

In addition to the environment mitigation plan and environmental monitoring plan, specific management plans have been developed for areas of concern, including the following:

- Waste Management Plan
- Construction Management Plan
- Coal Dust Management Plan
- Spill Management Plan

These plans are included in **Appendix 4**.

7.1 Institutional Framework

The organizational roles and responsibilities of the key players are summarized below:

PQA: The project proponent will undertake overall responsibility for compliance with the EMP. They will carry out verification checks to ensure that the contractors are effectively implementing their environmental and social requirements.

Contractors: The contractors will implement the majority of environmental and social mitigations as required by their contract with the Owners. The contractors will carry out field activities as part of the proposed project. The contractors are subject to certain liabilities under the environmental laws of the country, and under their contracts with the Project proponent.

7.1.1 Management Responsibilities

The responsibilities of the client and contractor are briefly described below:

- Primary responsibilities:
  - The Owner's Project Manager will be responsible for environmental assessment and EMP compliance throughout the project on behalf of the company itself.
  - The Owners will coordinate with the concerned government departments.
- Project management and quality control:
  - Carrying out construction activities in an environmentally sound manner during the project will be the responsibility of the contractor's site manager.
  - Owner's representative will be responsible for the overall environmental soundness of all field operations.

Specific roles and responsibilities for environmental monitoring are provided in **Table 7.1**.

Table 7.1: Roles and Responsibilities for Environmental Monitoring

Aspect	*The Owners' Responsibilities*	*Contractor's Responsibilities*	*Relevant Documentation*
Contracting	Ensuring that monitoring and mitigation requirements are included in the contract between the Owners and the construction contractor(s).	Understanding the requirements and estimating the required resources	Contract between the Owners and the construction contractor(s)
Monitoring plan	Ensuring finalization of monitoring plan before construction commencement	Prepare a construction management plan	Finalized monitoring plan and Construction Management Plan
Resources	Ensuring availability of resources required for environmental monitoring	Ensuring availability of resources required for environmental monitoring	Project budgets
Environmental staff	Designating an Environmental Manager for the project	Designating an Environmental Manager for the project (may be combined with health and safety)	Job descriptions
Monitoring surveys and inspections	Undertaking regular inspections and carrying out further measurements when necessary	Undertaking regular inspections and collecting data on environmental performance, and carry out surveys	Inspection and survey reports
Environmental audit	Conducting periodic audits of the construction site and commissioning third party audits	Conducting periodic internal audits	Audit reports
Reporting	Ensuring that periodic environmental monitoring reports are received from the construction contractor(s) and reviewing those reports	Producing environmental monitoring reports periodically and distributing those among the Owners management and appropriate	Environmental monitoring reports

Aspect	*The Owners' Responsibilities*	*Contractor's Responsibilities*	*Relevant Documentation*
		staff members	
Corrective actions	Verifying that activities carried out comply with the EIA/EMP and identifying corrective actions if needed	Carrying out corrective actions as required	Corrective action record
Maintenance of record	Maintaining monitoring data and recording all incidents of environmental significance and related corrective measures	Maintaining monitoring data and recording all incidents of environmental significance and related corrective measures	Environmental databases

7.2 Environmental Mitigation Plan

The mitigation plan is a key component of the EMP. It lists all of the mitigation measures identified in the environmental assessment and the associated environmental and social aspects of those measures. The mitigation measures for the proposed project are presented in **Table 7.2**.

Table 7.2: Environmental Mitigation and Management Plan

Aspect	*Potential Environmental Impact*	*Environmental Mitigation and Management Measures*	*Timing*	*Institutional Responsibilities*
				Implementation
Design Phase				
Project Disclosure	Stakeholder concerns	Submit EIA to Sindh EPA and obtain approval.	BC	Owner
Land Acquisition	Effects of resettlement on livelihood	The guidelines in the Resettlement Policy Framework will be followed.	BC	Owner
Traffic	Safety Hazard	There will be traffic hazards throughout the route of the conveyer belt and especially at key intersections. The conveyor belt will be designed as per the principles of traffic engineering. In particular following factors will be taken into consideration: • Minimize interference in existing traffic flow; • Ensuring that the incoming traffic has full visibility of approaching traffic on the intersection	BC	Consultant
Construction Phase				
Construction management	Construction activities although temporary can potentially have adverse impact on the environment.	Ensure that a detailed Construction Management Plan (CMP) based on the skeleton plan included in **Appendix 4** is developed.	BC	Contractor
		Ensure that the CMP is implemented	DC	Owner
Waste generation	Waste can impact the soil, water and general environment of the area.	Ensure that the waste is disposed as per the waste management plan. (**Appendix 4)**	DC	Contractor
Spills and accidents	Spills can cause damage to the environment	Develop and implement Spill Prevention and Mitigation Plan (SPMP, **Appendix 4).**	BC/DC	Owner

Aspect	*Potential Environmental Impact*	*Environmental Mitigation and Management Measures*	*Timing*	*Institutional Responsibilities*
				Implementation
Social Environment	Impacts of the influx of labor force and staff and social conflicts	Maintain liaison with the local community to ensure that conflicts related to the use of common resources, if any, are identified as early as possible, and are resolved in a timely and appropriate manner. Ensure grievance mechanisms and implement regular monitoring (**Section 7.8**).	DC	Contractor
	Effects of movement of construction equipment on traffic congestion and movement of people	Specific timings for construction work will be planned to avoid disturbance to the local communities and their mobility during business hours. If necessary, traffic signs, driving safety education, speed restrictions will be implemented. Regular maintenance of vehicles and associated equipment will be carried out.	DC	Contractor
Health and Safety	Exposure to the risks of accident	The following mitigation measures will be employed: • Training for Health, Safety and Environment unit and labor • Use of appropriate of personal protective equipment (PPE) and appropriate trainings • Construction of temporary first aid station at the working site with nurse. • Establishment of cooperative relationship with the local medical facilities.	DC	Contractor
Operation and Maintenance Phase				
Air Quality	Impact from fugitive emissions from coal handling and stockpile.	Ensure that a detailed Coal Dust Management Plan based on the skeleton plan included in **Appendix 4** is developed. Ensure that the Coal Dust Management Plan is implemented Dust extraction/suppression system will be provided at transfer points of conveyor system and ventilation system to supply fresh air; Conveyor belt will be enclosed to prevent dust generation; Provision of water sprinkling system at storage yard;	DO	Owner

Aspect	*Potential Environmental Impact*	*Environmental Mitigation and Management Measures*	*Timing*	*Institutional Responsibilities*
				Implementation
		Asphalting of the roads within the stockyard ; and Develop a Greenbelt around the coal stockyard to arrest the fugitive emissions.		
	Exhaust from vehicles and equipment	Maintain vehicles and equipment in accordance with manufacturer's instructions.	DO	Owner
Operational health and safety	Health and safety of workers at coal stockyard and during conveyer belt maintenance.	Develop health and safety management plan to cover identified health and safety risks likely to occur. Systematically and continuously identify, assess and respond to health and safety risks throughout the Project life cycle. Restrict the noise levels emitted from equipment or provide suitable personal protection devices if this limit cannot be achieved. Provide personnel with appropriate personal protection equipment (PPE). Provide staff with training on how and when to use the PPE. Provide fire protection systems. Prevent access to areas with high hazard potential and clearly mark such areas with suitable warning signs showing written and visual representation of the hazard. Encourage personnel to report near misses where Project activities or infrastructure could have potentially resulted in harm to staff, visitors, local communities or ecological systems.	DO	Owner
Wastewater	Pollution of receiving water bodies	Wastewater should be compliant with SEQS guidelines for wastewater. Opportunities for use of recycled water should be explored.	DO	Owner
Storm water	Pollution of receiving water bodies	Use of infiltration and runoff control measures such as compacted soils, protective liners, and sedimentation controls for runoff from coal piles. Oil water separators and grease traps will be installed and maintained as appropriate at refueling facilities, workshops, parking areas, fuel storage and containment areas.	DO	Owner

Aspect	*Potential Environmental Impact*	*Environmental Mitigation and Management Measures*	*Timing*	*Institutional Responsibilities*
				Implementation
		Adequate storm drains will be constructed along the boundary of the stockyard area to drain off the storm water during monsoon period.		
Waste management		Prepare operational waste management plans and implement these consistent with Pakistan regulations and international standards to the extent practicable. Include in the waste management plans the following: • a commitment to a waste hierarchy comprising a) waste avoidance, source reduction, prevention or minimization; b) waste recovery for materials that can be re-used specifically ash; c) waste treatment to avoid potential impacts to human health and the environment or to reduce the waste to a manageable volume; and d) safe and responsible waste disposal specifically for ash disposal; • inventory of wastes identifying the source/s, characteristics and expected volumes; • waste segregation requirements; • location and type of waste collection points, which are conveniently located, have adequate capacity, are frequently serviced and clearly labelled; • storage requirements; • opportunities for source reduction, re-use or recycling; • targets for waste re-use, recycling and incineration; • opportunities to minimize bulk or render waste non-hazardous; • procedures for operating waste storage, treatment and disposal facilities; • labeling requirements for waste disposed of offsite; • method of tracking waste recovered, incinerated or disposed of to the site's landfill; • method of tracking quantity, date, transporter and fate of waste	DO	Owner

Aspect	*Potential Environmental Impact*	*Environmental Mitigation and Management Measures*	*Timing*	*Institutional Responsibilities*
				Implementation
		disposed of offsite; • a contingency plan should waste disposal facilities be unavailable for a time; and • training requirements for waste management staff and other employees and contractors		
Noise pollution	Noise from the equipment	The occupational noise exposure to the workers in the form of 8 – hourly time weighted average will be maintained well within the 60 dB (A)). Acoustic enclosures will be provided wherever required to control the noise level below 60 dB (A). Anywhere not possible technically to meet the required noise levels, personal protection equipment will be provided to the workers.	DO	Owner
Stakeholder engagement		Develop and implement Stakeholder Engagement Plan that includes: • maintaining regular communication with stakeholders to address any potential issues in timely manner; • maintaining a grievance procedure, and encourage and facilitate stakeholders to use the mechanism to express concerns; and • provides sufficient resources to the community relations team to enable them to monitor negative perceptions and associated tensions, and to address them in a timely fashion.	DO	Owner

Note: BC: Before Construction

DC: During Construction

DO: During Operation

7.3 Environmental Monitoring Plan

Environmental monitoring is a vital component of an EMP. It is the mechanism through which the effectiveness of the EMP is gauged. The feedback provided by environmental monitoring is instrumental in identifying any problems and planning corrective actions.

7.3.1 Objective of Monitoring

The main objectives of environmental monitoring during the construction phase of the proposed coal conversion plan will be:

- To provide a mechanism to determine whether the project construction contractors and the Owner's management are carrying out the project in conformity with the EMP.
- To identify areas where the impacts of the projects are exceeding the criteria of significance and, therefore, require corrective actions.
- To document the actual project impacts on physical, biological, and socioeconomic receptors, quantitatively where possible, in order to design better and more effective mitigation measures.
- To provide data for preparing the monitoring report to be submitted to the Sindh EPA in accordance with the national law requirement.

7.3.2 Monitoring Plan

The environmental parameters that may be qualitatively and quantitatively measured and compared are selected as 'performance indicators' and recommended for monitoring during project stages. These monitoring indicators will be monitored to ensure compliance with the national and Sindh standards and comparison with the baseline conditions established during design stage. The list of indicators and their applicable standards to ensure compliance are given below.

The detailed environmental monitoring plan will be finalized prior to commencement of construction and operation. The requirements identified in the environmental assessment are presented in **Table 7.3**.

Table 7.3: Environmental Monitoring Plan

Parameter	*Location*	*Means of Monitoring*	*Frequency*	*Responsible Agency*
Construction Phase				
Handling and storage of parts and equipment	Work Sites	Visual inspection	Daily	Contractor
Top soil	Construction areas	Top soil of 0.5 m depth will be excavated and stored properly	Beginning of earth filling works	Contractor
Erosion	Construction areas and material storage sites	Visual inspection of erosion prevention measures and occurrence of erosion	Monthly	Contractor
Hydrocarbon and chemical storage	Construction camps	Visual Inspection of storage facilities	Monthly	Contractor
Local roads	PQA roads	Visual inspection to ensure local roads are not damaged	Monthly	Contractor
Traffic safety	PQA roads	Visual inspection to see whether proper traffic signs are placed and flagmen for traffic management are engaged where required	Monthly	Contractor
Air quality (dust, smoke)	Construction sites	Visual inspection to ensure good standard equipment is in use and dust suppression measures (spraying of waters) are in place.	Daily	Contractor
Air quality (dust, smoke)	Material storage sites	Visual inspection to ensure dust suppression work plan is being implemented	Monthly	Contractor
Waste management	Construction camps and construction sites	Visual inspection that solid waste is disposed at designated site	Monthly	Contractor
Drinking water and sanitation	In construction sites and construction camps	Ensure the construction workers are provided with safe water and sanitation facilities in the site	Monthly	Contractor
Reinstatement of work sites	All work sites	Visual Inspection	After completion of all works	Contractor
Safety of workers	At work sites	Usage of personal protective equipment	Monthly	Contractor

Parameter	*Location*	*Means of Monitoring*	*Frequency*	*Responsible Agency*
Operation Phase				
Land Use Disturbance	Conveyer belt route and coal loading terminal	Visual inspection	Quarterly or on receipt of grievance	Owner
Effluent Water	All effluent channels exit points from the coal stockyard	Water quality (as indicated in SEQS for liquid effluents)	Annually	Owner
Air	At coal stockyard	PM_{10} and TSP for 24 hour filter-based low-volume sampler	Biennially	Owner
Vehicles and equipment		Records of vehicle and equipment maintenance	As per manufacturer's instructions	Owner
Dust suppression system	At conveyor belt and coal stockyard	As per manufacturer's instructions	As per manufacturer's instructions	Owner
Conveyer Belt				
Ecological	Surrounding areas around coal stockyard	Records of animal and fish kills Records of major wildlife sightings	On occurrence	Owner
Community	Grievance register maintained at Project site	Community grievances or complaints, categorized by type.	Monthly	Owner
Hazardous material	Warehouse or storage facility Hazardous material containment facilities	Records of hazardous materials used Inspections of hazardous substances containment facilities, instrumentation and detection systems.	On arrival at site Every three months	Owner
Waste	Waste disposal sites	Volume of different wastes types • disposed of to landfill or incineration • recycled or reused • soil bio-remediated	Continuous	Owner

7.4 Reporting

An effective mechanism to store and communicate environmental information during the project is an essential requirement of an EMP. This section covers details of the reporting mechanism for the EMP.

7.4.1 Meetings

Two kinds of environmental meetings will take place during the project:

- Kick-off meetings
- Fortnightly meetings

The purpose of the kick-off meeting will be to present the EMP to project staff and discuss its implementation.

A fortnightly meeting will be held during construction phase at site. The purpose of this meeting will be to discuss the environmental issues and their management. The proceedings of the meeting, the required action, and responsibilities will be recorded in the form of a brief report.

7.4.2 Reports

Environmental reports will be prepared on a bi-monthly basis during construction and quarterly during operation.

7.4.3 Environmental Records

The following environmental records will be maintained:

- Periodic inspection reports of Contractor's Environmental Officer or his designate
- Incident record of all moderate and major spills. The record will include:
    - Location of spill
    - Estimated quantity
    - Spilled material
    - Restoration measures
    - Photographs
    - Description of any damage to vegetation, water resource
    - Corrective measures taken, if any
    - Corrective measures taken, if any
- Waste Tracking Register that will records of all waste generated during the construction and operational period. This will include quantities of waste disposed, recycled, or reused

- Survey reports, in particular, the following:
    - Soil erosion: Baseline survey, including photographs (or video), will be conducted to document pre-construction condition of the construction corridor
    - Vehicle and equipment noise
    - Ambient noise survey reports

7.4.4 Change-Record Register

A change-record register will be maintained at the site, in order to document any changes in EMP and procedures related to changes in the project design, construction plan or external environmental changes affecting the EMP. These changes will be handled through the change management mechanism discussed later in this chapter.

7.5 Change Management

An environmental assessment of the proposed project has been made on the basis of the project description available at the time the environmental assessment report was prepared. However, it is possible that changes in project design may be required at the time of project implementation. This section describes the mechanism that will be put into place to manage changes that might affect the project's environmental impacts.

Potential changes in project design have been categorized as first-order, second-order, and third-order changes. These are defined below.

7.5.1 First-Order Change

A first-order change is one that leads to a significant departure from the project described in the environmental assessment report and consequently requires a reassessment of the environmental impacts associated with the change.

In such an instance, the environmental impacts of the proposed change will be reassessed, and the results sent to the Sindh EPA for approval.

7.5.2 Second-Order Change

A second-order change is one that entails project activities not significantly different from those described in the environmental assessment report, and which may result in project impacts whose overall magnitude would be similar to the assessment made in this report.

In case of such changes, the environmental impact of the activity will be reassessed, additional mitigation measures specified if necessary, and the changes reported to the Sindh EPA.

7.5.3 Third-Order Change

A third-order change is one that is of little consequence to the environmental assessment reports' findings. This type of change does not result in impact levels exceeding those already discussed in the environmental assessment; rather these

may be made onsite to minimize the impact of an activity. The only action required in this case will be to record the change in the change record register.

7.5.4 Changes to the EMP

Changes in project design may necessitate changes in the EMP. In this case, the following actions will be taken:

- A meeting will be held between the Owners and the contractor representatives, to discuss and agree upon the proposed addition to the EMP
- Based on the discussion during the meeting, a change report will be produced collectively, which will include the additional EMP clause and the reasons for its addition
- A copy of the report will be sent to the head offices of the Owners and the contractor
- All relevant project personnel will be informed of the addition

7.6 Environmental Training

Environmental training will help to ensure that the requirements of the environmental assessment and EMP are clearly understood and followed by all project personnel in the course of the project. The contractor will be primarily responsible for providing training to all project personnel. An indicative environmental and social training program is provided in **Table 7.4**, which will be finalized before the commencement of the project.

Table 7.4: Training Program

Type of Training	*Training By*	*Personnel to be Trained*	*Training Description*	*Period*	*Duration*
Occupational Health and Safety	External Sources	EHS Manager	Training should be provided to aware staff to conform to safety codes.	Before starting of project activities	Full day (8 hour session)
Occupational Health and Safety	EHS Manager	Workers Staff	Health, safety and hygiene Proper usage of personnel protective gear Precautions to be taken for working in confined areas.	Before starting of project activities During Project Activities	Full day (8 hour session)
Health, Safety and Environmental Auditing	External Sources	Staff responsible for inspection/audits	Procedures to carry out Health, Safety and Environmental Audits Reporting requirements	Before starting of project activities	Full day (8 hour session)
Waste Disposal and Handling	External Sources	Relevant Workers Relevant Staff	Segregation, identification of hazardous waste, use of PPEs, waste handling	Before starting of project activities	Full day (8 hour session)
Social & Environmental laws & regulations, norms, procedures and guidelines of Government	External sources	EHS staff Managers and supervisors	Environmental standards and their compliance Govt. regulations	Before starting the project activities	Full day (8 hour session)
Implementation of environmental management and monitoring	External Sources	EHS staff Responsible supervisory staff Management	Concepts of environmental management and monitoring plan	Once in 3 months during the entire construction period	Full day (8 hour session)

7.7 Grievance Redress Mechanism

Timely and effective redress of stakeholder grievances contribute to bringing sustainability in the operations of a project. In particular, it will help advocate the process of forming and strengthening relationships between project management and the stakeholder community groups and bridge any gaps to create a common understanding, providing the project management the 'social license' to operate in the area. The grievance redress mechanism proposed for the Project will help achieve the objectives of sustainability and cooperation by dealing with the environmental and social issues of the Project.

The proposed grievance redress mechanism will be designed to cater for the issues of the people that can be affected by the Project. The population that can be affected by the Project is identified in **Chapter 4**. The potential impacts of the Project are described in **Chapter 5**.

7.7.1 Framework for Grievance Redress Mechanism

The Owners will develop a stakeholder grievance redress mechanism.

Pakistan Environmental Protection Act 1997

The Federal Agency, under Regulation 6 of the IEE-EIA Regulations 2000, has issued a set of guidelines of general applicability and sectoral guidelines indicating specific assessment requirements. Under the regulations and guidelines, no specific requirements are laid out for developing a grievance redress mechanism for projects. However, under its Guidelines for Public Consultation, 1997, the proponents are required to consult stakeholders during the implementation phase of the project. In this regards, it is stated that the representatives of local community partake in the monitoring process to promote as Table relationship between the project management and the community.

Outline of Mechanism for Grievance Redress

The Owners will have an effective mechanism to ensure timely and effective handling of grievances related to the Project, including those related to transportation of coal. It may include:

- A Public Complaints Unit (PCU), which will be responsible to receive, log, and resolve complaints; and,
- A Grievance Redress Committee (GRC), responsible to oversee the functioning of the PCU as well as the final non-judicial authority on resolving grievances that cannot be resolved by PCU;
- Grievance Focal Points (GFPs), which will be educated people from the fishing community that can be approached by the community members for their grievances against the BQPS. The GFPs will be provided training by the Owners in facilitating grievance redress.

Gaps in this Section

Due to lack of information on the project design, the following impacts are not assessed, or provide mitigation measures and monitoring plan:

7. Dust emission from conveyor belt (post dust suppression system) and coal yard and its impact on the surround area air quality
8. Impact of effluent on the receiving water body

CHAPTER 8. Mechanism of Public Consultations and Disclosure

As part of the Environmental Impact Assessment process, consultations were undertaken with communities and institutions that may have interest in the proposed project or may be affected by it. This section documents the consultation process for the EIA of the proposed Project.

8.1 Objectives of Stakeholder Consultations

The objectives of the stakeholder consultations during the EIA process are to:

- Ensure involvement of the affected and interested public into the project planning and EIA decision making processes;
- Inform the stakeholders on the proposed activities and its consequences;
- Gather data and information from the public about their human and biophysical environment, as well as about the relations they have with their environment;
- Seek input from the public on the planned activities to increase its positive outcomes and avoid or mitigate negative impacts.

The views, interests and concerns of Project stakeholders are taken into account in the following decisions:

- Planning, design and implementation of the Project;
- During the assessment of the potential impacts of the Project and the identification of appropriate mitigation measures;
- Decisions by the regulatory authorities on whether to approve the Project and corresponding conditions of approval.

8.2 Good Practice Principles

The consultations should be undertaken in good faith, while remaining impartial. The good practice principles that should be observed during the consultations are listed below:

- *Cultural sensitivity* – this requires understanding and appreciation of the social institutions, values, and culture of the communities in the project area and respect for the historical, cultural, environmental, political and social backgrounds of the communities which are affected by a proposal;
- *Interactive approach* – consultation should not be limited to one–way dissemination of information. Stakeholder comments should be fed into the EIA process and proposed project design;
- *Open, transparent and informative* – People who are affected by the Project and are interested in participating should be given access to relevant information, in a simple and understandable format;
- *Inclusive and equitable* – It should be ensured that all stakeholder groups are represented, including less represented groups such as women, children, elderly and poor people;

- *Appropriateness and flexibility* – Consultation methodologies should be appropriate to the specific phase of the EIA process and the stakeholder groups identified. The consultation should be adjusted according to the resources available;
- *Capacity building* – Capacity building should be part of consultation interaction wherever appropriate and practicable.

8.3 Framework for Consultations

The EIA of the proposed Project is undertaken in compliance with relevant national legislation.

Public consultation is mandated under Sindh's environmental law. Regulation 6 of the IEE-EIA Regulations 2000 provides the general requirements whereas the sectoral guidelines indicating specific assessment requirements are provided in the Guidelines for Public Consultation 1997 (the 'Guidelines'). These are summarized below.

- **Objectives of Public Involvement:** 'To inform stakeholders about the proposed project, to provide an opportunity for those otherwise unrepresented to present their views and values, providing better transparency and accountability in decision making, creating a sense of ownership with the stakeholders';
- **Stakeholders:** 'People who may be directly or indirectly affected by a proposal will clearly be the focus of public involvement. Those who are directly affected may be project beneficiaries, those likely to be adversely affected, or other stakeholders. The identification of those indirectly affected is more difficult, and to some extent it will be a subjective judgment. For this reason it is good practice to have a very wide definition of who should be involved and to include any person or group who thinks that they have an interest. Sometimes it may be necessary to consult with a representative from a particular interest group. In such cases the choice of representative should be left to the group itself. Consultation should include not only those likely to be affected, positively or negatively, by the outcome of a proposal, but should also include those who can affect the outcome of a proposal';
- **Mechanism of consultations:** 'Provide sufficient relevant information in a form that is easily understood by non-experts (without being simplistic or insulting), allow sufficient time for stakeholders to read, discuss, consider the information and its implications and to present their views, responses should be provided to issues and problems raised or comments made by stakeholders, selection of venues and timings of events should encourage maximum attendance';
- **Timing and Frequency:** Planning for the public consultation program needs to begin at a very early stage; ideally it should commence at the screening stage of the proposal and continue throughout the EIA process;

- **Consultation Tools:** Some specific consultation tools that can be used for conducting consultations include; focus group meetings, needs assessment, semi-structured interviews; village meetings and workshops;
- **Other Important Considerations:** 'The development of a public involvement program would typically involve consideration of the following issues; objectives of the proposal and the study; identification of stakeholders; identification of appropriate techniques to consult with the stakeholders; identification of approaches to ensure feedback to involved stakeholders; and mechanisms to ensure stakeholders' consideration are taken into account'.

8.4 Potential Project Impacts

The Project can result in the following major impacts, which can affect the stakeholders directly or indirectly:

Air quality impacts

The Project may generate air emission due to loading and unloading of coal on the conveyer belt, transport of coal through conveyor belt and storage of coal in the coal stockpile. This may affect the ambient air quality of the area.

Natural resources

The Project may affect the natural resources including surface water drains due to generation of coal dust and traces of heavy metals in the liquid effluent discharge from the dust suppression system.

Route blockage

The elevated conveyor belt will be constructed in the center of the road. This may result in temporary disruption of traffic during construction on the conveyor route.

Socioeconomic impacts

The Project may stimulate economic growth through employment. relocation, changes to society and pressure on available infrastructure and services brought about by influx of job seekers, social conflicts and changes in the cultural setting due to Project related activities, community development, empowerment of vulnerable groups through increased participation in Project and economic decline at closure;

Other Environmental impacts such as transformation of land and landscape, changes to water resources, noise and vibrations, and ecology and biodiversity disturbance.

8.5 Project Stakeholders

Project stakeholders are defined as those groups or individuals that 'are directly or indirectly affected, positively or negatively, by the project and who can contribute to or hinder its success'. The identification of stakeholders is an ongoing and iterative process and more stakeholders are normally identified as the project develops.

8.5.1 Stakeholder Identification and Analysis

As mentioned earlier, stakeholders include individuals and groups that can affect or take affect from a project's outcome. In case of the Project, these include:

- Communities located in areas that are affected by Project activities;
- Industries and factories located in areas that are affected by Project activities;
- Government and regulatory authorities directly or indirectly connected to or overseeing, the activities of the Project;
- Non–governmental organizations working in areas that can be affected by the Project;
- Academia that can be interested in the Project from transfer of skill and knowledge point–of–view.

Based on the varying roles and political backgrounds, stakeholders can be divided into the following target groups:

- Communities
- Institutions

The list of identified stakeholders is included in **Section 8.4.**

8.5.2 Consultation Material

The main documents for distribution to stakeholders during the consultations include:

- The Background Information Document (BID) informed the stakeholders about the EIA process and on how they can participate in it. In addition, it contained Project details. The BID for the Project is included as **Appendix 6**.

The consultation material was prepared and issued by HBP for information of consultation team members in advance to the process.

8.6 Consultation Mechanism

A transparent and effective consultation mechanism was adopted for the Project, which ensured that the consultation objectives were met. Representatives of client and HBP were present during the consultation meetings with the stakeholders.

8.6.1 Institutional Stakeholders

HBP dispatched the BID attached as **Appendix 6** to the identified industrial stakeholder that may be affected by the Project activities and asked for their opinions and concerns on the potential environmental and social impacts of the proposed Project. HBP also conducted consultation meetings with the selected industrial stakeholders for which letters to inform about the objective of the consultation process and to setup meetings with the industrial stakeholders were dispatched in advance. The meetings progressed in the following manner:

- An overview of the Project description was provided;
- Briefly described the EIA process that was undertaken for the Project and presented the structure of the EIA report to facilitate understanding of the report;
- Concerns were recorded, queries were addressed;

The team from HBP provided information related to the Project EIA via letters to all the institutional stakeholders. The institutional stakeholders were divided in two categories: key-stakeholders and non-key stakeholders. Key-stakeholders consisted of institutions which had higher stake in the Project due to their nature of sensitivity. An appointment time slot was requested from them for an HBP representative to visit them for a discussion on the Project and recording their concerns. The other stakeholders were given the option to participate in the Project consultative meetings or provide their feedback in the form of emails or letters.

The current list of identified institutional stakeholders is given in **Table 8.1**.

Table 8.1: List of Institutional Stakeholders

Stakeholder	*Stakeholder Status*	*Date Consulted on*
Industrial Stakeholders		
Pakistan International Bulk Terminal (PIBT)	Key-Stakeholder	Feb 25, 2016
Bin Qasim Association of Trade & Industry (BQATI)	Key-Stakeholder	Feb 24, 2016
Pharm Evo Co.	Key-Stakeholder	Feb 8, 2016
Indus Motors	Key-Stakeholder	Feb 8, 2016
Garib Sons	Key-Stakeholder	-
Karachi Grains	Key-Stakeholder	Feb 24, 2016
Dawood Meat	Stakeholder	Feb 24, 2016
Pak Petro Chemical	Stakeholder	-
Al-Hassan Warehouse	Stakeholder	-
APL Logistics	Stakeholder	-
Bukhari Farm	Stakeholder	-
PARCO Pearl Gas Pvt Ltd	Stakeholder	-
Power Gas Pvt Ltd	Stakeholder	-
Overseas Oil Trading Company Ltd (OOTCL)	Stakeholder	-
Hamza Vegetable	Stakeholder	-
Raaziq International	Stakeholder	-
IKEA Warehouse	Stakeholder	-
Rashid Enterprise Warehouse	Stakeholder	-
Al-Razzaq Flour Mills	Stakeholder	-
Total Oils Pakistan	Stakeholder	-
Government Stakeholders		
Port Qasim Authority (PQA)	Key-Stakeholder	Feb 24, 2016
Pakistan Steel Mill	Key-Stakeholder	-
Pakistan Railways	Key-Stakeholder	-

8.6.2 Community Stakeholders

The community meetings were scheduled at selected settlements along the areas that can be affected by the Project activities. Community representatives and interested groups were invited to attend these meetings.

The key agenda items for the meetings included:

- Provided an overview of the Project description to the community representatives;
- Briefly described the EIA process that will be undertaken for the Project and presented the structure of the EIA report to facilitate understanding of the report;
- Recorded the community concerns and answered any queries.

A team from HBP provided Project EIA information to the meeting participants. The consultation proceedings were recorded and documented.

The current list of identified community stakeholders is given in **Table 8.2**.

Table 8.2: List of Community Stakeholders

Stakeholder	*Stakeholder type*	*Date Consulted on*
Piranu Goth	Community	January 28 2016
Jumma Goth	Community	January 28, 2016
Kamal Shah	Community	January 29, 2016
Bhains Colony # 10	Community	January 29, 2016
Bhains Colony – Sheheryar Town.	Community	January 29, 2016

8.7 Schedule

The consultations were conducted between January 28 and February 25, 2016.

8.8 Documentation and Reporting

The HBP team kept the record of all discussions during the meetings. An attendance record was maintained and series of photographs were taken. Photographs of community consultations are provided in **Figure 8.1**. Detailed log of consultation minutes is provided in **Appendix 7.** Summary of concerns raised during institutional stakeholder consultations is provided in **Table** and during community consultations is provided in **Table 8.4**.

Consultation at Bhains Colony (Shehryar Town)

Consultation at Bhains Colony #10

Consultation at Kamal Shah

Consultation at Jumma Goth

Consultation at Jumma Goth (Perano Goth)

Figure 8.1: Community Consultation Photographs

Table 8.3: Summary of Institutional Consultation

Aspect	*Concerns*
Cost Dust Generation	The industries in the area shared concerns regarding the impact of coal dust on their operations. Sensitive receptors identified by the industry included the following: • Car storage area and ambulance and bullet proof car manufacturing unit of Indus Motors • Medicine manufacturing facilities and HVAC equipment of PharmaEvo • Food processing and edible oil industries • Feeding operations of the meat industry BQATI noted that edible oil was contaminated at KPT due to coal transport and something similar could happen at PQ.
Analysis of Alternatives	Industry representatives wanted to know what alternatives had been considered during the design phase. Specially they asked whether: • Coal could be transported directly via train without the conveyer belt going through the industrial area • Coal could be loaded onto trains, without intermittent storage at the stockyard. • Coal could be imported using other jetties such as those at the Sinohydro plant or at PSM.

Table 8.4: Summary of Community Consultation

Aspect	*Concerns*
Coal unloading at PIBT	The fishermen community had their concerns regarding the ships that will bring the coal to the Port as the ships may pollute the sea. The ships sometimes have the problem of oil spillage that is harmful for the marine life. There is also the problem of blackwater which is actually the waste from toilets and medical facilities that contain harmful bacteria which will also damage the marine life.
Employment opportunities	Demand of employment in both skilled and unskilled labor. The employment rate in the area is very low and any sort of work will be gladly welcomed. There will be protests if labor is hired from other areas.
Transportation of coal	The coal transportation on the conveyor belt may cause hindrance in the way of the overloaded trucks of green grass that move around in the area. The conveyor belt may disrupt the smooth flow of the trucks.

Gaps in this Section

This section can be completed once follow-up consultations are conducted with stakeholders who have industries in the area near the project footprint due to serious reservations presented by these stakeholders during consultations. The follow-up consultations should communicate information regarding dust emission control measures and alternative design options that were considered for the project.

CHAPTER 9. Conclusion

The proposed coal transport project entails the construction of a coal conveyer belt that will transport coal from PIBT to a coal loading terminal next to the railway line where the coal will stored before loading onto railway wagons for transport up country.

The Project will allow the smooth transport of 20 million tons of coal that will fuel coal fired power plants throughout the country resulting in positive impacts on the socioeconomic environment through the increased availability of cheap electricity. Furthermore, transport of coal via conveyer belt is better than the alternative of transport via truck which will clog the roads in Port Qasim and lead to the deterioration in the air quality of the area.

Among the potential negative impacts of the Project, the main concern is the generation of coal dust from the conveyer belt and coal stockpiles. Due to gaps in the project description as described in **Chapter 3**, these impacts and their mitigation measures could not be accurately identified. However, if strict coal dust suppression measures are incorporated in the design, the conveyer belt is fully covered, with a sprinkling system installed for coal dust suppression, the coal stockpile has sprinkling systems installed and all liquid effluents generated from the sprinkler systems comply with NEQS guidelines then the negative impacts can be mitigated to an acceptable degree.

The results of the air dispersion modeling in **Chapter 5.4.2** indicate that incremental PM_{10} and $PM_{2.5}$ concentrations in the air with the Project in operation will be compliant with national ambient air quality standards.

If the field activities, including the implementation of all mitigation measures and monitoring requirements as outlined in the Environmental Management Plan (**Chapter 7**), are carried out as described in this report, the anticipated impact of the Project on the area's natural and socioeconomic environment will be well within acceptable limits. The project will also comply with all the statutory requirements and standards listed in **Chapter 2** of this report.

Appendix 1: LAeq, 1 hour and HTV Count

This appendix contains hourly LAeq results along with corresponding traffic counts. Noise levels at N1 fluctuate around the 8 hour LAeq however, at T2 they begin low and rise at the end of the day, around 5 pm. Point T3 had the lowest noise levels along with the lowest traffic count. N1 and N2, both with high truck traffic register high noise levels. A detailed breakdown of the data is presented in **Table 1.1** to **Table 1.3** and **Figure 1.1** to **Figure 1.3**.

Table 1.1: Hourly $LA_{eq,\ 1\ hour}$ and Traffic Count at N1

Time	*LAeq 1 hour (dbA)*	*HTV*	*LTV*	*Total*
10:00 to 11:00	65.5	287.0	811	**1098**
11:00 to 12:00	65.9	218.0	550	**768**
12:00 to 13:00	65.9	181.0	793	**974**
13:00 to 14:00	65.5	218.0	446	**664**
14:00 to 15:00	66.1	289	539	**828**
15:00 to 16:00	65.1	289	652	**941**
16:00 to 17:00	66.1	315	612	**927**
17:00 to 18:00	66.7	147	335	**482**

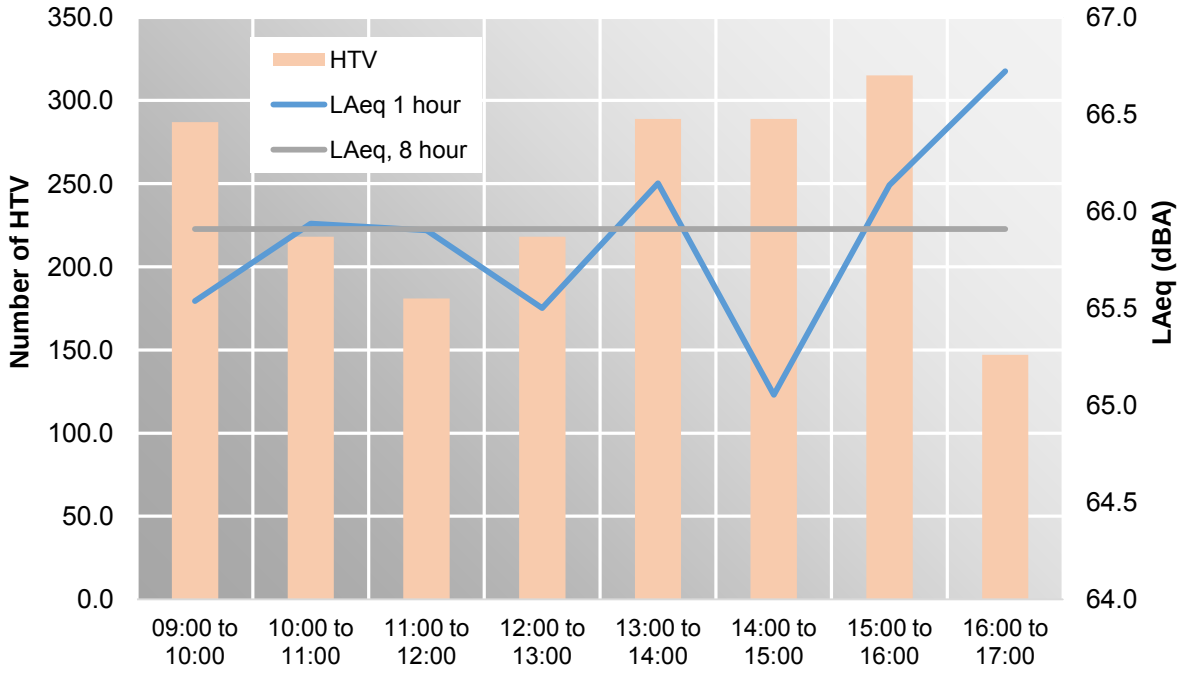


Figure 1.1: Hourly LAeq, 1 hour and Traffic Volume at N1

Table 1.2: Hourly $LA_{eq,\ 1\ hour}$ and Traffic Count at N2

Time	*LAeq 1 hour (dBA)*	*HTV*	*LTV*	*Total*
10:00 to 11:00	62.3	120	140	**260**
11:00 to 12:00	62.0	87	110	**197**
12:00 to 13:00	63.9	146	187	**333**
13:00 to 14:00	63.2	137	159	**296**
14:00 to 15:00	61.9	158	253	**411**
15:00 to 16:00	61.6	149	184	**333**
16:00 to 17:00	63.7	253	338	**591**
17:00 to 18:00	66.5	216	309	**525**

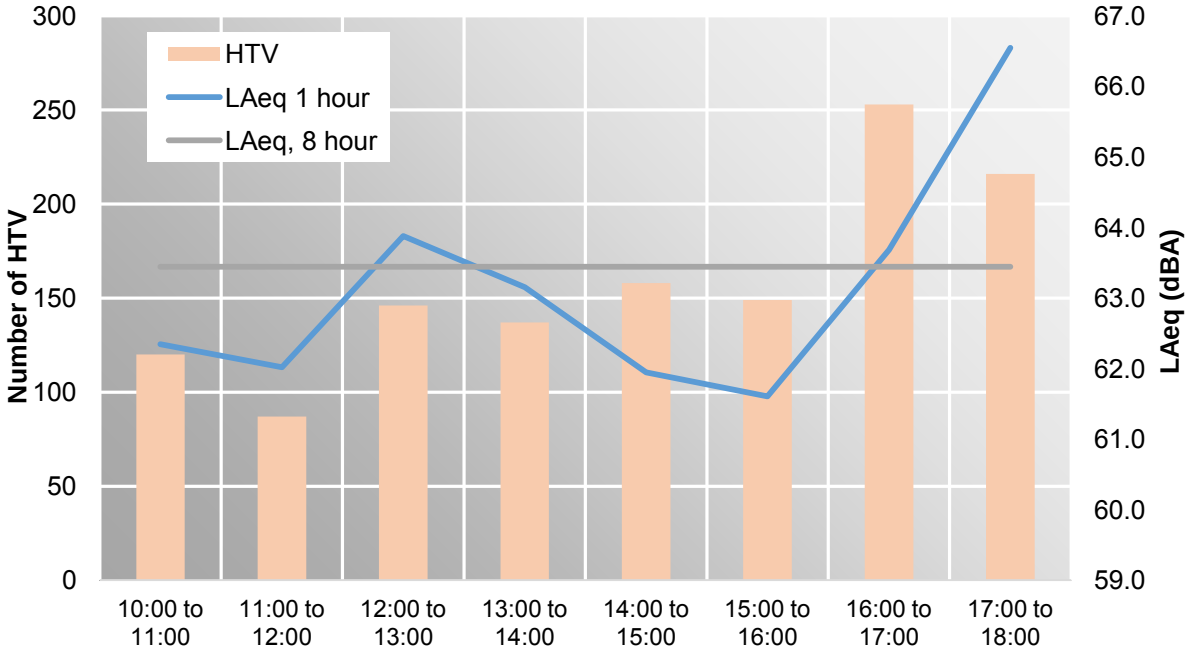


Figure 1.2: Hourly LAeq, 1 hour and Traffic Volume at N2

Table 1.3: Hourly LAeq, 1 hour and Traffic Count at N3

Time	*LAeq 1 hour*	*HTV*	*LTV*	*Total*
10:00 to 11:00	52.1	0	2	**2**
11:00 to 12:00	54.1	0	3	**3**
12:00 to 13:00	59.1	2	1	**3**
13:00 to 14:00	56.1	0	0	**0**
14:00 to 15:00	54.0	0	1	**1**
15:00 to 16:00	56.3	0	0	**0**
16:00 to 17:00	56.5	0	0	**0**
17:00 to 18:00	57.3	0	0	**0**

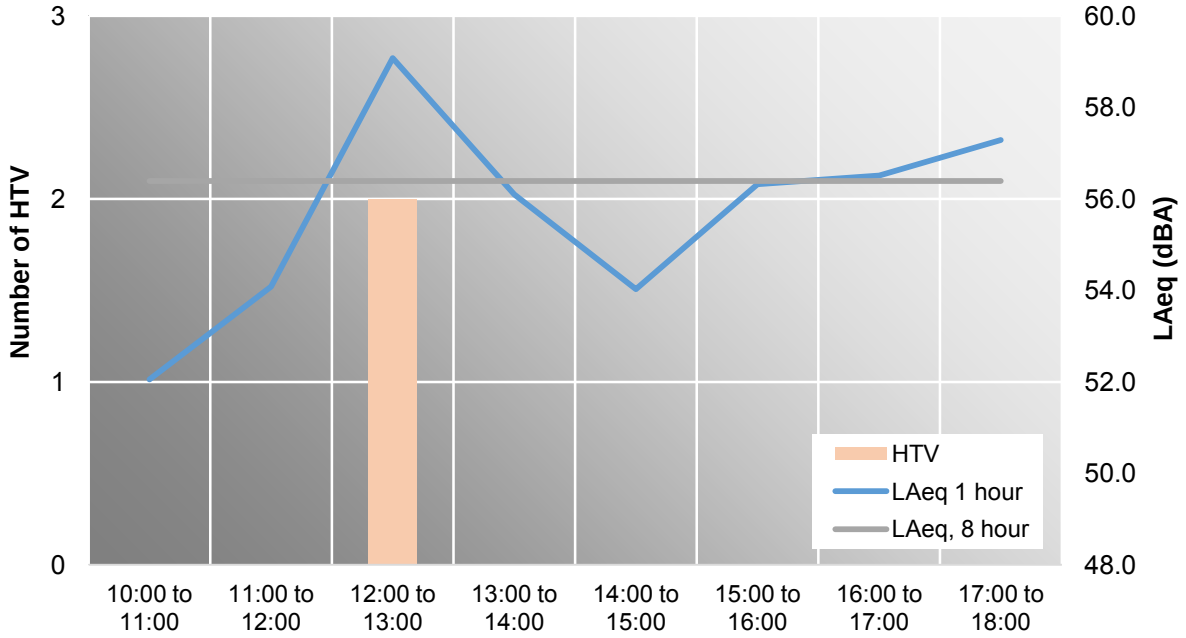


Figure 1.3: Hourly LAeq, 1 hour and Traffic Volume at N3

Appendix 2: Traffic Data

This section presents the complete traffic counts at the various survey locations.

2.1 Passenger Car Units

A Passenger Car Unit (PCU) is a method used in transport modelling to allow for the different vehicle types within a traffic flow group to be assessed in a consistent manner. The PCU factors used are given in **Table 2.1**:

Table 2.1: PCU Factor by Vehicle Type

Vehicle Type	*PCU Factor*
Motorcycle/Two Wheeler	0.50
Car/SUV/Taxi	1.00
Station Wagon/ Jeeps/ 4WD	1.25
Bus	2.00
Truck - 2axle	2.50
Truck - 3axle	3.00
Truck - 4axle	3.50
Truck - 5+axle	4.00
Truck - 2axle (overloaded)	2.50
Truck - 3axle (overloaded)	3.00
Truck - 4axle (overloaded)	3.50
Truck - 5+axle (overloaded)	4.00

2.2 Point T1: Mehran Highway near start of PQ Industrial Zone

2.2.1 From Port Qasim Rd to Bhains Colony

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	PQ Rd to Bhains Colony	09:00 to 10:00	33	45	67	10	8	7	1	–	–	2	–	38	**211**	**194.25**
13-01-16	PQ Rd to Bhains Colony	10:00 to 11:00	32	30	51	5	20	4	1	–	1	–	–	23	**167**	**174.5**
13-01-16	PQ Rd to Bhains Colony	11:00 to 12:00	31	26	88	3	23	1	3	1	–	–	–	20	**196**	**188.5**
13-01-16	PQ Rd to Bhains Colony	12:00 to 13:00	43	27	49	1	25	6	3	–	–	1	–	18	**173**	**197.75**
13-01-16	PQ Rd to Bhains Colony	13:00 to 14:00	30	24	110	–	31	8	1	–	–	–	–	31	**235**	**220**
13-01-16	PQ Rd to Bhains Colony	14:00 to 15:00	39	34	103	1	33	9	1	1	–	–	–	14	**235**	**252**
13-01-16	PQ Rd to Bhains Colony	15:00 to 16:00	62	43	118	8	42	7	1	1	–	–	–	19	**301**	**324.25**
13-01-16	PQ Rd to Bhains Colony	16:00 to 17:00	51	40	111	10	23	1	2	–	–	3	–	24	**265**	**254.5**
			321	**269**	**697**	**38**	**205**	**43**	**13**	**3**	**1**	**6**	–	**187**	**1783**	**1805.75**

2.2.2 From Bhains Colony to Port Qasim Road

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	Bhains Colony to PQ Rd	09:00 to 10:00	68	96	172	20	20	10	4	–	–	2	55		**447**	**607.5**
13-01-16	Bhains Colony to PQ Rd	10:00 to 11:00	74	49	110	5	37	5	2	–	–	1	–	26	**309**	**318.25**
13-01-16	Bhains Colony to PQ Rd	11:00 to 12:00	78	45	285	2	46	4		–	1	–	–	20	**481**	**411.75**
13-01-16	Bhains Colony to PQ Rd	12:00 to 13:00	34	46	77		43	12	2	–	–	–	–	18	**232**	**280.5**
13-01-16	Bhains Colony to PQ Rd	13:00 to 14:00	44	33	96	44	42	11	3	–	–	–	–	25	**298**	**369.75**
13-01-16	Bhains Colony to PQ Rd	14:00 to 15:00	48	56	140	6	45	3		–	–	–	1	14	**313**	**325**
13-01-16	Bhains Colony to PQ Rd	15:00 to 16:00	40	37	84	25	47	12	2	–	–	–	–	18	**265**	**338.75**
13-01-16	Bhains Colony to PQ Rd	16:00 to 17:00	24	28	40	5	43	11	1	–	2	–	–	18	**172**	**241**
			410	**390**	**1004**	**107**	**323**	**68**	**14**	**0**	**3**	**3**	**56**	**139**	**2517**	**2892.5**

2.2.3 From Port Qasim Road to PIBT

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	PQ Rd to PIBT	09:00 to 10:00	–	–	2	–	2	2	–	–	–	–	–	2	**8**	**12**
13-01-16	PQ Rd to PIBT	10:00 to 11:00	–	–	–	–	–	–	–	–	–	–	–	–	–	–
13-01-16	PQ Rd to PIBT	11:00 to 12:00	–	1	1	–	–	–	–	–	–	–	–	–	**2**	**1.75**
13-01-16	PQ Rd to PIBT	12:00 to 13:00	1	1	3	–	–	–	–	–	–	–	–	–	**5**	**3.75**
13-01-16	PQ Rd to PIBT	13:00 to 14:00	–	1	–	–	1	–	–	–	–	–	–	–	**2**	**3.75**
13-01-16	PQ Rd to PIBT	14:00 to 15:00	–	1	–	–	–	–	–	–	–	–	–	–	**1**	**1.25**
13-01-16	PQ Rd to PIBT	15:00 to 16:00	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			1	**4**	**6**	–	**3**	**2**	–	–	–	–	–	**2**	**18**	**22.5**

2.2.4 From PIBT to Port Qasim Road

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	PIBT to PQ Rd	09:00 to 10:00	13	26	34	9	18	9	7	1	1	–	–	10	**128**	**185**
13-01-16	PIBT to PQ Rd	10:00 to 11:00	23	13	19	2	39	22	5	–	–	–	–	6	**129**	**233.75**
13-01-16	PIBT to PQ Rd	11:00 to 12:00	32	25	49	–	33	8	10	–	–	–	–	2	**159**	**229.25**
13-01-16	PIBT to PQ Rd	12:00 to 13:00	32	18	30	–	37	17	20	2	–	–	–	5	**161**	**291**
13-01-16	PIBT to PQ Rd	13:00 to 14:00	32	13	43	1	31	55	11	1	–	–	–	3	**190**	**356.75**
13-01-16	PIBT to PQ Rd	14:00 to 15:00	33	23	53	2	39	29	11	–	–	–	–	8	**198**	**315.25**
13-01-16	PIBT to PQ Rd	15:00 to 16:00	48	42	69	10	57	30	12	5	–	1	–	10	**284**	**453**
13-01-16	PIBT to PQ Rd	16:00 to 17:00	62	34	60	35	33	22	3	1	–	–	–	6	**256**	**367.5**
			243	**181**	**314**	**58**	**256**	**137**	**68**	**9**	**1**	**1**	–	**47**	**1315**	**2074.75**

2.2.5 From Mehran Highway to PIBT

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	Highway to PIBT	09:00 to 10:00	81	38	133	–	43	44	4	3	3	2	–	8	**359**	**479.5**
13-01-16	Highway to PIBT	10:00 to 11:00	60	21	62	–	35	26	7	1	–	–	–	4	**216**	**311.25**
13-01-16	Highway to PIBT	11:00 to 12:00	44	20	64	–	21	17	5	3	–	–	–	3	**177**	**234**
13-01-16	Highway to PIBT	12:00 to 13:00	24	16	42	2	13	30	4	–	–	–	–	3	**134**	**205.5**
13-01-16	Highway to PIBT	13:00 to 14:00	28	18	44	–	33	24	6	–	–	–	–	3	**156**	**248**
13-01-16	Highway to PIBT	14:00 to 15:00	17	16	39	8	29	29	6	1	–	–	–	7	**152**	**257**
13-01-16	Highway to PIBT	15:00 to 16:00	17	14	38	5	30	35	6	–	–	–	–	3	**148**	**264.5**
13-01-16	Highway to PIBT	16:00 to 17:00	6	8	26	–	10	33	3	–	–	–	–	5	**91**	**163.5**
			277	**151**	**448**	**15**	**214**	**238**	**41**	**8**	**3**	**2**	–	**36**	**1433**	**2163.25**

2.2.6 From NWIZ to Bhains Colony

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	PIBT to Highway	09:00 to 10:00	–	1	2	–	–	–	–	–	–	–	–	–	**3**	**2.25**
13-01-16	PIBT to Highway	10:00 to 11:00	3	–	3	–	–	–	–	–	–	–	–	–	**6**	**4.5**
13-01-16	PIBT to Highway	11:00 to 12:00	–	1	3	–	–	–	–	–	–	–	–	3	**7**	**2.75**
13-01-16	PIBT to Highway	12:00 to 13:00	2	–	1	–	–	–	–	–	–	–	–	–	**3**	**2.5**
13-01-16	PIBT to Highway	13:00 to 14:00	–	–	2	–	–	1	1	–	–	1	1	1	**7**	**14.5**
13-01-16	PIBT to Highway	14:00 to 15:00	–	–	–	–	–	–	–	–	–	1	–	–	**1**	**3.5**
13-01-16	PIBT to Highway	15:00 to 16:00	–	2	1	–	–	–	–	–	–	–	–	–	**3**	**3**
13-01-16	PIBT to Highway	16:00 to 17:00	–	–	1	–	–	–	–	–	–	–	–	–	**1**	**0.5**
			5	**4**	**13**	–	–	**1**	**1**	–	–	**2**	**1**	**4**	**31**	**33.5**

2.3 Point T2:

2.3.1 From Mehran Highway to NWIZ

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	Highway to NWIZ	10:00 to 11:00	42	6	31	–	35	22	3	2	–	1	–	4	**146**	**240.5**
13-01-16	Highway to NWIZ	11:00 to 12:00	17	3	18	–	21	13	6	–	–	–	–	1	**79**	**142.25**
13-01-16	Highway to NWIZ	12:00 to 13:00	27	16	36	–	22	20	2	–	–	–	–	1	**124**	**187**
13-01-16	Highway to NWIZ	13:00 to 14:00	19	14	28	17	23	5	–	–	–	–	–	1	**107**	**157**
13-01-16	Highway to NWIZ	14:00 to 15:00	29	36	30	–	22	15	6	7	–	–	–	6	**151**	**238**
13-01-16	Highway to NWIZ	15:00 to 16:00	22	11	32	4	20	20	1	1	–	–	–	1	**112**	**177.25**
13-01-16	Highway to NWIZ	16:00 to 17:00	23	10	22	1	25	56	11	2	1	–	–	7	**158**	**329.5**
13-01-16	Highway to NWIZ	17:00 to 18:00	6	4	17	7	12	34	12	–	–	–	–		**92**	**207.5**
			185	**100**	**214**	**29**	**180**	**185**	**41**	**12**	**1**	**1**	–	**21**	**969**	**1679**

2.3.2 From NWIZ to Mehran Highway

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	NWIZ to Highway	10:00 to 11:00	12	10	19	1	30	6	8	3	–	–	–	1	**90**	**169**
13-01-16	NWIZ to Highway	11:00 to 12:00	15	9	21	–	25	6	13		–	–	–	2	**91**	**162.75**
13-01-16	NWIZ to Highway	12:00 to 13:00	27	12	22	–	44	24	20	3	–	–	–	7	**159**	**317**
13-01-16	NWIZ to Highway	13:00 to 14:00	27	13	34	–	36	26	16	4	–	–	–	4	**160**	**300.25**
13-01-16	NWIZ to Highway	14:00 to 15:00	28	48	39	–	13	15	15	6	–	16	8	–	**188**	**345.5**
13-01-16	NWIZ to Highway	15:00 to 16:00	29	29	41	4	51	41	1	–	–	–	–	3	**199**	**347.75**
13-01-16	NWIZ to Highway	16:00 to 17:00	138	22	97	41	53	40	12	–	–	–	–	5	**408**	**590.5**
13-01-16	NWIZ to Highway	17:00 to 18:00	124	17	113	25	33	50	27	–	–	–	–	3	**392**	**578.75**
			400	**160**	**386**	**71**	**285**	**208**	**112**	**16**	–	**16**	**8**	**25**	**1687**	**2811.5**

2.3.3 From Mehran Highway to PIBT

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	Highway to PIBT	10:00 to 11:00	3	1	6	–	1	1	1	–	–	–	–	–	**13**	**16.25**
13-01-16	Highway to PIBT	11:00 to 12:00	1	1	5	–	–	–	–	–	–	–	–	–	**7**	**4.75**
13-01-16	Highway to PIBT	12:00 to 13:00	2	–	10	1	3	–	–	1	–	–	–	1	**18**	**20.5**
13-01-16	Highway to PIBT	13:00 to 14:00	–	–	5	–	–	3	–	–	–	1	–	3	**12**	**15**
13-01-16	Highway to PIBT	14:00 to 15:00	8	–	3	–	–	–	–	–	–	–	–	7	**18**	**9.5**
13-01-16	Highway to PIBT	15:00 to 16:00	1	–	3	–	1	–	–	–	–	–	–	2	**7**	**5**
13-01-16	Highway to PIBT	16:00 to 17:00	2	2	8	–	2	–	–	–	–	–	–	2	**16**	**13.5**
13-01-16	Highway to PIBT	17:00 to 18:00	1		4	2	1	–	–	1	–	–	–		**9**	**13.5**
			18	**4**	**44**	**3**	**8**	**4**	**1**	**2**	–	**1**	–	**15**	**100**	**98**

2.3.4 From PIBT to Mehran Highway

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	PIBT to Highway	10:00 to 11:00	1	1	1	–	1	–	–	–	1	–	–	–	**5**	**9.25**
13-01-16	PIBT to Highway	11:00 to 12:00	3	1	2	–	–	–	–	–	–	–	–	–	**6**	**5.25**
13-01-16	PIBT to Highway	12:00 to 13:00	1	6	13	–	1	1		–	–	–	–	–	**22**	**20.5**
13-01-16	PIBT to Highway	13:00 to 14:00	3	2	–	–	–	–	–	–	–	–	–	1	**6**	**5.5**
13-01-16	PIBT to Highway	14:00 to 15:00	–	8	6	–	9		4	–	3	–	–	–	**30**	**61.5**
13-01-16	PIBT to Highway	15:00 to 16:00	4	1	5	–	–	1	–	–	–	–	–	–	**11**	**10.75**
13-01-16	PIBT to Highway	16:00 to 17:00	–	–	6	–	–	–	–	–	2	–	–	2	**10**	**11**
13-01-16	PIBT to Highway	17:00 to 18:00	–	–	15	–		1	–	–		–	–		**16**	**10.5**
			12	**19**	**48**	–	**11**	**3**	**4**	–	**6**	–	–	**3**	**106**	**134.25**

2.3.5 From PIBT to NWIZ

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	PIBT to NWIZ	10:00 to 11:00	1	2		–	1	–	–	–	–	–	–	–	**4**	**6**
13-01-16	PIBT to NWIZ	11:00 to 12:00	–	–	1	–	3	–	–	–	–	–	–	–	**4**	**8**
13-01-16	PIBT to NWIZ	12:00 to 13:00	–	2	–	–	–	3	–	–	–	–	–	–	**5**	**11.5**
13-01-16	PIBT to NWIZ	13:00 to 14:00	–	–	3	–	–	1	5	–	–	–	–	1	**10**	**22**
13-01-16	PIBT to NWIZ	14:00 to 15:00	–	8	4	–	6	–	4	–	–	–	–	–	**22**	**41**
13-01-16	PIBT to NWIZ	15:00 to 16:00	–	–	1	–	2	2		–	–	–	–	1	**6**	**11.5**
13-01-16	PIBT to NWIZ	16:00 to 17:00	1	–	2	–	–	3	3	–	–	–	–	–	**9**	**21.5**
13-01-16	PIBT to NWIZ	17:00 to 18:00	–	–	4	–	–	–	–	–	–	–	–	1	**5**	**2**
			2	**12**	**15**	–	**12**	**9**	**12**	–	–	–	–	**3**	**65**	**123.5**

2.3.6 From NWIZ to PIBT

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
13-01-16	NWIZ to PIBT	10:00 to 11:00	–	2	2	–	1	1	1	–	–	–	–	–	**7**	**12.5**
13-01-16	NWIZ to PIBT	11:00 to 12:00	7	3	3	–	–	–	–	–	–	–	–	2	**15**	**12.25**
13-01-16	NWIZ to PIBT	12:00 to 13:00	–	3	10	–	–	–	–	1	–	–	–	–	**14**	**12.75**
13-01-16	NWIZ to PIBT	13:00 to 14:00	1	3	7	–	–	–	–	–	–	–	–	–	**11**	**8.25**
13-01-16	NWIZ to PIBT	14:00 to 15:00	–	1	5	–	–	4	5	–	–	–	–	2	**17**	**33.25**
13-01-16	NWIZ to PIBT	15:00 to 16:00	–	–	5	–	–	–	–	–	–	–	–	–	**5**	**2.5**
13-01-16	NWIZ to PIBT	16:00 to 17:00	–	1	4	–	1	–	–	–	–	–	–	–	**6**	**5.75**
13-01-16	NWIZ to PIBT	17:00 to 18:00	–	1	3	–	2	7	2		–	–	–	–	**15**	**35.75**
			8	**14**	**39**	–	**4**	**12**	**8**	**1**	–	–	–	**4**	**90**	**123**

2.4 Point T3: Main PQA Access Road and NWIZ Main Road Intersection

2.4.1 From Highway (N5) to SIZ

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
12-01-16	Highway to SIZ	09:00 to 10:00	158	19	96	2	24	32	14	3	7	2	–	11	**368**	485.75
12-01-16	Highway to SIZ	10:00 to 11:00	100	16	50	–	14	28	8	7	5	4	–		**232**	354
12-01-16	Highway to SIZ	11:00 to 12:00	89	15	88	–	22	34	22	5	14	1	–	2	**292**	465.25
12-01-16	Highway to SIZ	12:00 to 13:00	56	36	68	–	19	39	20	8	8	–	–	4	**258**	433.5
12-01-16	Highway to SIZ	13:00 to 14:00	52	26	44	–	18	63	21	17	9	–	–	3	**253**	518
12-01-16	Highway to SIZ	14:00 to 15:00	58	20	58	–	24	66	32	4	10	–	–	2	**274**	538
12-01-16	Highway to SIZ	15:00 to 16:00	42	17	33	5	21	51	33	4	18	–	–	–	**224**	498.75
12-01-16	Highway to SIZ	16:00 to 17:00	59	19	42	–	47	49	25	20	18	13	8	–	**300**	681.25
			614	**168**	**479**	**7**	**189**	**362**	**175**	**68**	**89**	**20**	**8**	**22**	**2201**	**3974.5**

2.4.2 From SIZ to Highway (N5)

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
12-01-16	SIZ to Highway	09:00 to 10:00	5	7	4	14	5	20	26	4	16	–	–	5	**106**	**287.25**
12-01-16	SIZ to Highway	10:00 to 11:00	14	14	11	–	7	22	22	13	22	–	–	1	**126**	**337.5**
12-01-16	SIZ to Highway	11:00 to 12:00	28	17	38	7	23	37	42	12	17	–	–	–	**221**	**513.75**
12-01-16	SIZ to Highway	12:00 to 13:00	13	15	29	–	27	16	30	4	8	–	–	2	**144**	**314.75**
12-01-16	SIZ to Highway	13:00 to 14:00	30	12	19	–	9	14	22	1	8	–	–	–	**115**	**232**
12-01-16	SIZ to Highway	14:00 to 15:00	63	18	22	–	22	38	46	1	11	–	–	1	**222**	**474.5**
12-01-16	SIZ to Highway	15:00 to 16:00	54	18	52	13	8	12	22	13	10	–	–	1	**203**	**353.5**
12-01-16	SIZ to Highway	16:00 to 17:00	42	49	57	32	36	32	37	20	32	–	–	–	**337**	**719.25**
			249	**150**	**232**	**66**	**137**	**191**	**247**	**68**	**124**	–	–	**10**	**1474**	**3232.5**

2.4.3 From Highway (N5) to NWIZ

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
12-01-16	Highway to NWIZ	09:00 to 10:00	15	5	10	2	6	4	5						**47**	**74.75**
12-01-16	Highway to NWIZ	10:00 to 11:00	4	3	2		10	3	7	2	13			1	**45**	**127.25**
12-01-16	Highway to NWIZ	11:00 to 12:00	5	1	3		7	1	2		2				**21**	**43.25**
12-01-16	Highway to NWIZ	12:00 to 13:00	11	6	1		8	2	5	1					**34**	**66.5**
12-01-16	Highway to NWIZ	13:00 to 14:00	6	7	2		8	3	6	1	1				**34**	**73.75**
12-01-16	Highway to NWIZ	14:00 to 15:00	13	5	6	2	9	10	6	1	2				**54**	**111.75**
12-01-16	Highway to NWIZ	15:00 to 16:00	57	34	15	15	19	22	12	12	11	1			**198**	**388**
12-01-16	Highway to NWIZ	16:00 to 17:00	19	18	19	1	18	8	19	1	8	4	4	4	**123**	**252.5**
			130	**79**	**58**	**20**	**85**	**53**	**62**	**18**	**37**	**5**	**4**	**5**	**556**	**1137.75**

2.4.4 From NWIZ to Highway (N5)

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
12-01-16	NWIZ to Highway	09:00 to 10:00	3	4	4	2	5	4	1	1	2	1	–	2	**29**	**57.5**
12-01-16	NWIZ to Highway	10:00 to 11:00	5	1	3	–	1	3	–	1	1	–	–	–	**15**	**27.25**
12-01-16	NWIZ to Highway	11:00 to 12:00	9	5	5	–	5	–	1	–	–	–	–	–	**25**	**33.75**
12-01-16	NWIZ to Highway	12:00 to 13:00	7	–	15	–	–	4	2	1		–	–	–	**29**	**37.5**
12-01-16	NWIZ to Highway	13:00 to 14:00	5	8	2	–	6	2	6	4	4	–	–	1	**38**	**90**
12-01-16	NWIZ to Highway	14:00 to 15:00	11	6	6	1	6	3	9	1	11	–	–	–	**54**	**127**
12-01-16	NWIZ to Highway	15:00 to 16:00	27	17	35	10	17	20	18	14	19	2	1	1	**181**	**393.75**
12-01-16	NWIZ to Highway	16:00 to 17:00	16	19	19	21	19	21	9	8	9	–	–	–	**141**	**301.25**
			83	**60**	**89**	**34**	**59**	**57**	**46**	**30**	**46**	**3**	**1**	**4**	**512**	**1068**

2.4.5 From NWIZ to SIZ

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
12-01-16	NWIZ to SIZ	09:00 to 10:00	33	15	44	10	12	25	33	29	–	1	–	6	**208**	**433.75**
12-01-16	NWIZ to SIZ	10:00 to 11:00	29	9	22	13	17	20	18	14	–	–	–	4	**146**	**298.75**
12-01-16	NWIZ to SIZ	11:00 to 12:00	27	26	21	10	29	50	16	3	–	–	–	–	**182**	**380.5**
12-01-16	NWIZ to SIZ	12:00 to 13:00	16	20	29	15	14	23	27	–	–	–	–	–	**144**	**284**
12-01-16	NWIZ to SIZ	13:00 to 14:00	37	25	28	10	17	29	15	–	2	–	–	5	**168**	**292.25**
12-01-16	NWIZ to SIZ	14:00 to 15:00	29	13	21	4	7	18	12	–	4	–	–	–	**108**	**193.25**
12-01-16	NWIZ to SIZ	15:00 to 16:00	18	7	38	12	22	23	20	–	–	–	–	1	**141**	**263.75**
12-01-16	NWIZ to SIZ	16:00 to 17:00	64	22	50	24	20	40	25	–	18	–	–	9	**272**	**494**
			253	**137**	**253**	**98**	**138**	**228**	**166**	**46**	**24**	**1**	–	**25**	**1369**	**2640.25**

2.4.6 From SIZ to NWIZ

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
12-01-16	SIZ to NWIZ	09:00 to 10:00	3	12	13	1	9	8	9	5	–	–	–	2	**62**	**124.5**
12-01-16	SIZ to NWIZ	10:00 to 11:00	14	12	12	9	19	18	23	–	–	–	–	12	**119**	**235**
12-01-16	SIZ to NWIZ	11:00 to 12:00	26	32	17	12	20	16	28	4	–	–	–	–	**155**	**310.5**
12-01-16	SIZ to NWIZ	12:00 to 13:00	25	14	19	7	17	21	30	6	–	3	–	6	**148**	**311**
12-01-16	SIZ to NWIZ	13:00 to 14:00	24	32	28	5	29	56	28	–	–	–	–	10	**212**	**426.5**
12-01-16	SIZ to NWIZ	14:00 to 15:00	34	14	37	13	30	50	14	1	3	–	–	5	**201**	**386**
12-01-16	SIZ to NWIZ	15:00 to 16:00	41	15	37	5	21	25	18			–	–	4	**166**	**278.75**
12-01-16	SIZ to NWIZ	16:00 to 17:00	78	56	53	52	18	25	21	21	14	–	–	13	**351**	**612**
			245	**187**	**216**	**104**	**163**	**219**	**171**	**37**	**17**	**3**	–	**52**	**1414**	**2684.25**

2.5 Point T4: Near proposed coal stockyard

2.5.1 From NWIZ to Proposed Stockyard

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
11-01-16	NWIZ to Stockyard	10:00 to 11:00	1	–	–	–	–	–	–	–	–	–	–	–	**1**	**1**
11-01-16	NWIZ to Stockyard	11:00 to 12:00	–	–	1	–	–	–	–	–	–	–	–	–	**1**	**0.5**
11-01-16	NWIZ to Stockyard	12:00 to 13:00	–	–	1	–	1	–	–	–	–	–	–	–	**2**	**3**
11-01-16	NWIZ to Stockyard	13:00 to 14:00	–	–	–	–	–	–	–	–	–	–	–	1	**1**	**–**
11-01-16	NWIZ to Stockyard	14:00 to 15:00	1	–	–	–	–	–	–	–	–	–	–	–	**1**	**1**
11-01-16	NWIZ to Stockyard	15:00 to 16:00	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**
11-01-16	NWIZ to Stockyard	16:00 to 17:00	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**
11-01-16	NWIZ to Stockyard	17:00 to 18:00	–	–	–	–	–	–	–	–	–	–	–	–	**–**	**–**
			2	**–**	**2**	**–**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**1**	**6**	**5.5**

2.5.2 From Proposed Stockyard to NWIZ

Date	*Direction*	*Time*	*Cars*	*Pick-up*	*Bikes*	*Buses*	*Trucks*					*Tractor*	*Trailor*	*Other*	***Total***	***PCU***
							2 AX	*3 AX*	*4 AX*	*5 AX*	*6 AX*					
11-01-16	Stockyard to NWIZ	10:00 to 11:00	1	–	–	–	–	–	–	–	–	–	–	–	**1**	**1**
11-01-16	Stockyard to NWIZ	11:00 to 12:00	–	–	2	–	–	–	–	–	–	–	–	–	**2**	**1**
11-01-16	Stockyard to NWIZ	12:00 to 13:00	–	–	–	–	1	–	–	–	–	–	–	–	**1**	**2.5**
11-01-16	Stockyard to NWIZ	13:00 to 14:00	–	–	–	–	–	–	–	–	–	–	–	2	**2**	–
11-01-16	Stockyard to NWIZ	14:00 to 15:00	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11-01-16	Stockyard to NWIZ	15:00 to 16:00	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11-01-16	Stockyard to NWIZ	16:00 to 17:00	–	–	–	–	–	–	–	–	–	–	–	–	–	–
11-01-16	Stockyard to NWIZ	17:00 to 18:00	–	–	–	–	–	–	–	–	–	–	–	–	–	–
			1	**–**	**2**	**–**	**1**	**–**	**–**	**–**	**–**	**–**	**–**	**2**	**6**	**4.5**

Appendix 3: Socioeconomic Form

The cattle colony specific survey form is given below.

Survey Form

Bhains Colony

1.1 Personal Information

Name of Investigator: _____Contact Number: _____

Coordinates: N _____ E _____

Source(s) of Earning:

_____

1.2 Farm Information

Size of farm:

☐ Small ☐ Medium ☐ Large

No of cattle: _____

Taxes/permits involved in buying and selling products:

☐ Yes ☐ No

1.3 Fodder

Amount of Fodder used: _____ (kg/day), _____ (kg/month)

Source of Fodder:

☐ Domestically produced ☐ Market purchased _____ (Rs/kg)

Domestic Production:

☐ Own resources ☐ Market purchased resources _____ (Rs/kg)

Market Purchased:

☐ Throughout year ☐ Seasonally

1.4 Milk Production

Consumption of produced milk:

☐ Subsistence ☐ Market-oriented _____ (Rs/liter)

☐ Milk processing unit _____ (Rs/liter)

Amount of sold milk: _____ (liters/day), _____ (liters/month)

1.5 Dairy Products other than Milk

☐ Butter ☐ Cream ☐ Yogurt ☐ Cheese

Others please specify _____

1.6 Health

Appendix 4: Environmental Management Plan

4.1 Waste Management Plan

The waste management plan is summarized in **Exhibit 4.1**.

Exhibit 4.1: Waste Management Plan Summary

No.	*Material Waste*	*Final Disposal Method*	*Associated Risks*	*Recommended Procedure*
1	Iron	Material returned to Store as unserviceable Scrap Store Recycling	Equipment and parts may be contaminated with oil or other liquids. This may pose hazards during recycling and/or melting.	Separate contaminated parts and ensure disposal contractor cleans and removes contaminations before recycling equipment.
2	Copper	Recycling Scrap Store	Copper wires and tubes may be covered with insulation and may pose hazard if melted.	Separate insulated copper from rest and ensure disposal contractor removes it before recycling.
3	Other Materials	Material returned to Store as unserviceable Scrape Store Recycling Landfill	Some waste materials may contain hazardous materials (such as mercury and lead) which may pose health risks if not handled or disposed of properly.	All hazardous substances such as lead and mercury will be identified and separated. Ensure waste contractor disposes hazardous materials in accordance with accepted methods.
4	Wood, Cotton, Plastic, Waste and Packing Materials	Recycling Landfill	Burning of wood, paper, plastic and other materials may cause air pollution Littering due to improper disposal	Ensure waste contractor disposes all non–recyclable plastic wastes and other non–recyclable materials at land disposal.
5	Electronics	Material returned to Store as unserviceable	Some electronic equipment may contain toxic materials and pose a health risk if opened or dismantled.	Ensure contractor disposes equipment properly and equipment is opened only under guidance of qualified professional.
6	Insulation	Material Re–used Landfill	Burning may cause air pollution. Littering due to improper disposal	Ensure contractor disposes insulation properly at landfill site.
7	Oil	Recycling Contractors	May cause contamination of soil or waterways	Ensure properly certified recycling contractors are used.
8	Concrete	Landfill or reuse as for filling	None	Ensure safe storage till disposal
9	Asbestos	To be handled according to the Asbestos Management plan		

4.2 Construction Management Plan

The Construction Management Plan (CMP) will clearly identify all areas that will be utilized during construction for various purposes. The detailed CMP is provided in

Exhibit 4.2 For example, on a plot plan of the construction site the following will be shown:

- Areas used for camp / site office
- Storage areas for raw material and equipment
- Waste yard
- Location of any potentially hazardous material such as oil
- Parking area
- Loading and unloading of material
- Septic tanks

Other key mitigation measures to be adopted are as follows:

- New equipment will be stored in properly demarcated and identified areas
- Separate storage of each item will be adopted and each area will be marked either on floor or cordoned off by tapes
- Lifting equipment (cranes) used for the equipment will follow the prescribed safety specification.
- Proper illumination to be provided
- Material Safety Data Sheet (MSDS) for chemicals, if any, will accompany the consignment. A copy of the MSDS will be available near the storage area at all times.
- Appropriate PPE will be provided to the workers and it will be ensured that the PPE are used.
- The staff will be provided with training in use of PPE.
- Proper scaffolding platforms will be provided for all work areas located more than 1 m above floor level.
- First Aid facilities and fire protection devices will be placed in areas where work activities will be performed.
- Ear protection will be used if the noise level is above 85 dB(A)
- All confined spaces[67] will be identified

[67] "Confined space" means a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

- The temperature of the confined space will be in the human tolerance range
- Artificial and intrinsically safe lighting will be provided in the confined spaces
- If there is a risk of gases or fumes in the confined space the provisions for ventilation will be made.

---

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and

(3) Is not designed for continuous employee occupancy.

Exhibit 4.2: Construction Management Plan

Aspect	*Objective*	*Mitigation and Management Measure*
Vegetation clearance	Minimize vegetation clearance and felling of trees	• Removal of trees should be restricted to the development footprint. • Construction activities shall minimize the loss or disturbance of vegetation • Use clear areas to avoid felling of trees • A procedure shall be prepared to manage vegetation removal, clearance and reuse • Cleared areas will be re-vegetated
Poaching	Avoid illegal poaching	• Contractual obligation to avoid illegal poaching • Provide adequate knowledge to the workers relevant government regulations and punishments for illegal poaching
Discharge from construction sites	• Minimize surface and ground water contamination • Reduce contaminant and sediment load discharged into water bodies affecting humans and aquatic life	• Install temporary drainage works (channels and bunds) in areas required for sediment and erosion control and around storage areas for construction materials • Prevent all solid and liquid wastes entering waterways by collecting waste where possible and transport to approved waste disposal site or recycling depot • Ensure that tires of construction vehicles are cleaned in the washing bay (constructed at the entrance of the construction site) to remove the mud from the wheels. This should be done in every exit of each construction vehicle to ensure the local roads are kept clean.
Soil Erosion and siltation	Avoid sediment and contaminant loading of surface water bodies and agricultural lands.	• Minimize the length of time an area is left disturbed or exposed. • Reduce length of slope of runoff • Construct temporary cutoff drains across excavated area • Setup check dams along catch drains in order to slow flow and capture sediment • Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. • Increase the watering frequency during periods of high risk (e.g. high winds) • All the work sites (except permanently occupied by the plant and supporting facilities) should be reinstated to its initial conditions (relief, topsoil, vegetation cover).

Aspect	*Objective*	*Mitigation and Management Measure*
Excavation, earth works, and construction yards	Proper drainage of rainwater and wastewater to avoid water and soil contamination.	• Prepare a program for prevent/avoid standing waters, which Construction Supervision Contractor (CSC) will verify in advance and confirm during implementation • Establish local drainage line with appropriate silt collector and silt screen for rainwater or wastewater connecting to the existing established drainage lines already there
Ponding of water	Prevent mosquito breeding	• Do not allow ponding of water especially near the waste storage areas and construction camps • Discard all the storage containers that are capable of storing of water, after use or store them in inverted position • Reinstate relief and landscape.
Storage of hazardous and toxic chemicals	Prevent spillage of hazardous and toxic chemicals	• Implement waste management plans • Construct appropriate spill containment facilities for all fuel storage areas • Remediate the contaminated land using the most appropriate available method to achieve required commercial/industrial guideline validation results
Land clearing	Preserve fertile top soils enriched with nutrients required for plant growth or agricultural development.	• Strip the top soil to a depth of 15 cm and store in stock piles of height not exceeding 2m and with a slope of 1:2 • Spread the topsoil to maintain the physio–chemical and biological activity of the soil. • The stored top soil will be utilized for covering all disturbed area and along the proposed plantation sites • Topsoil stockpiles will be monitored and should any adverse conditions be identified corrective actions will include: o Anaerobic conditions – turning the stockpile or creating ventilation holes through the stockpile; o Erosion – temporary protective silt fencing will be erected;
	Avoid change in local topography and disturb the natural rainwater/ flood water drainage	• Ensure the topography of the final surface of all raised lands are conducive to enhance natural draining of rainwater/flood water; • Reinstate the natural landscape of the ancillary construction sites after completion of works

Aspect	*Objective*	*Mitigation and Management Measure*
Construction vehicular traffic	Control vehicle exhaust emissions and combustion of fuels.	• Use vehicles with appropriate exhaust systems. • Establish and enforce vehicle speed limits to minimize dust generation • Cover haul vehicles carrying dusty materials (cement, borrow and quarry) moving outside the construction site • Level loads of haul trucks travelling to and from the site to avoid spillage • Use of defined haulage routes and reduce vehicle speed where required. • Regular maintenance of all vehicles • All vehicle exit points from the construction site shall have a wash-down area where mud and earth can be removed from a vehicle before it enters the public road system.
	Minimize nuisance due to noise	• Maintain all vehicles in good working order • Make sure all drivers comply with the traffic codes concerning maximum speed limit.
	Avoid impact on existing traffic conditions	• Prepare and submit a traffic management plan • Restrict the transport of oversize loads. • Operate transport vehicles, if possible, in non–peak periods to minimize traffic disruptions.
	Prevent accidents and spillage of fuels and chemicals	• Restrict the transport of oversize loads. • Operate transport vehicles, if possible, in non–peak periods to minimize traffic disruptions. • Design and implement safety measures and an emergency response plan to contain damages from accidental spills. • Designate special routes for hazardous materials transport.

Aspect	*Objective*	*Mitigation and Management Measure*
Construction machinery	Prevent impact on air quality from emissions	• Use machinery with appropriate exhaust systems. • Regular maintenance of all construction machinery • Provide filtering systems, duct collectors or humidification or other techniques (as applicable) to the concrete batching and mixing plant to control the particle emissions in all stages
	Reduce impact of noise and vibration on the surrounding	• Appropriately site all noise generating activities to avoid noise pollution to local residents. • Ensure all equipment is in good repair and operated in correct manner. • Install high efficiency mufflers to construction equipment. • Operators of noisy equipment or any other workers in the vicinity of excessively noisy equipment are to be provided with ear protection equipment
Construction activities	Minimize dust generation	• Water the material stockpiles, access roads and bare soils on an as required basis to minimize dust. • Increase the watering frequency during periods of high risk (e.g. high winds). • Stored materials such as gravel and sand should be covered and confined • Locate stockpiles away from sensitive receptors
	• Reduce impact of noise and vibration on the surrounding • Avoid driving hazard where construction interferes with pre–existing roads.	• Notify adjacent landholders or residents prior to noise events during night hours • Install temporary noise control barriers where appropriate • Avoid working during 21:00 to 06:00 within 500m from residences.
	Minimizing impact on water quality	• Stockpiles of potential water pollutants (i.e. bitumen, oils, construction materials, fuel, etc.) shall be locate so as to minimize the potential of contaminants to enter local watercourses or storm-water drainage.
		• Storm-water runoff from all fuel and oil storage areas, workshop, and vehicle parking areas is to be

Aspect	*Objective*	*Mitigation and Management Measure*
		directed into an oil and water separator before being discharged to any watercourse. • An Emergency Spills Contingency Plan shall be prepared.
Siting and location of construction camps	Minimize impact from construction footprint	• Locate the construction camps at areas which are acceptable from environmental, cultural or social point of view.
Construction Camp Facilities	Minimize pressure on local services	• Adequate housing for all workers • Safe and reliable water supply. • Hygienic sanitary facilities and sewerage system. • Treatment facilities for sewerage of toilet and domestic wastes • Storm water drainage facilities. • In–house community entertainment facilities.
Disposal of waste	Minimize impacts on the environment	• Ensure proper collection and disposal of solid wastes in the approved disposal sites • Store inorganic wastes in a safe place within the household and clear organic wastes on daily basis to waste collector. • Establish waste collection, transportation and disposal systems • Ensure that materials with the potential to cause land and water contamination or odor problems are not disposed of on the site. • Ensure that all on-site wastes are suitably contained and prevented from escaping into neighboring fields, properties, and waterways, and the waste contained does not contaminate soil, surface or groundwater or create unpleasant odors for neighbors and workers.
Fuel supplies for cooking purposes	Discourage illegal fuel wood consumption	• Provide fuel to the construction camps for domestic purpose • Conduct awareness campaigns to educate workers on preserving the biodiversity and wildlife of the project area, and relevant government regulations and punishments on wildlife protection.
Site Restoration	Restoration of the construction camps to original condition	• To the extent possible, restore the camp site and all other areas temporarily used for construction to their conditions that existed prior to commencement of construction work.

Aspect	*Objective*	*Mitigation and Management Measure*
Construction activities near religious and cultural sites	Avoid disturbance to cultural and religious sites	• Stop work immediately and notify the site manager if, during construction, an archaeological or burial site is discovered. • It is an offence to recommence work in the vicinity of the site until approval to continue is given by the plant management. • Maintain appropriate behavior with all construction workers especially women and elderly people • Resolve cultural issues in consultation with local leaders and supervision consultants
Health and Safety	Minimize health and safety risks	• Implement suitable safety standards, • Provide the workers with a safe and healthy work environment, taking into account inherent risks in its particular construction activity and specific classes of hazards in the work areas, • Provide personal protection equipment (PPE) for workers, such as safety boots, helmets, masks, gloves, protective clothing, goggles, full–face eye shields, and ear protection. • Maintain the PPE under a regular checking and replacement program
Water and sanitation facilities at the construction sites	Improve workers' personal hygiene	• Provide portable toilets at the construction sites and drinking water facilities. • Portable toilets should be cleaned once a day. • All the sewerage should be pumped from the collection tank once a day into the common septic tank for further treatment.

4.3 Coal Dust Management Plan

Coal dusts from coal stockpile and coal conveyor belt area are the major source of fugitive emissions. Dust suppression using a sprinkler system will be primarily employed to control the coal dust from these areas. Recycled water from the waste water treatment plants and cooling water blow down will be the primary source of water to the sprinkler system.

Two methods of dust control will be implemented: dust extraction and dust suppression.

Coal dust suppression will comprise wetting air–borne dust particles with a fine spray of water, causing the dust particles to agglomerate and move by gravity to the coal stream flow. Once properly wetted, the dust particles will remain wet for some period and will not tend to become airborne again. The dust suppression system at PIBT Terminal and Coal Stockpile yard will consist of swivelling and wide–angle full–cone spray nozzles. These nozzles will be provided on both sides of the pile and at ground level, spaced every 50 m. Ventilation slots are proposed in the top portion of the raw coal bunkers, allowing coal fed into the bunkers to displace any gases that may have formed as a result of resident coal.

In the coal dust extraction system, dust will be extracted from screening feeders and belt feeders by suctioning the dust–laden air and trapping coal particles in fine water sprays, thereafter discharging the clean air into the atmosphere. The dust collection equipment will include cyclones, wet scrubbers, fans, collecting hoppers, filters, hoods, ducts, dampers, and drain pipes. In this system, the dust–laden air will enter the collector where it comes in contact with water; the slurry will be collected in the hopper and disposed of in the settling pond. Settle dust will be put back into the stockyard where it will be mixed with crushed coal for use. In addition, roof extraction fans will be provided in essential areas like crusher house and boiler bunker floors. Air conditioning for control room and pressurized ventilation with unitary air filter unit for Electrical and Control buildings of coal handling plant will be provided.

Rainfall runoff from the coal pile and runoff from the application of dust suppression sprays will contain mainly suspended solids. This runoff will be routed to the settling basin for retention and settling of suspended solids, and the clear water from there may be used for the dust suppression system.

The volatility of the coal of this Project is high, easy to cause spontaneous combustion; therefore, the coal to the coal yard must be stored in different piles and compacted, the earlier it comes, the earlier it is to be used, with regular rearrangement of the coal piles. The bucket wheel machine itself is equipped with water tank to spray water over the fly dust points so as to reduce the fly dust. The coal pile shall have an automatic temperature monitoring system; when an increase in temperature is detected, an alarm will be immediately triggered, alerting of the presence of hot spots. Based on the temperature and the risks, the coal will be either immediately sent to the boiler for utilization, or the portion of coal will be isolated and allowed to burn off. Coal fires

cannot be extinguished by water. Rubber belt of the belt conveyer shall use flame retardant material.

4.4 Spill Prevention and Mitigation Plan

Liquid waste spills that are not appropriately managed have the potential to harm the environment. By taking certain actions BQPS can ensure that the likelihood of spills occurring is reduced and that the effect of spills is minimized.

To enable spills to be avoided and to help the cleanup process of any spills, the EPC contractors and the management and staff of the Owners should be aware of spill procedures. By formalizing these procedures in writing, staff members can refer to them when required thus avoiding undertaking incorrect spill procedures.

A detailed spill management plan will be prepared for the construction phase. Similar, plan will also be developed for specific areas during plant operation. The plan will contain the following:

- Identification of potential sources of spill and the characterization of spill material and associated hazards.
- Risk assessment (likely magnitude and consequences)
- Steps to be undertaken taken when a spill occurs (stop, contain, report, clean up and record).
- A map showing the locations of spill kits or other cleaning equipment.

4.4.1 Avoiding spills

By actively working to prevent spills, money and time can be saved by not letting resources go to waste. In addition, the environment is protected from contaminants that can potentially cause harm.

All liquids will be stored in sealed containers that are free of leakage. All containers will be on sealed ground and in an undercover area. Sharp parts will be kept away from liquid containers to avoid damage and leaks.

Bunding: To prevent spills from having an effect on the Project site operations or the environment, bunding will be placed around contaminant storage areas. A bund can be a low wall, tray, speed bump, iron angle, sloping floor, drain or similar and is used to capture spilt liquid for safe and proper disposal.

4.4.2 Spill Kits

Spill kits are purpose designed units that contain several items useful for cleaning up spills that could occur. Typical items are:

- Safety gloves and appropriate protective clothing (depending on the type of chemicals held onsite)
- Absorbent pads, granules and/or pillows

- Booms for larger spills
- Mops, brooms and dustpans.

Spill kits are used to contain and clean up spills in an efficient manner. Sufficient number of spill kits will be provided. Spill kits will be kept in designated areas that are easily accessible to all staff. Staff members will be trained in using the spill kit correctly.

After cleaning up a spill, the materials used to clean up will be disposed of correctly. Depending on the spill material, the used material may be disposed in the hazardous waste facility or the landfill site.

4.4.3 Responding to spills

Stop the source: If it is safe to do so, the source of the spill should be stopped immediately. This may be a simple action like upturning a fallen container.

Contain and control the flow: To stop the spill from expanding, absorbent materials and liquid barriers should be placed around the spill. Work from the outside to soak up the spill. It is vital that spilt liquid is not allowed to reach storm water drains, sewer drains, natural waterways or soil.

For large scale spills that involve hazardous materials, authorities may have to be alerted.

Clean up: Using information from Material Safety Data Sheets (MSDS) about the properties of the liquid spilled and the spill equipment available, spills should be cleaned up promptly.

Record the incident: By keeping a simple log of all spills, precautionary measures can be put in place to avoid similar accidents from occurring in the future.

4.4.4 Fire Emergency Response Plan

A firefighting system will be installed with a standard operating procedure considering the potential fire from the sparks in coal storage and handling.

4.4.5 Coal Unloading and Transportation Management Plan

A detailed transportation management plan will be prepared through the PIC. The outline of the plan is as follows:

- *Objective*: To protect the community and environment from potential hazards of coal unloading and bulk transportation and to protect the workers and its contractors from occupational hazards of associated with bulk transportation of material.
- *Scope:* The plan will cover both rail and road transportation of all material including, but not limited to, coal, equipment, ash, limestone, construction material and gypsum.

- *Referring Documents:* The Plan will be prepared in light of the preparatory survey[68] conducted by JICA and this EIA of the Project.

- *Timeline:* The Plan for the construction phase of the Project will be completed before the start of construction activity and arrival of the equipment on port. The Plan for the operations phase will be completed at least one year before commissioning of the Project.

- *Executing Arrangement:* The Owner will be responsible to commission the study and implement its recommendations.

[68] Preparatory survey for Lakhra coal fired thermal power plant construction project, JICA (2014)

Appendix 5: Background Information Document

See following pages.

January 2016

Background Information Document on the Environmental Impact Assessment of Coal Transportation between PIBT at Port Qasim and Pakistan Railways Main Line

Introduction

The Government of Pakistan (GoP) is planning to set up a 660 MW ultra-supercritical coal fired power plant at Lakhra to be financed by the Japan International Cooperation Agency (JICA) and other potential donors.

This project plans to transport 2 million tons of imported coal to the proposed power plant by railway after unloading at Pakistan International Bulk Terminal (PIBT) at Port Qasim. Unloading facilities from ship, coal stock yard, jetty including conveyor belt are under construction at PIBT but connection facility to railway and loading facility for railway wagons at terminal are not considered.

In this regard, JICA initiated a feasibility study through Nippon Koei Company for development of coal transportation between PIBT and nearby Pakistan Railways main line. Services of Hagler Bailly Pakistan (Pvt.) Limited have been acquired for undertaking Environmental Impact Assessment (EIA) and Resettlement Policy Framework (RPF) for the proposed coal transportation between PIBT and nearby PR main line.

As part of the EIA process, consultations are being undertaken with communities and institutions that may have interest in the other Project or may be affected by the Project (the “Stakeholders”). For informed consultations with the stakeholders, this Background Information Document (BID) has been prepared that provides information on the proposed Project, its setting, and the EIA process that is being followed.

The consultations are an on-going activity that will continue throughout the project activities, and beyond closure of the Project. The information provided in this BID is subject to changes as further information on some aspects of the Project becomes available or the Project is modified as a result of the EIA process.

Project Setting

The proposed Coal Transport project is located at Port Qasim in Karachi and to be developed in the form of conveyor belt system, with total length of approximately 4.5 km. Associated facilities include reclaimer at PIBT coal stock yard and unloading facilities at coal stock yard at PR Station terminal. The covered area of conveyor belt is about 4 m in width and 4,500 m in length. The conveyor belt be 1.4 m in width and capacity will be 10 million tons/year of coal.

The required right of way (ROW) and minimum height clearance will be 10 m each. The ROW will be developed in the center median of existing roads of PQ which will

also be utilized as temporary and maintenance roads. Two alternate routes are proposed for the conveyor belt system from PIBT to Pakistan Railways main line, one towards Bin Qasim Station (shown in green) and one towards Jumma Goth Station (shown in orange) in **Exhibit 1**.

Project Outline

The proposed coal transport Project entails the construction and operation of a conveyor belt over a 4.5 km route that would transport coal from the PQA coal stockyard at PIBT to the Pakistan Railway Main line.

The detailed coal transfer process is explained below:

- Step 1. Import and storage of coal at Pakistan International Bulk Terminal
- Step 2: Loading of coal onto the conveyer belt
- Step 3: Transport of coal via conveyor belt
- Step 4: Storage of coal at coal stockyard
- Step 5: Loading of coal onto rail wagons

Step 1 above is not covered in the scope of this study. The main components of the coal transport project are briefly discussed below:

Component	*Description*
Site Preparation	Preparation of land for construction of new facilities including conveyor belt
New equipment Installation	Construction works and installation of new equipment.
Coal storage facilities	Construction of coal storage and handling facilities near PR main line.
Coal transport	Operation of conveyor belt system

Approach to the EIA

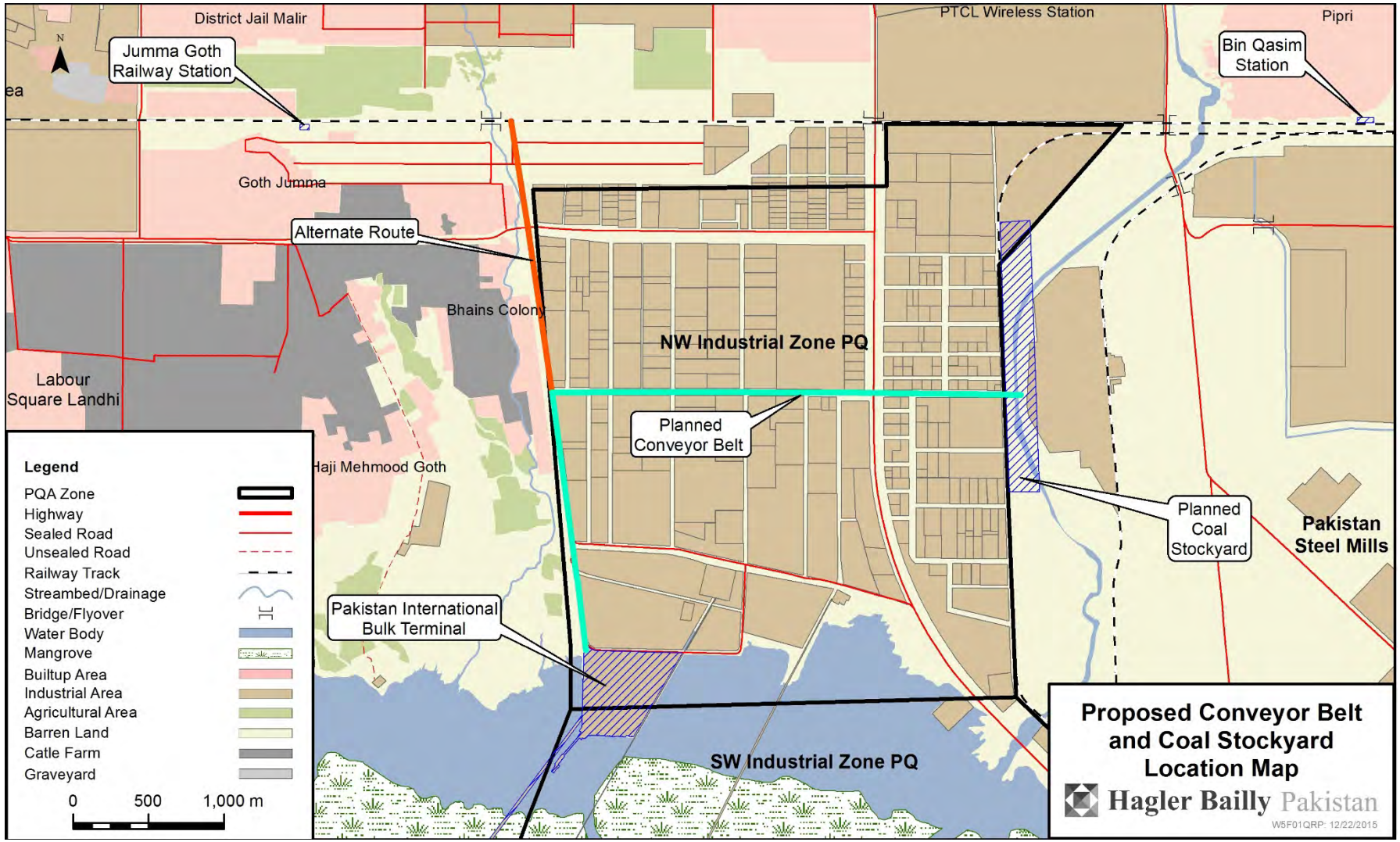
The EIA for the Project will be undertaken in compliance with relevant national legislation. The major components of the EIA will include:

- comprehensive baseline studies to characterize the existing social and biophysical environment;
- a public consultation process to ensure that project stakeholders are informed of the project development plan and have an opportunity to influence it;
- a comprehensive analysis of the environmental and social impacts of the project, both negative and positive; and
- development of impact mitigation plans and environmental management plans

For more information on the EIA contact

Hidayat Hasan *Hagler Bailly Pakistan* *Block 1, Commercial Area, Street 21, F-8/2,* *Islamabad* *Tel: +92 51 265 7200-07* *Cell: +92 (300) 856 0713* *Fax: +92 51 265 7208-09* *Email: hhasan@haglerbailly.com.pk*	*Hussain Ali* *Hagler Bailly Pakistan* *Block 1, Commercial Area, Street 21, F-8/2,* *Islamabad* *Tel: +92 51 265 7200-07* *Cell: +92 (334) 431 4368* *Fax: +92 51 265 7208-09* *Email: hali@haglerbailly.com.pk*

Exhibit 1: Project Location



Appendix 6: Public Consultation and Disclosure Plan

See following pages.

Appendix 7: Consultation Log

The following consultations were carried out during the EIA process.

No	Stakeholder	Stakeholder type	*Date Consulted on*
1	Bin Qasim Association of Trade & Industry (BQATI)	Institutional	February, 24, 2016
2	Indus Motors	Institutional	February, 8, 2016
3	Pharma Evo Private Ltd.	Institutional	February, 8, 2016
4	Pakistan International Bulk Terminal (PIBT)	Institutional	February, 25, 2016
5	Piranu Goth	Community	January 28 2016
6	Jumma Goth	Community	January 28, 2016
7	Kamal Shah	Community	January 29, 2016
8	Bhains Colony # 10	Community	January 29, 2016
9	Bhains Colony – Sheheryar Town.	Community	January 29, 2016

The consultation logs for each of these consultations are on the following pages.

Environmental Impact Assessment of the Conveyor Belt from PIBT to Coal Stockyard

Nippon Koei

Record of the Consultation Meeting

Stakeholder:	Bin Qasim Association of Trade & Industry (BQATI)
Date:	Feb 24, 2016
Time:	03:00 pm
Meeting Venue:	Office of BQATI
Attended by:	Shakil Ashfaq (SA), President, BQATI Mian Muhammad Ahmed (MA), Patron-in-chief/Founder President, BQATI Abdul Rehman Punjwani (AP), Member Managing Committee, BQATI Amin Dawood (AD), Chairman, Dawood Meat Company (Pvt.) Ltd Wajid Bux Siddiqui (WB), Manager Production Control & Logistics, Indus Motors Khalil ul llah Malik (KH), Assistant Manager Production, Indus Motors Abdur Rehman Ismail (AI), General Secretary, BQATI Salim Dada (SD), Member Managing Committee Ibrahim Saeed (IS), Port Qasim Environment Director. Azhar (AZ), Port Qasim Authority Iftikhar (IF), Port Qasim Authority
Conducted by:	Mr Hussain Ali, Senior Engineer, Environmental Programs, HBP
Recorded by:	Mr Hussain Ali, Senior Engineer, Environmental Programs, HBP
Language:	English, Urdu
Preamble:	The discussion started with the introduction of HBP, Nippon Koei and the team working on the EIA of the proposed conveyor belt between PIBT and the coal stockyard. Mr Ali briefed about the purpose of the meeting by using the Background Information Document for the Project (BID) and gave a comprehensive description of how the project is to be implemented and related activities. At the end of the informative session, Mr Ali invited the participants to share their comments and concerns, which have been documented below. The institution was assured that their concerns would be communicated to the Project proponent for their consideration and action. Where possible, the response was given from the Project BID.

No.	*Issues/Comments*	*By*	*Response Provided*
1.	We need to review the alternatives that are proposed for the transportation of coal from PIBT to the coal stockyard other than the conveyor belt system.	WB	This information cannot be shared now but will be made public in the EIA.
2.	What is the approximate capacity storage of the coal stockyard?	KH	The demand of coal is 2 million tons annually. Storage capacity of the coal stockyard will be shared in the EIA.
3.	Who will control the operations and management of the conveyor belt system?	WB	Port Qasim Authority will manage the conveyor belt system.

No.	*Issues/Comments*	*By*	*Response Provided*
4.	The standards of already functional projects are set according to the previous air records, the conveyor belt system may alter the air quality.	IF	Concern noted.
5.	The major concern is the impact that this coal related project will have on the already operational food, pharmaceutical and other industries. The impact will be major due to sensitivity of these industries and may result in inclusion of contaminants in our food chain.	SA	The coal will move in an enclosed conveyor belt from PIBT to the coal stockyard that will be acquired from the Pakistan Steel Mills. This will minimize the impacts.
6.	The coal should go directly from PIBT to its desired destination via the railway line. There is no need of a conveyor belt.	WB	Noted.
7.	The animals of the meat industry will be eating coal if a conveyor belt is installed in the surrounding area.	AD	Concern noted.
8.	What is the procedure of transporting coal from terminal to stockyard in other countries?	SA	The conveyor belt system is a widely used technique around the globe.
9.	Why is there a need to pollute the backup area and the coal stockyard land? Transport the coal from the terminal directly to the railway track.	SD	Concern noted.
10.	The conveyor belt may not leak but there is a possibility of the cover being removed while the coal is being transported.	SD	Concern noted.
11.	The conveyor belt passing through the industrial area is not a feasible option. What are the possibilities of an additional railway line being constructed?	SA	Concern noted. Alternatives will be discussed in the EIA.
12.	The Pakistan Steel Mills belt should be used rather than constructing an additional belt.	WB	The Pakistan Steel belt was designed for a different use and cannot be used for this project.
13.	The railway line in the master plan was originally designed for the transportation of oil, clinker and other related bulk cargo but there was no mention of the transportation of coal.	MA	Concern noted.
14.	A coal jetty for Sinohydro has already been constructed, it would be advisable to use that rather than importing coal at PIBT.	AP	Concern noted.
15.	Edible oil was contaminated at KPT due to coal transportation, something similar may happen in PQ which cannot be allowed.	SD	Concern noted.
16.	Are other power plant projects in the scope of this meeting?	SA	No, this consultation session is strictly for this project.

Record of the Consultation Meeting

Stakeholder:	Indus Motors.
Date:	Feb 8, 2016
Time:	2:30 pm
Meeting Venue:	Conference Room, Indus Motors.
Attended by:	Kashif Rahim (KR) – Manager Safety Health and Environment Khalil Ullah Malik (KM) - Assistant Manager Production
Conducted by:	Mr Hussain Ali, Senior Engineer, Environmental Programs, HBP
Recorded by:	Mr Hussain Ali, Senior Engineer, Environmental Programs, HBP
Language:	English, Urdu
Preamble:	The discussion started with the introduction of HBP, Nippon and the team working on the ESIA of the proposed conveyor belt between PIBT and the coal stockyard. Mr Ali briefed about the purpose of the meeting by using the Background Information Document for the Project (BID) and gave a comprehensive description of how the project is to be implemented and related activities. At the end of the informative session, Mr Ali invited the participants to share their comments and concerns, which have been documented below. The institution was assured that their concerns would be communicated to the Project proponent for their consideration and action. Where possible, the response was given from the Project BID.

No.	*Issues/ Comments*	*By*	*Response Provided*
1.	It is advisable to share the results of air modelling.	KM	The air modeling results will be shared in the EIA.
2.	A thorough evaluation of the impacts will be conducted to assess impact on our car storage area which is very close to the proposed conveyor belt path.	KM	Noted.
3.	A special car manufacturing unit where bullet proof cars and ambulances are manufactured is in close vicinity to the conveyor belt which is very sensitive to dust.	KR	Concern noted.
4.	An incremental dust impact report should be provided.	KM	Will be provided in the EIA.
5.	What will be the dust suppression measures that will be employed?	KR	The conveyor belt system will be enclosed and other dust suppression techniques will be shared in the EIA.
6.	Further concerns and potential impacts will be shared once the EIA is reviewed.	KM	Noted

Record of the Consultation Meeting

Stakeholder:	Pharma Evo Private Ltd.
Date:	Feb 8, 2016
Time:	11:00 am
Meeting Venue:	Library, PharmaEvo.
Attended by:	Niaz Jatoi (NJ), Senior Executive EHS. Ejaz Hussain (EH), PharmaEvo.
Conducted by:	Mr Hussain Ali, Senior Engineer, Environmental Programs, HBP
Recorded by:	Mr Hussain Ali, Senior Engineer, Environmental Programs, HBP
Language:	English, Urdu
Preamble:	The discussion started with the introduction of HBP, Nippon and the team working on the ESIA of the proposed conveyor belt between PIBT and the coal stockyard. Mr Ali briefed about the purpose of the meeting by using the Background Information Document for the Project (BID) and gave a comprehensive description of how the project is to be implemented and related activities. At the end of the informative session, Mr Ali invited the participants to share their comments and concerns, which have been documented below. The institution was assured that their concerns would be communicated to the Project proponent for their consideration and action. Where possible, the response was given from the Project BID.

No.	*Issues/ Comments*	*By*	*Response Provided*
1.	The dust will have adverse effects on the sensitive HVAC equipment.	EH	Concern noted
2.	The medicine manufacturing facilities will be severely affected by the increased coal dust content in the air.	EH	Noted
3.	The incremental dust impact report should be provided.	NJ	The quantity of increment in dust will be shared in the EIA.
4.	How will the sprinkling system work to minimize dust impacts?	NJ	The details of dust suppression systems will be shared in the EIA.
5.	We will conduct our own study to establish sensitivity of our HVAC systems with dust in the environment.	NJ	Noted

Record of the Consultation Meeting

Stakeholder:	Pakistan International Bulk Terminal (PIBT)
Date:	Feb 25, 2016
Time:	11:00 am
Meeting Venue:	PIBT office.
Attended by:	Zeeshan Liaquat (ZL), Manager Project Coordination and Research Analyst, PIBT Ahmed Raza (AR), PIBT
Conducted by:	Mr Hussain Ali, Senior Engineer, Environmental Programs, HBP
Recorded by:	Mr Hussain Ali, Senior Engineer, Environmental Programs, HBP
Language:	English, Urdu
Preamble:	The discussion started with the introduction of HBP, Nippon and the team working on the ESIA of the proposed conveyor belt between PIBT and the coal stockyard. Mr Ali briefed about the purpose of the meeting by using the Background Information Document for the Project (BID) and gave a comprehensive description of how the project is to be implemented and related activities. At the end of the informative session, Mr Ali invited the participants to share their comments and concerns, which have been documented below. The institution was assured that their concerns would be communicated to the Project proponent for their consideration and action. Where possible, the response was given from the Project BID.

No.	*Issues/ Comments*	*By*	*Response Provided*
1.	The impact on food industries should not be that drastic as the conveyor belt will be enclosed and the chances of pollution are minimal.	AR	Noted
2.	The higher authorities of PQ should be approached with regard to this project and requested to engage industries to take them into confidence with regards to the project design and associated environmental impacts.	ZL	Noted
3.	PIBT is in full support of the conveyor belt system as this project will contribute to the development of the country and is feasible.	ZL	Noted

Record of the Consultation Meeting

Stakeholder/s:	Piranu Goth(village)	
Date:	January 28 2016	
Meeting Venue:	Piranu Goth	
Attended by:	Name	Contact Number
	Alam Khan (AK)	0345 6924957
	Shamshad Ali (SA)	0321-2580216
	Wali Gul (WG)	0300-9260125
Conducted by:	Jan Muhammad	
Recorded by:	Jan Muhammad	
Language:	Sindhi, Dhatki	
Preamble:	The meeting started with the exchange of introduction between the participants and the HBP representative. After the introduction, the community was briefed on the objective of the consultation and BID was explained in depth and detail. At the end of the informative session, the community was invited to share their views, concerns, and suggestions regarding the conveyor belt that was going to be set up there. Responses were provided to ESIA related aspects.	

No.	*Issues, Concerns and Suggestions*	*By*	*Response Provided*
1.	The Nippon Koei Company should provide us with the labor jobs when the construction begins.	SA	Concern noted
2.	Since our town is closest to the path of the belt then we should be provided the facilities of education, water and electricity.	WG	Concern noted
3.	There should be no hindrances in our routes by the construction of this conveyor belt.	WG	Concern noted
4.	We have overloaded trucks of green grass going to and fro this area, the conveyor belt should not block the way of the trucks.	AK	The design of the belt will be accordingly.
5.	We do not have any medical or sanitary facilities in our area.	WG	Concern noted
6.	Provide us with qualified teachers in our schools as the education facilities are very poor here.	WG	Concern noted

Record of the Consultation Meeting

Stakeholder/s:	Jumma Goth(village)	
Date:	January 28, 2016	
Meeting Venue:	Jumma Goth	
Attended by:	Name	Contact Number
	Haji Dil Muhammad (DM)	0321-2050920
	Gulam Muhammad (GM)	0300-2192150
	Rehmat Ullah (RU)	0300-2726998
	Pervaiz Maseeh (PM)	N/A
	Mahmood Himayti (MH)	0324-281949
Conducted by:	Jan Muhammad	
Recorded by:	Jan Muhammad	
Language:	Sindhi, Dhatki	
Preamble:	The meeting started with the exchange of introduction between the participants and the HBP representative. After the introduction, the community was briefed on the objective of the consultation and BID was explained in depth and detail. At the end of the informative session, the community was invited to share their views, concerns, and suggestions regarding the conveyor belt that was going to be set up there. Responses were provided to ESIA related aspects.	

No.	*Issues, Concerns and Suggestions*	*By*	*Response Provided*
1.	We fear that you may take over our lands in lieu of this survey.	DM	Concern noted.
2.	We want the jobs of skilled and unskilled labor once the construction work of the belt starts.	DM	Concern noted.
3.	We were promised compensation for our lands that had been previously acquired by other industry but were given nothing, so we do not want the same thing to happen again.	RU	We assured them that our motive is just to build a pathway for the conveyor belt that will pass through the roads and no part of their land will be taken over.
4.	We do not trust the intentions of the Port Qasim Authorities. .	GM	Concern noted.
5.	We want the executing company to hire more Sindhis.	DM	Local skills will be utilized wherever required.
6.	We will do protests in the area if you do not give us the labor jobs.	DM	Concern noted
7.	Some part of the earnings should be spent on the development of our area.	DM	Concern noted

No.	*Issues, Concerns and Suggestions*	*By*	*Response Provided*
8.	Improve the standard of education in our area by improving the conditions of our school and by providing us qualified teachers.	RU	Concern noted

Record of the Consultation Meeting.

Stakeholder/s:	Kamal Shah	
Date:	January 29, 2016	
Time:	03:00pm to 04:30 pm	
Meeting Venue:	Kamal Shah	
Attended by:	Name	Contact Number
	Jameel	N/A
	Nadeem.	N/A
	Asif.	0302-2408051
	Abid.	0321-9269370
Conducted by:	Jan Muhammad	
Recorded by:	Jan Muhammad	
Language:	Sindhi, Dhatki	
Preamble:	The meeting started with the introduction of participants and the HBP representatives. After the introduction, the community was briefed on the objectives of the consultation and BID was explained in depth and detail. At the end of the informative session, the participants were given an opportunity to share their views, concerns, and suggestions regarding the Project. Responses to the concerns were provided from the BID. Discussions during the consultation session are documented in this report.	

No.	Issues, Concerns and Suggestions	By	Response Provided
1.	We want the executing company to provide more jobs to the local sindhi speaking community.	Nadeem	Concern noted.
2.	The fishermen community was concerned with the amount of pollution the ships would bring in the sea that will harm their income.	Jameel	Concern noted.
3.	The executing company should also bring development in our area in the form of clean water supply, electricity and education.	Asif.	Concern noted.
4.	We should be provided with scholarships so that our children can also get better education.	Nadeem	Concern noted.
5.	Develop a training center in our area where our youth shall be trained in skill labor such as welding.	Jameel	Concern noted

Notes: The locals do not have objections with the construction work of the conveyor belt.

Record of the Consultation Meeting

Stakeholder:	Bhains Colony # 10	
Date:	January 29, 2016	
Meeting Venue:	Bhains Colony # 10	
Attended by:	Name	Contact Number
	Qadir Bux (QB)	0313-2342294
	Ali Murad (AM)	0308-2762289
	Abdul Karim (AK)	N/A
	Dildar	N/A
	Adnan	N/A
Conducted by:	Jan Muhammad	
Recorded by:	Jan Muhammad	
Language:	Sindhi, Dhatki	
Preamble:	The meeting started with the introduction of participants and the HBP representatives. After the introduction, the community was briefed on the objectives of the consultation and BID was explained in depth and detail. At the end of the informative session, the participants were given an opportunity to share their views, concerns, and suggestions regarding the Project. Responses to the concerns were provided from the BID. Discussions during the consultation session are documented in this report	

No.	Issues, Concerns and Suggestions	By	Response Provided
1.	All sorts of unskilled labor should be recruited from the local population.	AM	Concern noted.
2.	The executing company should also bring development in our area in the form of clean water supply, electricity and education.	AK	Concern noted.
3.	For further consultation, talk to our community leader Umar Jath.	QB	Concern noted.
4.	The district level budget assigned to our area is not being effectively utilized on the cleanliness of the area.	QB	Concern noted.
5.	Medical facilities should be provided to us as all fish waste is dumped directly in the sewage that results in a lot of diseases particularly in hot weather.	Adnan	Concern noted.

Notes: The villagers had no issues with the installation of the conveyor belt.

Record of the Consultation Meeting

Stakeholder/s:	Bhains Colony – Sheheryar Town.	
Date:	January 29, 2016	
Meeting Venue:	Bhains Colony – Sheheryar Town.	
Attended by:	Name	Contact Number
	Gulam Rasool (GR)	0300-0936019
	Muhammad Adam (MA)	0308-7275985
	Ata-ul-Mohsin (AUM)	0306-2210088
	Abdul Ghaffar (AG)	0307-2135194
	Zia-ul-Haq (ZUH)	0300-6882052
Conducted by:	Jan Muhammad	
Recorded by:	Jan Muhammad	
Language:	Sindhi, Urdu	
Preamble:	The meeting started with introduction of the participants and the HBP representative. After the introduction, the community was briefed on the objectives of the consultation and BID was explained in depth and detail. At the end of the informative session, the participants were to share their views, concerns, and suggestions regarding the convey belt that was going to be set up there. Responses were provided to EIA on related aspects.	

No.	*Issues, Concerns and Suggestions*	*By*	*Response Provided*
1	The Nippon Koei Company should provide us with employment opportunities.	MA	Concern Noted.
2	Local fishermen will have an adverse effect on their income from the pollution of the ships that will bring the coal to the port.	MA	Concern noted.
3	The Nippon Koei Company should also bring development in our area in the form of water, electricity and education.	AUM	Concern noted.
4	As soon as the construction work starts, it will damage our houses.	MA	Concern noted.
5	The area is very dirty due to the kettle dung which is dumped directly in the sewage that results in a lot of skin diseases. Medical facilities should be provided in our area.	AUM	Concern noted.

Notes: The villagers of this area generally did not have any issues with the installation of the conveyor belt and were pleased that this will bring employment opportunities.

Appendix-7
Resettlement Plan Framework

Hagler Bailly Pakistan

Coal Transportation Between Port Qasim Coal Unloading Terminal and Pakistan Railway Main Line

Resettlement Plan Framework

Draft Report

HBP Ref.: D6RP1QRP

June 14, 2016

Nippon Koei Company Ltd.

Tokyo, Japan

Abbreviations

AD	Assistant Directors
ADB	Asian Development Bank
ARP	Abbreviated Resettlement Plan
BOR	Board of Revenue
CRO	Chief Resettlement Officer
DC	Deputy Commissioner
EIA	Environmental Impact Assessment
GoP	Government of Pakistan
GRC	Grievance Redress Committee
HBP	Hagler Bailly Pakistan
IFC	International Finance Corporation
IoL	Inventory of Lost Assets
JICA	Japan International Cooperation Agency
JST	JICA Study Team
LAA	Land Acquisition Act
LAC	Land Acquisition Collector
LCPP	Lakhra Coal Fired Thermal Power Plant
MW	megawatt
NGO	Non-Governmental Organization
NRP	National Resettlement Policy
NWIZ	North Western Industrial Zone
PIB	Project Information Brochure
PIBT	Pakistan International Bulk Terminal
PMU	Project Management Unit
PQA	Port Qasim Authority
PR	Pakistan Railway
RAP	Resettlement Action Plans
RPF	Resettlement Policy Framework
SEPA	Sindh Environmental Protection Agency
TOR	Terms of Reference
WB	World Bank
XEN	Executive Engineer

Contents

Table

Figures

CHAPTER 1. Description of the Project

The Government of Pakistan (GoP) is planning to set up a 660 MW ultra-supercritical coal fired power plant at Lakhra to be financed by the Japan International Cooperation Agency (JICA) and other potential donors. JICA has commissioned the study "Preparatory Survey on Lakhra Coal Fired Thermal Power Plant Construction Project" (the "Lakhra Study") to support the construction of high efficiency, ultra-supercritical, Lakhra Coal Fired Thermal Power Plant (LCPP) of 600 megawatt (MW) net capacity at Lakhra in Jamshoro District of Sindh.

The LCPP project plans to import 2 million tons of coal annually at Pakistan International Bulk Terminal (PIBT) located at Port Qasim. The coal will be then transported to LCPP by the existing railway main line of Pakistan Railway (PR). The nearest railway station on the main line is the Bin Qasim Station located about 9 kilometer (km) from Port Qasim. In anticipation of the new imported coal-based power plants being developed in Jamshoro and in Punjab, PR is planning the improvements at Bin Qasim Station and of the spur line between Port Qasim and Bin Qasim Station. However, currently there is no infrastructure to transport coal between coal unloading terminals at PIBT and the Bin Qasim Station. In this regard, JICA has initiated a feasibility study through Nippon Koei Company (or JICA Study Team, JST) for development of coal transportation between PIBT and PR main line (the “Project”).

JST acquired the services of Hagler Bailly Pakistan (Pvt.) Limited for preparing a Resettlement Policy Framework (RPF) for the proposed Project. This report documents the RPF process and its results.

1.1 Project Location

The proposed Coal Transport Project is located in the North Western Industrial Zone (NWIZ) of Port Qasim (PQ) in Karachi (**Figure 1-1**). The coal will be transported through a conveyor belt, with total length of 4–4.5 km. Two options are under consideration, as shown in **Figure 1-2**. The Project also includes a coal loading terminal that contains infrastructure such as unloading facilities, coal stockpiles and a coal loading facility for loading of coal onto trains.

Figure 1-1: Location of Proposed Project

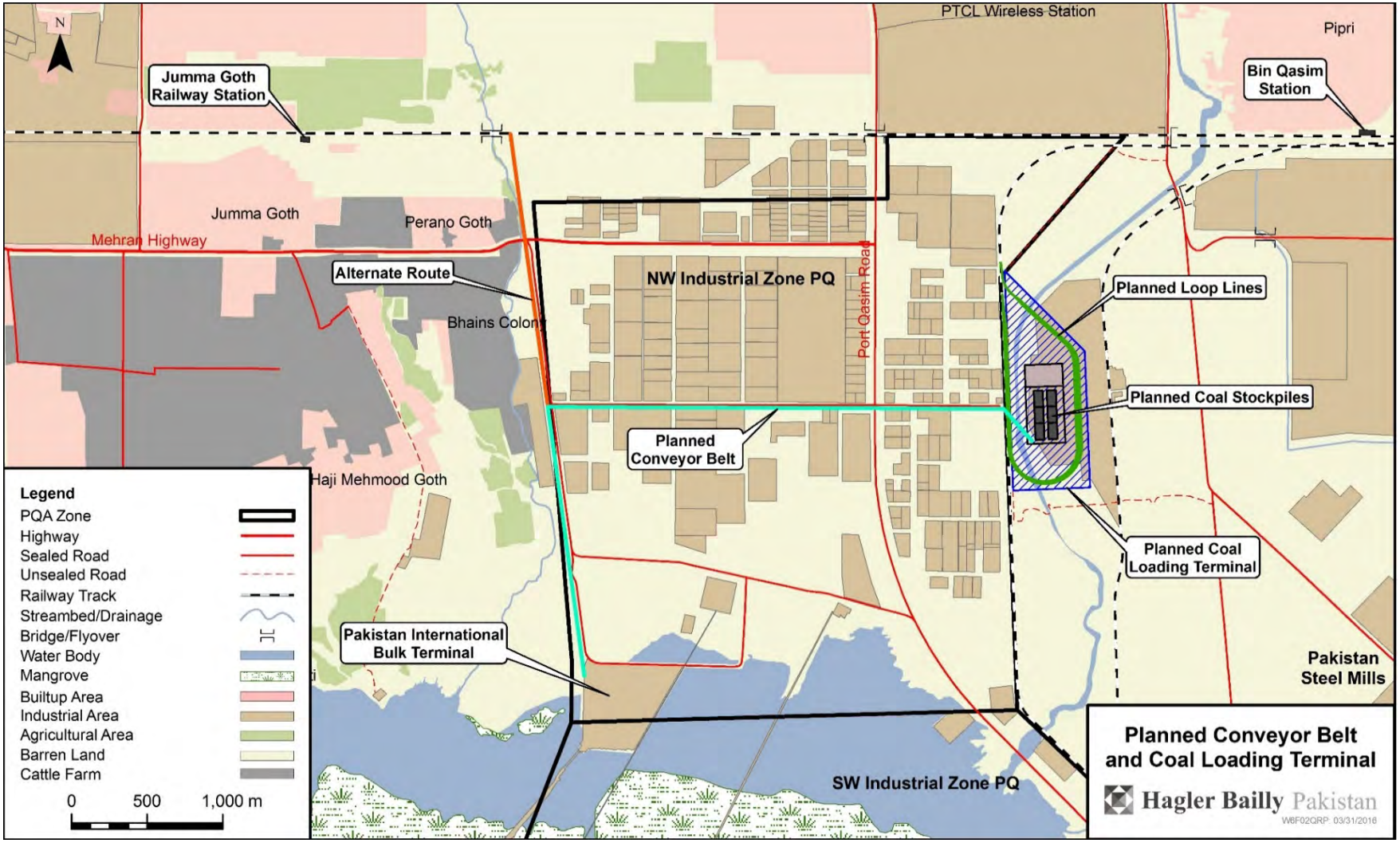


Figure 1-2: Location of Proposed Project and Surroundings

1.2 Importance of the Project

The proposed Coal Transport Project will play a lifeline role in the operation of proposed coal fired thermal power plants throughout the country. Annually, the conveyer belt is planned to handle 20.26 million tons of coal that will be supplied to 9 power plants across Sindh and Punjab that have a combined capacity of 6664 MW.

1.3 Objectives of the Project

The primary objective of the Project is to construct an environmentally and economically viable option for transportation of imported coal from PIBT to nearby main rail line of Pakistan Railways. The project will be constructed and operated in compliance to the principles of sustainable development and applicable national environmental and social standards and laws.

1.4 Objective and Purpose of RPF

The objective of the RPF as stated in the Request for Proposal (RFP) is a) to prepare the RFP in accordance with the requirements of the "National Resettlement Policy (2002)", and b) Set the parameters for the entitlements package for those affected people, the institutional framework, mechanisms for consultation and grievance resolution, the timeframe and cost estimates, and c) the approval for the RFP to be obtained from Sindh Environmental Protection Agency (SEPA).

In subsequent communication, it has been cleared that the National Resettlement Policy (2002) is an outdated document and is not applicable. Similarly, the approval of the RFP from the SEPA is not required.

As per the proposal, the RPF process and the contents of the RFP report will conform to the requirements of the following documents:

- Guidelines for Public Consultation 1997
- Land Acquisition Act 1896
- Draft National Resettlement Policy (2002), to the extent valid

Further, HBP referred to international guidelines such as that of World Bank/IFC wherever there is a gap in national regulations and guidelines.

CHAPTER 2. Land Acquisition and Resettlement Impacts

2.1 Potential Impacts

Physical and ecological impacts of the Project are detailed in the corresponding EIA for the Project. Land use related impacts are given in **Table 2-1**. Receptors that may be impacted are shown in **Figure 2-1.**

Table 2-1: Land Use Related Impacts of the Coal Transfer Project

Project Component	Receptor	Description of Impact
Planned Coal Stockpile	Grazing area and access route	The proposed area for the coal stockpile between the Northwest Industrial Zone and Pakistan Steel is sometimes used for grazing goats from Bhains Colony. Furthermore, herders use this area to access grazing land to the south of the planned location for the coal stockpile.
Alternate location for Coal Stockpile	Farms	There are farms present near the Jumma Goth Railway Station. These may be displaced if the second option for the coal stockpile is chosen
	Planned housing schemes	While there presently aren't any houses in the vicinity there are some planned housing schemes in the locality.
	Water Channel	Extremely dirty water is present in the eastward water channel. It consists of cow manure. However, it is used to inundate the agricultural fields in the dried water channel. This water source may be effected by the Project. The figure below shows the water discussed and farming on the eastward river bed
Conveyor belt	Private companies, homes and farms	At points where the conveyor belt cannot be made on the center meridian (e.g. turning point etc.) existing users may be displaced.
	Traffic	Future road expansion may be hindered due to the construction of the conveyor belts on the center meridian of the roads.

Goats grazing and crossing through the area of the planned coal stockpile. The railway tracks are also visible in the photograph

Harvesting of fuel wood from the area of the planned coal stockpile.

Farming in dried bed of eastern water channel

Water quality of eastern water channel is poor and has a visibly high concentration of cattle manure.

Figure 2-1: Photographs of Current Land Use and Resource Extraction near Project Footprint

2.2 Objective and Purpose of the Resettlement Plan Framework

The conveyor belt passes through many different types of land each of which have a different ownership structure. While there may be some resettlement involved in some areas, in others the land may have to be leased or permissions may have to be obtained from various bodies. The resettlement policy framework will be a statement for all the land, whether state or private. Where it is state, it will briefly specify the mechanism. Private land may be required near Jumma Goth and possibly PIBT. **Table 2-2** lists some of the types of ownership that may the Project footprint may fall under. Photographs of the site locations of the project footprint are shown in **Figure 2-2**. The RPF will categorize all the land requirements and the mechanism for 'acquisition'.

Table 2-2: Ownership Categories of Land under Project Footprint

Current Owners	Type of 'acquisition'	Example
PQA	Lease or permission to use	Median of road for conveyor belt
Pakistan Steel	Permission to use	Coal Yard
Private individuals	Purchase	Coal yard near Jumma Goth and land near turning point of conveyor belt
Pakistan Railway	Permission to use	Coal yard near Jumma Goth
Private firms	Purchase	Land near PIBT
PQA	Purchase	Land near PIBT
PQA/Pakistan Steel/ Private individuals/ Pakistan Railway/ Private firms	Permission to use/Short-term lease	Land for construction camp and facilities

Proposed coal stockpile site to the east of NWIZ. The stockpile is planned up till the fence of PSM which is visible in the background along with PSM buildings. The westward water channel flows through the center and has eroded the land around its banks.

Barren land around the railway line near the Jumma Goth Station. This is the area near the end of the alternate route for the conveyor belt and possibly the alternate location for the coal stockpile.

Meridian of the road passing through the center of the NWIZ towards the proposed coal stockpile location.

While there is no constructed center meridian on the road coming from PIBT and going towards the alternate stockpile location, there is room on both sides of the current road.

Figure 2-2: Photographs of Project Sites

2.3 Minimizing Land Acquisition and Displacement

Two options were considered for the proposed project as shown in **Chapter 1**: a) the coal yard east of NWIZ (the selected option), and b) the coal yard northwest of the NWIZ (the alternate option). By selecting Option a) acquisition of private land has been avoided. All land that will be acquired will either belong to PQA or to the Steel Mills. No displacement of people will be necessary. Similarly, no agricultural land or other land with which livelihood of people is associated will be acquired.

2.4 Scope of Land Acquisition

The land required for the project is shown in **Table 2-3**.

Table 2-3: Scope of Land Acquisition

Component	Current Owners	Type of 'acquisition'	Approximate Area
Conveyor belt	PQA	Lease or permission to use	1.25-1.5 ha
Coal Yard	Pakistan Steel	Permission to use	60 ha
Land for construction camp and facilities	PQA/Pakistan Steel/ Private individuals/ Pakistan Railway/ Private firms	Permission to use/Short-term lease	2 -3 ha

2.5 Land Acquisition and Resettlement Impact

Given the nature of land acquisition, no impact on community land is anticipated. Therefore the number of displaced persons, the community assets, affected business and household structures, agricultural land, trees, and crops are all zero. Similarly no vulnerable groups will be affected, employment will be lost, or livelihood will be affected.

CHAPTER 3. Legal and Policy Framework

This section provides information on Pakistani laws and regulations on land acquisition and resettlement and the International Finance Corporation (IFC) policy on involuntary resettlement.

3.1 Policy and Legal Framework for Land Acquisition and Resettlement in Pakistan

Land Acquisition Act (LAA) 1894

The Pakistan law governing land acquisition is the LAA of 1894 and successive amendments. The LAA regulates the land acquisition process and enables the provincial government to acquire private land for public purposes. Land acquisition is a provincial responsibility and provinces have also their own province specific implementation rules like Punjab and Sindh Land Acquisition Rules, 1983. The LAA and its Implementation Rules require that, following an impact identification and valuation exercise, land and crops are compensated in cash at the current market rate to titled landowners. In past practice land acquisition was usually based on the last 3 to 5 years average registered land-sale rates. However, in several recent cases, the median rate over the past 1 year, or even the current rates have been applied. Under section 23 of LAA 1894 and its amendments, in addition to the market-value of the land a sum of fifteen percent amount as compulsory acquisition surcharge is also paid to the affected person, if the acquisition has been made on a public purpose and a sum of twenty-five percent on such market-value if the acquisition has been made for a Company. The APs, if not satisfied, can go to the Court of Law to contest the compensation award of the LAC.

The various sections relating to the land acquisition are briefly discussed below and summarized in **Table 3-1**.

Table 3-1: Key Feature of the LAA 1894

Preliminary Investigation :

- Section 4, refers to the publication of preliminary notification and power for conducting survey.
- Section 5 relates to the formal notification of land for a public purpose and 5(a) covers the need for inquiry.

Declaration of Intended Acquisition:

- Section 6 refers to the government makes a more formal declaration of intent to acquire land.
- Section 7 indicates that the Land Commissioner shall direct the LAC to take order for the acquisition of land.
- Section 8, Land to be marked out, measured and planned, the Collector shall thereupon cause the land (unless it has been already marked out under Section 4) to be marked out. He shall also cause it to be measured and if no plan has been made thereof, a plan to be made of the same.
- Section 9, allows the LAC to give notice to all APs that the government intends to take possession of the land. If they have any claims for compensation then these claims are to be made to him at an appointed time.
- Section10 delegates power to the LAC to record statements of APs in the land to be acquired or any part thereof as co-proprietor, sub-proprietor, mortgagee and tenant or otherwise;

Enquiry into Measurement, Value and claims and Award by the Deputy Commissioner:

- Section 11, enables the Collector to make inquiries into the measurements, value and claim and issue the final "award". The award includes the land's marked area and the valuation of compensation and the LAC has made an award under Section 11, LAC will then take possession and the land shall thereupon vest absolutely in the government, free from all encumbrances.
- Section 12, DC makes a decision on the final award.
- Section 12 A, if there are any, DC correct and adjust any mistake in the final award.
- Section 13, Adjournment of enquiry.
- Section 14, power to summon and enforce attendance of witness.
- Section 15, matters to be considered and neglected.

Taking Possession:

- Section 16, power to take possession
- Section 17, Special powers in case of urgency. Emergency land acquisition, which will not be applied in this Project for the acquisition of land.

Reference to Court & Procedure Thereupon

- The Section 18, reveals that in case of dissatisfaction with the award, APs may request the LAC to refer the case onward to the court for a decision;
- Section 19, Statement of the court
- Section 20, Service of Notice

- Section 21, Restrictions of Scope & proceedings
- Section 22 and 22A Proceedings to be in open court and cross Objections
- Section 23, refers to the award of compensation for the owners for acquired land is determined at its market value plus 15% in view of the compulsory nature of the acquisition for public purposes;
- Section 24 Matters to be neglected in determining compensation
- Section 25 Rules as to amount of compensation
- Section 26 Forms of Award
- Section 27 Costs
- Section-28 relates to the determination of compensation values and interest premium for land acquisition;

Appointment of Compensation

- Section 29 Particulars of apportionment to be specified
- Section 30 Dispute as to apportionment

Payments

- Section 31, provides that the LAC can, instead of awarding cash compensation in respect of any land, make any arrangement with a person having an interest in such land, including the grant of other lands in exchange;

Others

- Section 35, refers to the temporary occupation of arable or waste land subject to the provision of Part VII of the Act. The provincial government may direct the Collector to procure the occupation and use of the same for such term as it shall think fit, not exceeding three years from the commencement of such occupation, and
- Section 36, provides the information relating to the power to enter and take possession and compensation on restoration. On the payment of such compensation, or on executing such agreement or on making a reference under Section 35, the Collector may enter upon and take possession of the land and use or permit the use thereof in accordance with the terms of the said notice.

Regulation on Land Classification

In Pakistan, the land are classified (i) "urban" or "rural" lands and, (ii) residential/commercial or agricultural lands depending on its jurisdiction as described in **Figure 3-1**.

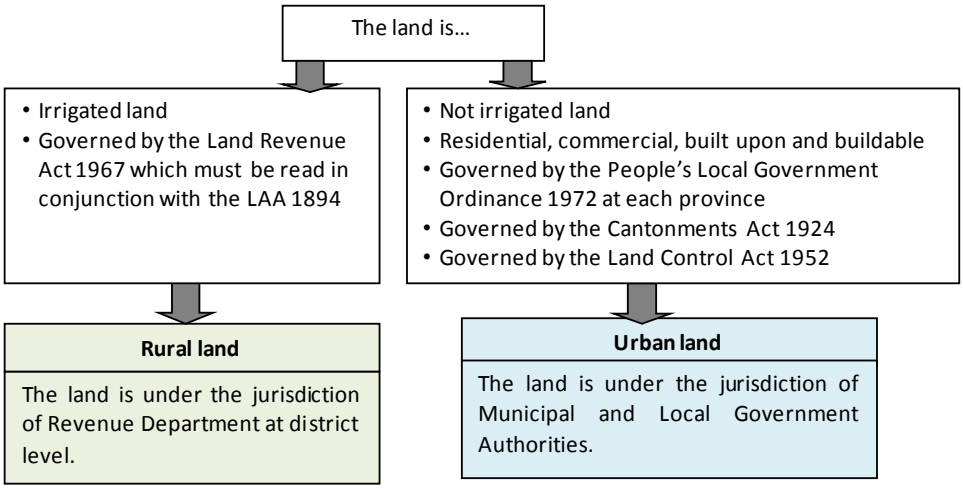


Figure 3-1: Land Classification (Urban versus Rural)

In general, either the Land Revenue Act or the People's Local Government Ordinances determines the classification of land. However there are some cases where both applies and other cases where different legislation altogether can indicate jurisdiction and classification over land.

Land for projects of public interest

Any ownerless property belongs to the Government: Article 172(1) of the Constitution of the Islamic Republic of Pakistan declares that "Any property which has no rightful owner shall, if located in a Province, vest in the Government of that Province, and in every other case, in the Federal Government".

Grant of state land to private citizens is governed by the Transfer of Property Act 1882, Government Grants Act 1895 and the Colonization of Government Land Act 1912. The Section 10 of the Colonization of Government Land Act 1912 declares as follows.

a. the Board of Revenue (BOR) subject to the general approval of the granting government land in a colony to any person;
b. the provincial government may issue a statement or statements of the conditions on which it is willing to grant land in a colony to tenants and;

c. where such statement of conditions have been issued, the Collector may, subject to the control of the Board of Revenue, allotting land to any person, to be held subject to such statement or conditions issued.

For the land, which there are no genuine claims, the BOR or district revenue department will prepare the record and award the land to the project proponent. The award will be registered in the records of the Revenue Department of district government to complete the acquisition process.

3.2 Policy and Legal Framework for Grievance Procedure in Pakistan

In Pakistan, the Land Acquisition Act (1894) allows for “objections” or “reference” to Court under Section 18 against any “award” of compensation by the Collector, requiring further review of the award. However, in case of grievance arising from “non-land” impacts and issues there are no statutory mechanisms provided in the LAA (1894). The West Pakistan Requisitioning of Immovable Property (Temporary Powers) Act, 1956 provides for dispute resolution for buildings through arbitrator and court. Neither of the two Acts, however, has provisions on relocation and resettlement of project-affected persons or grievances related to resettlement entitlements and other extra-legal benefits.

3.3 IFC's Performance Standards on Involuntary Resettlement

Since the LAA does not automatically mandate for specific rehabilitation/ assistance provisions benefiting the poor, vulnerable groups, or severely affected APs; nor does it automatically provides for rehabilitation of income/ livelihood losses or resettlement costs. However, there are exceptions to these rules, as the law is broadly interpreted at provincial level depending on the operational requirements, specific local needs, and socioeconomic circumstances. Recourse is often taken to ad hoc arrangements, agreements and understandings for resettlement in difficult situations. The Project will make optimal use of such recourses. In addition, the provisions in IFC (International Finance Corporation) Policy on Involuntary Resettlement will also be applied to this Project’s resettlement related activities.

The key principles of IFC's Performance Standards on involuntary resettlement are summarized below.

- Involuntary resettlement and loss of means of livelihood are to be avoided when feasible by exploring all viable alternatives.
- When, population displacement is unavoidable, effective measures to minimize the impact and to compensate for losses should be taken.
- People who must be resettled involuntarily and people whose means of livelihood will be hindered or lost must be sufficiently compensated and

supported, so that they can improve or at least restore their standard of living, income opportunities and production levels to pre-project levels.

- Compensation must be based on the full replacement cost[1] as much as possible.
- Compensation and other kinds of assistance must be provided prior to displacement.
- For projects that entail large-scale involuntary resettlement, resettlement action plans must be prepared and made available to the public. It is desirable that the resettlement action plan include elements laid out in the World Bank Safeguard Policy, OP 4.12, Annex A.
- In preparing a resettlement action plan, consultations must be held with the affected people and their communities based on sufficient information made available to them in advance. When consultations are held, explanations must be given in a form, manner, and language that are understandable to the affected people.
- Appropriate participation of affected people must be promoted in planning, implementation, and monitoring of resettlement action plans.
- Appropriate and accessible grievance mechanisms must be established for the affected people and their communities.
- Above principles are complemented by World Bank OP 4.12, since it is stated in JICA Guideline that "JICA confirms that projects do not deviate significantly from the World Bank's Safeguard Policies". Additional key principle based on World Bank OP 4.12 is as follows.
- Affected people are to be identified and recorded as early as possible in order to establish their eligibility through an initial baseline survey (including population census that serves as an eligibility cut-off date, asset inventory, and socioeconomic survey), preferably at the project identification stage, to prevent a subsequent influx of encroachers of others who wish to take advance of such benefits.
- Eligibility of Benefits include, the APs who have formal legal rights to land (including customary and traditional land rights recognized under law), the APs who don't have formal legal rights to land at the time of census but

[1] "Replacement cost" is defined in the World Bank Safeguard Policy, OP 4.12, Annex A as follows:

Agricultural Land—The pre-project or pre-displacement, whichever is higher, market value of land of equal productive potential or use located in the vicinity of the affected land, plus the cost of preparing the land to levels similar to those of the affected land, plus the cost of any registration and transfer taxes

Land in Urban Areas—The pre-displacement market value of land of equal size and use, with similar or improved public infrastructure facilities and services and located in the vicinity of the affected land, plus the cost of any registration and transfer taxes.

Houses and Other Structures— The market cost of the materials to build a replacement structure with an area and quality similar or better than those of the affected structure, or to repair a partially affected structure, plus the cost of transporting building materials to the construction site, plus the cost of any labor and contractors' fees, plus the cost of any registration and transfer taxes

have a claim to such land or assets and the APs who have no recognizable legal right to the land they are occupying.

- Preference should be given to land-based resettlement strategies for displaced persons whose livelihoods are land-based.
- Provide support for the transition period (between displacement and livelihood restoration.
- Particular attention must be paid to the needs of the vulnerable groups among those displaced, especially those below the poverty line, landless, elderly, women and children, ethnic minorities etc.
- For projects that entail land acquisition or involuntary resettlement of fewer than 200 people, an Abbreviated Resettlement Plan is to be prepared and the plant will cover the contents complemented by World Bank OP 4.12.
- In addition to the above core principles on the JICA policy, it also laid emphasis on a detailed resettlement policy inclusive of all the above points; project specific resettlement plan; institutional framework for implementation; monitoring and evaluation mechanism; time schedule for implementation; and, detailed Financial Plan etc.

3.4 Gaps and Gap-filling Measures

The **Table** 3-2 outlines the differences between the Pakistani Law (LAA) and IFC Policy on Involuntary Resettlement.

In principle, Pakistani Law and IFC Policy adhere not only to the objective of affected households (AH) compensation, but also to that of AH rehabilitation. However, Pakistani Law is unclear on how rehabilitation is to be achieved and in practice the provision of rehabilitation is left to ad hoc arrangements of local governments and project proponents. To clarify these issues and reconcile gaps between Pakistani Laws and IFC Policy, PQA will comply with this Policy Framework prepared for the project, ensuring compensation at replacement cost for all items affected, relocation and resettlement of AHs, provision of basic public facilities, and subsidies or allowances for AHs, suffering business or other livelihood losses.

Table 3-2: Pakistani Law and IFC Land Acquisition Policies

Pakistani Law (LAA)	IFC Policy on Involuntary Resettlement
Land compensation only for titled landowners or holders of customary rights	Lack of title should not be a bar to compensation and/ or rehabilitation. Non-title-holders are to be rehabilitated
Crop losses compensation provided only to registered landowners and lease/ sharecrop tenants (non-registered are often deprived)	Crop compensation is provided to landowners and sharecrop/ lease tenants according to their shares, whether they are registered or not
Tree losses are compensated on the basis of officially fixed rates by the Forest and Horticulture departments	Tree losses are compensated according to actual worth of affected trees based on market rates
Land valuation based on the median registered land transfer rate over the previous 3/ 5 years.	Land valuation is to be based on current replacement (open market) value
Built-up structures valuation based on official rates, with depreciation deducted from the structures' gross value	Valuation of built-up structures is based on current market value and/ or cost of new construction of the structure demolished
Land Acquisition Collector (LAC) or District Court are the final authorities to decide disputes and address complaints regarding quantification and assessment of compensation for the affected lands and other assets	Complaints and grievances are resolved informally through community participation in the Grievance Redress Committees (GRC) at the Village or Union Council levels, the District Governments, NGO or local-level community based organizations (CBOs)

CHAPTER 4. IFC Policy on Involuntary Resettlement

4.1 Institutions and Responsibilities

The district management is responsible for the entire land acquisition process. The district management is also responsible to keep law and order in the project area and to facilitate the project management during the planning and implementation of the project. The hierarchy of district management is shown in **Figure 3.2** below.

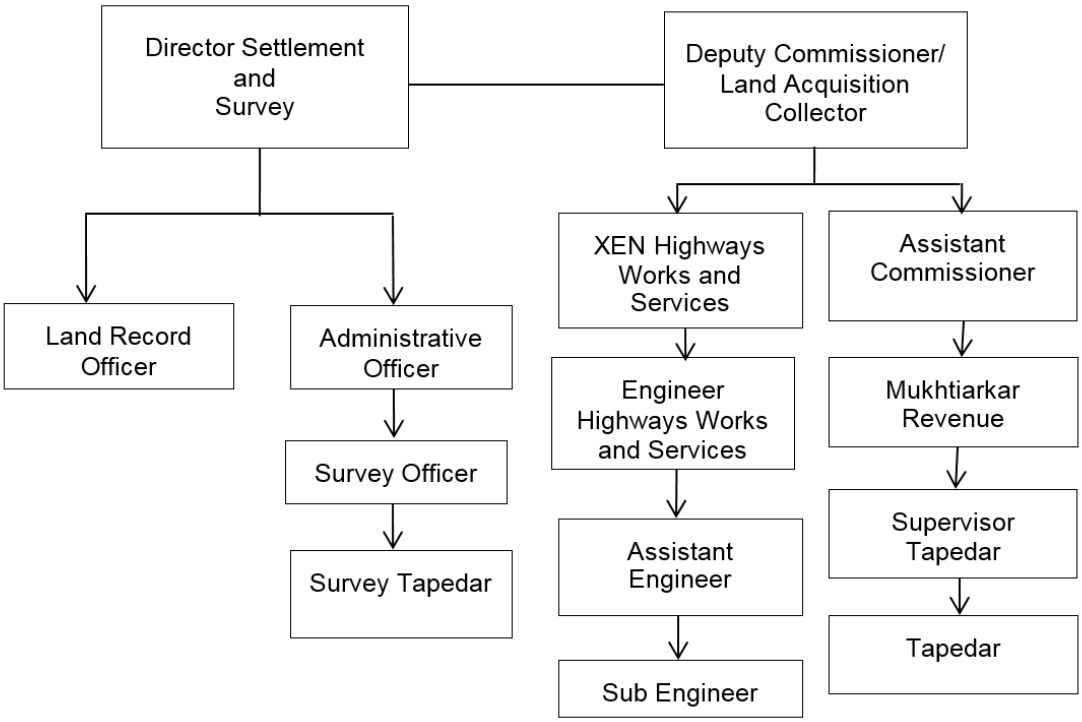


Figure 4-1: Hierarchy of District Management

Role of Deputy Commissioner and Assistant Commissioner

The district management has the jurisdiction for land administration, valuation and acquisition of land. The Deputy Commissioner being head of the district administration and Land Acquisition Collector (LAC) is responsible for these matters. In this project, the DC Malir will be responsible for the entire process of land acquisition.

Role of Mukhtiarkar, Supervisor Tapedar and Tapedar

Mukhtiarkar is the representative of the district LAC at tehsil level. Within Mukhtiarkar office Supervisor Tapedar and Tapedar, carry out specific roles such

as titles identification and verification of lands. Therefore the verifications of lands will be the basic responsibility of the concern Tapedar during the land acquisition process.

Role of Executive Engineer Highways Works and Services Department

At District level construction of roads is a responsibility of Executive Engineer (XEN) highways Works and Services. Therefore XEN Highways with the help of Engineer, Assistant Engineer and Sub Engineer plan design and implement road projects within the district. In this project XEN highway works will not have any role.

Role of Director Settlement and Survey

Director settlement and survey along with its staff is responsible for survey of lands. Director settlements and survey will take survey the un-surveyed lands.

4.2 Land Acquisition Process for the Project

The Government of Sindh will use the Project Resettlement Policy (the Project Policy) for the project specifically because existing national laws and regulations have not been designed to address involuntary resettlement according to international practice, including IFC's policy.

The Project Policy is aimed at filling-in any gaps in what local laws and regulations cannot provide in order to help ensure that PAPs are able to rehabilitate themselves to at least their pre-project condition.

This section discusses the principles of the Project Policy and the entitlements of the PAPs based on the type and degree of their losses. Where there are gaps between the Pakistan Laws and IFC's Policy on Involuntary Resettlement, practicable mutually agreeable approaches will be designed consistent with Government practices and IFC's Policy.

Land Acquisition and Involuntary Resettlement

Avoided where feasible, or minimized, by identifying possible alternative project designs that have the least adverse impact on the communities in the project area.

Where displacement of households is unavoidable, all PAPs (including communities) losing assets, livelihoods or resources will be fully compensated and assisted so that they can improve, or at least restore, their former economic and social conditions.

Compensation and rehabilitation support will be provided to any PAPs, that is, any person or household or business which on account of project implementation would have his, her or their:

- Standard of living adversely affected;
- Right, title or interest in any house, interest in, or right to use, any land (including premises, agricultural and grazing land, commercial properties, tenancy, or right in annual or perennial crops and trees or any other fixed or moveable assets, acquired or possessed, temporarily or permanently;
- Income earning opportunities, business, occupation, work or place of residence or habitat adversely affected temporarily or permanently; or
- Social and cultural activities and relationships affected or any other losses that shall be identified during the process of resettlement planning.

Eligibility for Compensation

All affected people will be eligible for compensation and rehabilitation assistance, irrespective of tenure status, social or economic standing and any such factors that may discriminate against achievement of the objectives outlined above.

Entitlements without Legal Claims to Land

Lack of legal rights to the assets lost or adversely affected tenure status and social or economic status will not bar the PAPs from entitlements to such compensation and rehabilitation measures or resettlement objectives All PAPs residing, working, doing business and/or cultivating land within the project impacted areas as of the date of the latest census and inventory of lost assets (IOL), are entitled to compensation for their lost assets (land and/or non-land assets), at replacement cost, if available and restoration of incomes and businesses, and will be provided with rehabilitation measures sufficient to assist them to improve or at least maintain their pre-project living standards, income-earning capacity and production levels.

PAPs that lose only part of their physical assets will not be left with a portion that will be inadequate to sustain their current standard of living. The minimum size of remaining land and structures will be agreed during the resettlement planning process

People temporarily affected are to be considered as PAPs and resettlement plans address the issue of temporary acquisition.

Where a host community is affected by the development of a resettlement site in that community, the host community shall be involved in any resettlement

planning and decision-making. All attempts shall be made to minimize the adverse impacts of resettlement upon host communities.

Resettlement Plan

The resettlement plans will be designed in accordance with the laws of government of Pakistan, Government of Sindh and IFC's Policy on Involuntary Resettlement. The Resettlement Plan will be translated into local languages and disclosed for the reference of PAPs as well as other interested groups.

Compensation and Rehabilitation

Payment for land and/or non-land assets will be based on the principle of replacement cost. Solely cash compensation will be avoided as an option if possible, as this may not address losses that are not easily quantified, such as access to services and traditional rights, and may eventually lead to those populations being worse off than without the project

Compensation for PAPs dependent on agricultural activities will be land-based wherever possible. Land-based strategies may include provision of replacement land, ensuring greater security of tenure, and upgrading livelihoods of people without legal land titles. If replacement land is not available, other strategies may be built around opportunities for re-training, skill development, wage employment, or self-employment, including access to credit.

Replacement lands, if the preferred option of PAPs, should be within the immediate vicinity of the affected lands wherever possible and be of comparable productive capacity and potential[2]. As a second option, sites should be identified that minimize the social disruption of those affected; such lands should also have access to services and facilities similar to those available in the lands affected.

Resettlement Assistance

Resettlement assistance will be provided not only for immediate loss, but also for a transition period needed to restore livelihood and standards of living of PAPs. Such support could take the form of short-term jobs, subsistence support, salary maintenance, or similar arrangements.

[2] Agricultural land for land of equal productive capacity means that the land provided as compensation should be able to produce the same or better yield the AP was producing on his/her land prior to the project. The production should be in the planting season immediately following the land acquisition. It can be for a future period if transitional allowance equal to the household's previous yield is provided to the AP household while waiting for the land to get back to the same productivity as the previous land.

Vulnerable Group

The resettlement plan must consider the needs of those most vulnerable to the adverse impacts of resettlement including the poor, those without legal title to land, ethnic minorities, women, children, elderly and disabled and ensure they are considered in resettlement planning and mitigation measures identified. Assistance should be provided to help them improve their socio-economic status PAPs will be involved in the process of developing and implementing resettlement plans

Consultation

PAPs and their communities will be consulted about the project, the rights and options available to them, and proposed mitigation measures for adverse effects, and to the extent possible be involved in the decisions that are made concerning their resettlement.

Measures to Avoid Adverse Impacts

Adequate budgetary support will be fully committed and made available to cover the costs of land acquisition (including compensation and income restoration measures) within the agreed implementation period. The funds for all resettlement activities will come from the Government.

Timing of Relocation

Displacement does not occur before provision of compensation and of other assistance required for relocation. Sufficient civic infrastructure must be provided in resettlement site prior to relocation. Acquisition of assets, payment of compensation, and the resettlement and start of the livelihood rehabilitation activities of PAPs, will be completed prior to any construction activities, except when a court of law orders so in expropriation cases. (Livelihood restoration measures must also be in place but not necessarily completed prior to construction activities, as these may be ongoing activities.)

Organization and Administrative Arrangements

Organization and administrative arrangements will be identified and in place prior to the commencement of the process; this will include the provision of adequate human resources for supervision, consultation, and monitoring of land acquisition and rehabilitation activities.

Monitoring and Reporting

Appropriate reporting (including auditing and redress functions), monitoring and evaluation mechanisms, will be identified and set in place as part of the resettlement management system. If necessary an external monitoring group will be hired by the project and will evaluate the resettlement process and final outcome. Such groups may include qualified NGOs, research institutions or universities.

Measures to Avoid Encroachment

The cut-off-date of eligibility refers to the date prior to which the occupation or use of the project area makes residents/users of the same eligible to be categorized as PAPs and be eligible to Project entitlements.

The establishment of the eligibility cut-off date is intended to prevent the influx of ineligible non-residents who might take advantage of Project entitlements.

CHAPTER 5. Mechanism of Consultation, Participation and Disclosure

The objective of this section is to provide framework for consultation with stakeholders and disclosure of Project related information with focus on resettlement.

5.1 Stakeholder Analysis and Identification

The project area comprises of two settlements i.e. Bhains Colony and Jumma Goth. People may be affected by the Project directly as well as indirectly. The person who may lose their land and/or assets due to the Project will be classified as directly affected person. While the person who will be affected by noise, dust and increase in traffic will be classified as indirect affected person.

Project stakeholders are all project affected persons and project beneficiaries. **Table 4-1** describes the primary and secondary stakeholders of the Project.

Table 5-1: Primary and Secondary Stakeholders

Type of Stakeholders	Stakeholder Profile
Primary Stakeholders	All project affected persons people who will potentially lose their assets or livelihood.
Secondary Stakeholders	PQA and regulators of other public land, if any

Table 1-2 identifies the following stakeholders who may be affected mainly due to land acquisition for this Project:

- Port Qasim Authority
- Pakistan Steel
- Private land owners
- Pakistan Railways

5.2 Information Disclosure

The main objective of the consultation and participation is information disclosure. For information disclosure, a Background Information Document should be prepared and Urdu translated copies should be provided to the local communities during consultation sessions. In these consultative meetings following points should be discussed.

- Project details.
- Construction related impacts.
- Increase in traffic due to project related transportation.
- Change to existing social and cultural norms.
- Land acquisition.
- Resettlement issues.
- Operation related impacts (noise/visual/dust)

5.3 Purpose of Consultation and Participation

The purpose of consultation and participation is to ensure meaningful and adequate consultation with all stakeholders, particularly the primary stakeholders in the project area in project planning processes. Thus, the resettlement planning processes should follow a participatory planning process with local inputs in decision-making, policy development and mitigation measures. Provisions for disclosures and mechanisms for information sharing among the stakeholders are also discussed.

This is also in compliance with the requirements of the JICA guidelines, which gives high priority to public consultation and participation in designing and implementation of a socially and environmentally compliant project.

5.4 Consultation Process

The consultations shall involve multiple methods, for example, household level interviews, participatory rural appraisal, community meetings and focus group discussions. The consultative process undertaken for the preparation of the RPF should include not only AHs, but also the local communities of the area. Special attention should be paid to identify the needs of vulnerable groups (such as the poor, women, and elderly), to ensure that their views have been considered in the formulation of the RPF.

Consultation with stakeholders at the different stages of the project is required by JICA guidelines on Involuntary Resettlement. The team preparing RAP should conduct a field study to understand the concerns and grievances of the directly and indirectly affected households.

During the same consultation sessions, a cut-off-date of for compensation eligibility should be communicated to all the participants. They should be clearly told that no subsequent changes in the land use would be entertained by the project for any compensation or financial assistance.

5.5 Disclosure of the RPF

The Project should disclose all the information on project scope and operations and eligibility and entitlements matrix including the unit rates used in assessing the compensations to all the AHs, in the form of Project Information Brochure (PIB), and keep them well informed on any subsequent changes to be made.

5.6 Mechanism of Addressing the Views Emerging from Consultation

All feedbacks and concerns from various consultation meetings and surveys should be considered in the design of the RPF. And internal and external monitoring should ensure the implementation of the plan.

5.7 Plan for Future Consultation and Community Participation

Consultation and information disclosure is continuous process during the design and implementation of a project. Consultation with stakeholders at different stages of the project and timely disclosure of information is a key for early identification of issues, participation of the community in decision making and resolve issue and disseminate firsthand information to the affected communities.

From design phase to project implementation, there are many activities that will require further community consultations as well as participation of the affected persons. **Table 4-2** presents a list of major activities and roles and responsibilities of various stakeholders in the implementation of consultation and disclosure of various activities at various stages of project implementation.

Table 5-2: Public Consultation Activities at Various Stages

No.	Activities	Purpose	Responsible Stakeholders
1	Conduct detailed land and property measurement survey	The participation of the affected people should be ensured in completing official measurement and inventory survey for compensation.	District Collector, PQA, Representation of Affected communities and Local Leading Group
2	Prepare LARP	Document loss of assets and land, the latest compensation cost based and the entitlement matrix etc. should be reflected to the updated LARP. The updated LARP should be reviewed and approved by JICA.	PQA and Consultants
3	Information dissemination through Public Information Centres	Leaflets or pamphlets containing major LARP information (entitlement matrix, compensation rates and detailed survey for land by District	PQA, local media

No.	Activities	Purpose	Responsible Stakeholders
		Collector and valuation assessment process) in local language should be distributed to all APs.	
4	Disbursement of compensation funds	Process compensation payment made to APs	District Collector, PQA, APs
5	Public disclosure of Project-related documents	Disclosure of updated LARP on PQA website	PQA

5.8 Information Disclosure and Consultation during Project Implementation

The draft LARP in English should be posted online, while its translation in Urdu should be disclosed to the AHs. In addition, a public information brochure in Urdu, summarizing compensation provisions should be sent to all AHs before the start of construction works.

A Public Information Canter should be established under the Project Management Unit (PMU) where all the project related information should be available. Any interested stakeholder will be allowed to visit this canter and review the information.

PMU through supervision consultant should hold monthly consultative meetings with the affected households. Supervision consultant should register all the received complaints related to the project by the affected households. These complaints will be discussed in monthly PMU meetings and decisions will be taken on these complaints.

5.9 Eligibility of Cut-off Date

Compensation and rehabilitation eligibility should be limited by a cut-off date to be fixed at the on-set of the detailed inventory taking of the affected assets for the detailed Resettlement Plan. This cut-off date should be announced and notified to all affected households and affected institutions, along with details of their effected area, so that all the affected are aware and discourage any newcomers into the area and/or changes in land use patterns. All AHs present in the Project's affected area before the cut-off date will be eligible for compensation and rehabilitation assistance. The AHs that settle in the Project's affected area and/or make changes in the land use patterns after the cut-off date will not be eligible for any compensation or rehabilitation assistance. They should, however, be given sufficient advance notice requesting them to vacate the area and dismantle the built-up structures and/or other establishments (if any) prior to the start of the project's construction operations. They should be allowed to reuse

their salvaged material for free and they should not be asked to pay any fine for making the changes. Forced eviction should only be considered when all efforts are exhausted.

5.10 Grievance Redress Mechanism

Stakeholders need a trusted way to voice and resolve concerns linked to the Project. Project proponent should develop an effective way to address community concerns. It is recognized that a well-functioning grievance mechanism:

- takes into consideration the local customs, awareness, literacy, and communication means;
- provides a predictable, transparent, and credible process to all parties, resulting in outcomes that are seen as fair, effective, and lasting;
- builds trust as an integral component of broader community relations activities; and
- enables more systematic identification of emerging issues and trends, facilitating corrective action and preemptive engagement.

Project proponent should develop and implement a grievance mechanism for the stakeholders, in particular the community living in the vicinity of the Project. The development and implementation can be broken down into four phases as follows:

- Define scope and determine goals: Develop the overarching purpose and goals for the grievance mechanism.
- Design: Assembles a preliminary plan that outlines the purpose, goals, scope, resolution approaches, structure, and specifics about how the grievance mechanism will function. This preliminary plan is tested and refined through consultation with stakeholders.
- Implement: Work with the stakeholders to introduce, refine, and institutionalize the grievance mechanism.
- Monitor, report, and learn: Gather information on the effectiveness of the mechanism in particular and, more generally, on the Project proponent's ability to prevent and address grievances. Refine the system based on this information.

The Project should set-up a Project Level Grievance Redress Committee (GRC), to be constituted of the representatives from the District Government, affected community/ groups and a local third-party (NGO), to resolve the minor disputes and complaints informally, in an effective and timely manner, and to avoid the often lengthy and costly litigation processes.

CHAPTER 6. Implementation of RPF

6.1 Mechanism of Relocation, Resettlement and Income Restoration

No relocation, resettlement, and impact on livelihood is anticipated, therefore no measures for relocation, resettlement and income restoration are required.

6.2 Implementation Arrangements

The acquisition of land for the project will involve transactions between government agencies only. No private owner, institutional or individual, will be involved.

The transactions may include:

- Agreement between PQA and Executing Agency (EA) of the Project for the lease of land for conveyor belt. As PQA has been nominated as the EA for the Project, this agreement will not be required.
- Agreement between Pakistan Steel and the EA (PQA, in this case) for the lease or use of Coal Yard land
- Agreement Government of Sindh (GoS) and the EA for the use of land falling under the stream. This will be required subject to resolution of disagreement between GoS, PQA and Pakistan Steel over the ownership of the land.

As all the transactions are between government agencies, no LARP will be required.

6.3 Compensation Costs and Budget

The compensation cost will be determined by the government agencies involved in the transaction.

6.4 Monitoring and Evaluation

As the transaction will involve only government agencies, no independent or external monitoring will be required.

Appendix-8

Port Handling Agreement Format with PIBT

PORT HANDLING AGREEMENT ("Agreement")

Pakistan International Bulk Terminal ("**PIBT"**) shall operate the port handling facility and provide the port handling services for handling of imported Coal to M/s----------(Private) Limited (the "**Company"**), which is [constructing] [providing] [processing] a ---------- [MW] [supercritical], Coal fired power plant----------, in Pakistan.

Each party has full corporate power and authority to execute and deliver this Agreement and to perform its obligations under this Agreement and this Agreement constitutes a legal, valid and binding obligation of the parties, enforceable against each party in accordance with its terms.

Item	Terms and Conditions
1. Parties	- Contractor/Operator: Pakistan International Bulk Terminal Limited; - Company/Customer: ---------- Limited
2. Sale and purchase of services	The Contractor/Operator shall provide the Port Handling Services including the hereinafter mentioned services ("Port Handling Services"): • Scheduling of Coal receipt; • Berthing of vessel; • Unloading of Coal from vessel; • Receipt, handling, transfer and storage of Coal; • Receipt, handling, transfer and storage of remnants; • Mooring of Coal vessel; • Weighing of Coal; • Assembly of Coal in storage yard; • Coal storage; • Magnet operations and provision of periodic reports; And • Assistance in sampling and testing of Coal. The Contractor/Operator shall unload Coal from the vessel and load the Company's cargo of approximately ----- million tonnes per annum (mtpa) at the storage yard of Contractor/ Operator ("Storage Yard Delivery Point"). The Customer shall commit to utilize PIBT Terminal for a

	minimum of ---- mtpa per annum and a maximum of ----- mtpa for which PIBT shall reserve capacity, on the basis that the entire Coal requirement of the Customer shall be channelized via the Operator. Terms and conditions with regards to payment of charges for non-utilization of minimum capacity allocated to the Customer from the Operator's reserved capacity shall be reflected in the Master Agreement prior to Commercial Operations Date ("COD") of the Company. **Additional optional services include ("Additional Services"):** • Additional sampling requirements; • Double handling of Coal within the facility and extended storage time. • Standard Coal blending • Additional weighment **Not included:** • PQA wet & dry charges as defined in their tariff • Services provided by PQA, this will include but not be limited to pilotage and tuggage
3. Operator's responsibility	The Contractor/Operator shall provide the Services, Additional Services and all related services to ensure that the Coal cargos are transported from the Coal vessel, to the Storage Yard Delivery Point. Other responsibilities include compliance with all the relevant laws and applicable QHSE regulations. The Storage Yard Delivery Point shall be located within the premises of PIBT.
4. Customer's responsibility	The Customer shall guarantee the quantities as agreed in the Agreement and also undertake to remove their full cargo of one vessel from PIBT Storage Yard efficiently, and before berthing the next vessel of laden cargo (to be agreed upon by the execution of the Master Agreement prior to Company's COD), from the Storage Yard Delivery Point. The Customer shall be responsible for any damage to the berth and equipment, caused by the Coal-carrying vessel, and the consequential loss of operations
5. Vessel	Up to Panamax vessel Length: 335m; Beam: 48.2m; Loaded Draught: 13 meters.
6. Vessel unloading	Up to 48 hours from the time of the berthing of the vessel to

time	completion of unloading, depending upon the size of the vessel, the berthing window of the Operator and the weather conditions.
7. Coal Delivery Point	Storage Yard Delivery Point.
8. Port Handing Facility Completion Date	End 2016
9. Estimated Contract Quantity	Up to Approx. ---- mtpa
10. Storage (tentative)	05 working days storage at terminal.
11. Price (tentative)	**[commodities' name] Handling:** Up to U.S $ [•]/ton subject to the actual adjustment as settled prior to Company's Commercial Operations Date (COD). **[commodities' name] Storage:** to be decided according to the terms set out in the Master Agreement, prior to Company's COD (applicable after storage allowance has been exhausted) Payable in equivalent of PKR; Currency Exchange Rate mechanism to be decided prior to Company's COD;
12. Terminal Operations	[20] hour operation excluding agreed maintenance period, force majeure events, forced outage of the PIBT Terminal and certain gazette holidays
13. Terminal Availability	Planned outages to be provided by the Contractor/Operator. The Contractor/Operator shall endeavor to match its outages with the scheduled outages of the Company subject to such dates being provided to the Contractor/Operator in accordance with the agreed timelines.
14. Payment Terms	The Contractor/Operator shall invoice after the departure of the Vessel from PIBT, the Company shall pay on or before the 30th day following the day the Contractor/Operator raises the invoice.
15. Coal Losses during handling	Coal loses during Coal handling will be in line with best international practices and shall be discussed and agreed between the Parties.
16. Insurance	Both Parties shall procure their respective Insurances.
17. Standards	All works and services performed shall be in accordance with international prudent industry practices
18. Governing law and alternative	Pakistani law shall be the governing law for this Agreement and the Courts in Pakistan shall have exclusive jurisdiction; Any dispute arising out of this Agreement shall first be

dispute resolution.	settled through mediation process at the National Centre for Dispute Resolution ("NCDR") and upon failure of mediation proceedings, the matter will be referred to Arbitration, under the Arbitration Act 1940, Pakistan and the seat of arbitration shall be at Karachi.
19. Confidentiality	This Agreement is confidential and shall not be shared with any third party.
20. Force Majeure	• Acts of God • Fire, Strike, Explosion, War, Riots, Embargo, Terrorism and such other events which are covered in the Agreement.
21. Delayed payment	After due date KIBOR +2% per annum (simple interest)
22. Term	The term of this Agreement will be for 5 years from the Commercial Operations Date (COD)

For and on behalf of **PAKISTAN INTERNATIONAL BULK TERMINAL LIMITED**	For and on behalf of **----------**
Name: _Sharique A. Siddiqui	**Name: ----------**
Title: Chief Executive Officer	**Title:**

Witness 1:	Witness 1:
Name:_____	**Name:_____**
CNIC #: _____	**CNIC #: _____**

Witness 2:	Witness 2:
Name:_____	**Name:_____**
CNIC #: _____	**CNIC #: _____**