



Final Report
April 2017

Environmental Impact Assessment (EIA)

132 kV Underground Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station



**EMC Pakistan
Private Limited**



Environmental Impact Assessment

132kV UG SINGLE CIRCUIT TRANSMISSION LINE FROM JACOB LINES GRID STATION TO GIZRI GRID STATION

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Executive Summary

Environmental Impact Assessment is a tool for environmental conservation and has been identified as a key component in implementation of any new project. The relevant rules which support this statement are: Section 17 of Sindh Environmental Protection Act 2014 and other regulatory documents such as Sindh Environmental Protection Agency (Review of IEE/EIA) Regulations 2014. These regulations require that every new development project has to be preceded by an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) depending upon the magnitude of the severity of impacts anticipated at the time of commissioning and operations of the project.

In compliance of above laws, this EIA has been prepared; which presents the findings of the Environmental Impact Assessment (EIA) study carried out by EMC Pakistan Pvt. Limited for the proposed 132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station. The project has been studied and analyzed in detail.

Existing 132 kV Gizri-Jacob current circuit is oil-filled and almost completed its life span. To satisfy the load requirement of power system and reduce the transmission losses, the proposed 132 KV Transmission Line is planned to be laid. The Transmission Line is Cross-linked Polyethylene (XLPE) underground transmission line with route length of around 7 kilometers.

Moreover, the addition of this circuit in Extra High Tension network will ensure the required degree of reliability for power system and enables the shift engineers and grid operators in easy and efficient management of load. The K-Electric consumers will benefit after the energization of this circuit.

Underground transmission line will initiate from Gizri Grid Station, initially run in DHA phase-II extension internal streets, intersect Sunset Boulevard and enters via internal streets in DHA Phase II and further connects to Korangi Road and runs parallel to the Korangi road while intersecting the Main Railway Line under Kala Pul and Shahrah-e-Faisal near FTC. After running along Korangi Road further, the route follows Mubarak Shaheed road and turns right from St. Patrick's High School and ends its terminus point at Jacob Lines Grid Station.

Objectives of the Project

Main objectives of the project are as follows:

- To improve the existing transmission network by replacing the old and redundant oil filled transmission line.

Other Approvals

Certificate (NOC) /Approvals will be obtained to acquire the Right of Way from the DHA, Korangi Creek Cantonment Board & KMC for the Under Ground Transmission Line.

Categorization of the Project

The Sindh Environmental Protection Agency (Review of IEE/EIA) Regulations, 2014 categorizes the project on the basis of nature and scope of the project. The project “132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station” falls in Schedule II requiring an EIA to be submitted to relevant Environmental Protection Agency, which in this case is Sindh Environmental Protection Agency (SEPA) and is given as:

- ✓ A. Energy
- ✓ Transmission Lines(11 kV and above) and Distribution projects

Collection of Data

To further study the project features, primary and secondary data is collected. Primary data is obtained through field data collection which includes observational surveys, monitoring and analysis of various environmental parameters, consultations and meetings for data collection from the neighboring communities etc. And, secondary data is collected from various sources such as internet, studies previously conducted in the project area and its neighborhood, in-house sources, Government Departments and NGO's etc. Furthermore, applicable international guidelines, conventions and environmental assessment procedures prepared by the SEPA have been consulted frequently while preparing this document.

Baseline

The physical, ecological and socio-economic environmental conditions of the microenvironment and macro environment of the project area have been studied in detail. Previous published and unpublished literature and other information were collected in order to gain a complete understanding of existing environmental and socioeconomic conditions in the area including the topography, geology, soils, water resources, ambient air, climate, flora and fauna, habitats within the proposed site and its surroundings, socio-economic conditions, infrastructure and land use; and any heritage aspects such as sites of cultural, archaeological or historical significance.

Physical Environment

The Ambient air quality of Korangi Road was monitored by EMC Pakistan Pvt. Limited. The results of air quality monitoring indicate that the concentration of SO₂, NO, NO₂, CO, O₃, SPM, PM₁₀ and PM_{2.5} are within the range of the SEQS but touching the limits due to the presence of heavy traffic and frequent traffic jams in peak hours.

The noise level at the proposed project alignment at different locations on the average is 66 dB (A), shows that the average noise measurements of the survey is slightly exceeding the limits of SEQS for Commercial Areas. While when we consider the individual noise measurement of the project area, at some points it is much higher than the limits of SEQS for Commercial Areas due to the traffic problems and heavy mass of traffic flow.

Ecological Environment

Ecological surveys were conducted in and around the project alignment to check the current ecological status of the project site and its immediate surroundings. Few tree species found along the proposed route of TL which includes *Ficus religiosa*, *Conocarpus erectus* and *Azadirachta indica*. *Ficus religiosa* species (5-6) are present in old area along Mubarak Shaheed road. *Conocarpus erectus* species are mainly found along the road islands.

Socio Economic Environment

The socio economic situations prevailing in the micro environment of the project area, based on primary and secondary information were studied. The primary data was gathered through extensive field surveys, while various relevant sources were used for secondary data. K. Electric transmission line passes through 4 UCs of Karachi East district to DHA Phase II. Names of the UCs in Karachi East district through which transmission line passes are UC – 9 Jacob Lines, UC – 8 Jat Lane lines, UC – UC-4 Chanesar Goth. Demography: Administratively, the project is located in 04 out of 26 Union Councils of East district and DHA Phase II (CBC). The total area of Karachi East district is approximately 72 sq. km.

Impacts and Mitigation Measures

Potential environmental impacts that would result due to various activities performed in project area for 132 kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station during different phases such as design, construction, operation and maintenance are identified and mitigation measures have been suggested to reduce those impacts. The potential impacts expected to arise during construction phase are temporary and localized and last during construction phase. Some of the significant impacts of construction activities are i) Intrusion to sensitive receptors and Existing Infrastructure, ii) obstruction to movement of people/traffic, iii) deterioration of air & water quality due to temporary construction camp area, vii) construction waste handling and disposal, viii) deterioration of local air quality due to dust and vehicular emissions, ix) noise and vibration near the construction activity site, x) removal of trees/ plants during ROW clearance, xi) occupational health and safety, xii) traffic movement, congestion and diversion due to construction along the roads, and xiii) community health & safety. The potential impacts in operation phase will be minor in nature and will arise only during maintenance of the proposed transmission line project e.g. noise pollution, vehicular emissions, collection and disposal of excavated debris after maintenance of underground transmission line. The mitigation measures for these impacts are summarized in the Environmental Management Plan.

Conclusions and Recommendations

On the basis of the findings of the EIA Study, it is possible to conclude that:

- Construction and Operation of Transmission line will, on adoption of the mitigation measures, have no significant impact on the physical as well as socio-economic composition of the microenvironment and macroenvironment of the project area;
- The likely impact of construction and operation of the Transmission line will be appropriately mitigated through proven technologies, careful planning and landscaping;
- The project is not likely to cause displacement of population, loss of business and annoyance to the living environment, or disturb the peace and tranquility of its surroundings;
- The project will meet the forecasted demand for energy due to extension of the project;
- The proposed 132 kV Supply Line after commissioning will become an integral part of the microenvironment and a friendly component of its macro environment.

Mitigation will be assured by a program of environmental monitoring conducted to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged. This will include observations on and off site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the EPA Sindh.

The study recommends and confirms that the proponent shall adopt all environmental management processes in full, as prescribed by the national and international laws and guidelines and given in the EIA document.

The study therefore recommends that the EIA report should be approved with the provision that the suggested mitigation measures will be adopted and the Environmental Management Plan will be followed in letter and spirit.

Environmental Management & Monitoring Plan (EMP)

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
Designing Phase							
Sensitive Receptors and Existing Infrastructure	Intrusion to sensitive receptors and Existing Infrastructure	<ul style="list-style-type: none"> During the selection of ROW for underground transmission line, significant efforts should be made to avoid or minimize impacts on sensitive receptors or existing infrastructures; Sensitive receptors shall be avoided like schools and religious places; Prior notices shall be given to the school / religious places administrators before the starting commissioning activities near these sensitive locations; Prior notices shall be given to the legal shop owners and residents before the starting commissioning activities near these settings; GRM shall be followed in letter and spirit; Impacts on public utilities should be minimized by incorporating environment friendly construction methods in the engineering design; and Works around public utilities should be carried out in consultation with relevant authorities. 	CC	Review of complaint register Review the records of local consultations / Near Construction site	Before Construction on monthly basis / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
Barriers to Movement of People/Traffic	excavation & backfilling of underground transmission line ROW may result in obstruction	<ul style="list-style-type: none"> Cables that cross main roads will be achieved through thrust boring under the road; Cables that cross railway mainline will be achieved through thrust boring; and The excavation and backfilling activities should be scheduled (skipping peak hours) to minimize the impact of barrier to the movement of people and traffic. Proponent should ensure that during the construction works, all the gates of the schools/colleges are not blocked. Work should be carried out sequentially to allow access to some gates, while work is carried out in front of others. It is recommended that as summer vacations are only a few months away, the construction works in this area should be completed during those months. 	CC	Traffic diversion sites, check access routes of pedestrians and construction sites / At ROW along the roads and footpaths	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
Temporary Construction Camps	Deterioration of air & water quality, and social impacts	<ul style="list-style-type: none">Camps are to be located away from residents/commercial activities to minimize nuisance;Sanitation facilities in the camps if provided should be mobile and collect its wastewater or connected to the local sewerage system;Water consumption should be regularly checked and measures will be implemented to avoid wastage of water;Bathing of construction crew should be prohibited at the camp as it will required large quantity of water as well as wastage.	CC	Consumption in liters / Construction sites/camps	Measured on daily basis / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
Contract clauses	Contractor may disown to work in environmental friendly manner	<ul style="list-style-type: none">Construction Contractor/Waste Contractor shall be made responsible through contract documents for proper disposal of the spoil / excavated earth and not to dump these spoils/ earth near open plots / open spaces / open storm water drains / in front of residents or left unattended along the construction site. It should be disposed in KMC designated landfill site.A proper site rehabilitation plan shall be made by the contractor include the spoil / excavated earth disposal arrangementsContractors shall also be made responsible through contract documents to follow Sindh Environmental Quality Standards (SEQS) and applicable standards during all the construction operations and ensure compliance of the same through periodic environmental monitoring reports.Contractors shall be made responsible through contract documents to follow Standard Practices and Standard Operating Procedures (SOPs) to ensure health & safety of workers at the site and public during all construction operations.As the work is usually completed by contractors and sub-contractors, K-Electric should monitor their works to ensure proper task completion.	KE				
Construction Phase							
Soil Erosion	Blockage of surface drainage network, impact on quality of natural water and biological system may cause potential environmental	<ul style="list-style-type: none">Construction activities should be scheduled to avoid runoff due to rain;The dredged soil must be contained in an enclosure to reduce the chances of runoff during the seasons of precipitation;Stock piles of fine material should be wetted or covered with tarpaulin especially during windy weather conditions;	CC	Check any obstruction in existing drains due to construction, check lifting of waste material, check waste management plan	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
	impacts that may also affect their users.	<ul style="list-style-type: none"> Cut and fill should be balanced to the extent practical at each site in order to minimize the need for fill and for spoil disposal. Cut material should be used to level the site area or be disposed at designated spoil disposal sites; Excess spoil should only be directed to designated disposal areas and temporary quarries; no disposal in waterways is allowed. 		/ At construction site			
Water Resources	Impact on Surface and ground water sources	<ul style="list-style-type: none"> All excavated soil left after backfilling should be completely removed; Debris and vegetation clogging culverts and drains should be regularly cleared; and Soil runoff from the site leading to off-site contamination (particularly during rainy season) should not be allowed. Construction works should ensure that the drains are not disturbed otherwise the entire road will be flooded. 	CC	Check drainage infrastructure / Construction sites near drainage infrastructure	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
Fuel, Oil & Chemical handling, storage and disposal	Soil contamination	<ul style="list-style-type: none"> Spillage of oil and grease from the vehicles should be avoided. Chemicals and oils should be stored in secure designated areas with temporary impermeable bunds at distance of at least 100 m from any water course; Refueling, oil changing and engine maintenance of machinery, equipment and vehicles should be avoided at construction site; Oil contaminated materials should be disposed at designated waste disposal facilities. 	CC	Check contamination on the ground, check waste disposal / Vehicles/ machinery in working areas	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
Construction Waste Disposal	This waste has the potential to cause negative impact on the surroundings if not properly managed and disposed of. Irregular storage of this waste is hazardous to the workers at the site as well	<ul style="list-style-type: none"> A Comprehensive Waste management Plan for Construction phase should be developed; Construction sites should be equipped with temporary refuse bins, and construction wastes should be collected on a daily basis and contained in a temporary designated waste storage area on each site; Designated waste storage areas should not be within 50 m of water ways; Any hazardous waste should be separated and stored in areas clearly designated and labeled, and disposal in environmental friendly manner. 	CC	Domestic waste, Hazardous waste – Chemical waste, electro waste, Paper and Polythene material waste and Wood / Collection, handling, storage areas and disposal	Measured on daily basis and reported quarterly	CC/KE	Waste disposal cost will be evaluated by CC based in the quantity and type

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
		<ul style="list-style-type: none"> Wastes should be routinely collected from the designated area and disposed at licensed waste disposal facilities approved by SEPA; and Upon completion of activities at a construction site all solid wastes should be completely removed and the site should be re-contoured or prepared for natural re-vegetation. 					
Dust Emissions	Deterioration of local Air Quality	<ul style="list-style-type: none"> Dust emissions from soil piles and aggregate storage stockpiles should be reduced by keeping the material wet by sprinkling water at appropriate frequency and erecting windshield walls on three sides of the piles; It should be mandated by KE to Contractor to backfill the trenches after laying of the pipeline and rehabilitate the excavated area to its original position. If it is a road, the backfilling will be followed by levelling and carpeting of road with bitumen; Vehicular movement should be restricted to a specific time for dumping of supplies and construction materials; and Workers should wear dust masks and safety goggles, especially during dry and windy weather conditions to avoid health risk. 	CC	SPM, PM ₁₀ , PM _{2.5} , SO _x , NO, NO ₂ and CO / Near Construction site (if several construction sites with a buffer distance of 5 km working consecutively or together, each site will be monitored at in a month)	Measured monthly for 12 working hours / reported quarterly basis	CC/KE	Rs.20,000 per site per month
Exhaust Emissions	Deterioration of local Air Quality	<ul style="list-style-type: none"> All vehicles, generators and other equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants; Emissions from the machinery and vehicles will be monitored on regular basis to ensure compliance of SEQS; Excessive engine idling will be discouraged and machinery causing excessive pollution (i.e. visible clouds of smoke) will be banned from sites; Standby generators for power supply will be kept away from pathways and will be placed at locations where probabilities of human intervention are limited; and The stack height of the generators used will be at least 3 m above the ground. 	CC	Smoke, CO, Noise, NO _x , PM, SO ₂ / All construction vehicles	Measured monthly/ reported quarterly basis	CC/KE	Rs.15,000 per vehicle per month
Noise and Vibration	Construction activities are expected to produce noise levels in the range of 80 – 95 dB and may cause	<ul style="list-style-type: none"> Machinery operation and high noise activities should be carefully planned and scheduled; To the extent practical batching plants and construction areas should not be located within 500 meters of a settlement; 	CC	Noise Intensity (dB) / Near Construction site (if several construction sites	Monthly / reported quarterly basis	CC/KE	Rs.5,000 per site per month

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
	discomfort to local residents	<ul style="list-style-type: none"> Where that is not possible, high noise activities should cease between 20:00 and 06:00 hrs at any construction site within 500 meters of a settlement, or if noise complaints are received from settlement residents. Vehicles and machinery will be equipped with silencers. Contractors will be required to fit noise shields on high noise construction machinery; Site labor working in high noise area such as where noise level exceeds 80 dB (A), will wear earplugs; The stationary sources of noise such as concrete mixers, batching plant, power generators and pumps will be selected and segregated from work areas and residents; and Occupational health, safety and environmental procedures and Environmental management plan for proposed project would be followed. 		with a buffer distance of 5 km working consecutively or together, each site will be monitored at in a month)			
ROW Clearance	Impacts on Ecology (Flora and Fauna), cutting of trees	<ul style="list-style-type: none"> Compensatory plantation shall be provided at a ratio of 1:3; Selection of plants for landscaping should consider the habitat suitability, trees of national interest, flowering trees and shrubs; and By using the best practice for vegetation clearing and disposal practices; will minimize the environmental risk associated with clearing and disturbance of vegetation communities. 	CC	Check tree cutting, compensatory plantation, inventory of cleared trees / plants / At construction alignment	Monthly / reported quarterly basis	CC/KE	Rs.5,000 per tree planting
Safety Precautions for the Workers	The construction of civil works poses an inherent risk of injury to workers from accidents and hazardous working environments. There may be either minor or major accidents due to different activities of construction phase	<ul style="list-style-type: none"> Preventive and protective measures including modification, substitution, or elimination of hazardous conditions, with particular attention to live power lines, working at height, working above water, EMFs, high noise levels, and exposure to chemicals will be made; Measures for the management and appropriate disposal of hazardous wastes will be undertaken to ensure protection of the workforce and the prevention and control of releases and accidents; Appropriate fire extinguishers and fire response plans will be available at the site; Appropriately stocked first-aid equipment and stations at both work sites and temporary construction camps, including appropriately trained first aid staff on site and adequate transport 	CC	Accidents, PPEs, Annoyance, Fire Hazards, Safety Protocols, Spill on Land and Spill on Water / All construction areas	Continuous / reported quarterly basis	CC/KE	PPE cost will be borne by CC Rs.12,000 per set of PPE

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
		<p>facilities for moving injured persons to the nearest hospital will be available;</p> <ul style="list-style-type: none"> • Training for workers and appropriate incentives to use and comply with health and safety procedures and PPEs will be provided; • Procedures for documenting and reporting occupational accidents, diseases, and incidents; • Emergency prevention, preparedness, and response arrangements will be in place; • There will be strict safety requirements for personnel assigned to construction work; • To maintain safe conditions for the general public, all substations will be fenced and gated, that must be locked at all times; and • Appropriate signage will be posted that shows the owner of the substation, the hazardous nature of the substation and contact information. 					
Traffic Movement near construction site	Traffic flow in the locality of project will slightly increase during construction activities of the project, which directly impact the traffic flow along the right of way of underground transmission lines and in the vicinity of grid stations. This increase in traffic may congest the flow of traffic on Korangi road (used by schools, hospital, residents and laborers); and may cause some accidental injuries and	<ul style="list-style-type: none"> • Traffic management plan will be developed and implemented during the construction phase; • Excavation near schools and businesses should be done during non-peak hours and the construction should be done in pieces near sensitive areas; • Construction activities will be scheduled to reduce the chances of traffic jams; • Adequate and appropriate road signs will be erected to warn road users along the ROW of transmission lines; • The movement of equipment (trucks) during the construction of the proposed project will be limited to 9:30 am - 4:30 pm per day; • Raw materials for construction work will be adequately covered within the trucks to prevent any escaping into the air and along the roadway; • Vehicles will be maintained regularly to reduce the exhaust emissions; and • Any complain launched by community member will be responded and appropriate action will be taken to avoid it in future. 	CC	<p>Traffic flow, timing of activities, near misses and injuries records and reporting</p> <p>/ At crossroads and along transmission line Right of Way</p>	Continuous / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
	deteriorate the air quality of ambient air.						
Social Impacts	Community health & safety issues	<ul style="list-style-type: none">Emergency response plan should be prepared and implemented during entire phase of construction;Procedures for interaction with local and regional emergency and health authorities should be made;In order to minimize traffic congestion (if applicable), deliveries of materials and equipment should avoid peak traffic hours between 6:30-8:30 am and 3:30-4:30 pm;It should be mandated by KE to Contractor to backfill the trenches after laying of the pipeline and rehabilitate the excavated area to its original position. If it is a road, the backfilling will be followed by levelling and carpeting of road with bitumen;CC should inform the community beforehand regarding the timings of the construction works and should respond to their complaints swiftly.Proper lighting at night near trenches will be ensured; andDiversions, danger points and works at culverts, bridges and construction sites will have appropriate warning signs; this is particularly important at night to avoid accidents.	CC	Review of complaint register Local Consultations / Near Construction site	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
				Surface topography, Proper backfilling and carpeting / All excavated areas	Continuous / reported quarterly basis	CC/KE	Backfilling and carpeting cost will be evaluated and borne by CC
Operational and Maintenance Phase							
Human Exposure to Electromagnetic Fields (EMF)	Adverse health effects	<ul style="list-style-type: none">Undertake EMF monitoring as per KE predefined procedures.	KE	Electromagnetic Field (EMF) / Transmission line Corridor	Conducted and reported annually	KE	Rs.8,000 per site per year
Barriers to Movement of People/Traffic during maintenance of transmission line	excavation & backfilling of underground transmission line ROW may result in obstruction during maintenance	<ul style="list-style-type: none">Excavation near schools and businesses should be done during non-peak hours and the construction should be done in pieces near sensitive areas;Backfilling the excavation / digging area and rehabilitate the excavated area to its original position will be required after each maintenance activity that involves excavation / digging;Hard barrication and safety and diversion signage will be provided at all maintenance areas.	KE	check access routes of pedestrians and maintenance sites / Maintenance areas	During maintenance activities	KE	Mitigation cost will be evaluated and borne by KE

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
Gaseous Emissions	Air pollution	<ul style="list-style-type: none"> All vehicles, power generators and other equipment used during the maintenance work will be properly tuned and maintained in good working conditions in order to minimize emission of pollutants; and Emissions from the machinery and vehicles will be monitored on regular basis to ensure compliance with SEQS. 	KE	Smoke, CO, Noise, NOx, PM, SO ₂ / All maintenance vehicles	During maintenance activities	KE	Rs.15,000 per vehicle
Solid Waste	The maintenance activities may generate some hazardous and non-hazardous waste such as wires and wild vegetation etc.	<ul style="list-style-type: none"> Ensure that all solid waste collected during operational or maintenance work is disposed of in an appropriate disposal site in the locality. 	KE	Waste collection and disposal records / Maintenance areas	During maintenance activities	KE	Waste disposal cost will be evaluated by KE based in the quantity and type
Notes KE = K-Electric; CC = Construction Contractor; SEQS = Sindh Environmental Quality Standards; PM = Particulate Matter.							

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Chapter 1 Introduction

K-Electric intends to connect the Jacob Lines Grid Station (GS) to Gizri Grid Station and laying a 132kV underground single circuit transmission line. The proposed 132 kV Line will distribute the load requirements between these two GS.

EMC Pakistan Pvt. Limited has been engaged by K-Electric to conduct the Environmental Impact Assessment of proposed 132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station in order to comply with the provisions of Sindh Environmental Protection Act, 2014 and the Sindh EPA Review of IEE and EIA Regulations, 2014.

The project is proposed to fulfill the electricity requirements of the city by improvement of transmission networks.

1.1 Project Developer Introduction

K- Electric Limited came under new management in 2008 and has gone on to bring about sustainable change throughout its organizational structure and compliance of HSEQ in all areas of its operations.

1.1.1 Vision

To restore and maintain pride in KE, Karachi and Pakistan.

1.1.2 Mission

Brightening lives by building the capacity to deliver uninterrupted, safe and affordable power to Karachiites.

1.1.3 Corporate Health, Safety, Environment and Quality

The company aims to maintain a high international standard to ensure quality, safety and reliability in its operations. . Training courses are conducted on a regular basis and staff is also provided training and networking opportunities within its five power plants in Karachi.

The Company's commitment to Environmental Sustainability is indicated by the Environmental Health & Safety Awards it has received over the years:

- 13th Award 2016 for 8th consecutive year.
- Runner up in ACCA WWF Best Environmental Performance Report Writing 2015 (latest).
- Winner of International EHS Award for category "Environmental Impact Assessment" 2015 and 2016.
- 3rd Position for Best Safety Practices, awarded by Employers Federation of Pakistan in collaboration with ILO, in the category of Oil, Gas and Energy held in 2014.
- “Fire & Safety Award 2013” for the 3rd consecutive year, awarded by NFEH and FPAP.
- OHSAS certification 18001-2007 for all generating stations.

1.1.4 Environmental Stewardship

K-Electric's Environmental Management System is ISO-14001 compliant, the international standard for environmental management. It complies with the Sindh Environmental Quality Standards of Pakistan for stack emissions and effluent discharge.

K-Electric is compliant with the IFC/ADB guidelines and also by the Sindh Environmental Quality Standards of Pakistan for Noise Pollution.

K-Electric has been recognized by Association of Chartered Certified Accountants (ACCA) ACCA- World Wildlife Fund (WWF) for its HSE practices.

1.1.5 Energy Conservation

K Electric has been recognized for the energy conservation measures undertaken at its plants and offices. K Electric received the Energy Leaders Award 2014 for Best Practices in Energy Conservation.

1.1.6 Corporate Social Responsibility

K Electric's commitment to CSR is demonstrated by the awards it has received over the years:

- 3rd consecutive CSR Business Excellence Award by the National Forum for Environment and Health (NFEH) in collaboration with Islamabad Chamber of Commerce and Industry (ICCI) and Federation of Pakistan Chambers of Commerce and Industry (FPCCI) at the 7th International CSR Summit.
- CSR Award for 2014 from NFEH in recognition of the utility's support to the education and youth platforms.
- Recognized for its 'Outstanding Corporate Volunteerism' by INJAZ Pakistan, over KE's involvement in the professional skills based mentoring programs.
- Level 'A' rating awarded for Sustainability Report by the Global Reporting Initiative.
- CSR Association of Pakistan – CSR Excellence Award 2012 for 'Innovation' and 'Sustainability Reporting'.
- International CSR Excellence Award 2012 organized by NFEH and UNEP for 'Community Service'.
- Certificates of Appreciation from Fatimid Foundation for overwhelming participation by K-Electric employees in blood donation drive.

1.2 Project Overview

Existing 132 kV Gizri-Jacob current circuit is oil-filled and almost completed its life span. To satisfy the load requirement of power system and reduce the transmission losses, the proposed 132 KV TL is planned to be laid. The Transmission Line is Cross-linked Polyethylene (XLPE) underground transmission line with route length of around 7 kilometers.

Moreover, the addition of this circuit in Extra High Tension network will ensure the required degree of reliability for power system and enables the shift engineers and grid operators in easy and efficient management of load. The K-Electric consumers will benefit after the energization of this circuit.

1.3 Project Location

Underground transmission line will initiate from Gizri Grid Station, initially run in DHA phase-II extension internal streets, intersect Sunset Boulevard and enters via internal streets in DHA Phase II and further connects to Korangi Road and runs parallel to the Korangi road while intersecting the Main Railway Line under Kala Pul and Shahrah-e-Faisal near FTC. After running along Korangi Road further, the route follows Mubarak Shaheed road and turns right from St. Patrick's High School and ends its terminus point at Jacob Lines Grid Station. **Fig.1.1** shows the location map of proposed line route.

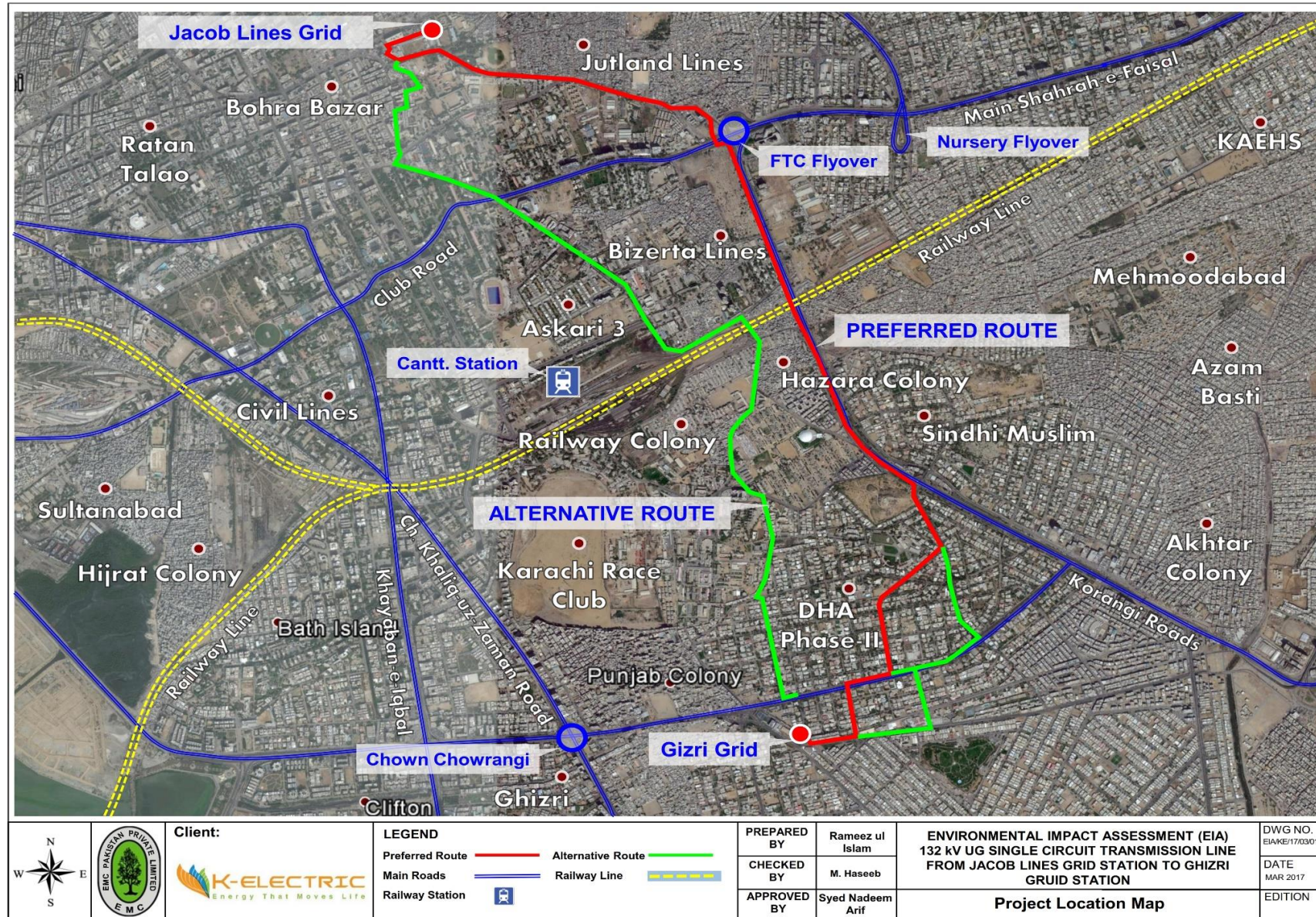


Fig. 1.1: Location map of the 132kV UG TL from Jacob GS to Gizri GS

1.4 Categorization of the Project

Sindh Environmental Protection Agency (Review of EIA/IEE) Regulations, 2014 notified under section 37 of SEPA, 2014 categorizes projects in two separate schedules which requires either an IEE (Schedule-I) or an EIA (Schedule-II) and according to this the proposed project falls in **Schedule II: A(4)** requiring an EIA.

- ✓ Transmission Lines(11 kV and above) and Distribution projects

1.5 Objectives of EIA

As stated by the United Nations Environment Programme's Division of Technology, Industry and Economics, an EIA is a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, finding ways and means to reduce the adverse impacts, shaping projects to suit the local environment, and presenting options to decision-makers.

An EIA can bring about both environmental and economic benefits, such as reduction in costs and time taken for implementation and design of a project and lesser intervention of legalities and regulations. A properly conducted EIA lessens conflicts by promoting community participation, informs decision-makers, and helps lay the base for environmentally sound projects.

The main purpose of this EIA Study is to provide and analyze information on the nature and severity of environmental aspects and propose mitigation measures in case of negative impacts arising from the construction and operation of the project and related activities that would take place concurrently or subsequently. The EIA study will in fact respond to the provision of Sindh Environmental Protection Act 2014 and Guidelines for the Preparation and Review of Environmental Reports. The Study will:

- Identify all major and minor impacts, negative as well as positive, on the environment (physical and ecological) during its different stages viz. pre-construction, construction and operation of Project;
- Identify Socioeconomic aspects, and
- Devise Environmental Management& Monitoring Plan (EMMP) for sustainable operation of the Project.

1.6 Methodology Adopted for EIA

This environmental impact assessment was conducted in the following manner:

1.6.1 Scoping

A scoping exercise was undertaken to identify the potential issues that are to be considered in the environmental impact assessment. The scoping exercise included the following tasks:

- **Data Compilation:** A generic description of the proposed activities relevant to this environmental assessment was compiled with the help of the Project proponent.
- **Review of Published literature:** All available published and unpublished information pertaining to the micro and macro environment of the study area was obtained and reviewed. It included the earlier studies conducted in the study area, environmental and social baselines and impact assessment studies conducted by different consultants in past. Secondary data was very helpful in understanding the issues that were identified by other consultants.
- **Review of applicable Legislation:** Information on relevant legislations, regulations, guidelines, and standards was reviewed and compiled.
- **Identification of potential impacts:** The information collected in the above procedures was reviewed and potential environmental impacts were identified.

- **Initial site visit:** An initial site visit was conducted to get an overview of site conditions and the surrounding areas.
- **Stakeholder consultation:** A stakeholder consultation was undertaken to document the concerns of the local community and other stakeholders, and to identify issues that may require additional assessment in order to address these concerns.

1.6.2 Review of Legislation and Guidelines

National legislations, international agreements and environmental guidelines were reviewed to set environmental standards that The KE will be required to follow during construction & operation phase of the project. Sindh Environmental Protection Act 2014, SEPA (Review of IEE/EIA) regulations 2014, Guidelines for the Preparation and Review of Environmental Reports and IFC EHS Guidelines for Electric Power Transmission & Distribution were the basic guiding documents used during the study.

1.6.3 Baseline Data Collection

Baseline Data was collected from different sources including electronic and print media, studies previously conducted by EMC Pakistan Pvt. Limited and archives of the experts, consultations with institutions, Non-government Organizations (NGOs) and field surveys conducted for this study by the team of EMC Pakistan Pvt. Limited etc.

Primary Data Collection

The team comprising of environment specialists, ecologist and sociologist collected area specific primary data during site visits of the proposed project. A description of baseline data (physical, biological and socioeconomic conditions) of the proposed project is provided in this report.

Secondary Data Collection

Previous published and unpublished literature and other information were collected in order to gain a complete understanding of existing environmental conditions in the area including the following:

- **Physical environment:** Topography, geology, soil, water resources, ambient air, noise and climate;
- **Biological environment:** Flora and fauna within the proposed site and its surroundings;
- **Socio-economic environment:** Settlements, socio-economic conditions, infrastructure and land use; and
- **Heritage aspects:** Sites of cultural, archaeological or historical significance.

1.6.4 Identification of Aspects

Identification of environmental aspects and their significance is fundamentally important for determination of severity of incidence of impacts at different stages of the project. This step is aimed at obtaining an inventory of the aspects. The aspects identified during this step cover all activities like construction, installation and operation, in order to determine those which have or can have significant impact on the environment.

1.6.5 Impact Assessment & EMMP

Environmental experts at EMC Pakistan Pvt. Limited analyzed and assessed the anticipated impacts that are likely to arise due to the identified aspects. Potential impacts were evaluated using the environmental, ecological, socioeconomic, and project information collected. The impact assessment covers the following aspects:

- Potential change in environmental parameters likely to be affected by Project related activities;
- Prediction of potential impacts;
- Evaluation of the likelihood and significance of potential impacts;
- Defining of mitigation measures to reduce impacts to as low as reasonably practicable;

- Prediction of any residual impacts, including all long-term and short-term, direct and indirect, and beneficial and adverse impacts; and
- Monitoring of residual impacts.

An environmental management & monitoring plan (EMMP) was developed to oversee the environmental performance of the project, adoption of proposed mitigation measures, to monitor impacts of all activities and performance of mitigation measures and to identify the residual impact, and also the positive/negative changes in the physical, ecological, and socioeconomic environment.

1.6.6 Documentation & Review

This is the final step of the EIA study. The data generated during and for the study was compiled and examined by experts. Sections of this report were prepared as the study progressed, by consultation with experts. The report was finally reviewed by Team Leader, who analyzed the information, assessed the potential environmental impacts in the light of national and international guidelines, and examined the alternatives in the light of observations on the field as well as meetings with the stakeholders.

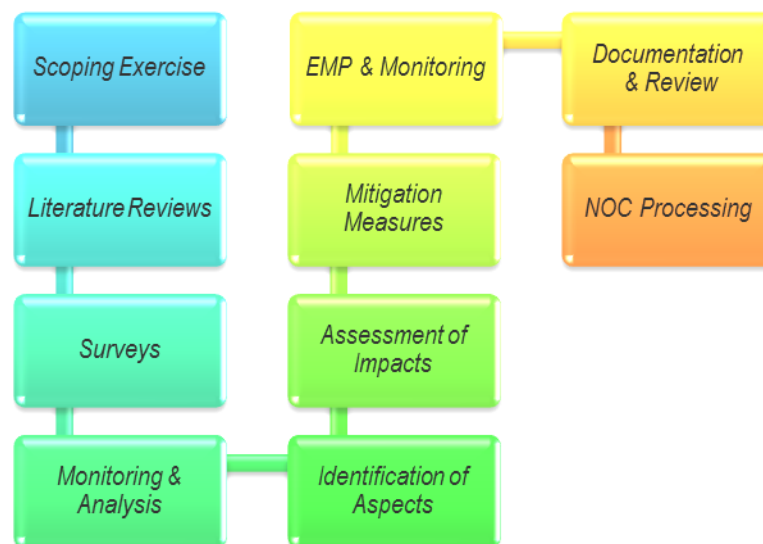


Fig. 1.2: EIA Methodology

1.7 Structure of the Report

This document is structured as follows:

- **Chapter 1:** Presents the background, objectives, scope and methodology adopted for the study;
- **Chapter 2:** Provides an overall description of project;
- **Chapter 3:** Describes the legislative and policy framework governing the project;
- **Chapter 4:** Provides environmental (Physical & Biological) and Social baseline conditions of the macro and microenvironment of the project area;
- **Chapter 5:** Summarizes the main concerns raised by stakeholders during consultations;
- **Chapter 6:** Provides analysis of different alternatives;
- **Chapter 7:** Screening of environmental impacts of the project and appropriate mitigation measures;
- **Chapter 8:** Provides an environmental management and monitoring plan (EMMP); and

- **Chapter 9:** Provides conclusions and recommendations.

The main text of the report is supported by a series of Annexure which provide supplementary information including respective sections of prominent provincial and national laws and guidelines.

1.8 EIA Study Team

EMC Pakistan Pvt. Limited has coordinated the following team for conducting the Environmental Impact Assessment (EIA) of the proposed 132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station.

Table 1.1: List of EIA Study Team		
S. No.	Name of Experts	Position in EIA Team
1.	Mr. Syed Nadeem Arif	Project Manager
2.	Dr. Ali Ghalib	Flora and Fauna Expert
3.	Mr. Saquib Ejaz Hussain	Environmental Specialist
4.	Mr. Muhammad Haseeb	Environmental Specialist
5.	Ms. Zulekha Soorma	HSE Expert
6.	Mr. Khurram Shams	Sociologist
7.	Mr. M. Jalal Abbas	Environmentalist
8.	Mr. Irfan Ali	Environmentalist
9.	Mr. Rameez ul Islam	AutoCAD Specialist

Chapter 2 Project description

2.1 Introduction

This chapter of EIA presents a brief overview of the project including objectives, location, scope, need, schedule and cost of the project. This chapter gives a clear picture of the project, its context and operations.

2.2 Overview of the project

Existing 132 kV Gizri-Jacob current circuit is oil-filled and almost completed its life span. To satisfy the load requirement of power system and reduce the transmission losses, the proposed 132 KV Transmission Line is planned to be laid. The Transmission Line is Cross-linked Polyethylene (XLPE) underground transmission line with route length of around 7 kilometers.

Moreover, the addition of this circuit in Extra High Tension network will ensure the required degree of reliability for power system and enables the shift engineers and grid operators in easy and efficient management of load. The K-Electric consumers will benefit after the energization of this circuit.

2.3 Objectives of the project

Main objectives of the project are as follows:

- To improve the existing transmission network; and
- To replace the old and redundant oil filled transmission line.

2.4 Scope and need of the project

The scope of the project is to supply, laying, testing and commissioning of 132 kV, 800mm² XLPE, Single circuit underground transmission line 7.0 km (approx.) from Jacob Lines Grid Station to Gizri Grid Station.

Karachi has a wide network of power transmission but the standards and conditions of the power transmission system are inadequate to meet rapidly growing demand of electrical power. This situation limits the national development and economic growth. To cope with the constraints, the existing power transmission infrastructure has been proposed to be improved and upgraded in proposed System Stabilization, Rehabilitation and Loss Reduction Programme. This program will enhance the customer service, improve power supply reliability, and strengthen health, safety and environmental management system. Nowadays power systems are complicated networks. They have several generating stations and load centers that are interconnected through power transmission lines. Generation facilities should have the capacity to produce required power to meet the customer demand. Bulk power generated must be transported through best transmission systems over a long distance without overheating or jeopardizing system stability.

2.5 Project Location

Underground transmission line will initiate from Gizri Grid Station, initially run in DHA phase-II extension internal streets, intersect Sunset Boulevard and enters via internal streets in DHA Phase II and further connects to Korangi Road and runs parallel to the Korangi road while intersecting the Main Railway Line under Kala Pul and Shahrah-e-Faisal near FTC. After running along Korangi Road further, the route follows Mubarak Shaheed road and turns right from St. Patrick's High School and ends its terminus point at Jacob Lines Grid Station. The proposed layout plan of the 132kV UG Supply line is as shown in **Fig. 2.1**.

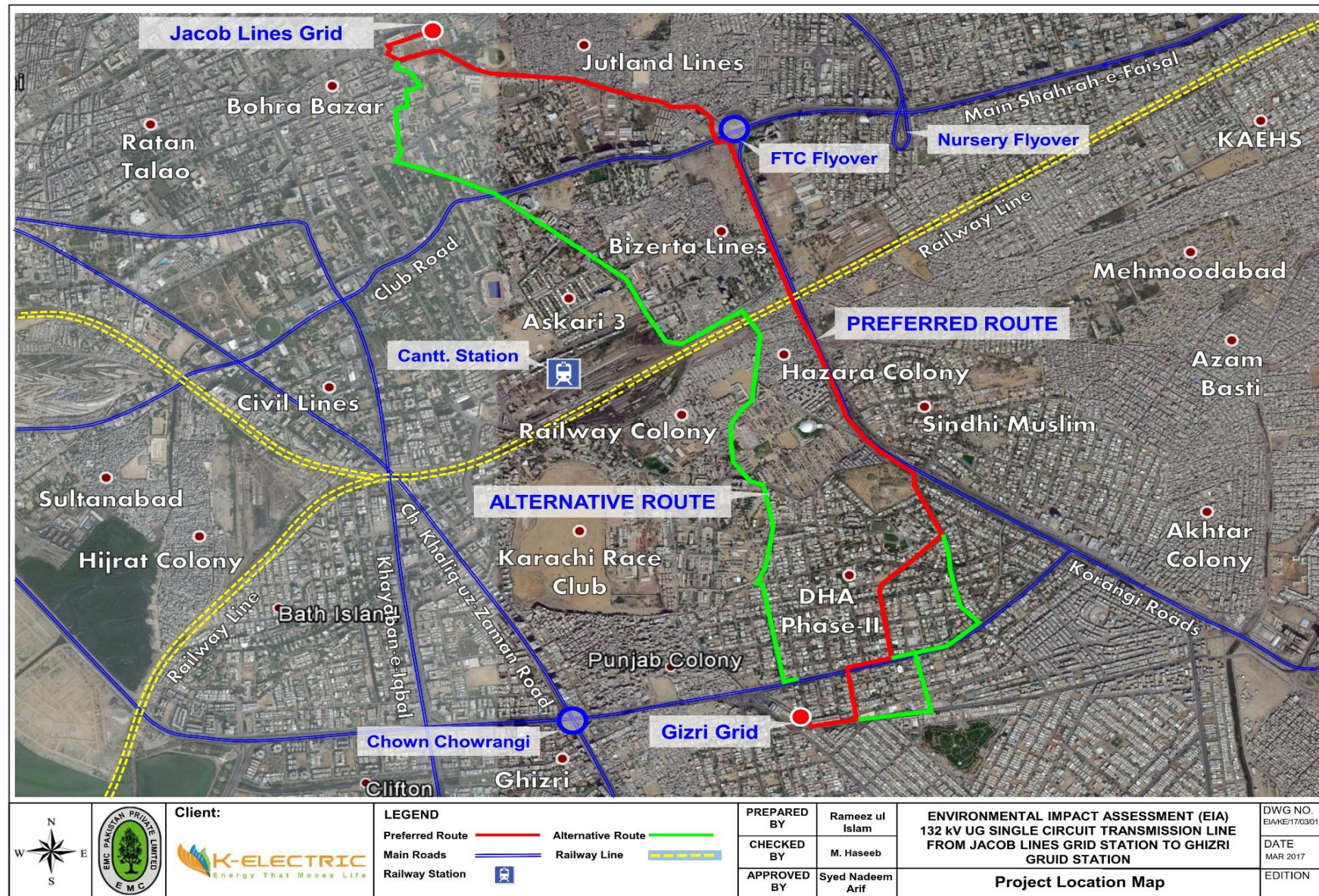


Fig. 2.1: Location map of the 132kV UG TL from Jacob GS to Gizri GS

2.6 Underground Transmission Lines

There are two main types of underground transmission lines currently in use. One type is constructed in a pipe with fluid or gas pumped or circulated through and around the cable in order to manage heat and insulate the cables. The other type is a solid dielectric cable which requires no fluids or gas and is a more recent technological advancement. Underground transmission lines are classified by type of pipes required and their insulation. At present, following types of transmission lines are in practice:

- High-pressure, fluid-filled pipe (HPFF)
- High-pressure, gas-filled pipe (HPGF)
- Self-contained fluid-filled (SCFF)
- Solid cable, cross-linked polyethylene (XLPE)

In the proposed 132 kV underground transmission lines, solid cable; cross-linked polyethylene (XLPE) transmission lines will be used. The cross-linked polyethylene (XLPE) underground transmission line is often called solid dielectric cable. The solid dielectric material replaces the pressurized liquid or gas of the pipe-type cables. This type of line relies on high quality manufacturing controls to eliminate any contaminants or voids in the insulation that could lead to electrical discharges and breakdown of the line from electrical stress. There is less maintenance with the solid cable, but impending insulation failures are much more difficult to monitor and detect. The diameter of the XLPE cables increase with voltage (Fig. 2.3).



Fig. 2.3: Underground XLPE cables

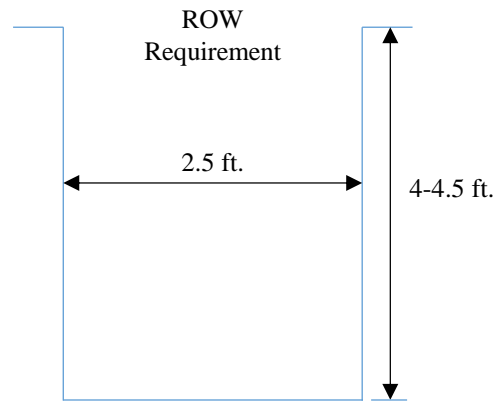
Each transmission line requires three separate cables, similar to the three conductors required for overhead transmission lines. They are not housed together in a pipe, but are set in concrete ducts or buried side-by-side. Each cable consists of a copper or aluminum conductor and a semi-conducting shield at its core. Cross-linked polyethylene insulation surrounds the core. The outer covering of the cable consists of a metallic sheath and a plastic jacket.

2.7 Activities involved in installation of Underground Transmission Lines

Many of the activities involved in installation of underground transmission lines may be conducted simultaneously so as to minimize the interference due to traffic and time. A fair estimated time of eight (8) weeks is foreseen for these activities.

ROW Requirement

4-4.5 ft. deep and 2.5 ft. wide ROW will be required for approx. length of 7.0 km.



Clearing Right of Way (ROW)

Similar to overhead transmission line construction, underground construction begins by staking the ROW boundaries and marking sensitive resources. Existing underground utilities are identified and marked prior to the start of construction. If the transmission line is constructed within roadways, lane closures will be required and traffic control signage installed. Construction activities including transport of material and equipment will disrupt traffic flow. Buildings are also prohibited in the ROW, since they would interfere with maintenance and repair work. At places the transmission line passes through unpaved areas, all shrubs and trees are cleared.

Trenching

Most commonly, a backhoe is used to dig the trench as shown in Fig. 2.5. The excavation starts with the removal of the top soil in unpaved areas or the concrete/asphalt in paved areas. Large trucks haul away excavated subsoil materials to approved off-site location for disposal, or if appropriate, re-use. In accordance with OSHA requirements, trenches of a certain depth may require additional shoring. Trench size will vary depending on the cable type and the line's voltage. The Underground transmission line would normally be buried 1.42 m beneath the surface. In many instances, groundwater will be encountered during the trenching; groundwater may be pumped from the excavation to a suitable upland area or pumped directly into a tanker truck for transport to a suitable location for release.

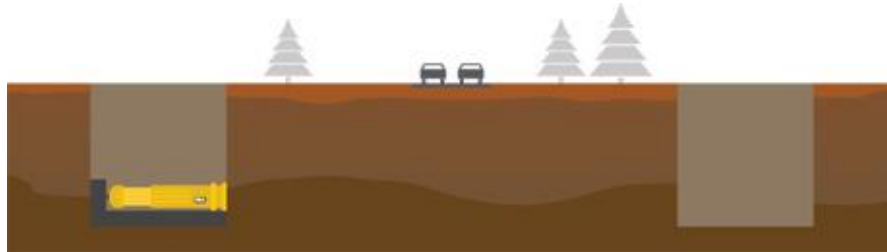


Fig. 2.5: Excavation Using Backhoe

Thrust Boring

Thrust boring is required while intersecting PR mainline and Shahrah-e-Faisal.

Thrust boring, is a jack and bore drilling method typically used for installing steel pipe casing beneath an existing surface where the risk of hole collapse whilst installing larger diameters has been identified or where the grade is critical. Thrust boring, is typically performed by placing an auger equipped with a cutting head inside a 200mm to 1500mm diameter steel pipe. The auger is then attached to the rotation shaft of a thrust boring machine.



A large rectangular pit is usually dug on each side of the work area to accommodate the steel pipe and machinery used in this procedure. The pipe casing is jacked into place as the drilling is performed with any excess soil transferred out of the pipe by the auger's blades.

Thrust boring generally works best in soils that are located above the groundwater table. When groundwater is present during a boring operation, special dewatering measures must be taken to prevent the steel pipe casing from being flooded with water. However, at 4-4.5 ft. deep trench, groundwater is not envisaged along the proposed route alignment.

Laying of XLPE cable system

The proposed Underground XLPE cable systems will be buried directly into the trench. The depth and width of trench will be nearly 1.4 m and 1.5 m respectively throughout the route of the cable. The trench is covered/ backfilled with a layer of fine sand 15 cm thick and the cable is laid over this sand bed. The purpose of sand is to prevent the entry of moisture from the ground and thus protects the cable from decay. After the laying of the cable in the trench, it is covered/ backfilled with another layer of sand of about 10 cm thickness, care being taken so that no sharp stone should come in direct contact with the cable. When more than one cable is to be laid in the same trench, horizontal or vertical interaxial spacing at least 30cm is provided in order to reduce the effect of mutual heating and also to ensure that fault occurring in any one cable does not damage the adjacent cable. Transmission line underground area must be safe from accidental contact with construction equipment; and vegetation must be managed to avoid roots from interfering with the system. Use of light mortar or thermal filler instead of fine sand considerably improves the transmission properties.¹

Advantages of laying cables by the above mentioned method are:

- Simple and less costly;
- Gives best conditions for dissipating the heat generated in the cables; and
- Clean and safe method as the cable is invisible and free from external disturbances.

Disadvantages of laying cables by the above mentioned method are:

- The extension of load is possible only by a completely new excavation which may cost as much as the original work;
- The alterations in the cable network cannot be made easily;
- The maintenance cost is very high;

¹ Underground Power cables, Nexons

- Locating a fault is difficult; and
- Cannot be used in congested areas where excavation is expensive and inconvenient.

Urban road ROWs often contain a wide variety of underground obstacles, such as existing utilities, natural features, topography, major roadways, or underpasses. The dimensions of the trench might need to be deeper and wider to avoid underground obstacles. Every effort is made to prevent impacts to existing utilities such as making minor adjustment to the alignment, relocating the existing utility, or putting the cables below the existing infrastructure.

Cable Installation obstacles

The cost of project increases with the number of obstacles that need to be crossed by excavating underneath or be avoided by routing around the obstacle. Common obstacles are streams, railroads, other utilities, sanitary and storm sewers, streets and highways in the right of way of proposed project. In proposed transmission lines, a storm water drain and main Korangi road would be the installation obstacles.

Horizontal Boring/ Jack and Bore

Jack and bore construction is carried out in areas where open trench construction is obstructed by existing features such as main road, railroads, waterways, or other large facilities or utilities. Horizontal boring requires an extensive construction area on each side of the bore. Entrance and exit pits are excavated to accommodate the boring equipment and materials. An auger is used in the entrance pit to excavate a hole and remove spoils. A jack pushes a reinforced pipe in sections behind the auger head. When the pipe is installed, the entrance and exit pits are restored to their original condition.

The amount of disturbed construction area required for a jack and bore is usually proportional to the diameter of the bore, its maximum depth, and the length of the bore.

Cooling

XLPE conductors operate at about 176°F to 194°F. In order to conductors operate efficiently; heat must be carried away from the conductor and is achieved by selecting a suitable backfill material/soil in and around the trench and by adopting appropriate cable installation method i.e., cable will be well-spaced from others for good heat dissipation. However; in overhead transmission line air performs this function.

Backfilling

All of the heat generated from direct buried cables will be dissipated through the soil. The selection of backfill type can make a strong difference on the capacity rating. Different soils have different abilities to transfer heat. Saturated soils conduct heat more easily than for instance, sandy soils. For this reason, the design needs to determine the type of soil nearest the line. A soil thermal survey will be necessary before construction to help determine the soil's ability to move heat away from the line. Due to transmission at 132 kV, the current flowing in cable shall be low; hence heat dissipation is not of major concern.

Site Restoration

Site restoration for underground construction is similar to overhead transmission line construction restoration. When construction is completed, roadways, landscaped areas, and undeveloped areas are restored to their original condition and topography. Highway lands and shoulders are re-constructed so as to support road traffic. Roadside areas and landscaped private properties are restored with top soils that was previously stripped and stockpiled during

construction or with new topsoil. Any infrastructure impacted by the construction projects such as driveways, curbs, and private utilities are restored to their previous function.

2.8 Utilities required during Construction

Water

Water needs for drinking purpose shall be the responsibility of the Turnkey Electrical Contractor. In all probability drinking water shall be obtained from reputable companies producing such water.

Solid Waste Management

Contractor will be responsible to collect Solid waste from different parts of construction sites and dispose of permanently in a KMC designated landfill site.

Work Force

Work shall be undertaken by Contractor(s) who have requisite local experience in successfully implementing such projects.

Chapter 3 Legislation & Administrative Framework

3.1 Introduction

Before initiation of any project, the mandatory legislations enacted by government and other regulatory agencies need to be studied. Governments from time to time have enacted many environmental rules, regulations, laws and guidelines specifying different requirements for diverse kind of projects. Therefore, it would be necessary to study those environmental laws pertaining to the project before its execution so that protection of environment can be ensured.

In this section, same methodology would be followed by studying those rules, regulations and laws that are relevant to the environmental and social aspects of the project “132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station”. The assessment has been carried out to comply with both local and international laws and guidelines. The main among these are:

- National Environmental Laws & Legislations;
- Provincial Environmental Laws & Legislations;
- National & International Environmental and Social Guidelines; and
- Institutional Setup for Environmental Management.

This project will comprehensively practice the applicable requirements of policy documents, legislative framework and recommendations described in national and international guidelines of the project and will follow the institutions existing in the country that may influence the environmental management of the proposed project. These laws and guidelines have been incorporated in the mitigation measures and Environmental Management & Monitoring Plan (EMMP), which have been formulated for better environmental, ecological and social management.

3.2 National Environmental Laws & Legislations

In Pakistan, the awareness about necessity of having environmental protection laws and regulations developed since late 1970s. First step in this direction was the promulgation of the Pakistan Environmental Protection Ordinance, 1983. The organization entrusted with enforcement of environmental laws was then established viz. Pakistan Environmental Protection Agency in 1984. These efforts were continued and plan for protection of environment was developed called the Pakistan National Conservation Strategy.

Similarly, provincial governments also created Provincial Environmental Protection Agencies to look after the environmental issues in their regions. Then, in 1993, the National Environmental Quality Standards (NEQS) were made.

The powers of Environmental Protection Agencies were considerably enhanced by enacting the Pakistan Environmental Protection Act, 1997. And, the Pakistan Environmental Protection Agency Review of IEE and EIA Regulations (IEE-EIA Regulations), 2000 explained the details about the preparation, submission, and review of Initial Environmental Examinations (IEEs) and Environmental Impact Assessments (EIAs). Moreover, there are numerous other national laws that contain the provisions for protection of environment.

Previously, the issue of ‘environmental pollution and ecology’ was placed in Concurrent list in the Constitution which allowed both Federal and Provincial Governments to enact laws on it. But, Eighteenth Amendment to the Constitution of Pakistan, 2010, transferred this issue to the Provincial governments. Due to this, the functions related to the national environmental management were transferred to the provinces. The Federal Government has established two Environmental Tribunals one each in Karachi and Lahore. The Karachi Tribunal has control over the provinces of Sindh and Baluchistan while the Lahore Tribunal covers the provinces of the Punjab and the Khyber Pukhtunkhwa. The High Courts have designated senior civil judges as Environmental Magistrates to take all contraventions punishable in respect of handling of hazardous substances and pollution caused by motor vehicles etc. The international obligations in the context of environment will be management by the Ministry of Climate Change, Government of Pakistan.

Significant national environmental laws and legislations that have relevance to the project are as discussed under:

3.2.1 The Pakistan Environmental Policy, 2005¹

The Pakistan Environmental Policy provides an overarching framework for addressing the environmental issues facing Pakistan, particularly pollution of fresh water bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters and climate change. It also gives direction for addressing the cross sectoral issues as well as the underlying causes of environmental degradation and meeting international obligations.

The National Environmental Policy, while recognizing the goals and objectives of the National Conservation Strategy, National Environmental Action Plan and other existing environment related national policies, strategies and action plans, provide broad guidelines to the Federal Government, Provincial Governments, Federally Administrated, Territories and Local Governments for addressing environmental concerns and ensuring effective management for their environmental resources.

The National Environmental Policy aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life for the citizens through sustainable development and the same is agreed by the proposed project “132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station”.

3.2.2 Pakistan Penal Code, 1860²

Section XIV of PPC deals with the offences affecting the public health, safety, convenience, decency and morals. Person may be guilty of public nuisance if his act or omission causes common injury, danger or annoyance to the public or results in spread of infection of diseases dangerous to life. The section also deals with environmental pollution.

Provisions under this Act relating to environment are no longer being enforced after promulgation of the Pakistan Environmental Protection Act, 1997 and then by Sindh Environmental Protection Act, 2014. However, pollution offences can still be tried under the Pakistan Penal Code, 1860.

3.2.3 Land Acquisition Act, 1894³

This Act provides law for the acquisition of land needed for public purposes and for companies; and for determining the amount of compensation to be made on account of such acquisitions. The law provides details of various peculiarities involved in acquisition of land such as preliminary investigation, objection to acquisition, declaration of intended acquisition, enquiry into measurements, value & claims, taking possession, reference to court and procedure thereon, apportionment of compensation, payment, temporary occupation of land, acquisition of land for companies, disputes resolutions, penalties and exemptions etc. This Act has 55 sections addressing different areas. Such as section 4(2) mentions that it shall be lawful for any official authorized by the Collector to enter upon and survey, to dig or to do all other Acts necessary to ascertain that whether the land is adapted for such purpose.

The 2.5 ft. wide ROW will be obtained from DHA / KMC / CBC for the underground Transmission line in the very beginning. NOCs from relevant institutions will be taken before the laying of TL.

3.2.4 Antiquities Act, 1975⁴

The Antiquities Act of 1975 ensures the protection of cultural resources in Pakistan. The Act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade, and export. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments; etc. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area that may contain such articles of archaeological significance.

No archeological and cultural site as protected under Antiquities Act 1975 is present near the proposed route alignment.

3.2.5 The Forest Act, 1927⁵

The Forest Act deals with the matters related with protection and conservation of natural vegetation/habitats. The Act contains procedures for constituting and managing various types of forests, such as reserved forests, village forests and

¹ The Pakistan Environmental Policy, 2005, Govt. of Pakistan, Ministry of Environment

² Pakistan Penal Code(XLV of 1860)6th October 1860

³ The Land Acquisition Act 1894 (Act of 1894) <http://punjabelaws.gov.pk/laws/12.html>

⁴ Act VII of 1976(Gazette of Pakistan, Extraordinary, Part 1, 14th January, 1976

⁵ The Forest Act, 1927(XVI of 1927) <http://punjab.laws.gov.com/laws/40.html>

protected forests. The Act empowers the provincial forest departments to declare any forest area as reserved or protected. It also defines the duties of forest related public servants, prohibits cutting of trees and prescribes penalties for violation of any provision of the Act.

The Project site does not encompass any reserve/protected forest area.

3.2.6 Cutting of Trees (Prohibition) Act, 1975

The Cutting of Trees Act prohibits cutting or chopping of trees without prior permission of the Forest Department. Section 3 of this Act states that “No person shall, without prior written approval of the local formation commander or an officer authorized by him in this behalf, cut fell or damage or cause to cut, fell or damage any tree growing within the five miles belt along the external frontiers of Pakistan.”

There are number of trees the preferred route and alternate routes. Few species are very old and located in old Jacob Lines area. These trees mainly planted on the islands and footpaths of the roads and are not natural and human planted and owned by the road authorities. These trees can be avoided by avoiding them or if it is not possible, compensatory plantation will be provided at a ratio of 1:3.

3.2.7 The Electricity Act, 1910⁶ & the Electricity (Amendment) Ordinance, 1979⁷

The electricity Act, 1910 relates to the supply and use of electrical energy. Supply of energy licenses and its revocation under various conditions is given in part II of the Act. This Act obligates licensee to pay compensation for any damages caused during the constructions and maintenance of any power distribution facilities. Part III of the Act discusses the supply, transmission and use of energy by non licensees. This law prohibits the generation, transmission, supply or use of energy, in any way that may injure any railway, tramway, canal or waterway or any dock, wharf or pier vested in or controlled by a local authority.

The electricity Act, 1910 is amended through the electricity (Amendment) Ordinance, 1979. Penalty of three years imprisonment or five thousand fines or with both is prescribed for dishonest abstraction or consumption of energy.

3.2.8 Electricity Rules, 1937⁸

These rules regulate the generation, transmission, supply and use of energy in Pakistan. The Act prescribes the conditions and procedures of issuance of licenses. General precautions for the safety of the public are mentioned. Construction, insulation and earthing of apparatus are prescribed to be done to prevent danger. Additional rules for electric tractions are also given.

3.2.9 The Electricity Control Ordinance, 1965⁹

This ordinance provides powers to control the production, distribution, use and consumption of electrical energy during an emergency throughout Pakistan. When the National Assembly is not in session and the President is satisfied that circumstances exist which render immediate legislation necessary, the president can promulgate the ordinance. The ordinance prescribes a penalty of six month or with fine, or with both, in case of non-compliance of the ordinance.

3.3 Provincial and Local Environmental Laws and Legislations

3.3.1 Sindh Environmental Protection Act (SEPA), 2014¹⁰

This Act has been enacted to provide for the protection, conservation, rehabilitation and improvement of the environment, for the prevention and control of pollution, and promotion of sustainable development. It equally lays emphasis for the preservation of the natural resources of Sindh and to adopt ways and means for restoring the balance in its eco-system by avoiding all types of environmental hazards.

⁶ The Electricity Act, 1910, (IX of 1910)

⁷ The Electricity (Amendment) Ordinance, 1979, (LXII OF 1979)

⁸ Electricity Rules, 1937

⁹ The Electricity Control Ordinance, 1965, Ordinance No. XXVIII of 1965

¹⁰ Sindh Environmental Protection Act, 2014, Sindh Act No. VIII of 2014 dated 20th March, 2014

Environmental Protection Council (EPC)

It has been formed consisting of Chief Minister as Chairman with Minister in charge of Environment Protection Department, Addl. Chief Secretary, Planning & Development Department, Government of Sindh and Secretaries of Environment, Finance, Public Health Engineering, Irrigation, Health, Agriculture, Local Government, Industries, Livestock & Fisheries Forest & Wildlife, Energy, Education Departments Government of Sindh and Divisional Commissioners of Sindh. Non-official members are also included (i.e. representatives of Chamber of Commerce & Industry and from medical or legal professions etc.) along with DG EPA & two Members of Provincial Assembly also form part of EPC.

The functions and powers of EPC include coordination & supervision of provisions of Act, approving provincial environmental & sustainable development policies & SEQS, provide guidance for protection & conservation, consider annual Sindh Environmental Report, deal with interprovincial and federal provincial issues, provide guidance for bio safety and assist Federal Government in implementation of various provisions of UN Convention on laws on Seas (UNCLOS).

Sindh Environmental Protection Agency (SEPA)

SEPA would be headed by Director General (DG) with the aim to exercise the powers and perform the functions assigned to it under the provisions of this Act and the rules and regulations made there under. The Agency shall have technical and legal staff and may form advisory committees.

The Agency shall administer and implement the provisions of this Act and rules and regulations. It shall also prepare environmental policies, take measures for implementation of environmental policies, prepare Sindh Environment Report and prepare or revise Sindh Environmental Quality Standards. SEPA shall also establish systems and procedures for surveys, surveillance, monitoring, measurement, examination, investigation, research, inspection and audit to prevent and control pollution and to estimate the costs of cleaning up pollution and rehabilitating the environment and sustainable development. SEPA would also take measures for protection of environment such as to promote research; issues licenses for dealing with hazardous substances, certify laboratories, identify need for or initiate legislation, specify safeguards etc. SEPA would also encourage public awareness and education regarding environmental issues.

SEPA would have powers to enter or inspect under a search warrant issued by Environmental Protection Tribunal or a Court search at any time, any land or building etc. where there are reasonable grounds to believe that an offence under this Act has been or is being or likely to be committed. SEPA may also take samples, arrange for testing or confiscate any article in discharge of their duties.

This act has also provided for Sindh Sustainable Fund derived from various sources such as voluntary contributions or fees generated etc. This fund is utilized for protection, conservation or improvement of environment.

Salient Features

Section-11: No person shall discharge or emit or allow the discharge or emission of any effluent waste, pollutant, noise or adverse environmental effects in an amount, concentration or level which is in excess to that specified in Sindh Environmental Quality Standards.

Section-12 & 13: No person shall import hazardous waste into Sindh province and handle hazardous substances except under licenses etc.

Section 14: No person shall undertake any action which adversely affects environment or which lead to pollute or impairment of or damage to biodiversity, ecosystem, aesthetics or any damage to environment etc.

Section 15: This section deals with regulation of motor vehicles banning emission of air or noise pollutants being emitted from them in excess of allowable standards.

Section 17: This section states that no proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment and has obtained from Agency approval in respect thereof. SEPA shall review the IEE & EIA and accord approval subject to such terms and conditions as it may prescribe or require. The agency shall communicate within four (04) months its approval or otherwise from the date EIA is filed failing which the EIA shall deemed to have been approved.

Section 21: Where agency is satisfied that the discharge or emission has occurred in violation of any provision of this act or rules etc. then it may, after giving an opportunity to person responsible, by order direct such person to take such measures within specified period. The agency under this section has been empowered to immediately stop, prevent or minimize emission, disposal etc. for remedying adverse environmental effects.

Section 22: The person who fails to comply with section 11, 17, 18 and 21 shall be punishable with a fine which may extend to five million rupees, to the damage caused to environment and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues. And, where a person convicted under sub-sections 1 & 2 had been previously convicted for any contravention of this Act, the Environmental Protection Tribunal (EPT) may, in addition to punishment, award imprisonment for a term that may extend up to three years, or order confiscation or closure of facility etc.

Section 23: Where any violation of this Act has been committed by any of employee of any corporate body, then, that employee shall be considered to be guilty of environmental pollution.

Section 25: This section allows for establishment of Environmental Protection Tribunals.

The Act is attached as **Annexure –I**.

3.3.2 Sindh EPA Review of IEE and EIA Regulations, 2014

The Sindh Environmental Protection Agency (Review of IEE/EIA) Regulations 2014 divides projects in Schedules I & II depending upon the severity of environmental impact of the project as follows:

Schedule I: A project falls in Schedule I if it is likely to have adverse environmental impacts, but of lesser degree or significance and all the mitigation measures to handle the impact is manageable. Such types of projects need IEE report including EMP.

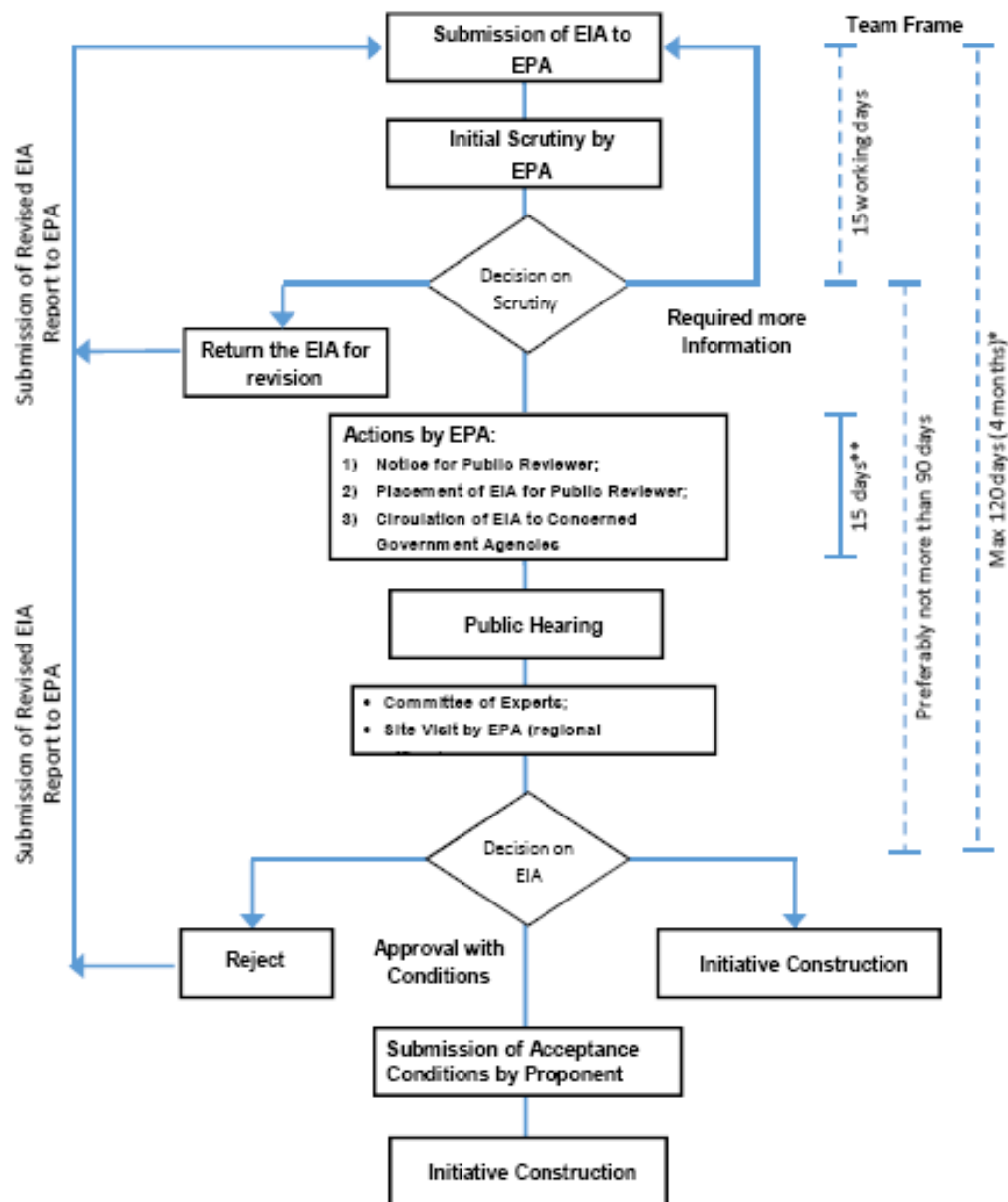
Schedule II: Projects are categorized in Schedule II if they generate significant adverse environmental impacts that require a comprehensive management plan, or if the project is located within or passes through: a) Areas declared by the Government of Pakistan as environmentally sensitive (National Parks/Sanctuaries/Game Reserve), b) Areas of international significance (e.g. protected wetland as designated by the RAMSAR Convention), or c) Areas designated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) as cultural heritage sites.

According to Sindh Environmental Protection Agency Regulation 2014, a proponent of a project shall file an EIA with the Sindh Environmental Protection Agency, if the project falls in any category listed in Schedule II; since the projects listed in Schedule II are generally major projects and have the potential to affect a large number of people.

The project “132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station” falls in Schedule II requiring an EIA as the project is categorized as:

- ✓ A. Energy
- ✓ Transmission Lines(11 kV and above) and Distribution projects

These regulations are attached as **Annexure –II**.



Procedure for EIA Review and Approval process

3.3.3 Sindh Environmental Quality Standards

On June 28, 2016, the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Air, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015 have been notified by Sindh EPA. The KE shall follow the SEQs in letter and spirit during project execution. The SEQs are attached as **Annexure –III**.

3.3.4 Hazardous Substances Rules, 2014¹¹

These Rules were notified to stream line procedures for issuance of licenses to industries/ businesses that generate hazardous waste, safety precautions for workers; and devices them methods for the removal of hazardous wastes in an environmental friendly manner. The rules also specify procedures to be adopted for import, transport and disposal of hazardous waste; and identify two hundred and forty-three hazardous substances and synthetic chemicals.

¹¹ Hazardous Substances Rules, 2014

3.3.5 Sindh Wildlife Protection Ordinance, 1972 (SWPO)¹²

This ordinance provides for the preservation, conservation and management of wildlife in Sindh. This Ordinance lays down rules for formation and management of protected areas and prohibition of hunting of wildlife species declared protected under the ordinance. The ordinance also specifies three broad classifications of the protected areas: national parks, wildlife sanctuaries and game reserves. Wildlife sanctuaries are areas that have been set aside as undisturbed breeding grounds and cultivation and grazing is prohibited in the demarcated areas. Nobody is allowed to reside in a wildlife sanctuary and entrance for the general public is by special dispensation. However, these restrictions may be relaxed for scientific purpose or betterment of the respective area on the discretion of the governing authority in exceptional circumstances. Game reserves are designated as areas where hunting or shooting is not allowed except under special permits.

The project is located in urban area and is not neighboring any Wildlife Sanctuary or Game Reserve.

3.3.6 The Sindh Cultural Heritage (Preservation) Act, 1994

The Sindh Cultural Heritage (Preservation) Act, 1994 is the provincial law for the protection of cultural heritage. Its objectives are similar to those of the Antiquity Act, 1975. No antiquity protected under these two laws is identified in the vicinity of the proposed project area.

Figure 3.1 shows the Cultural Resources located along the proposed route alignment. Christian Cemetery and St. Patrick's Church (protected under this Act) will not be infringed by the route, however, the line will pass along the public roads/footpaths outside these locations. There will be no impact to these receptors because the trench placed near them will be only 4 feet deep, however, there will be a short term impact to the visitors visiting these sites during construction phase. But the impact will be minimal and of short term.

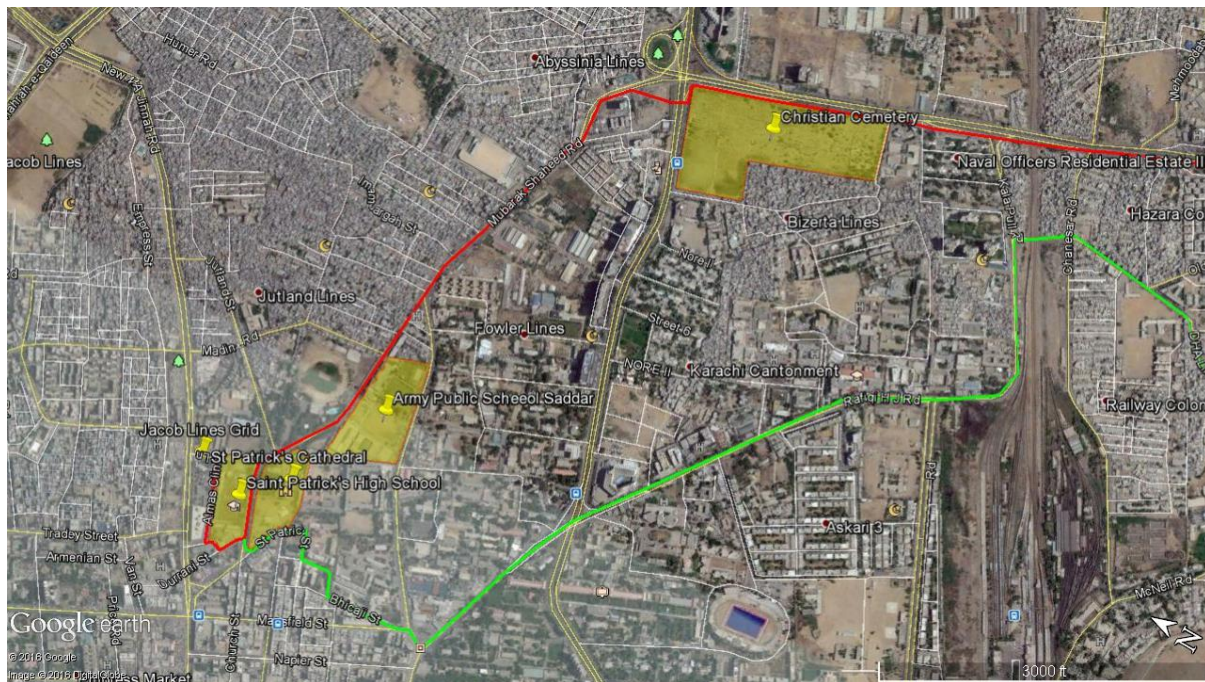


Figure 3.1: Sensitive locations located along the preferred route alignment

3.4 Environmental and Social Guidelines

The environmental as well as social guidelines related to the proposed project are as discussed under:

3.4.1 Environmental Protection Agency's (EPA's) Guidelines on Environmental & Social Aspects

The Federal EPA has prepared a set of guidelines for conducting environmental and social assessments as discussed under:

¹² The Sindh Wildlife Protection Ordinance, 1972. 1 Sindh Ordinance No. V of 1972. AN 13th April, 1972

- **Policy & Procedures for the Filing, Review and Approval of Environmental Assessments, 2014¹³**

The Policy & Procedures for the Filing, Review and Approval of Environmental Assessments 2014, prepared by the SEPA under the powers conferred upon it by the Sindh Environmental Protection Act 2014, provide the necessary details on the preparation, submission, and review of the Initial Environmental Examination (IEE) and the Environmental Impact Assessment (EIA).

This EIA Study has followed the procedures defined in the Sindh Environmental Protection Act 2014 and Review guidelines 2014, and the EIA will be submitted to the SEPA in whose jurisdiction the project will be implemented. The PEPA has, however, been given the right to review any environmental report at any time and the power to revoke the decision of the provincial EPA, if it deems this to be necessary.

- **Guidelines for the Preparation and Review of Environmental Reports, 1997**

The guidelines on the preparation and review of environmental reports target project proponents and specify:

- The nature of the information to be included in environmental reports;
- The minimum qualifications of the EIA conductors appointed;
- The need to incorporate suitable mitigation measures at every stage of project implementation; and
- The need to specify monitoring procedures.

The terms of reference for the reports are to be prepared by the project proponents themselves. The report must contain baseline data on the study area, detailed assessment thereof, and mitigation measures.

- **Guidelines for Public Consultation**

These guidelines provide assistance throughout the environmental assessment of the project by involving the public which can lead to better and more acceptable decision-making. Timely, well planned and appropriately implemented public involvement, undertaken in a positive manner and supported by a real desire to use the information gained to improve the proposal, will lead to better outcomes, and lay the basis for ongoing positive relationships between the stakeholders. Specifically public involvement is a valuable source of information on key impacts, potential mitigation measures and the identification and selection of alternatives.

3.4.2 World Bank Guidelines on Environmental & Social Aspects¹⁴

The principal World Bank publications that contain environmental guidelines are listed below:

- Environmental Assessment Operational Policy 4.01. Washington, DC, USA. World Bank 1999;
- Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross Sectoral Issues. World Bank Technical Paper Number 139, Environment Department, the World Bank, 1991,;
- Environmental Assessment Sourcebook, Volume III: Guidelines for Environmental Assessment of Energy and Industry Projects. World Bank Technical Paper No. 154, Environment Department, the World Bank, 1991; and
- Pollution Prevention and Abatement Handbook: Towards Cleaner Production, Environment Department, the World Bank, United Nations Industrial Development Organization and the United Nations Environment Program, 1998.

The first two publications listed here provide general guidelines for the conduct of an IEE/EIA, and address the IEE/EIA practitioners themselves as well as project designers. While the Source book in particular has been designed for the Bank projects, and is especially relevant for the impact assessment of large-scale infrastructure projects, it contains a wealth of information which is useful to environmentalists and project proponents.

The Source book identifies a number of areas of concern, which should be addressed during impact assessment. It sets out guidelines for the determination of impacts, provides a checklist of tools to identify possible biodiversity issues and suggests possible mitigation measures. Possible development project impacts on wild lands, wetlands, forests etc. are also identified and mitigation measures suggested. The Sourcebook also highlights concerns in social impact assessment, and emphasizes the need to incorporate socio-economic issues in EIA exercises.

¹³ Policy and Procedure for the Filing, Review and Approval of Environmental Assessments, Government of Pakistan, November 1997

¹⁴World Bank Guidelines On Environmental & Social Aspects

3.4.3 IFC Environmental, Health, and Safety Guidelines for Electric Power Transmission and Distribution

The Environmental, Health, and Safety (EHS) Guidelines are technical reference documents with general and industry specific examples of Good International Industry Practice (GIIP)¹⁵. These industry sector EHS guidelines are designed to be used together with the General or multiple industry-sector guidelines as may be necessary. The EHS Guidelines contain the performance levels and measures that are generally considered to be achievable in new facilities by existing technology at reasonable costs. Application of the EHS Guidelines to existing facilities may involve the establishment of site-specific targets, with an appropriate timetable for achieving them. The applicability of the EHS Guidelines should be tailored to the hazards and risks established for each project such as host country context, assimilative capacity of the environment etc. This justification should demonstrate that the choice for any alternate performance levels is protective of human health and the environment.

Industry-Specific Impacts and Management

This include construction site waste generation, soil erosion and sediment, control from materials sourcing areas and site preparation activities, fugitive dust and other emissions (e.g. from vehicle traffic, land clearing activities, and materials stockpiles), noise from heavy equipment and truck traffic, potential for hazardous materials and oil spills associated with heavy equipment operation and fueling activities.

Performance Indicators and Monitoring

Where dust or potentially contaminated water runoff exists, site operations should comply with guidelines described. Monitoring should be conducted by trained individuals and monitoring data should be analyzed and reviewed at regular intervals and compared with the operating standards so that any necessary corrective actions can be taken. Occupational health and safety performance should be evaluated against internationally published exposure guidelines. Projects should try to reduce the number of accidents among project workers.

¹⁵ www.ifc.org/ifcext/enviro.nsf/Content/EnvironmentalGuidelines

Chapter 4 ENVIRONMENTAL & SOCIAL BASELINE OF THE PROJECT AREA

4.1 General

4.1.1 The Aim of Baseline Study

The baseline study relate to the physical, biological and socio-economic environment of the project area prior to the beginning of construction and operational activities.

This categorization would aid in understanding the prevalent macro and micro environment of this project and would enable assessment of possible environmental impacts that may arise as a result of the activities associated with the project. It would also assist the design team in defining the mitigation measures that would be required to minimize if not eliminate the negative impacts which are pointed out in this study.

4.1.2 Methodology

Information for this section was collected from different sources including electronic and print media, studies previously conducted in proposed project area by EMC and archives of the experts, consultations with institutions, Non-government Organizations (NGOs) and field surveys conducted for this study by the team of EMC Pakistan (Pvt.) Ltd. etc.

4.1.3 Study Area

The macroenvironment of the project area comprises the administrative area of Karachi East District and DHA Phase II.

The Project starts from Jacob Lines Grid station at 24°51'50.72"N & 67° 2'4.21"E and ends at Gizri Grid Station at 24°49'41.31"N & 67° 3'12.85"E. Karachi Cantonment measuring 993.916 km² and Clifton Cantonment Board measuring 51.327 Sq. Km. the project runs from Jacob lines Grid station through 0.23 km Almas Clinic Lane > 0.7 km Durrani Street > 1.95 km Mubarak Shaheed Road which further links to 2.6km segment of Korangi Road which connects to 0.32 km South Circular Avenue Road at 24°50'26.96"N & 67° 3'34.92" > 0.42 km Link Ave Road > 0.42 km 7th S Street > 0.24km Sunset Boulevard Road > 0.30km Sunset Avenue Road and 0.25 km segment of Sunset Commercial Street which links to Gizri Grid Station.

The macroenvironment of the proposed project of 132Kv UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station is Karachi East District and DHA Phase II. Karachi East is being administered by Karachi Building Control Authority (KBCA) under the jurisdiction of Karachi Metropolitan Corporation (KMC) and DHA Phase II is being administered by Clifton Board Cantonment (CBC).

The macro environment and the route of the UG Transmission Line is shown in the Figure 4.1.

4.2 Physical Environment

4.2.1 Meteorology and Climate

The climate of the macroenvironment can be characterized by dry, hot and humid conditions and in general terms it is moderate, sunny and humid. Climatic conditions of the whole region are influenced in summer by the monsoon winds from the West and by winds from North (Quetta) during winter. There is a minor seasonal intervention of a mild winter from mid-December to mid-February followed by a long hot and humid summer extending from April to September, with monsoon rains from July to mid- September. The average annual rainfall is about 160 mm, of which 70% to 80% falls during the monsoon months of July, August and September. The annual maximum rainfall varies from 2.5 mm to 487 mm. The maximum rainfall recorded in one day is 205 mm in July 2009 and maximum annual rainfall is 487 mm in 1994. The summer temperatures are high, rising to over 46°C on some days. The winters are mild, although the night temperatures are quite low (up to 1.3°C) when the northern winds invade the area. The mean sea level (MSL) average atmospheric pressure during June to August is around 1000 mbar. From Nov to Feb average MSL pressure rises up to 1018 mbar. The relative humidity ranges from about 90% in the morning during May-September to 24% in the evening during December-January.

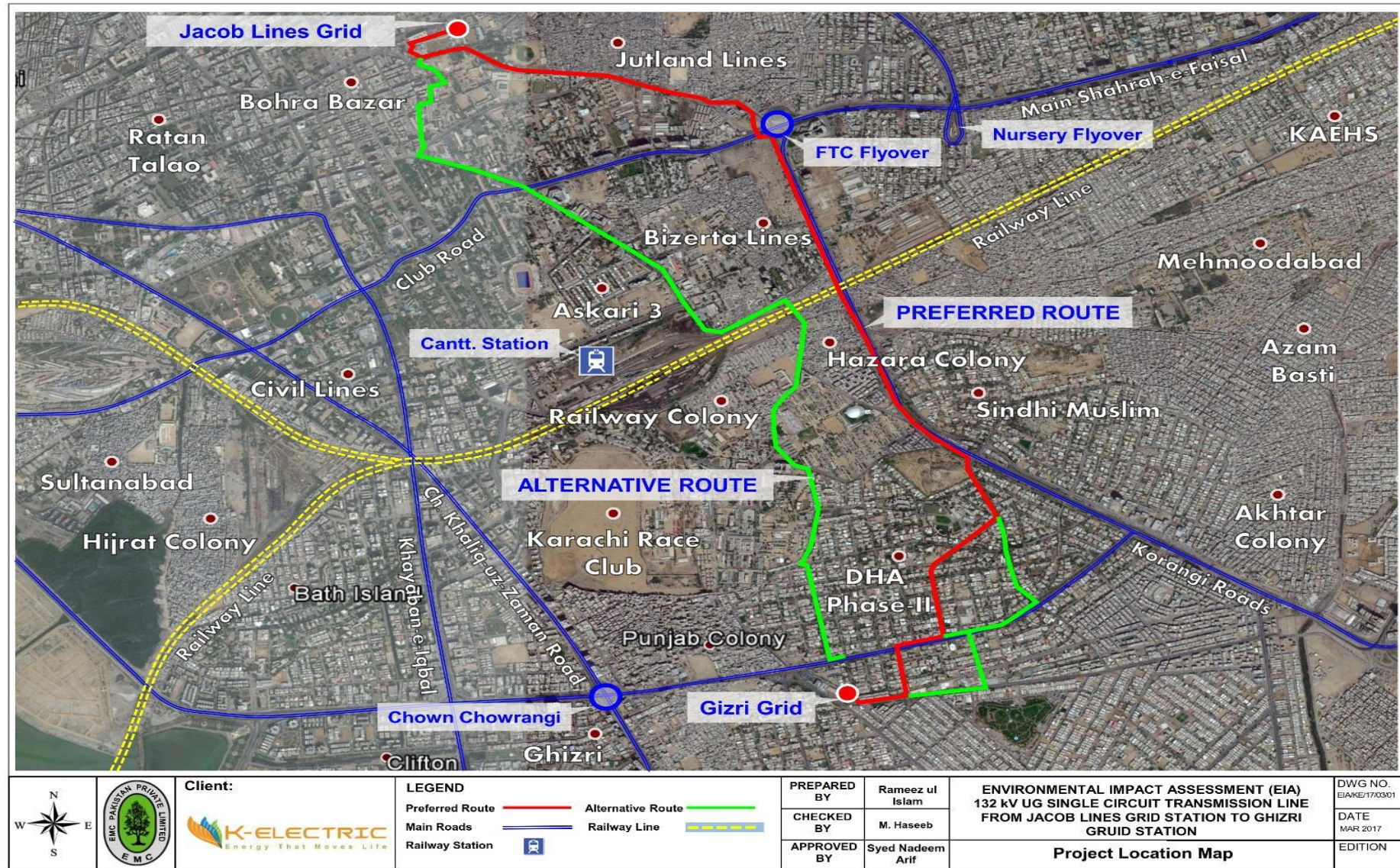


Fig.4.1: Location map of the proposed project 132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station

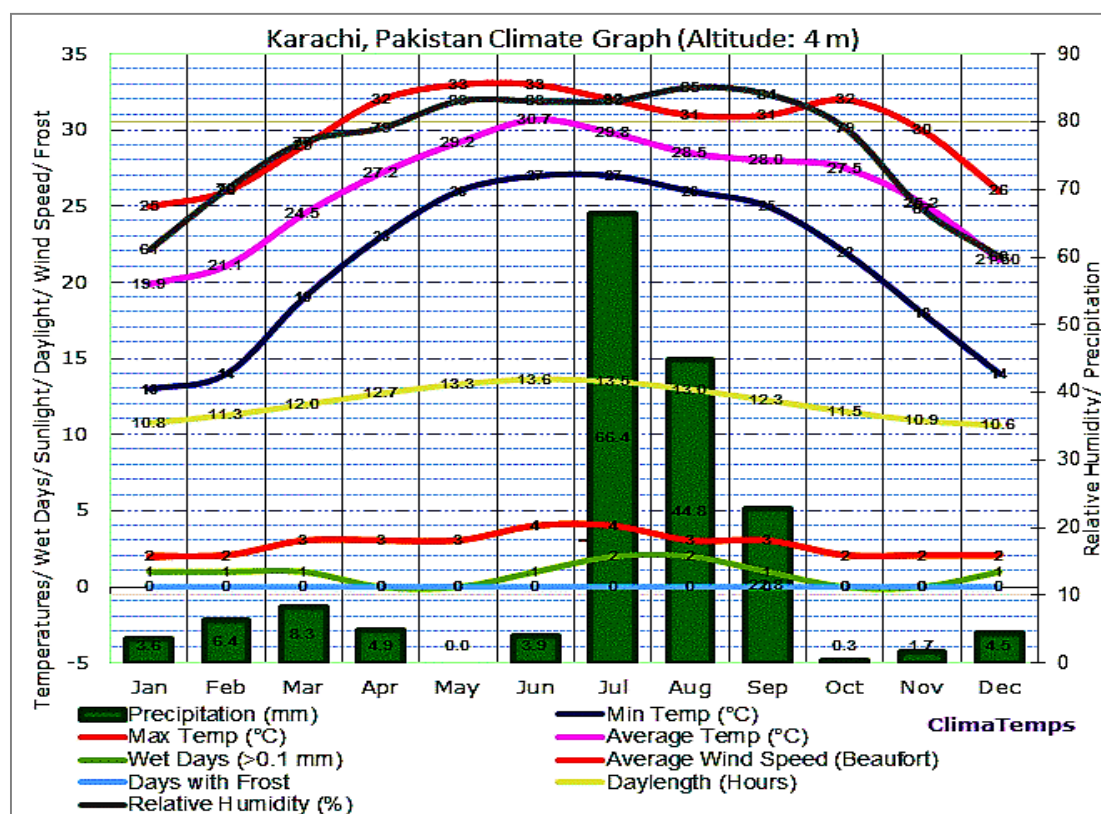


Figure 4.2: Climate of Karachi

Table 4.1: Karachi Weather Averages

Months	J	F	M	A	M	J	J	A	S	O	N	D
Average min temp (°C)	13	14	19	23	26	27	27	26	25	22	18	14
Average max temp (°C)	25	26	29	32	33	33	32	31	31	32	30	26
Average temp (°C)	19	20	24	28	30	30	30	29	28	27	24	20
Average rainfall (mm)	7	11	6	2	0	7	96	50	15	2	2	6
Wet days (>0.1mm)	1	1	1	0	0	1	2	2	1	0	0	1
Relative humidity (%)	61	70	77	79	83	83	83	85	84	79	67	60
Av. Wind speed (Beaufort)	2	2	3	3	3	4	4	3	3	2	2	2
Average no. of frosty days	0	0	0	0	0	0	0	0	0	0	0	0

Source: Pakistan Meteorological Department

During the month of June the wind speed increases and ranges from 4-9m/s with a direction of 225° - 350°. Maximum velocities are recorded during the month of July i.e. from 9-12m/s with a prevailing direction of 225° - 315°. The month of July is usually considered as being the peak of the southwest monsoon. During the month of August wind speed ranges between 2 - 9m/s with a direction of 300° to 45° whereas during the month of October and November, wind blows with varying speed, between 3 and 9m/s and direction shifts between 45° and 320°. During the month of December the prevailing wind speed is predominately 2m/s from a variety of directions varying between 225° and 135° (DHA, circa 2007).

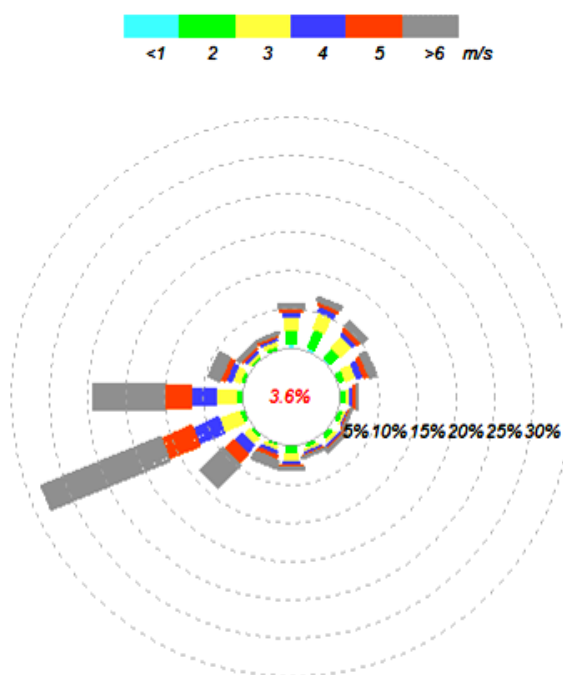


Figure 4.3: Wind rose of Karachi

4.2.2 Ambient Air Quality

The prime objective of the baseline air quality study was to establish the existing ambient air quality of the area. Ambient Air Monitoring was conducted by EMC Pakistan in the Korangi Road in the month of March, 2017. The ambient air quality was monitored for the priority pollutants such as Carbon monoxide (CO), Sulphur dioxide (SO₂), Ozone (O₃), nitrogen oxide (NO), nitrogen dioxide (NO₂), suspended particulate matter and particulate matter (PM₁₀ and PM_{2.5}). The summary of air quality data results are given in Table 4.1.

Table 4.1: Ambient Air Quality Test Results

Date	Time	SO ₂ ($\mu\text{g}/\text{m}^3$)	NO ($\mu\text{g}/\text{m}^3$)	NO ₂ ($\mu\text{g}/\text{m}^3$)	CO (mg/m^3)	O ₃ ($\mu\text{g}/\text{m}^3$)	SPM ($\mu\text{g}/\text{m}^3$)	PM ₁₀ ($\mu\text{g}/\text{m}^3$)	PM _{2.5} ($\mu\text{g}/\text{m}^3$)
		SEQS Limit (120)	SEQS Limit (40)	SEQS Limit (80)	SEQS Limit (5)	SEQS Limit (130)	SEQS Limit (500)	SEQ S Limit (150)	NEQS Limit (75)
18-03-2015	10:00	25.2	26	49	2.3	16	393	121	23
18-03-2015	11:00	26.4	25	56	2.5	15			
18-03-2015	12:00	27.3	24	34	2.3	16			
18-03-2015	13:00	26.5	25	52	2.5	14			
18-03-2015	14:00	27.9	18	56	2.4	16			
18-03-2015	15:00	28.1	28	48	2.5	16			
18-03-2015	16:00	28.4	21	42	2.4	17			
18-03-2015	17:00	25.4	31	57	2.5	18			
18-03-2015	18:00	24.3	32	55	2.4	18			
18-03-2015	19:00	26.4	30	43	2.3	18			
18-03-2015	20:00	26.7	22	39	2.3	15			
18-03-2015	21:00	28.1	20	36	2.5	16			

The results of air quality monitoring indicate that the concentration of SO₂, NO, NO₂, CO, O₃, SPM, PM₁₀ and PM_{2.5} are within the range of the SEQs but touching the limits due to the presence of heavy traffic and frequent traffic jams in peak hours.

4.2.3 Noise Levels

The noise quality survey of the proposed project area was conducted by EMC Pakistan Private Ltd. with the help of a noise measuring instrument.

Table 4.2: Ambient Noise Quality Results				
<i>S. No.</i>	<i>Timings</i>	<i>Locations of the Project Area</i>	<i>Coordinates</i>	<i>Noise Level Measurements dB(A)</i>
1	12:00-12:07	At Sunset Boulevard	24°49'50.04"N 67° 3'22.73"E	69
2	12:10-12:15	Main Korangi Road	24°50'29.62"N 67° 3'30.28"E	71
3	12:19-12:24	Near FTC	24°51'30.15"N 67° 2'59.01"E	72
4	12:28-12:35	Near St. Patrick's School	24°51'45.83"N 67° 2'7.03"E	63
5	12:40-12:45	Near Jacob GS	24°51'48.32"N 67° 2'2.44"E	56

The noise level at the proposed project alignment at different locations on the average is 66 dB (A), shows that the average noise measurements of the survey is slightly exceeding the limits of SEQS for Commercial Areas. While when we consider the individual noise measurement of the project area, at some points it is much higher than the limits of SEQS for Commercial Areas due to the traffic problems and heavy mass of traffic flow.

4.2.4 Hydrogeological features of Karachi Region

1) Hydrogeology of Karachi

Hydrogeologically, the city of Karachi lies in the Hab River Basin and the Malir River Basin. The Malir River Basin is drained by the Malir River and the Lyari River. The aquifer of Karachi is, therefore, mainly recharged by seepage from Hab River, Hab Dam as well as the Malir and the Lyari Rivers. The Hab River lies on the western frontier of Sindh and for some distance the boundary between Sindh and the Baluchistan provinces. It located about 30 km to the west of Karachi, along the Karachi- Lasbela boundary. It falls into the Arabian Sea near Cape Monze, with a total drainage course length of 336 km.

During the past several years, a number of pumping wells have been installed to meet requirements for the irrigation-water supply (to raise vegetables, fruits, dairy and poultry) and drinking-water supply for Karachi. Excessive pumping of groundwater and continuous lowering of water-table is likely to result in intrusion of seawater into the Malir Basin under natural seepage conditions and under artificially induced conditions of recharge of saline seawater in the coastal aquifer(s) of Karachi.

2) Recharge sources

Five possible water-sources are contributing to the groundwater recharge in Karachi. The first possible source is the rainfall. As the city of Karachi suffers from deficit of precipitation (only rainfall), the contribution to shallow groundwater storage from rain is very little. However, rainfall in the hinterlands and other areas surrounding Karachi may significantly contribute to the groundwater flow-system. The two freshwater sources are the Hab Lake/Hab Dam and the Indus River. Water from Hab Dam and the Indus River is piped to various residential zones in Karachi for drinking and irrigation purposes. The spring water discharges into Malir River and Lyari River and the municipal/industrial waste effluents added to these rivers are also contributing to groundwater storage as a fourth recharge source. Seawater intrusion along Karachi coast is the fifth possible source.

3) Shallow Groundwater

Physico-chemical data of shallow groundwater (depth less than 30 meters) shows that the shallow wells, located in the vicinity of coast and in the proximity of polluted rivers, have relatively higher values of electrical conductivity, salinity and population of Coliform bacteria. The shallow groundwater is moderately saline, representing electrical conductivity values in the range of 1.1 to 1.9 mS/cm and salinity in the range of 1 ppt. The pH of shallow groundwater varies from mildly acidic (~6.3) to mildly alkaline values (~7.9). Areas with quite poor sanitary conditions have relatively low values of pH (~6.3 to 6.8). Shallow groundwater below 20 meters is slightly reducing. The dissolved oxygen is in the range of 1.5 to 7.9 mg/L. Turbidity of shallow groundwater varies between 3.6 NTU and 95 NTU. The concentration of HCO₃⁻ (356-514ppm, n=4), Cl⁻ (82-169 ppm, n=4) and SO₄⁻² (38-117 ppm, n=4) in shallow groundwater is very reasonable. The mean chemical concentrations of Cl⁻, SO₄⁻² and HCO₃⁻ in shallow groundwater are as follows:

Mean Cl⁻ (Shallow Groundwater): 132.8 + 36.5 ppm (n=4)

Mean SO₄⁻² (Shallow Groundwater): 63.3 + 36.7 ppm (n=4)

Mean HCO₃⁻ (Shallow Groundwater): 423 + 67.4 ppm (n=4)

The range of variation in stable isotope content of total dissolved inorganic carbon (TDIC) and oxygen in Lyari River water is as follows:

δ 18 O (Shallow Groundwater) -6.3 to -5.8 ‰ V-SMOW (n=8)

δ 13 C (TDIC-Shallow Groundwater): -16.5 to -5.5 ‰ PDB (n=8)

The mean stable isotope content of 18O and 13C in shallow groundwater is as follows:

Mean δ 18 O (Shallow Groundwater): -5.9 + 0.32 ‰ V-SMOW (n=8)

Mean δ 13 C (TDIC-Shallow Groundwater): -10.1 + 3.3 ‰ PDB (n=8)

The stable-isotope results indicate that the shallow / phreatic aquifers are recharged by a mixture of fresh waters of Indus River and Hab River (draining spring water and flooded rainwater), as well as polluted Layari and Malir rivers and their feeding drains (both under natural infiltration conditions and artificially induced infiltration conditions) and, to a much smaller extent, from direct recharge of local precipitation.

4) Deep Groundwater

In general, Deep groundwater is mostly saline and has high electrical conductivity (range: 1.9- 19.1 mS/cm) and salinity (range: 1.7-7.4 ppt), as compared to shallow groundwater.

Based on hydro chemical data of water samples collected from pumping wells, it is assumed that the shallow mixed deep groundwater discharged by large-scale pumping wells mainly represents the deep groundwater from confined aquifer. The mean chemical concentrations of Cl⁻, SO₄⁻² and HCO₃⁻ in shallow mixed deep groundwater are as follows:

Mean Cl⁻ (Deep Groundwater): 2169.2 + 1828.0 ppm (n=9)

Mean SO₄⁻² (Deep Groundwater): 458.4 + 691.4 ppm (n=9)

Mean HCO₃⁻ (Deep Groundwater): 353.6 + 215.4 ppm (n=9)

The range of variation in stable isotope content of total dissolved inorganic carbon (TDIC) and oxygen in shallow mixed deep groundwater is as follows:

$\delta^{18}\text{O}$ (Deep Groundwater): - 6.2 to -4.2 ‰ V-SMOW (n=10)

$\delta^{13}\text{C}$ (TDIC - Deep Groundwater): -13.2 to -0.3 ‰ PDB (n=10)

The mean stable isotope content of ^{18}O in shallow mixed deep groundwater is as follows:

Mean $\delta^{18}\text{O}$ (Deep Groundwater): -5.3 +0.7‰ V-SMOW (n=10)

Mean $\delta^{13}\text{C}$ (TDIC- Deep Groundwater): -10.5 + 3.7‰ PDB (n=10)

The hydro chemical and stable isotope results indicate that the confined aquifer hosts a mixture of rainwater from hinterlands and surrounding regions around coastal Karachi, as well as sea trapped water / seawater, through intrusion under natural infiltration conditions or under induced recharge conditions.

5) Groundwater Recharge Characteristics/Sea water Intrusion

Presently, coastal Karachi is known to have five sources of recharge to its groundwater reserves.

- (i) Rainfall,
- (ii) Indus River water supply
- (iii) Hab-River & Hab Lake water supply
- (iv) Polluted Lyari and Malir rivers/ contributory channels draining mixtures of domestic industrial and agricultural wastewater, composed of pre-said three sources
- (v) Seawater

The possibilities of major contribution to groundwater recharge of shallow/phreatic aquifer directly by local rainfall seems very small, due to very poor frequency of rainfall events and rainfall intensities in the Karachi and high evaporation rates. The long-term (15 years annual record) mean monthly average precipitation for Karachi is between 0-15 mm during the months of January to June, 23 - 91 mm during the months of July to September, and 0-7 mm during the months of October to December.

The remaining four sources play a significant role in recharge of the shallow aquifer-system and deep groundwater system (confined aquifer) in coastal Karachi. Unpolluted seawater of Karachi coast is characterized by a $\delta^{18}\text{O}$ value of $\sim +1$ ‰ VSMOW and a chloride content of ~ 23000 ppm. Both the Lyari River and Malir River waters, as well as the Indus River water and the Hab Lake water, have extremely very low aqueous contents of chloride and sulfate ions as compared to seawater. The average mean value of $\delta^{18}\text{O}$ in polluted river waters is ~ 5 ‰ V-SMOW and in shallow groundwater is -5.9 ‰ V-SMOW. The relatively deeper ground waters representing confined aquifer have a mean $\delta^{18}\text{O}$ value of -4.3 ‰ VSMOW and excessively high values of aqueous chloride and sulfate.

4.2.5 Geology, Geomorphology and Soil

Geology: Karachi is the part of major synclinorium stretching from Ranpathani River in the east to Cape Monze in the west, Mehar and Mole Jabal (Mountains) in the north. Within the synclinorium a number of structures such as Pipri, Gulistan-e-Jauhar, Pir Mango and Cape Monze are exposed. The presence of concealed structures under the Malir River valley, Gadap and Maripur plains can fairly be deduced.

Rock aggregates, sand, limestone and clay are some of the potentials for gainful utilization. Gulistan-e-Jauhar member of the Gaj formation offers groundwater potential for limited use. The area is underlain by rocks of sedimentary origin ranging in age from Eocene to Recent. Major structural trends and the basin axis strike generally south but with a “bulge” to the east also called Karachi Arc (Bender and Raza 1995).

Geomorphology of Karachi: Karachi is located in the south of Sindh, on the coast of the Arabian Sea. It covers an area of approximately 3,600 km², comprised largely of flat or rolling plains, with hills on the western and northern boundaries of the urban sprawl. The city represents quite a variety of habitats such as the sea coast, islands, sand dunes, swamps, semi-arid regions, cultivated fields, dry stream beds, sandy plains, hillocks. Classified according to physiographic features, Karachi City District can be divided into three broad categories: Hilly Region (Mountain Highland), Alluvial Plain (Piedmont Plain) and Coastal Areas (Valley Floor). The metropolitan area is divided by two non-perennial river streams namely Lyari and Malir Rivers. The Malir River flows from the east towards the south and centre, and the Lyari River flows from north to the south west. Gujjar and Orangi are the two main tributaries of the Lyari River while Thaddo and Chakalo are the main tributaries of the Malir River. The dry weather flow of both rivers carries urban sewage that is ultimately drained in the Arabian Sea. Among the various physiographic features, low flat-topped parallel hills devoid of vegetation, interspersed with widespread plains and dry riverbeds are the main topographic characteristics of the city.

The greatest height of the region is 250 ft that gradually decreases to 5 ft above mean sea level along the coastline. The Karachi Harbour is a sheltered bay to the south-west of the city, protected from storms by the Sandspit Beach, the Manora Island and the Oyster Rocks.

The Arabian Sea beach lines the southern coastline of Karachi. Dense mangroves and creeks of the Indus delta can be found towards the south east side of the city. Towards the west and the north is Cape Monze, an area marked with projecting sea cliffs and rocky sandstone promontories.

Soil: The soil mainly consist of yellow to light brown silt stone & sand stone, greyish clay & yellow sandstone in different areas of East Karachi.

Lithology: Mainly consist of siltstone, clay, sandstone & limestone of Gulistan-e-Jauhar member of Gaj formation of Miocene.

Geological Structure: The area is anticlinal in structure which dips towards NE & NW. A fault line also passes through the region from south to NE towards Gulshan-e-Iqbal town.

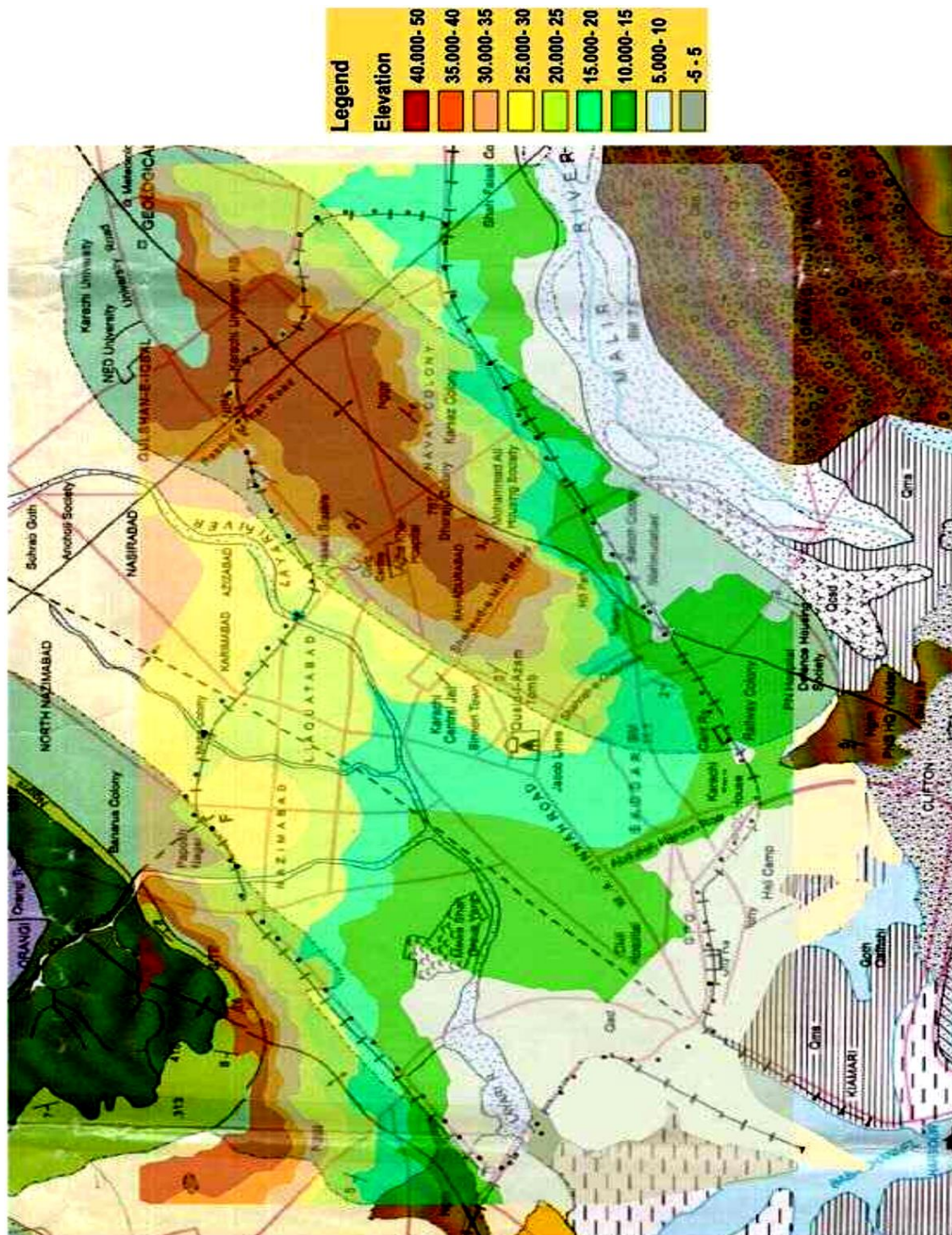


Figure 4.4: Geomorphological Map of Karachi

4.2.6 Seismicity

Seismic activity in the Indus Delta and its estuarine area, which include the creeks, resulting from ancient deltaic activity, and hence the Malir River bed as well as Lyari River are all located on the passive continental margin, is due to and mainly from intra-plate active faults, particularly the Rann of Kutch and Pab Faults and their strands. There are four active fault lines in the vicinity of Karachi coast. They are Karachi-Jati, Allah Bund-Rann of Kutch Fault, Surjan-Jhimpir, and Pab. The Allah Bund Fault passes in the proximity of the Steel Mills and Karachi Nuclear Power plant. The project site is on Malir River bed which for seismicity considerations is a syncline and hence vulnerable to shocks although of intra-plate nature. The orientation of the Rann of Kutch fault is roughly east-west; it is 225 km in length and is responsible for the production of earthquakes of considerably high magnitude of up to 7.6 M on Richter scale and of IX to X intensity

on the Modified Mercalli, MM scale. The Pab fault on the other hand is 135 Km in length and is oriented north-south. However, the shocks being of intra-plate nature are not likely to be destructive.

Over the last sixty years, earthquakes of intensity lower than 5 on Richter Scale, including those in 1945 and 1985, have struck this city.

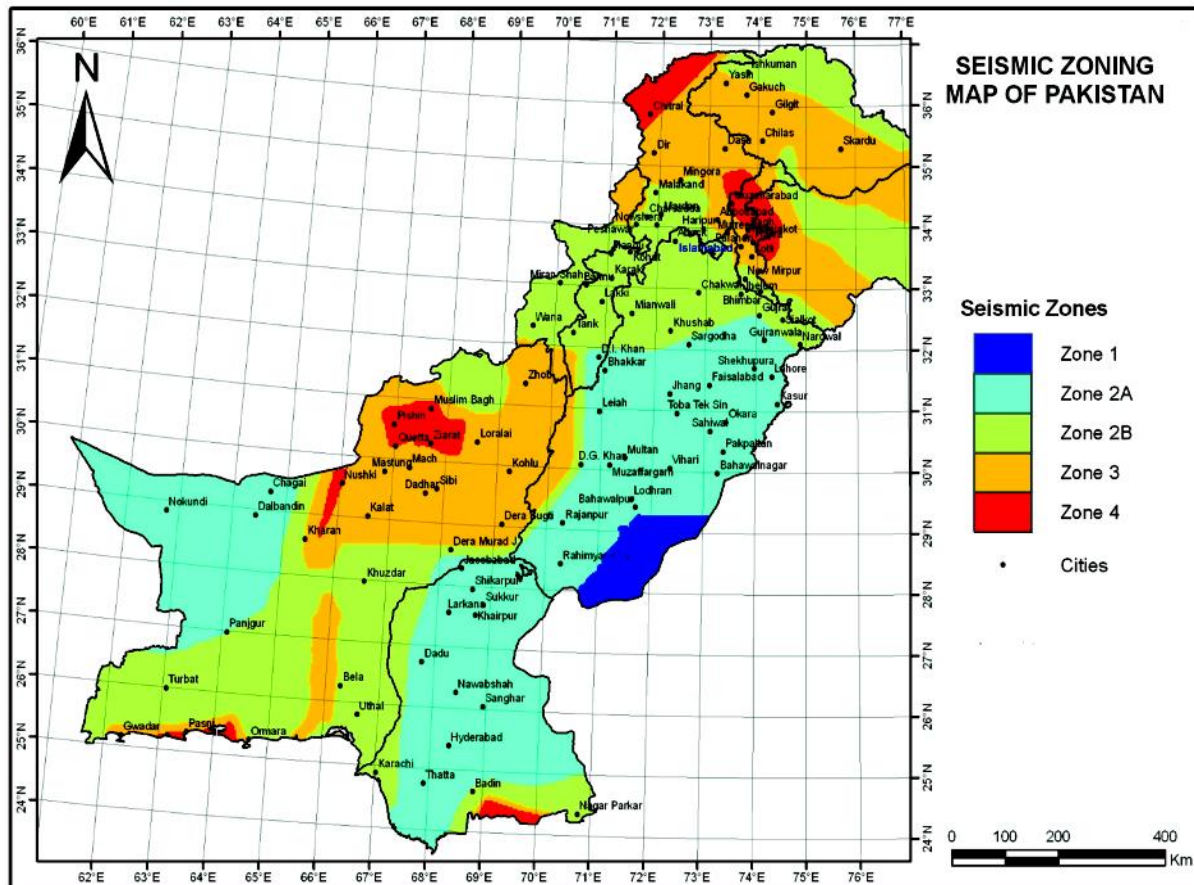


Figure 4.5: Seismic Zones of Pakistan

Karachi Building Control Authority has placed Karachi in Zone 2B, based on the actual events, the past observance of fault movement and other geological activities it has been inferred that Karachi is situated in a region where moderate earthquake of magnitude 5.0 to 6.0 equivalent to intensity between VII and VII on Modified Mercallis Scale may occur. On the basis of correlation of different scales and zoning, Karachi has been established as being situated in a noticeably moderate earthquake zone. Since heavy construction is not likely to be involved at the project site therefore observation of the building code in letter and spirit would be sufficient as mitigation measure.

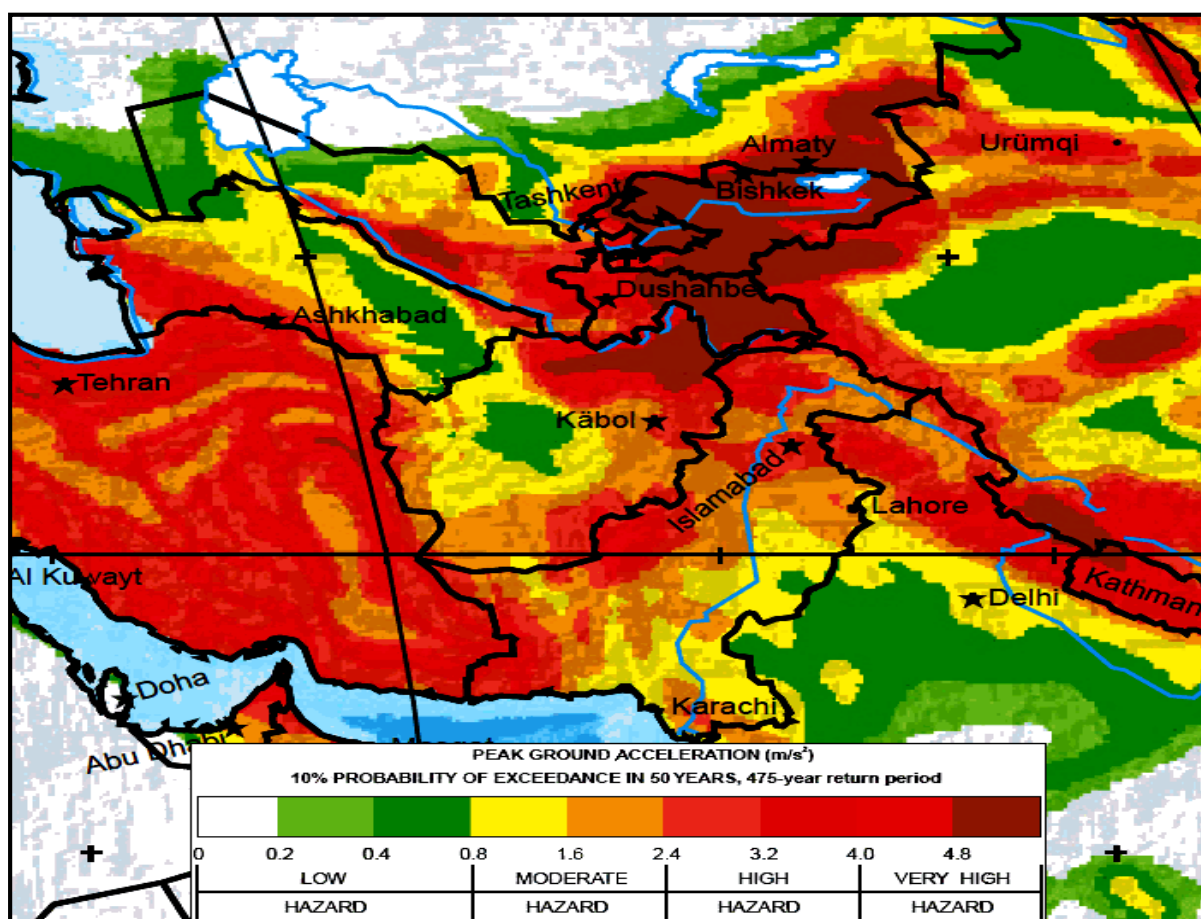


Figure 4.6: Peak Ground Acceleration (m/sec²)

4.2.7 Water Supply and Sewerage System

The water supply and sewerage system is managed by Karachi Water Supply & Sewerage Board (KW&SB). Present water supply system of Karachi City has a supply capacity of 560 mgd. Actually as of the end of year 2006, the KW&SB supply bulk water of about 630 mgd beyond the capacity as shown in following Table. Out of 630 mgd, water of 209 mgd is supplied without filtration, which is equivalent to one third of actual supply amount of 630 mgd.

Table 4.3: Present Water Supply Capacity		
Supplied from		Rated Capacity
Gharo Filtration Plant		20 mgd
Pipri Filtration Plant	with Filtration	100 mgd
	without Filtration	-
Dumlottee Conduit (without Filtration)	from Wells	20 mgd
	from GK/K-III Systems	-
NEK Old Filtration Plant		25 mgd
NEK New Filtration Plant		100 mgd
COD Filtration Plant	with Filtration	115 mgd
	without Filtration	-
Hub Filtration Plant		80 mgd
Supply without Filtration (from K-III System)		100 mgd
Supply without Filtration (from GK System)		-
Total		560 mgd
		Actual Supply
Gharo Filtration Plant		30 mgd
Pipri Filtration Plant	with Filtration	102 mgd
	without Filtration	32 mgd
Dumlottee Conduit (without Filtration)	from Wells	0 mgd
	from GK/K-III Systems	17 mgd
NEK Old Filtration Plant		5 mgd
NEK New Filtration Plant		100 mgd
COD Filtration Plant	with Filtration	104 mgd
	without Filtration	48 mgd
Hub Filtration Plant		80 mgd
Supply without Filtration (from K-III System)		95 mgd
Supply without Filtration (from GK System)		17 mgd
Total		630 mgd

The water distribution network in Karachi covers 18 towns, 6 Cantonments and a Defense Housing Authority (DHA) Area. These 18 towns are included in 5 administrative water supply zones classified by the KW&SB, which is shown on Figure. Jamshed Town is included in Zone II-B.

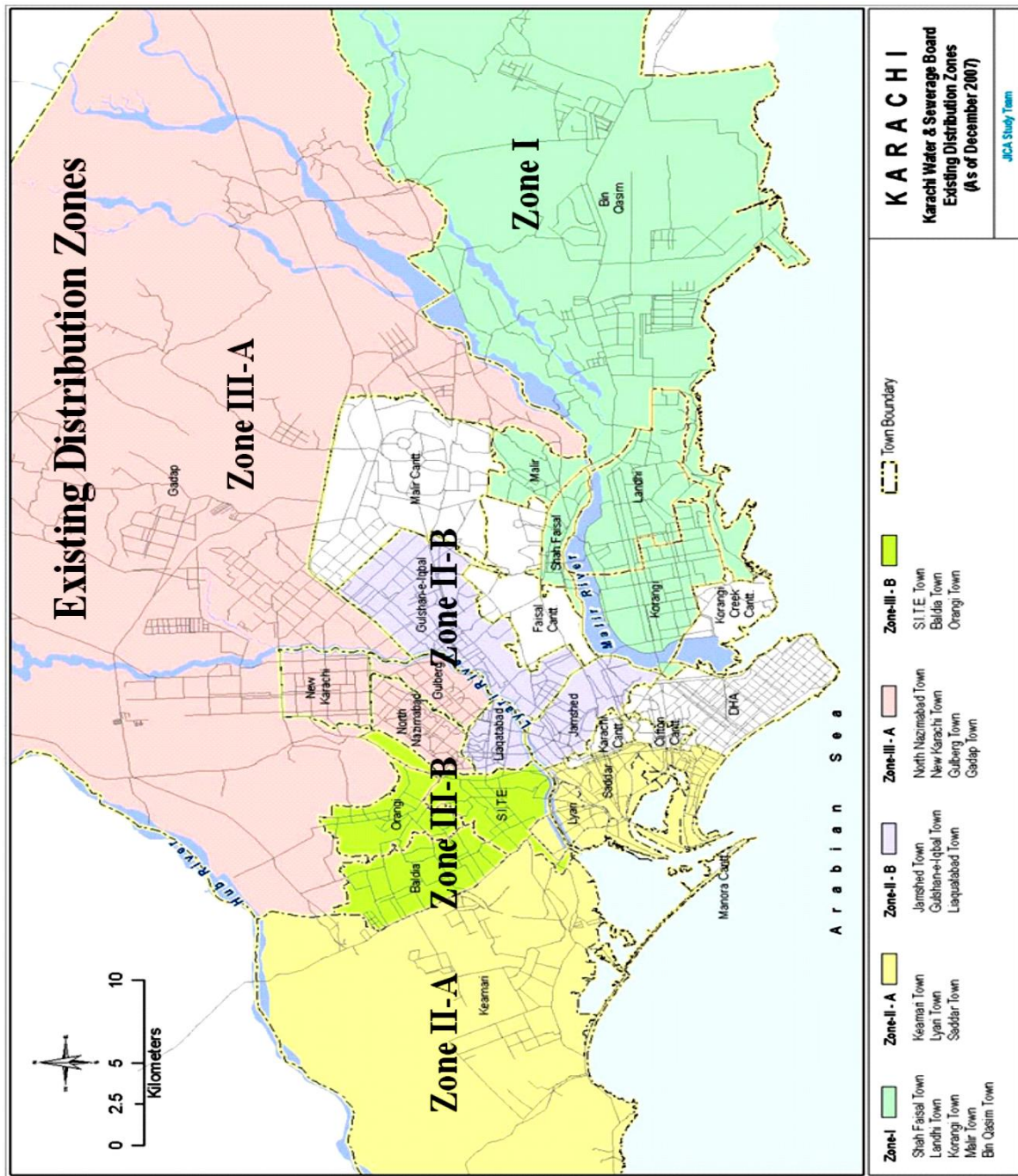


Figure 4.7: Existing Water Distribution Zones



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4.2.8 Water Quality

Because of unsafe and insufficient water supply and low sanitation coverage, as well as people's poor hygiene habits, around 60 percent of children suffer from diarrhea that is fatal if not treated in time. Concerns have been raised by various quarters about contamination in drinking water supply in the distribution network and possible linkages with water borne diseases in the city. The seriousness of the issue can be rated from the fact that in the year 2002, the Provincial Ombudsman Sindh, Justice Haziquil Khairi in response to a growing number of reports received from all over the Sindh province about the supply of contaminated drinking water, instituted a study for investigating the claims of the public and assessing the causes of contamination.

Regarding the quality of surface water supplied to the consumers, the Study Report prepared by Dr. Mirza Arshad Ali Beg, concluded that about 75% of the water supplied to Karachi is chlorinated. Shortfall in the availability of water for drinking constrains the distribution to intermittent supply that is one of the main causes of water pollution.

The water that leaks through the distribution mains and smaller pipes, particularly the ones that were laid long time before and in the Third Phase of the Bulk Water Supply scheme for Karachi, creates an underground pool during the supply hours. This serves as a nursery to the micro-organisms, including fecal coliform released by the leaky sewers crisscrossing the water supply pipes. Sewage might enter into the distribution system due to vacuum created during idle hours. This is the reason for the gradual depletion of free-active chlorine in the treated water as it proceeds from the filter plant to the distribution network and in its onward journey to the households. The findings of the analysis of the water samples suggest that the water even though treated gets contaminated in the distribution network and on its way to the consumers.

This finding suggests that the water as received by the residents is not safe for drinking. Assessment of ground water quality in the aforementioned Ombudsman Study Report indicated that ground water has been over exploited in Sindh and the drying of traditional wells in the vegetable and fruit growing areas in the suburbs of Karachi has occurred. Although water quality has not been tested yet, groundwater pollution by nitrates, pesticides, heavy metals and hydrocarbons discharged into the environment is not negligible. The salinity of groundwater in Southern Sindh, particularly in the coastal areas has increased since over pumping has induced seawater to flow in, causing what is known as seawater intrusion.

The fact, also acknowledged by KW&SB that 150 mgd (681,900 m³/day) of water supplied to the consumers is chlorinated and bypasses the KW&SB filter plants is an important indicator of the need of addressing this issue on a priority basis. The Ombudsman Study Report says that the water drawn from about 95% of the wells in the city of Karachi is contaminated with sewage bacteria and also contains total dissolved solids beyond permissible limits. The Ombudsman Study Report also documents that 90% of the survey sample tests conducted by PCSIR indicate that the water is unfit for drinking purposes referring to the guidelines set by the World Health Organization (WHO).

The study on water supply and sewerage system in Karachi by JICA in 2008 records the final analysis on quality of drinking water collected from Jamshed Town area. The results are presented in following table.

S.#	Parameters	Jamshed Town, No. 46, Gulistan Club Pumping Station	Unit
1	pH	8.2	-
2	Turbidity	0.3	NTU
3	TDS	288	mg/l
4	Amm. Nitrogen	0.515	mg/l
5	Cadmium	0.065	µg/l
6	Total Chromium	ND	µg/l
7	Copper	3.00	µg/l
8	Lead (Pb)	2.79	µg/l

9	Mercury	ND	µg/l
10	Selenium	ND	µg/l
11	Silver (Ag)	12.70	µg/l
12	Zinc (Zn)	0.018	mg/l
13	Arsenic	1.720	µg/l
14	Alkalinity	101	mg/l
15	Elect. Cond.	415	µS/cm
16	Iron (Fe)	0.64	mg/l
17	Manganese	22.85	µg/l
18	Boron (B)	ND	µg/l
19	Fluorine (F)	0.053	mg/l
20	Nitrate	19.70	mg/l
21	Nitrite	3	µg/l
22	Calcium	33	mg/l
23	Magnesium	13	mg/l
24	Sodium	35	mg/l
25	Potassium	6.7	mg/l
26	Sulphate ion	58	mg/l
27	Chloride ion	41	mg/l
28	Chlorine	ND	mg/l
29	Coliform	< 3	Count/dl
30	Fecal Coliform	< 3	Count/dl
31	Plate Count Bacteria	220	cfu/ml

4.2.9 Storm Water Drainage

Following Table outlines stormwater drainages and nallahs under each township administration. Drainages are artificial water channels for stormwater drainage; on the contrary, nallahs are natural water channels. Many drainages are connected to nallahs and some drainages connected to river directly; Nallahs discharge into rivers such as Lyari River and Malir River receiving stormwater. As sewage collection system in Karachi City is not enough and its maintenance is not satisfactory, stormwater drainage and nallahs have to receive sewage all year long in addition to stormwater in rainy season.

Table 4.5: Town-wise Stormwater Drainage/Nallah Length			
Town	Depth (m)	Width (m)	Length (km)
1. Keamari Town	1.21	0.91~3.04	7.62
2. SITE Town	2.13	3.65	16.08
3. Baldia Town	1.22	2.43	11.77
4. Orangi Town	1.52	2.43~3.65	34.1
5. Lyari Town	1.37	0.6~13.7	19.4
6. Saddar Town	1.37	3.05	11.14
7. Jamshed Town	1.5	2.43	33.8
8. Iqbal Town	3.64	2.4~15.2	28.0
9. Faisal Town	1.22~4.57	1.52~24.0	20.1
10. Landhi Town	1.22	2.43	35.36
11. Korangi Town	1.52	2.74	36.4
12. North Nazimabad Town	1.22	2.4	30.7
13. North Karachi Town	1.22	2.4	45.1
14. Gulberg Town	1.37	2.4	22.1
15. Liaquatabad Town	1.52	3.65	19.5
16. Malir Town	1.22	3.04	6.15
17. Bin Qasim Town	1.22	3.64	14.63
18. Gadap Town	1.22	3.65	24.43
Total			416.38
Source: KWSB			

There are no exclusive pumping facilities for stormwater drainage in Karachi City. However, many pumping stations called "ejector", which were constructed for sewage discharge to natural nallahs or rivers have worked as stormwater pumping facilities in rainy season.

Roadside drains are cleaned by KW&SB one to two months before monsoon season comes every year. Removed and collected silt/garbage is conveyed to designated solid waste disposal sites. However, roads are cleaned afterwards by town administration and silt/garbage is transferred to drains again. This is said to be how inundation is caused. In addition to above mentioned administrative issues, many drains and nallahs have been already encroached on by illegal houses and buildings. Strong enforcement of building code and other relevant laws is expected. Another major issue with malfunctioned drains/nallahs is that garbage is easily and routinely dumped to these facilities, which leads to their reduced sections. Comprehensive solid waste management system has to be introduced.

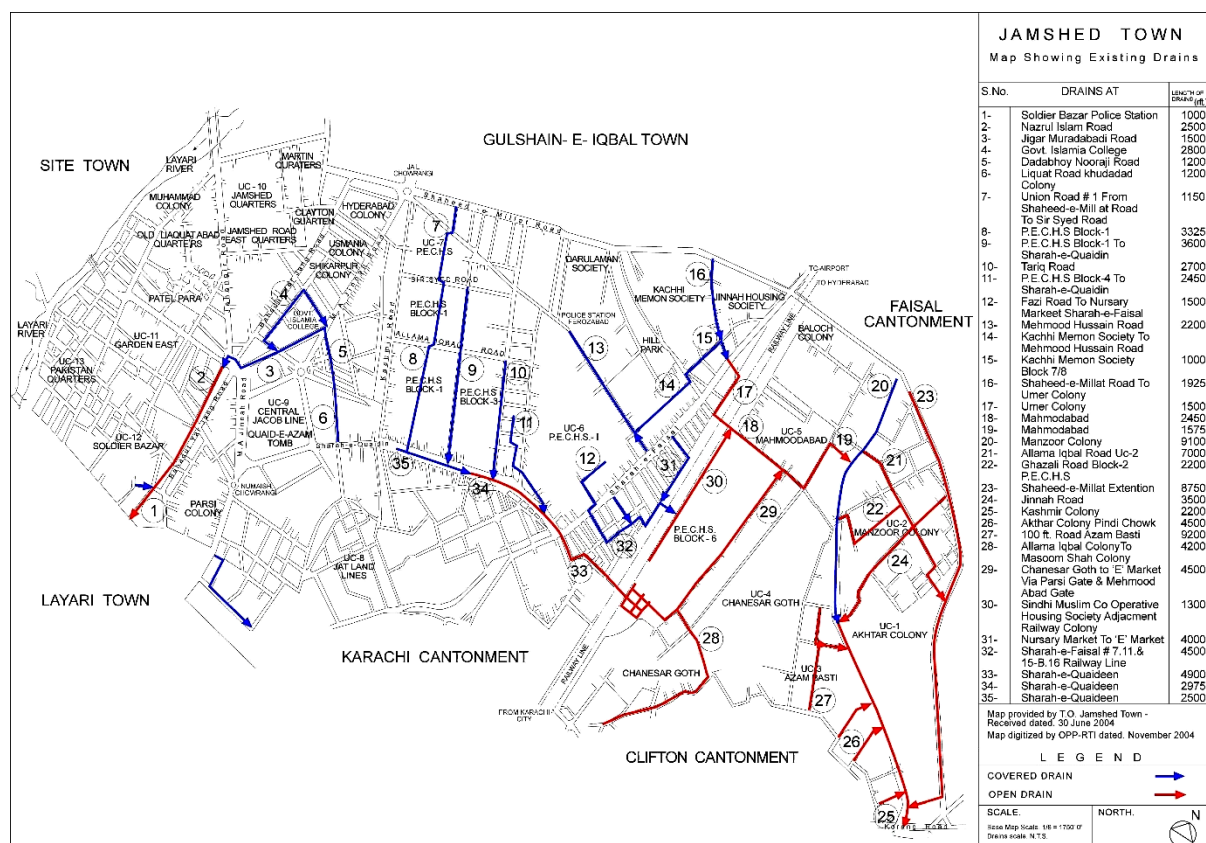


Figure 4.9: Existing Drains in Karachi East District

4.3 Description of Biological Environment

The ecology of microenvironment and macroenvironment of the project area has completely changed as a result of continuous emergence of urban conglomerates. Ecological risk of high order has been induced by land clearance and removal of natural vegetation from the plains during the urban sprawl to make room for industrialization and urbanization. This has degraded the physical environment as quantified in the above section & the biological environment in the sense that the entire macroenvironment has lost its biodiversity.

4.3.1 Flora

The study of the three municipal towns of Karachi, including Gulberg in Central District, East District and in South District was carried out by Institute of Environmental Studies at Karachi University. Field studies of roadside tree composition and diversity were conducted from March 2015 to December 2015. All road categories were randomly sampled by making transects on it. Out of these metallic roads, wide roads are with 87 km length in Karachi East. The medium roads

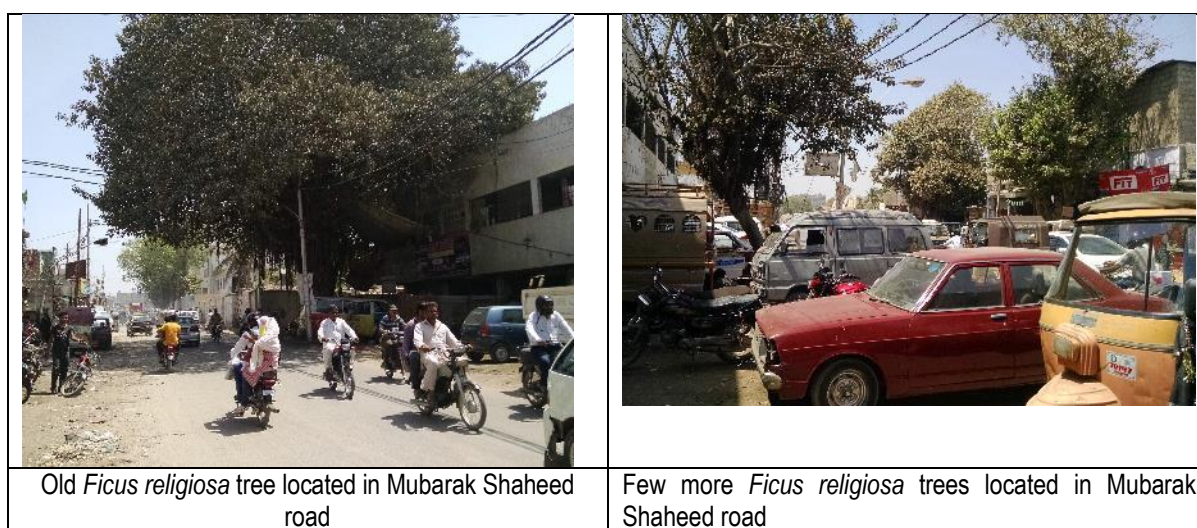
have approximately 43 trees per kilometer in which maximum DBH is 3.78 meters and maximum height is 13.5 meters. The Narrow Roads have the most treeless corridors with the maximum tree density of 25 per kilometer. The maximum DBH found to be 1.52 and maximum height was 15.35 meters.

The wide roads had maximum 1530 trees per kilometer, with an average of 173 and standard deviation of 356 and 15 species. The most dominant specie was *Conocarpus erectus* having relative dominance of 29.34%, it was also the most abundant specie along wide roads having relative abundance of 78.96%. *Phoenix dactylifera* is the second most dominant specie with the relative dominance of 21.50%, but it was not abundantly found and had relative abundance of 3.82%. The second most abundant specie was *Azadirachta indica* having relative abundance of 5.1%. Among the other species, *Eucalyptus* and *Ficus religiosa* were dominantly found.

The medium roads have the total transects of 14, out of which 3 transects were treeless. Total number of trees found on either side or median of the road is 610. The maximum number of trees per kilometer of medium road is 100 among 18 species. The most dominant and specie is *Alstonia scholaris* with relative abundance of 65.63% and the most abundant specie is *Crateva adansonii* with the relative abundance of 14.75%.

For narrow Road Category, out of 52 total transects sampled, 34 were treeless, the rest have the most abundant specie the *Conocarpus erectus* with the relative abundance of 60.30%, while the most dominant was found to be *Ficus virens*, having relative dominance of 46.34% other than *Ficus virens* there is a species of *Ficus* which couldn't be recognized at specie level, because of no fruiting.

Few tree species found along the proposed route of TL which includes *Ficus religiosa*, *Conocarpus erectus* and *Azadirachta indica*. *Ficus religiosa* species (5-6) are present in old area along Mubarak Shaheed road. *Conocarpus erectus* species are mainly found along the road islands.



4.3.2 Fauna

The impoverished as well as degraded environment resulting from non-availability of surface as well as groundwater and discharge of untreated wastewater into Lyari and Malir River has irreversibly reduced the biodiversity of the indigenous as well as introduced vegetation and hence it offers very little chance for the survival/growth of fauna in the macro-environment of project area. There are even otherwise no habitats of large and small animals, birds or reptiles within the surveyed area.

4.4 Description of Socio-Economic Environment

4.4.1 Macroenvironment

Karachi East district is the largest and totally developed Town of Karachi city; almost each Union Council of this district is as populous as expected with such a vast district. The Lyari River, Karachi & Clifton Cantonment, Malir River and Gulshan-e-Iqbal Town border it, (separated by Shaheed-e-Millat road). This district has some UCs that are terminal point for many trip-generating activities mainly related to visits to shopping centres, or for going to work in offices and trading centres. It also has some UCs that are suppliers of manpower and hence are trip generators for workers who have to go to work in the adjacent areas.

It consists of a mix of old and new, planned and unplanned areas. The areas surrounding the mausoleum of Quid-e-Azam are planned and old, whereas the 'Lines' areas and the colonies towards the southern scene are a mix of old and new but unplanned urbanization. The Union Councils number 1, 2, 3, 4 and 5 are primarily colonies and their boundaries reflect the unplanned growth. In an effort to maintain their compactness, the whole colony has been included in U.Cs. No. 1 to 5 resulting in irregular boundaries.

The population of Karachi East District was estimated to be about 35,32,870 at the 1998 census, of which 99% are Muslim. There are several ethnic groups in Block II including Mahajirs, Baltis, Punjabis, Sindhis, Christians, Kashmiris, Seraikis, Pakhtuns, Balochis, Memons, Bohras and Ismailis. Muhajirs constitute an overwhelming majority of the population.

Table 4.6: Composition of the Town

S.#	Name U.C	Areas/Description	Population as Per Census of 1998
1	Akhter Colony	Akhter Colony, Kashmir Colony, Rehman Colony, Junejo Town	53,579
2	Manzoor Colony	Manzoor Colony, Shah Faisal Road to Ghalib Road, Manzoor Colony Block D, Defence View Apptt. & Rehman Bungalows	62,312
3	Azam Basti	Azam Basti, Azam Town Hil Town	47,580
4	Chanessor Goth	Chanessor Goth (Part), Masoom Shah Colony, Liaquat Ashraf Colony 1&2, Baloch Colony	52,459
5	Mehmoodabad	Karachi Administration Society, Mehmoodabad (Part), Liaquat Ashraf Colony (Part II), Baloch Colony	51,061
6	PECHS –(I)	SMHS, PECHS	66,395
7	PECHS –(II)	PECHS, Block2 &6 (Part), Society Area & Umer Colony	61,438
8	Jat Lane Line	Jat Line Shahnawaz Bhutto Colony	68,959
9	Central Jacob Line	Parsi Katrick Colony, Catholic Colony	65,361
10	Jamshed Quarters	Jahangir Quarter, Jamshed Quarters, Marten Quarters, Clayton Quarters, Usmania Mohajir Colony	62,786
11	Garden East	Garden East, Patel Para, Dur Muhammad Village Dad Muhammad Village, Al-Zia Colony, Jahangir West Quarter	55,532
12	Soldier Bazar	Garden East, Soldier Bazar, Gul-e-Rana Colony	43,296
13	Pakistan Quarters	Pakistan Quarters, Muhammad Colony, Mustafa Colony, Islam Nagar, Peoples Colony	43,063
Total			7,33,821

The population explosion due to rapid urbanization in the Karachi city is the key element in causing the traffic problems and transportation issues which need urgent planning and designing to meet the future requirements. Karachi is now among the ten top ranking largest cities in the world. Karachi's reported population in 1940 was 387,000, in 1960 it was 1,913,000, in 1981 it was 5,208,000 and in 1998 it was 9,957,726. In 2005, the population of Karachi was estimated at 15.1 million which is expected to reach 27.5 million marks by 2020. The number of households in 2005 was about 2.1 million and by 2020 it would increase to 3.9 million, which means an increase of 1.77 million households, at an average size of 7 persons per household.

Even at decreasing average annual growth rate (from 4.15 percent in 2005 to 3.5 percent in 2020), the increase in absolute terms is staggering and will put heavy pressure on the physical, infrastructure, financial and institutional systems of the city. The urban population growth rate also increased after 1998 from 3% to 6% till the year 2005. The past and projected population growth estimates of all towns of Karachi City are presented in table 4.7.

Table 4.7: Population estimates and projection for towns of Karachi City					
Town #	Town Name	Population (1,000)			
		2005	2010	2015	2020
1	Kimari Town	583.6	1,030.4	1,477.2	1,923.9
2	Site Town	709.9	771.5	833.0	894.5
3	Baldia Town	616.7	781.2	945.6	1,110.1
4	Orangi Town	1,098.9	1,208.9	1,318.9	1,428.9
5	Lyari Town	923.2	938.6	953.9	969.3
6	Saddar Town	935.6	997.9	1,060.3	1,122.7
7	Jamshed Town	1,114.2	1,262.8	1,411.4	1,559.9
8	Gulshan-e-Iqbal Town	949.4	1,424.0	1,898.7	2,373.4
9	Shah Faisal Town	509.9	543.9	577.9	611.9
10	Landhi Town	1,012.4	1,282.4	1,552.3	1,822.3
11	Korangi Town	829.8	1,161.7	1,493.7	1,825.6
12	North Nazimabad Town	753.4	828.8	904.1	979.5
13	New Karachi Town	1,038.9	1,108.1	1,177.4	1,246.6
14	Gulberg Town	688.6	757.4	826.3	895.2
15	Liaquatabad Town	985.6	1,002.0	1,018.4	1,034.9
16	Malir Town	604.8	705.6	806.4	907.1
17	Bin Qasim Town	480.9	1,038.4	1,596.0	2,153.6
18	Gadap Town	439.7	1,319.0	2,198.4	3,077.7
19	Cantonment Areas	844.5	1,100.7	1,356.9	1,613.0
	Total	15,119.8	19,263.3	23,406.7	27,550.1
	Growth Rate	1.27	1.22	1.18	
	Yearly Growth Rate (%)	5.0	4.0	3.3	

Source: The Study on Future Traffic Demand Forecast of Karachi City, August 2008, JICA

Karachi expanded from an area of 116 km² in 1947 to 1800 km² in 1987 and has remained confined to that area ever since. In population, however, it has expanded from 0.3 million to 5.9 million in 1981 and to about 23 million as of now.

Low-income households were initially located in the trans-Lyari sections of Golimar, Liaquatabad, Nazimabad and were subsequently extended in the early 1950s northward to Nazimabad, Liaquatabad, Federal Area, North Karachi, Baldia, Orangi and Sindh Industrial Estate, and eastward to Drigh Colony, Malir Colony, Landhi Colony and Landhi Industrial Estate, and Korangi Colony and Korangi Industrial Area. These settlements were close to employment opportunities. Economic growth sequential to industrial and commercial activities attracted settlement of low-income households on encroachments all along vacant areas of railway lines, unoccupied plots as well as amenity plots. Such encroachments are interspersed as katchi abadis throughout the city.

Pakistan Employees Cooperative Housing Society in Jamshed Town was initially meant to provide housing facility to Government Employees. It was among the most important settlements of the time and so were the other housing societies like Sindhi Muslim Cooperative Housing Society, Jinnah Housing Society, Karachi Administration Housing Society along the Corridor. Establishment of these societies was accompanied by encroachment and katchi abadis such as Mehmoodabad, Liaquat Ashraf Colony and Umer Colony were interspersed along the railway line and between Chanesar Goth and Baloch settlements further east.

Settlements in Shah Faisal Colony, Malir Colony or Landhi Colony were likewise accompanied by encroachments and subsequent regularization of their status as Katchi Abadis around unoccupied land. Such settlements include those in Natha Khan Goth, Green Town, and Golden Town in Shah Faisal Town; Jafare Tayyar, and land opposite Malir City Railway Station as well as along the railway line in Malir Town, Quaidabad and Laiqabad in Bin Qasim Town and

Mansehra Colony, Gulistan Society and Moinabad in Landhi Colony to house the people who are seeking employment in the industrial area.

The macroenvironment of Project site is home to middle class people. The Literacy rate is more than 80 percent. Educational facilities in the surrounding area of the Project are excellent. Availability and access to all levels of education is well provided because of efficient and effective management system to facilitate and promote higher education. Literacy rate among females is comparable with males.

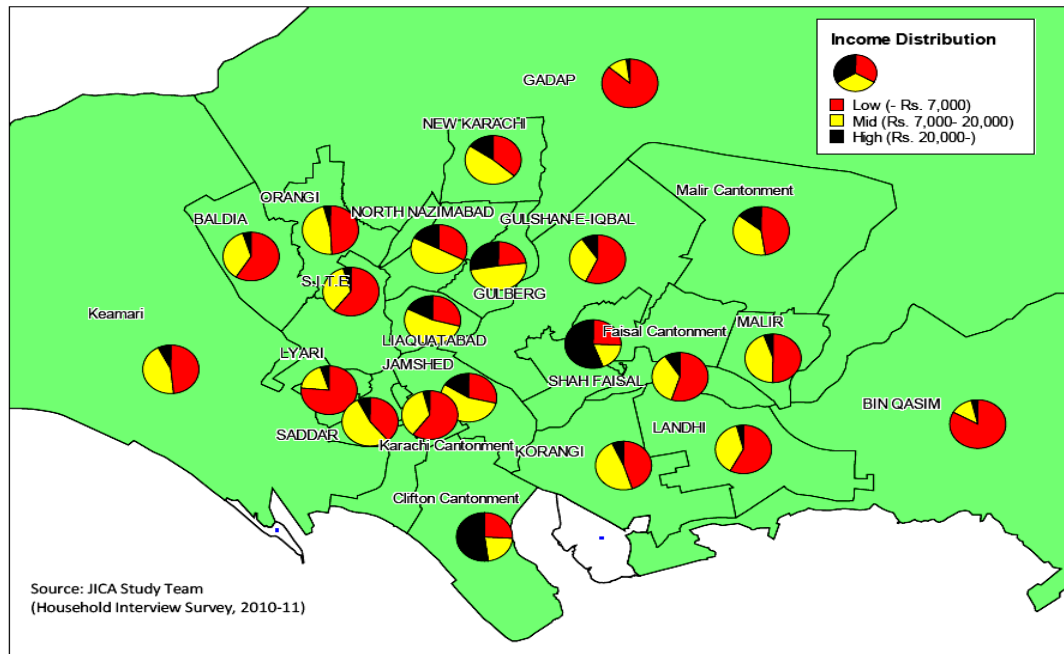


Figure 4.10: Income Level by Town

A socio-economic survey was conducted in late 2005 that covered a sample of 5000 households living in the 18 towns of the Karachi City District. The overall objective of the survey was to investigate the living conditions of the population, existing provision of basic services and facilities, living style, economic conditions, social problems and felt needs of the population. Some of the major findings of the survey are:

- literacy rates are comparatively low and could be improved through non-formal education that includes both home and street schools;

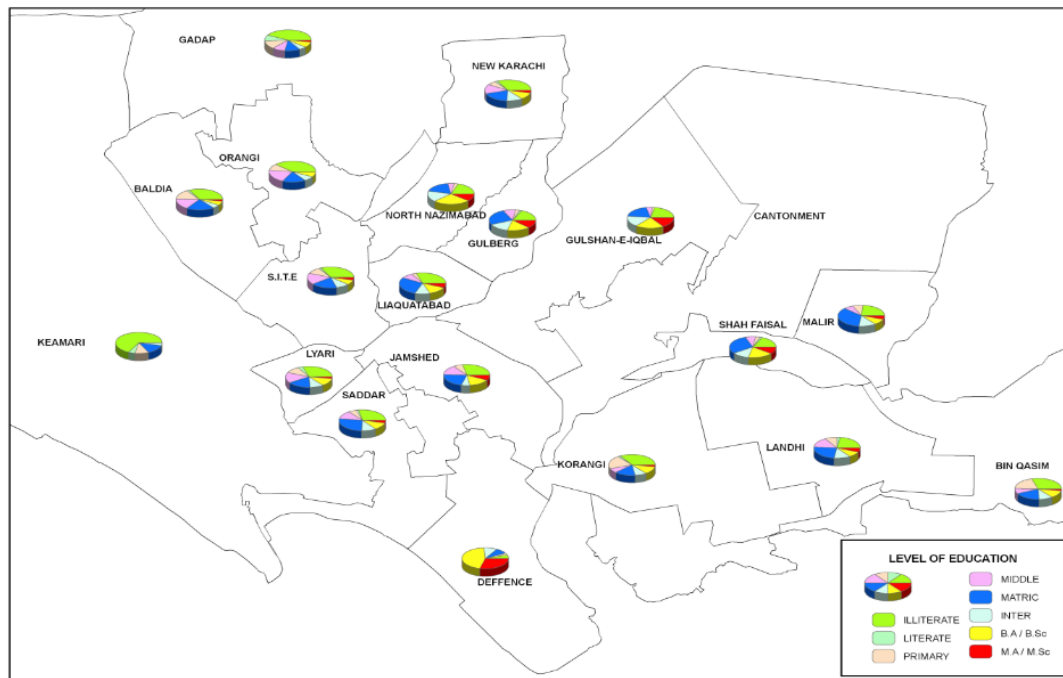


Figure 4.11: Level of Education in Karachi

- Health is the most neglected area. The present level of facilities is not sufficient to serve the population; small clinics, mother and child health centers and primary health care centers in particular are needed;
- Access to clean drinking water is the greatest perceived need of the population;
- Participation of women in economic activities should be systematically encouraged and ensured in order to enhance household income and upgrade standards of living; and
- Non-completion of development projects and programs has had a negative impact on development.

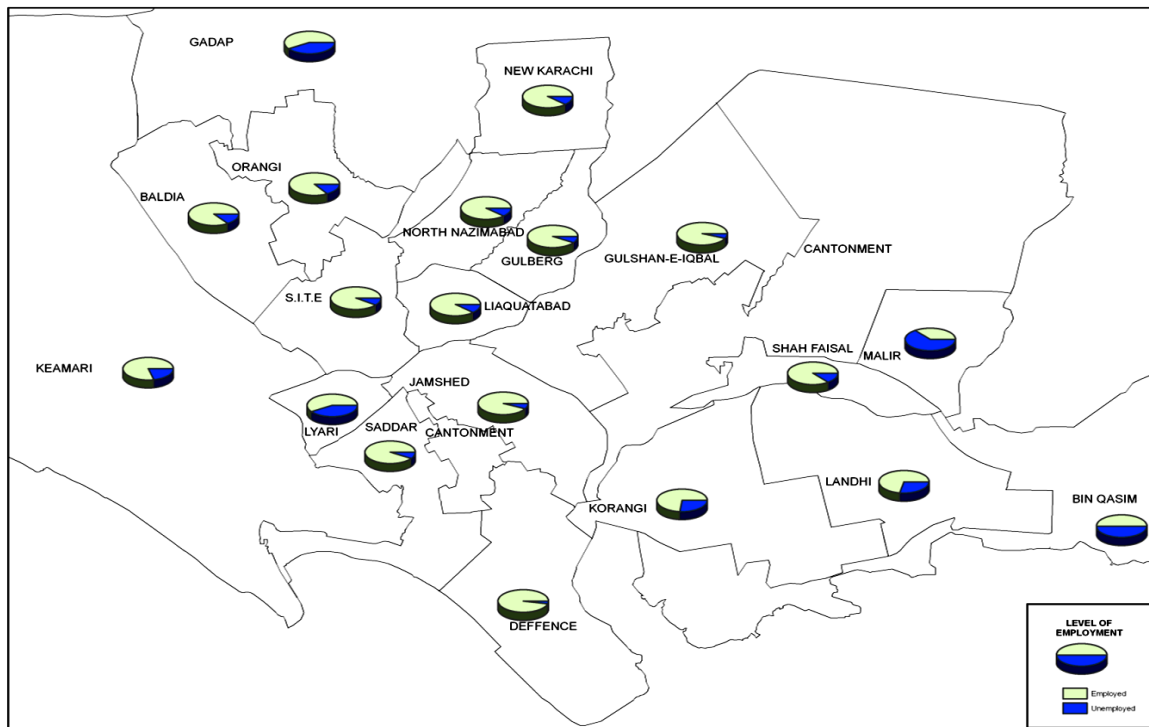


Figure 4.12: Level of employment in Karachi

Some of the main indicators from the survey can be described as follows. In describing the characteristics of household heads:

- Roughly 83 percent are male and 17 percent female;
- More than 30 percent are aged between 40 and 49 years, with only 7.4 percent less than 30 years of age;
- Roughly 88 percent are married;
- About 29 percent are illiterate; the remainder literate and/or educated;
- 81 percent are employed;
- 50 percent of the employed are self-employed with 31 percent working in the private sector, 3 percent in the semi-private sector and 16 percent for the public sector;
- 32 percent of the self-employed are shopkeepers and 12 percent are laborers; and
- 41 percent earn between 3,000 and 6,000 rupees per month.

On the other hand, available resources for housing and infrastructure expenditures are fairly limited at the level of most households, given overall low incomes, high levels of expenditures on basic needs (75 percent of total), and already high expenditures for utilities (19 percent of total). The high percentage of owner occupation, however, suggests that home assets could be used as collateral to get access to finance for improvements. Priorities of Karachi residents include improved water supply quality.

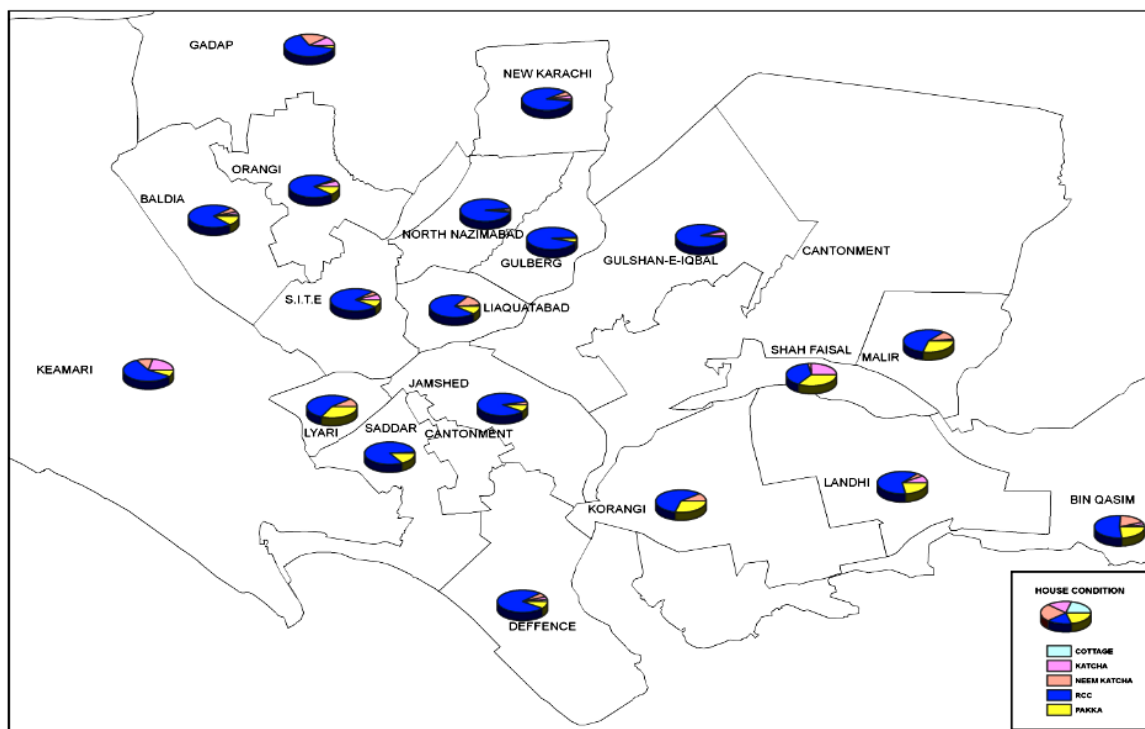


Figure 4.13: Housing Condition in Karachi

These are the characteristics of Karachi households:

- Roughly 85 percent are nuclear families, with the remaining 15 percent living in a combined arrangement of two or more families in one dwelling;
- Family composition includes 35 percent male adults, 32 percent female adults, 17 percent boys and 16 percent girls. (Boys and girls are defined as those under 17 years of age).

- 44 percent earn between 5,000 and 10,000 rupees per month;
- 34 percent have less than 5,000 rupees expenditures per month;
- 75 percent of the monthly expenditures are devoted to food, 19 percent for utilities and less than 2 percent for housing;
- Close to 39 percent of the male family members and 29 percent of the female members are literate; and
- More than 11 percent have household members that were unemployed; and amongst these unemployed, 89 percent are male and 11 percent female.

In terms of household residential stability 22 percent had been living in Karachi for more than 59 years, 22 percent for 41 to 58 years; 30 percent for 24 to 40 years; 13 from 12 to 23 years; only 7 percent have been living in the city for less than 6 years;

- 26 percent had been living in their present house for 10 years and 33 percent for more than 20 years;
- 74 percent had lived in the inner city prior to their current residence; and
- 70 percent had migrated to Karachi to obtain employment.

In terms of property and family assets:

- 75 percent of the houses are on land that was leased;
- 80 percent of the houses are owner occupied;
- 60 percent of the owner-occupied houses are self-purchased; 22 percent self-built and 19 percent inherited;
- 25 percent of the houses cost less than Rs 300,000, with 16 percent cost more than Rs 1.3 million.

This socioeconomic survey shows the population of Karachi is relatively stable, with most households having lived in the city for many years. This suggests a high level of commitment on the part of Karachites to stay in the city and build a life for themselves over time. This in turn implies that residents are willing to invest in the improvement of their homes and the infrastructure services they receive at them.

In terms of housing conditions:

- 76 percent of dwelling units are in pakka condition;
- 15 percent of units have less than 60 square yards floor area; 35 percent are approximately 80 square yards; and 30 percent in the 120 square yards range;
- 81 percent have only one portion;
- 36 percent of households are connected to the sewer line.

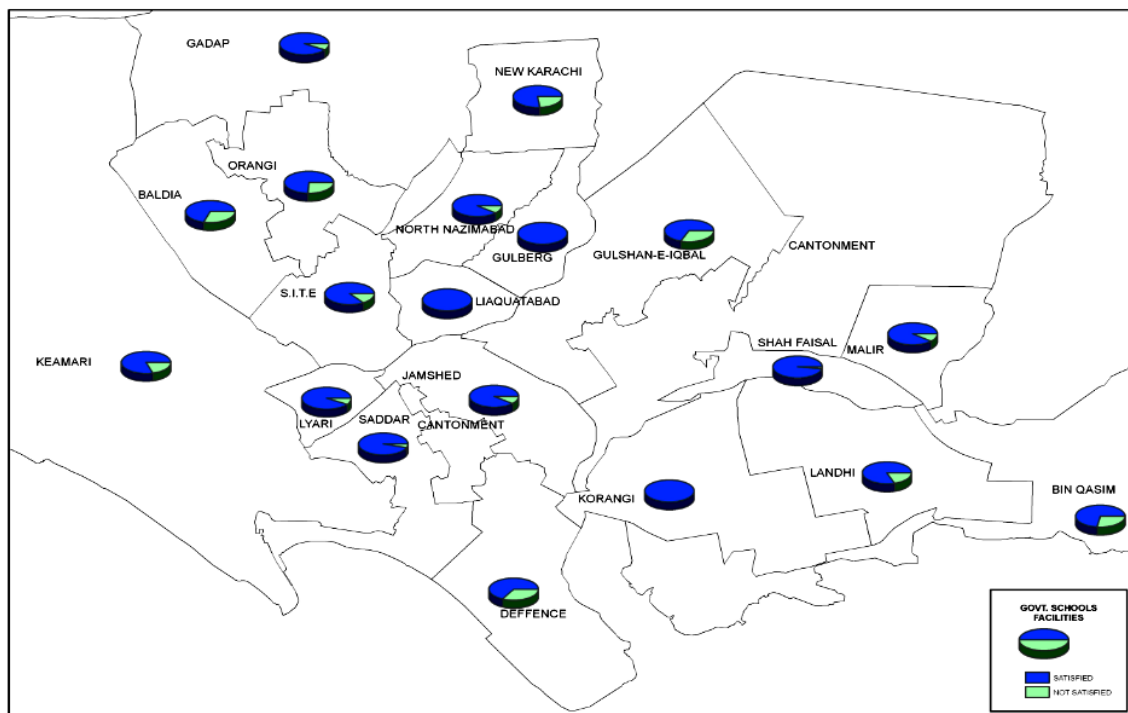


Figure 4.14: Government schools facilities in Karachi

In a 2006 JICA Study on Person Trips, it was found that Karachi City was expanding towards the east and northeast. The construction of a few multi-storeyed complexes in Karachi has prompted the Builders and Developers to enter into the real estate business in a big way. The existing residential units are preparing to enter real estate business and entering into construction of high risers, multi-storeyed complexes.

Communities having diverse social and economic interests and cultural values form an integral part of the population in the microenvironment of project. The people belong to the upper stratum of the society. They are so integrated that it is difficult to identify one demographic character from the other. People from all over the country and all walks of life are residing and contributing to progressive development of this area from a largely residential area in the 1970s & 1980s to a combination of residential & non-residential interests. Both commercial & non-commercial units have enjoyed success in their venture in the area and its surroundings. These are indicators of opportunities that exist for development in the area. This area is fast developing into network of service providers, and thus raises the quality of life of those intending to do so.

4.4.2 Microenvironment

Existing Conditions of the Microenvironment

General Overview: The project comprises of 132 kV underground transmission line from Jacob Lines Grid Station to Gizri Grid Station. The project lies in DHA Phase II and Karachi East District.



Figure 4.15: Jacob Lines Grid Station



Figure 4.16: start point from Gizri Grid Station



Figure 4.17: PR Mainline where the proposed Transmission line may intersect via thrust boring



Figure 4.18: Shahrah-e-Faisal where the proposed Transmission line may intersect via thrust boring



Figure 4.19: Mubarak Shaheed Road where the proposed Transmission line may pass



Figure 4.20: Dhobi Ghat at the back side of Jacob Lines GS at which the proposed TL will pass

K. Electric transmission line passes through 4 UCs of Karachi East district to DHA Phase II. Names of the UCs in Karachi East district through which transmission line passes are UC – 9 Jacob Lines, UC – 8 Jat Lane lines, UC – UC-4 Chanesar Goth.

Demography: Administratively, the project is located in 04 out of 26 Union Councils of East district and DHA Phase II (CBC). The total area of Karachi East district is approximately 72 Sq. km

Safety and Security: The presence of private security guards at several famous shopping areas, branches of popular banks & automobile shops generally provides a secure environment for shopkeepers and customers. The general hustle and bustle of the shopping area from 12 pm-12 am also discourages crime and illicit activities. However, during late hours when businesses are closed, area residents and offices located in bungalows have reported robberies. The area comes under the jurisdiction of the Ferozabad Police Station, whereas the nearest office of the Citizens Police Liaison Committee (CPLC) is located near Hill Park.

Traffic and Parking: Even though the transmission line passes through dense commercial zone, there are many exits and entry points for traffic. However, during business traffic hours the proposed route attracts huge volume of traffic and traffic congestion becomes common. Moreover, there is already a huge shortage of parking spaces in the area which is evident from the large number of cars parked illegally along both sides of the road.

Road Network

The microenvironment of the project comprises of the following roads:

Mubarak Shaheen Road:

Mubarak shaheen road is the proposed transmission line route. The total length of the road is approx. 1.04km, 40 ft wide road which link to main Korangi road at its South East 24°51'35.27"N 67° 2'50.55"E.

Korangi Road:

Korangi Road is approximately 2.68km, 107 ft. wide road. The road is known as one of the major road which serves the Korangi Industrial area. A number of major industries from different sectors such as pharmaceutical, textile, petroleum, rice and etc are located on this road. There are number of other important roads that passes through Korangi road such as Iqbal Shaheen Road, Shahrah-e-Faisal, Kala Pull Road, Chanesar Road, Mehmoodabad Road, Old Korangi road and links to Link Avenue Road at 24°50'15.00"N 67° 3'39.84"E.

Shahrah-e-Faisal:

Approximately 9.52km 120ft wide road. This road runs connects Saddar, Jamshed, Shah Faisal and Malir Town. Mostly major commercial section is located on both sides of the road. A small segment of the proposed K.E Transmission Line passes through Shahrah-e-Faisal.

Sunset Boulevard Road:

Approximately 1.8km, 95ft wide road which runs between Korangi Road and Old Sunset Boulevard Road and connects to Khyaban-e-Roomi at 24°49'46.00"N & 67° 3'4.13"E. There are residential areas on both the sides of the road.

Chapter 5 Public Consultation & Participation

Public Participation is a mandatory requirement of the Environmental Impact Assessment exercise under the Sindh Environmental Protection Act 2014 and the rules & regulations framed thereunder. Public consultation & participation process provides an opportunity for those directly & indirectly affected by the project to express their concerns during the feasibility phase before finalization of the project design. It aims to ensure that the EIA process is transparent and robust and enables sustainability in the design, implementation, operation & management of development projects.

- The key objectives of public involvement are to:
- Obtain local knowledge about the microenvironment (project neighborhood) that may be useful for decisions regarding the project design and identification of potential impacts;
- Facilitate consideration of alternatives, mitigation & compensatory measures;
- Ensure that important impacts are not overlooked and benefits are maximized;

Following are the benefits envisaged from the Public Consultation & Participation process:

Table 5.1: The benefits of effective participation for different groups		
Proponent	Decision-Maker	Neighborhood/Local Community
Raises the proponent's awareness of the potential impacts of a proposal on the environment and the affected community	Achieves more informed and accountable decision-making	Provides an opportunity to raise concerns and influence the decision-making process
Legitimizes proposals and ensures greater acceptance and support	Provides increased assurance that all issues of legitimate concern have been addressed	Provides an opportunity to gain a better understanding and knowledge about the environmental impacts and risks that may arise
Improves public trust and confidence	Demonstrates fairness and transparency, avoiding accusations of decisions being made 'behind closed doors'	Increases awareness of how decision-making processes work, who makes decisions & on what basis
Assists by obtaining local information/data	Promotes good relations with the proponent and third parties	Empowers people, providing the knowledge that they can influence decision making and creating a greater sense of social responsibility
Avoids potentially costly delays later in the process by resolving conflict early	Avoids potentially costly delays later in the process by resolving conflict early	Ensures all relevant issues and concerns are dealt with prior to the decision

In the context of the present project for laying of transmission lines from Jacob Lines Grid Station to Gizri Grid Station there is a need to strictly follow the procedures laid down under the environmental regulations and all relevant bylaws prescribed by KMC and relevant provincial government departments of the Government of Sindh.

Purpose of stakeholder engagement for '132 kV Transmission Line' project is to:

- Inform nearby resident, commercial interests and institutions in the immediate neighborhood about the project and its likely impacts;
- Ascertain the views of those facing direct and indirect impacts and identify feasible measures that can be adopted to alleviate the negative impacts and enhance the positive aspects

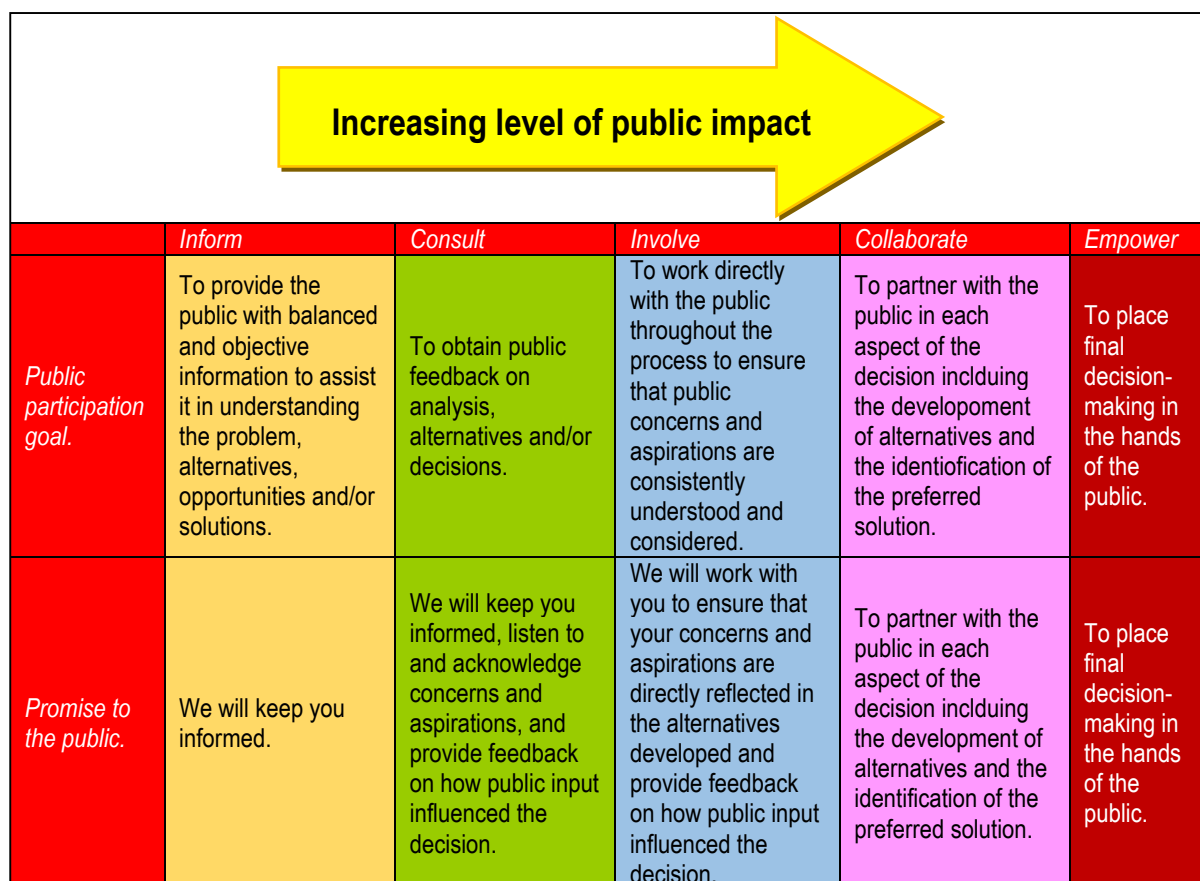


Figure 5.1: Public Participation Approach

5.1. Identification of Stakeholders

The major stakeholder groups involved in an EIA and their interests are explained in the following paragraphs:

1. **Local People/Neighborhood:** Individuals or groups in the vicinity of the project site are informed regarding the project background and context. Due to their proximity to the project site, they are often the most vulnerable stakeholders and therefore, consultation with these stakeholders is carried out throughout the project life. The consultation exercise provides opportunity to appraise the stakeholders regarding the consultation process, identify likely project impacts, and record local communities' concerns. Moreover, intensive stakeholder engagement during the planning stage of the project provides a basis for reducing the trust deficit and encourages confidence-building.
2. **Proponents:** The main aim of the project proponent is to accomplish the objectives of the project through cost-effective and sustainable project activities. To this end, the project proponents recognize that strong relationships and friendly relations with stakeholders is inevitable for project success. Thereby, from the onset, the proponent strives to engage stakeholders at all levels, informs them regarding project goals, design and any alternatives. Moreover, they try to create public understanding and acceptance of the proposal through the provision of basic information on the project throughout the life cycle. They try to accomplish the project through general acceptance of the design and keep improving through use of public inputs on alternatives and mitigation measures.
3. **Government Agencies:** The government agencies involved in the EIA process are mandated to have their policy and regulatory responsibilities addressed in impact analysis and mitigation consideration. For the competent authority, an effective public involvement programme will ensure a project proposal that effectively incorporates environmental and social concerns. Moreover, in line with international standards, SEPA invites the proponent for evidence of CSR activities in the past and plans for CSR activities in the project vicinity. During the EIA review, the most important concern for SEPA is a transparent public consultation process and a strong stakeholder engagement plan that can address the concerns and suggestions of all stakeholders.

4. NGOs/Interest groups: Comments from NGOs and specific interest groups often provide a useful policy perspective on the project's methodology and implementation mechanism. For example, due to the vast exposure of certain NGOs and interests groups, alternative measures for reaching the project goals may be advised that is more environmentally friendly and socially acceptable. Their views are also helpful when developing CSR programs and later on through monitoring and evaluation of these programs.

5. Other Groups: Other interested groups include those who are experts in particular fields and can make a significant contribution to the EIA study. The advice and knowledge of relevant government agencies, academia and private companies most directly concerned with the proposal are often sought. More often than not, a range of experts from these groups are consulted and their input is solicited based on the project requirements.

The main stakeholders for the 132 Kv Transmission Line project have been identified in Table 5.2.

Table 5.2: Stakeholders for the 132 Kv Transmission Line Project	
Main Primary Stakeholders	Dhobi Ghat Saint Patrick's School & College (Boys) Saint Patrick's Cathedral Saint Joseph's Convent School & College Parsi Community Center Army Public School, Saddar Auto-Mechanics & Small Shops (Mubarak Shaheed Road) Furniture Market (Abbasi Shaheed Road) PSO Pump (Abbasi Shaheed Road) Cantt General Hospital Saddar Police Station Total Pump (Opp. Gora Qabristan, Shahra-e-Faisal) Gora Qabristan (Christian Cemetery) Canteen Stores Department (Korangi Road) N.O.R.E. -III (Navy Housing) Residential Areas-Umer Farooq Town, Railway Colony, Hazara Colony (Korangi Road) Shell Petrol Pump (South Circular Avenue) Residential Areas-DHA Phase II, Phase II Ext, Phase IV Masjid Bait-us-Salam
Government Departments	Sindh Environmental Protection Agency (SEPA) Office of Commissioner, District East Defence Housing Authority (DHA) Cantonment Board Clifton (CBC) Sui Sothem Gas Company (SSGC) Transport & Communication Deptt, GoS Karachi Water & Sewerage Board (KWSB)
NGOs/Interest groups	Urban Resource Center Shehri-CBE National Forum for Environment & Health (NFEH)
Other Groups	Department of Energy and Environment, IoBM NED University of Engg. & Tech Civil Engineering Department, PIMSAT Institute of Engineers, Pakistan (IEP)

5.2. Consultation Approach & Methodology

Consultation was conducted in two stages for the 132 Kv Transmission Lines Project. A social survey team identified residential neighborhoods, commercial interests and other institutions in the area that may face direct impacts from laying of the transmission lines. In preparation for the survey a 'Project Brief' was prepared highlighting the salient features of the project and the proposed route of the transmission line. In the first stage, a reconnaissance survey was conducted whereby all stakeholders along the proposed route were identified. Relevant public service institutions directly involved in service provision in the areas were also identified.

During the second stage, a social survey field team engaged residents, commercial interests, social service institutions, and government departments along the transmission route. Those stakeholders who were not available at the first

attempt, were re-visited on the same day or followed-up for their comments during the next few days. During each meeting, the project team introduced the project to the stakeholders, recorded their concerns and suggestions and provided contact details to enable stakeholders to share further comments over email or in writing. The comments solicited from stakeholders were helpful in examination of the potential environmental & social aspects of the project and identification of possible mitigation measures.

5.3. Consultation Feedback

The comments, concerns and suggestions received from stakeholders during the consultation meetings and in writing to EMC's Karachi Office have been collated in this section. The comments have been analyzed through categorization of stakeholder comments based on the stakeholders in the vicinity of the project site.

5.3.1. Concerns & Suggestions

The concerns and suggestions of stakeholders have been segregated into specific categories based on the interests of the stakeholders. These are elucidated in Table 5.3.

Stakeholder Categories	Concerns & Suggestions
1. Institutions (Local Government, GoS Departments, Utilities)	<ul style="list-style-type: none"> The route that falls in the Lines area has many heritage sites as well as historical buildings. The work should not damage nor provide any nuisance to these sites. Representatives of the relevant Union Councils came forward and appreciated the works and offered all support from their offices.
2. Religious and Historical Places (Parsi Community Center, St. Patrick's Cathedral, Masjid Bait-us-Salam)	<ul style="list-style-type: none"> All the representatives welcomed the project and appreciated the consultation process with stakeholders, especially with minorities and religious places. They expressed their support for any development works that are in the interests of the larger community. If possible, work should be avoided on days when large congregations visit including Fridays for Mosques and Sundays for the Cathedral and Parsi Center.
3. Social Service Providers (St. Patrick's Boys School & College, St. Josephs Convent School & College, Cantt General Hospital, CBC Elaj)	<ul style="list-style-type: none"> This side of Mubarak Shaheed Road has many academic institutions and therefore traffic jams are common in this area during school timings in the morning and afternoon. Moreover, to cater to the large volume of students and teachers that enter/exit the area, a large number of school vans and buses are continuously parked on the road reducing the thorough-way for other traffic. St. Patricks School alone has 7,000 students and a staff of over 500. The proponent should ensure that during the construction works, all the gates of the schools/colleges are not blocked. Work should be carried out sequentially to allow access to some gates, while work is carried out in front of others. There is a nallah passing in front of the St. Patrick's Boys School & College; construction works should ensure that the nallah is not disturbed otherwise the entire road will be flooded. It is recommended that as summer vacations are only a few months away, the construction works in this area should be completed during those months. The major health facilities along the route welcomed the project and requested for works to be completed in the shortest possible duration, especially to avoid any obstruction to ambulatory services and any other emergency cases.
4. Residential Pockets (Umer Farooq Town, Railway Colony, Hazara Colony, DHA Phase II, II Ext, IV)	<ul style="list-style-type: none"> Representatives of residential pockets visited welcomed the project and hoped that load-shedding would decrease in the areas. Currently load-shedding occurs anywhere from 2-7 hours in the areas near the transmission route, which is worse in the summers. K-Electric recently completed some work for underground cables in the area; even though the work has been complete several months ago, large heaps of dirt are still lying on the roadside next to Jacob Lines Grid Station which is a nuisance for workers and visitors of Dhobi Ghat. It should be ensured that this time around K-Electric

	<p>completes the work with proper backfilling and rehabilitation of the areas.</p> <ul style="list-style-type: none"> • The residents requested that the construction works should be planned to avoid minimum disturbance to residents. • They requested that K-Electric should inform them beforehand regarding the timings of the construction works and should respond to their complaints swiftly.
5. Commercial Interests (Dhobi Ghat, Auto-Mechanics, Furniture Market, Fuel Stations, Shop owners, property dealers)	<ul style="list-style-type: none"> • Majority of the fuel stations complained that even temporary disturbance in front of their facilities hurts their business significantly; previous experience has shown that sales significantly decrease during the construction months. In some areas, fuel stations are already suffering due to the expenses they have to bear for generator diesel and maintenance. • The smaller commercial areas along the route such as auto-mechanics, furniture market, retail shops and dhobi ghat face varying hours of load shedding. However, overall all areas expressed that load-shedding had decreased compared to previous years. Further decrease in power outages would attract more customers and improve their income. • The works should be carried out in the shortest possible time; areas should not be left dug-up for several days. • Office equipment suffers from electrical fluctuations. K-Electric should be mindful of the risks the businesses face due to loss of essential office equipment and machinery due to such frequent fluctuations. • As the work is usually completed by contractors and sub-contractors, K-Electric should monitor their works to ensure proper task completion.

Consultation Photos



Ayan Autos at Mubarak Shaheed road



Shahwaiz Silencer Maker at Mubarak Shaheed road



Waryam & Sons at Mubarak Shaheed road



Mufaddal Motors at Mubarak Shaheed road



St. Patrick's School for Boys



Parsi Community Center



Manager, PSO Pump at Mubarak Shaheed road



Rehan Engineering Works



Discussion with Residents and Workers of Dhobi Ghat (back side of Jacon Line GS)



Discussion with Councillor, Union Council-10 (Jacob Lines Grid Station)



Consultation with TOTAL PARCO Petrol Pum owner at Shahrah-e-Faisal – Korangi Road



Consultation with local Mosque Imam in Hazara Colony near Korangi Road along Pak Railway Mainline



Consultation with Shell Petrol Pum owner at South Circular
Avenue – Korangi Road



Consultation in CBC Elaj along South Circular Avenue



Consultation with shop owner at Sunset Commercial
Street #1



Consultation with Real Estate agent at Sunset Commercial
Street #1

Chapter 6 Screening of Alternatives

6.1 Introduction

The screening of alternatives is a part of the EIA process to select the best among all possible project options. The alternatives of a project are defined as the options that can help to meet the objectives of a project by different means including an alternative project site, technology or material, design or inputs. The key criteria when identifying alternatives is that they should be feasible and reasonable.

6.2 The 'No Action' Alternative

132 kV Gizri-Jacob current circuit is oil filled and is very old almost completed its life span. Moreover, the addition of this circuit in EHT network will ensure the required degree of reliability for power system and comfort the shift engineers, grid operators in easy and efficient management of load. The KE consumers will surely be benefitted after the energization of this circuit. The augmentation of bulk supply through underground transmission lines will be able to meet the rising power demand. Therefore "No Action" alternative option will not be considered as beneficial for the proposed development.

6.3 Transmission technologies alternative

6.3.1 Choices between one HVTL or several LVTL

Towards meeting the required distribution, the decision of either utilizing four 33kV lines, two 66kV lines instead of one 132kV line were evaluated with the final being the favoured alternative on practical grounds. Transmitting power at high voltage decreases the fraction of energy lost to resistance. For a given measure of energy, a higher voltage reduces the current and thus the resistive losses in the conductor. For example, raising the voltage by factor of 10 decreases the current by a corresponding of 10 and in this manner the I^2R losses by a variable of 100, gave the same measured conductors are utilized as a part of both cases. Regardless of the possibility that the conductor size (cross-sectional range) is reduced 10-fold to match the lower current the I^2R losses are still decreased 10-fold. Long distance transmission is commonly done with underground lines at voltages of 115 to 1,200 kV.

6.3.2 Overhead versus Underground Transmission line

The decision between overhead versus underground transmission lines was also considered. Certainly, electric power can be transmitted by underground power cables which assist the transmission of power crosswise over thickly populated urban zones, territories where area is occupied or arranging assent is troublesome, waterways and other natural obstacles, land with extraordinary natural or environmental heritage, regions of significant or prestigious infrastructural advancement and area whose worth must be kept up for future urban development and rural improvement.

Underground Transmission

- Less subject to harm from extreme climate conditions (mostly lightning, wind and heavy showering);
- Remarkably decreases the intensity of electromagnetic fields (EMF) in the surrounding area. All electric currents produces EMF, yet the protecting shield provided by the earth encompassing underground cables limits their extent and power;
- Underground cable require a narrower encompassing strip to introduce; though an overhead line require a surrounding strip of around 20–200 meters wide to be kept for all time clear for safety, support and repair;

- Site restoration for underground construction is a much larger effort than it is for overhead construction because soil is disturbed along the entire route;
- High-voltage underground transmission lines require small substations called transition substations wherever the underground cables connects to overhead transmission;
- Underground high-voltage transmission lines generally need to be replaced after approximately 40 years;
- Underground cables pose no risk to low flying airplane or to natural life, and are essentially more secure as they pose no shock hazard (except the digging and excavation);
- Their maintenance and repair is very arduous and time consuming;
- Underground lines are silent except in the immediate area near the transition substations, which are lighted throughout the night for security purposes;
- They are less likely to cause death or injury due to accidental contact with the lines/cables;
- The transmission through underground is more expensive than overhead electrical cables, and the life cycle expense of an underground power cable is two to four times more than an overhead electrical cable.

Overhead Transmission

- Installation of overhead lines may prevent from removal of small trees and bushes along the transmission ROW;
- Overhead lines are at great risk against lightning strikes which can cause interruption and serious accident;
- Overhead lines use bare conductors and can be damaged;
- Aesthetically unattractive as they distract the scene of the landscape;
- It doesn't require high cost in construction, repair & maintenance;
- Overhead high voltage lines can emit hiss or hum noises;
- When people come into accidental contact with overhead lines, the implications are extremely severe;
- Overhead lines have a life expectancy of more than 80 years;
- Its cost is lesser than Underground Transmission line.

6.3.3 High Pressure, Fluid-Filled Pipe Type Cable or Solid Cable, Cross-Linked Polyethylene

XLPE cable will be used since some problems associated with HPFF pipe-type underground transmission lines including maintenance issues and possible contamination of surrounding soils and groundwater due to leaking oil have been observed. XLPE cable has become the national standard for underground electric transmission lines which are less than 200 kV. There is less maintenance with the solid cable, but impending insulation failures are much more difficult to monitor and detect.

6.3.4 Selection of transverse routes

Transverse routes of transmission line will be designated through the technical criteria and must consider the following subjects

- Minimization of transmission line length that may prevent the excess use of resources;
- Minimize the disruption of traffic, mobility/access of people;
- Minimize the disruption of existing utility lines;
- Minimize the cutting of trees;

The shortest distance from Gizri GS to Jacob lines GS is 4.4 km. The preferred routes with regards to cost and laying of TL will be the shortest route, however several factors must be taken into account to lay the TL which as discussed as follows:

Availability of ROW

ROW must be acquired for the preferred route. It is evident that the selected route will avoid major social settings like housing structures, shops, government departments, commercial areas. As the proposed area is highly concentrated with development activities. Therefore it is proposed that existing arterial roads to be used for the laying of the TL. Land along the roads must be acquired from relevant local agencies like DHA, Cantonment, KMC, Pakistan Railways etc.

Two major linear structures are laid between the two GS i.e. Mainline of Pakistan Railways and Shahrah-e-Faisal. Mainline of PR is avoidable only if the TL will connected from Kala Pull and run over the PR mainline along the Pull. However, the selection will depend on the selected Contractor's technique. On the other hand, the TL will intersect the PR mainline and Shahrah-e-Faisal using the thrust boring technique. The technique requires open area on both sides of the alignment where the boring is required. Therefore the intersection point on these two linear structures will be so selected to have the ample area for the boring requirements.

Sensitive locations

Following figure shows the sensitive locations that will be avoided for the route planning.

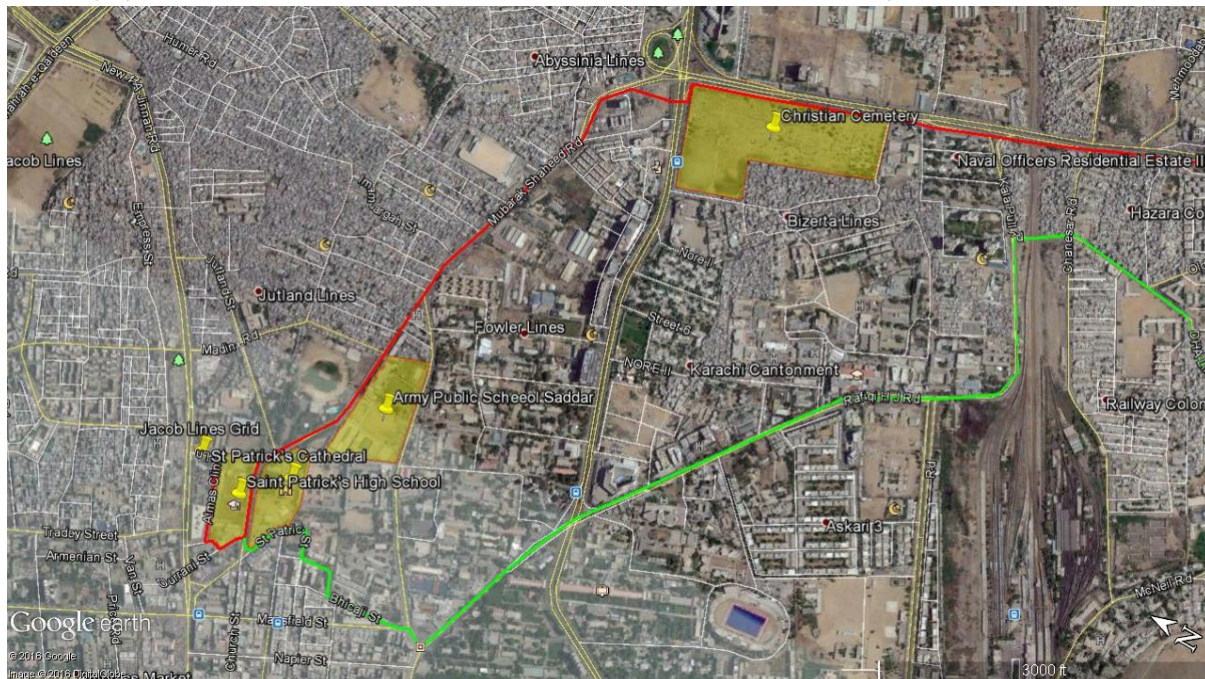


Figure 6.1: Sensitive locations along the route

Christian Cemetery and St. Patrick's Cathedral will not be intrude by the route, however, the line will pass along the public roads/footpaths outside these locations. There will be no impact to these receptors because the trench placed near them will be only 4 feet deep, however, there will be a short term impact to the visitors visiting these sites during construction phase. But the impact will be minimal and of short term.

6.3.5 The Preferred Option

The installation of underground transmission line would not exert negative impacts associated with the power line such as visual intrusion especially in residential areas, impacts on road, street infrastructure, utilities services and terrestrial utilization. Subsequently, the natural shield provided by the earth surrounding underground cables restricts the range

and power of electromagnetic fields (EMF) generated as a result of high voltages. In the worst environmental conditions such as lighting, heavy shower and turbulent wind situation, underground transmission cable would remain safe and are significantly harmless for the biological environment. Therefore underground transmission option will be feasible and remain beneficial for the proposed development. Energy efficient equipment's would be the first priority to avoid the excess use of resources in the construction activities. Generally, trench excavation would be required along the entire route through the excavators, Backhoe and jack hammers but in streets or narrow path, where the machineries approach are not possible trench would be constructed manually through spade and shovel instead of fork and pick-axe to avoid the damages of other utilities.

The Preferred Route

Figure 6.2 shows the preferred route (shown in Red) due to the following reasons:

1. This route is the shortest route which can be laid via roads
2. It avoids major residential areas and Katchi Abadis
3. It avoids the main commercial area of Saddar
4. Ample space for 2.5ft. ROW is available on this route along the roads and footpaths
5. Consultations were conducted with stakeholders present along this route and all have no issues of having a transmission line laid along the roads.

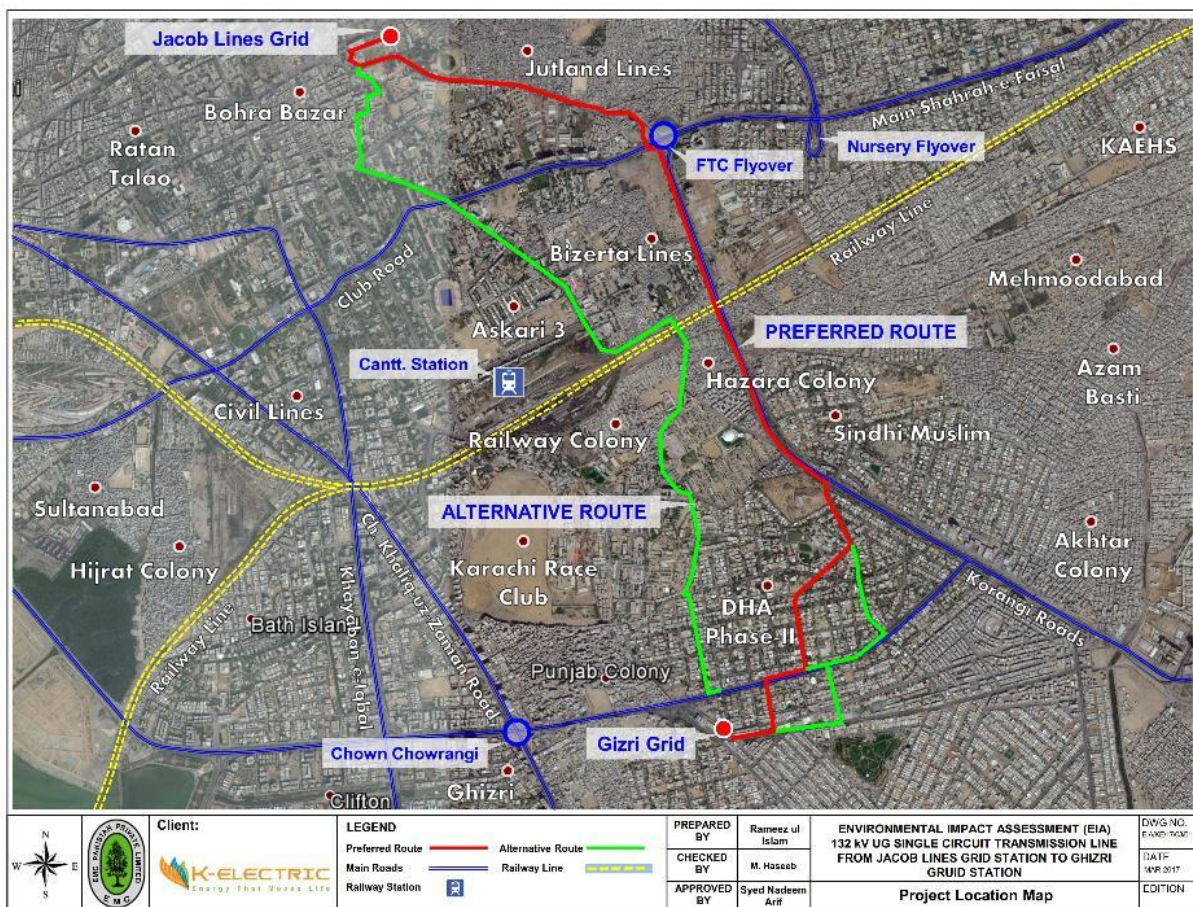


Figure 6.1: Preferred Route alignment for laying of 132 KV TL (as shown in Red)

Chapter 7 Potential Environmental Impacts & Proposed Mitigation Measures

7.1 Introduction

This chapter documents the findings of assessment of potential environmental and socio-economic impacts and proposes their mitigation measures. It includes identification, analysis, prediction, significance and characteristics of the impacts and mitigation measures to prevent unacceptable adverse effects through the implementation of appropriate project modifications.

This chapter plays a vital role in environmental impact assessment and identifies all significant impacts during the designing, construction and operation phases of the project. Environmental and social aspects identified during the stakeholder consultations and by the screening process are assessed for their severity and mitigation measures have been proposed on the basis of assessment. Additionally residual impacts are identified using professional judgment that may persist after adoption of mitigation measures. The proponent will adopt these mitigation measures to reduce, minimize and compensate for the negative impacts as far as possible.

7.2 Screening Methodology

Potential Project impacts have been identified in this section related to the project pre-construction (siting), construction and operation phases. Impact predictions are based on the consultants' previous experiences on similar projects; professional judgment; data collected in the field; discussions with local communities, relevant government officials and relevant technical specialists. Predicted impacts relate to all aspects of the proposed 132 kV UG Transmission line. Many of the mitigation measures are related to route alignment, others with good construction practices.

7.3 Designing Phase: Impacts and their Mitigation Measures

Designing phase impacts are primarily related to i) land acquisition, resettlement and approvals; ii) sensitive receptors (schools, hospitals, environmentally sensitive areas) and existing infrastructure (roads, railways); and iii) physical cultural resources (PCRs). Mitigations are mainly related to careful selection of the right of way for underground transmission line so as to avoid or minimize impacts.

7.3.1 Land Acquisition, Resettlement and Approvals

The ROW will be obtained from DHA / KMC / CBC for the underground Transmission line in the very beginning. NOCs from relevant institutions will be taken before the laying of TL.

7.3.2 Physical Cultural Resources by affecting any archaeological site

The construction of underground transmission line ROW has the potential to negatively impact any physical cultural resource like an archeological building.

Figure 7.1 shows the Cultural Resources located along the proposed route alignment. Christian Cemetery and St. Patrick's Cathedral will not be intrude by the route, however, the line will pass along the public roads/footpaths outside these locations. There will be no impact to these receptors because the trench placed near them will be only 4 feet deep, however, there will be a short term impact to the visitors visiting these sites during construction phase. But the impact will be minimal and of short term.

7.3.3 Sensitive Receptors and Existing Infrastructure

The construction of underground transmission line ROW has the potential to negatively impact sensitive receptors (schools, hospitals) and existing infrastructure (roads, railways, utility Lines). No residential or public buildings like factory, school, hospital, mosque or graveyards are permitted within the corridor of underground transmission line.

Figure 7.1 shows the sensitive locations located along the preferred route alignment.

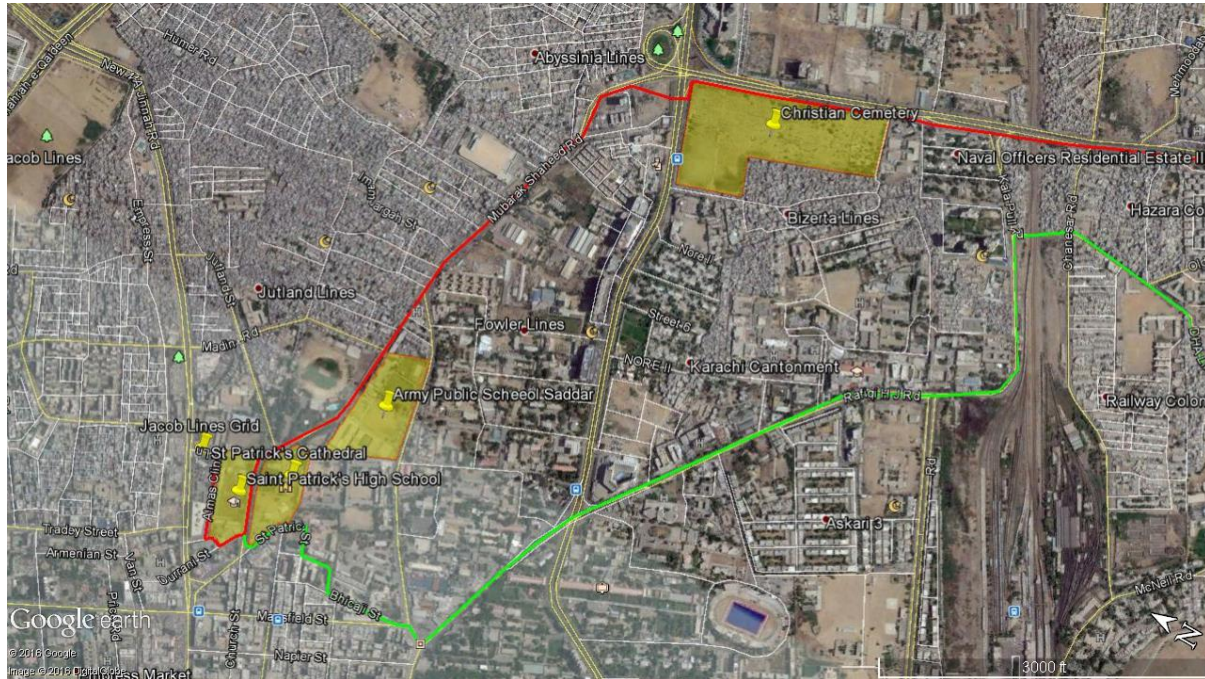


Figure 7.1: Sensitive locations located along the preferred route alignment

Mitigation Measures

- During the selection of ROW for underground transmission line, significant efforts should be made to avoid or minimize impacts on sensitive receptors or existing infrastructures;
- Sensitive receptors shall be avoided like schools and religious places;
- Prior notices shall be given to the school / religious places administrators before the starting commissioning activities near these sensitive locations;
- Prior notices shall be given to the legal shop owners and residents before the starting commissioning activities near these settings;
- GRM as discussed in Section 8 shall be followed in letter and spirit;
- Impacts on public utilities should be minimized by incorporating environment friendly construction methods in the engineering design; and
- Works around public utilities should be carried out in consultation with relevant authorities.

7.3.4 Barriers to Movement of People/Traffic

The excavation & backfilling of underground transmission line ROW may result in obstruction to movement of people/ local traffic.

Mitigation Measures

- Cables that cross main roads will be achieved through thrust boring under the road;
- Cables that cross railway mainline will be achieved through thrust boring; and
- The excavation and backfilling activities should be scheduled (skipping peak hours) to minimize the impact of barrier to the movement of people and traffic.

7.3.5 Temporary Construction Camps

There may be a requirement to establish small construction camp. If not undertaken carefully these activities can result in deterioration of air & water quality, and social impacts including social unrest and disease transmission.

Mitigation Measures

- Camps are to be located away from residents/commercial activities to minimize nuisance;
- Sanitation facilities in the camps if provided should be mobile and collect its wastewater or connected to the local sewerage system;
- Bathing of construction crew should be prohibited at the camp as it will required large quantity of water as well as wastage.

7.3.6 Establishing responsibility on construction contractor regarding disposal of spoil/ excavated earth

Construction Contractor/Waste Contractor shall be made responsible through contract documents for proper disposal of the spoil / excavated earth and not to dump these spoils/ earth near open plots / open spaces / open storm water drains / in front of residents or left unattended along the construction site. It should be disposed in KMC designated landfill site.

A proper site rehabilitation plan shall be made by the contractor include the spoil / excavated earth disposal arrangements

7.3.7 Establishing responsibility on construction contractor to abide SEQS

Contractors shall also be made responsible through contract documents to follow Sindh Environmental Quality Standards (SEQS) and applicable standards during all the construction operations and ensure compliance of the same through periodic environmental monitoring reports.

7.3.8 Health and Safety of Workers and Public

Contractors shall be made responsible through contract documents to follow Standard Practices and Standard Operating Procedures (SOPs) to ensure health & safety of workers at the site and public during all construction operations.

7.4 Construction Phase: Impacts and Mitigation Measures

Construction phase impacts include erosion of soil; impacts on surface and groundwater; solid waste management; air quality issues, primarily related to dust generation; noise; vegetation removal or cutting of trees and other impacts on flora and fauna; aesthetic impacts; and occupational and community health risks. Mitigation measures include good construction and housekeeping practices, and compensatory planting for the loss of trees in the ROW.

7.4.1 Erosion of soil

Project activities may cause erosion of soil. Such activities may be identified as transportation of materials and equipment, excavation for 132 kV Line and for laying of transmission cables, backfilling and restoration of road, landscaping, and removal of natural vegetation etc. Usually, the exposed soil after excavation for foundations is vulnerable to erosions and runoff by heavy rains.

But, the impact of all these activities would be less significant and temporary lasting only for construction period. However, the aspects of soil erosion such as blockage of surface drainage network, impact on quality of natural water and biological system may cause potential environmental impacts that may also affect their users.

Mitigation Measures

- The most suitable strategy to avoid adverse environmental impact of soil erosion is to limit area from where the removal of vegetation is being done to construction site only. The other areas should be disturbed least;
- Construction activities should be scheduled to avoid runoff due to rain;
- The dredged soil must be contained in an enclosure to reduce the chances of runoff during the seasons of precipitation;
- Stock piles of fine material should be wetted or covered with tarpaulin especially during windy weather conditions;
- Site workers should wear dust masks especially during the dry and windy weather conditions;
- Debris should be collected during construction and disposed of in low lying areas near the site;
- After constructional activities are finished, the site which is cleared temporarily and is recommended for vegetation should be re-vegetated promptly;
- Cut and fill should be balanced to the extent practical at each site in order to minimize the need for fill and for spoil disposal. Cut material should be used to level the site area or be disposed at designated spoil disposal sites;
- Excess spoil should only be directed to designated disposal areas and temporary quarries; no disposal in waterways is allowed.

7.4.2 Impacts on Surface and ground water sources

Generally the type and significance of the impact is dependent on the characteristics of the water resource, the design of the structures and their method of construction. However underground transmission line may come across a storm water drain and will have short term impacts.

Mitigation Measures

- All excavated soil should be completely removed;
- Debris and vegetation clogging culverts should be regularly cleared;
- Soil runoff from the site leading to off-site contamination (particularly during rainy season) should not be allowed; and
- Spillage of oil and grease from the vehicles should be avoided.

7.4.3 Fuel, Oil & Chemical handling, storage and disposal

Inappropriate handling, storage and disposal of fuels, oils and chemicals at construction sites may lead to contamination of soil.

Mitigation Measures

- Chemicals and oils should be stored in secure designated areas with temporary impermeable bunds at distance of at least 100 m from any water course;
- Refueling, oil changing and engine maintenance of machinery, equipment and vehicles should be avoided at construction site;
- Oil contaminated materials should be disposed at designated waste disposal facilities.

7.4.4 Water Consumption and Conservation

Water is used in numerous construction activities such as concreting, curing, plastering, domestic etc. Water required for such activities is being met from external sources such as water tankers supplying water to the construction site.

Mitigation Measure

- Regular monitoring of water consumption, conservation and quality;
- Use of leak proof water storage tanks;

7.4.5 Solid Waste Management

Typical solid waste generated during construction include waste concrete, steel scrap, wooden scaffolding, empty cement bags, excavated soil, wood remains etc. Solid waste generated during land clearance and Earth-fill material will be in large quantities. This waste has the potential to cause negative impact on the surroundings if not properly managed and disposed of. It is likely to block nearby drainage channels that can ultimately cause localized flooding during monsoon season. Random storage of this waste is hazardous to the workers at the site as well. Windblown debris is a nuisance to the nearby dwelling units. Poor waste management practices would result in short term and long term negative impacts on the aesthetics of the surrounding.

Mitigation Measures

- A Comprehensive Waste management Plan for Construction phase should be developed;
- Construction sites should be equipped with temporary refuse bins, and construction wastes should be collected on a daily basis and contained in a temporary designated waste storage area on each site;
- Designated waste storage areas should not be within 50 m of water ways;
- Any hazardous waste should be separated and stored in areas clearly designated and labeled, and disposal in environmental friendly manner.
- Wastes should be routinely collected from the designated area and disposed at licensed waste disposal facilities approved by SEPA; and
- Upon completion of activities at a construction site all solid wastes should be completely removed and the site should be re-contoured or prepared for natural re-vegetation.

7.4.6 Dust Emissions

Construction activities that may lead to dust generation include cutting and excavation; transportation and tipping of cut materials; handling and storage of aggregates in concrete plants; concrete batching; site leveling and clearing of trees; and associated activities. The quantity of dust that may generate on a particular day of construction phase will depend on the magnitude and nature of activity and the atmospheric conditions prevailing on that day.

Mitigation Measures

- Dust emissions from soil piles and aggregate storage stockpiles should be reduced by keeping the material wet by sprinkling water at appropriate frequency and erecting windshield walls on three sides of the piles;
- It should be mandated by KE to Contractor to backfill the trenches after laying of the pipeline and rehabilitate the excavated area to its original position. If it is a road, the backfilling will be followed by levelling and carpeting of road with bitumen;
- Vehicular movement should be restricted to a specific time for dumping of supplies and construction materials; and
- Workers should wear dust masks and safety goggles, especially during dry and windy weather conditions to avoid health risk.

7.4.7 Exhaust Emissions

Major sources of exhaust emissions are standby diesel generators, material transport vehicles and emissions from construction machinery/earth moving equipment. Major exhaust emissions of concern are CO, CO₂, SO_x, NO_x and PM₁₀. These emissions are injurious to human health in high concentration and also can cause vegetation damage by clogging the photosynthesis process in plants.

Mitigation Measures

- All vehicles, generators and other equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants;
- Emissions from the machinery and vehicles will be monitored on regular basis to ensure compliance of SEQs;
- Excessive engine idling will be discouraged and machinery causing excessive pollution (i.e. visible clouds of smoke) will be banned from sites;
- Standby generators for power supply will be kept away from pathways and will be placed at locations where probabilities of human intervention are limited; and
- The stack height of the generators used will be at least 3 m above the ground.

7.4.8 Noise and Vibration

During the construction phase noise will be generated from the operation of heavy machinery and haulage of construction materials to and around construction sites and construction activities including concrete mixing, excavation, thrust boring, drilling, backup power generators for supply of electricity; use of pressure horn etc. These construction activities are expected to produce noise levels in the range of 80 – 95 dB and may cause discomfort to local residents and fauna.

Vibration and noise could become a major consideration (within 100m of schools, religious premises, hospitals or residences etc.).

Mitigation Measures

- Machinery operation and high noise activities should be carefully planned and scheduled;
- To the extent practical batching plants and construction areas should not be located within 500 meters of a settlement;
- Where that is not possible, high noise activities should cease between 20:00 and 06:00 hrs at any construction site within 500 meters of a settlement, or if noise complaints are received from settlement residents.

- Vehicles and machinery will be equipped with silencers. Contractors will be required to fit noise shields on high noise construction machinery;
- Site labor working in high noise area such as where noise level exceeds 80 dB (A), will wear earplugs;
- The stationary sources of noise such as concrete mixers, batching plant, power generators and pumps will be selected and segregated from work areas and residents; and
- Occupational health, safety and environmental procedures and Environmental management plan for proposed project would be followed.

7.4.9 Impacts on Ecology (Flora and Fauna)

Construction activities of underground transmission line may slightly affect some species of flora and fauna of common nature, however this impact would be minimum as all activities would be limited and strictly carried out on the transmission line ROW. Birds will not be affected as they will relocate to adjacent suitable habitats.

Mitigation Measures

- Compensatory plantation shall be provided at a ratio of 1:3;
- Selection of plants for landscaping should consider the habitat suitability, trees of national interest, flowering trees and shrubs; and
- By using the best practice for vegetation clearing and disposal practices; will minimize the environmental risk associated with clearing and disturbance of vegetation communities.

7.4.10 Occupational Health and Safety

The construction of civil works poses an inherent risk of injury to workers from accidents and hazardous working environments. There may be either minor or major accidents due to different activities of construction phase.

Mitigation Measures

- Preventive and protective measures including modification, substitution, or elimination of hazardous conditions, with particular attention to live power lines, working at height, working above water, EMFs, high noise levels, and exposure to chemicals will be made;
- Measures for the management and appropriate disposal of hazardous wastes will be undertaken to ensure protection of the workforce and the prevention and control of releases and accidents;
- Appropriate fire extinguishers and fire response plans will be available at the site;
- Appropriately stocked first-aid equipment and stations at both work sites and temporary construction camps, including appropriately trained first aid staff on site and adequate transport facilities for moving injured persons to the nearest hospital will be available;
- Training for workers and appropriate incentives to use and comply with health and safety procedures and PPEs will be provided;
- Procedures for documenting and reporting occupational accidents, diseases, and incidents;
- Emergency prevention, preparedness, and response arrangements will be in place;
- There will be strict safety requirements for personnel assigned to construction work;
- To maintain safe conditions for the general public, all substations will be fenced and gated, that must be locked at all times; and
- Appropriate signage will be posted that shows the owner of the substation, the hazardous nature of the substation and contact information.

7.4.11 Heat Stress to Construction Workers

There will be a very likely impact of sunlight causing heat stress to construction workers during summer season. Also the project corridor has no significant vegetative cover.

Mitigation Measures

- Move to a cool place e.g. cool shady area;
- Provide plenty of drinking water;
- Break the working in shifts; and
- Massage muscles gently to ease spasms, or firmly if cramped, then apply ice packs and drink glucose.

7.4.12 Impacts on Traffic

Traffic flow in the locality of project slightly increases during construction activities. The transportation of trucks for raw materials and mobilization and demobilization of the earth works equipment are required during construction phase of proposed project. This activity has potential to directly impact the traffic flow along the right of way of underground transmission lines. This increase in traffic may congest the flow of traffic along Sunset Boulevard, Korangi road etc. (used by schools, residents, businesses along the roads, laborers and office going people); and may cause some accidental injuries and deteriorate the air quality of ambient air.

Mitigation Measures

- Traffic management plan will be developed and implemented during the construction phase;
- Excavation near schools and businesses should be done during non-peak hours and the construction should be done in pieces near sensitive areas;
- Construction activities will be scheduled to reduce the chances of traffic jams;
- Adequate and appropriate road signs will be erected to warn road users along the ROW of transmission lines;
- The movement of equipment (trucks) during the construction of the proposed project will be limited to 9:30 am - 4:30 pm per day;
- Raw materials for construction work will be adequately covered within the trucks to prevent any escaping into the air and along the roadway;
- Vehicles will be maintained regularly to reduce the exhaust emissions; and
- Any complain launched by community member will be responded and appropriate action will be taken to avoid it in future.

7.4.13 Socio-economic Impacts

During construction phase, an average of approximately 100-120 persons will be employed on contract basis which will put the positive impact on the socio-economic status of Karachi City.

7.4.14 Damage to Other Utilities by Using the Existing ROW

There can be risk of damage to other utilities during excavation activities. Sharing corridors with existing facilities may minimize impacts by:

- Reducing the amount of new ROW required;
- Concentrating linear land uses and reducing the number of new corridors that fragment the landscape; and
- Magnetic fields may be reduced because new structure designs places line conductors closer together resulting in lower fields.

However, Contractor will evaluate the use of existing ROW. Also, all drawings of existing services along the chosen route alignment must be with the Contractor. It must be avoided to the sewerage line and other water mains will be broken down. If the breakage of the lines occurred, repair must be made as quickly as possible. KE should mandate the Contractor to rehabilitate the lines as its original positions with coordination with the relevant agencies.

7.4.15 Community Health & Safety

The construction of underground transmission line also poses a modest risk to local communities from emergency events such as entry of local people in dangerous working environments and can also disrupt the traffic. Falls into the trenches made for laying of transmission cables at night can also occur.

Mitigation Measures

- Emergency response plan should be prepared and implemented during entire phase of construction;
- Procedures for interaction with local and regional emergency and health authorities should be made;
- In order to minimize traffic congestion (if applicable), deliveries of materials and equipment should avoid peak traffic hours between 6:30-8:30 am and 3:30-4:30 pm;
- It should be mandated by KE to Contractor to backfill the trenches after laying of the pipeline and rehabilitate the excavated area to its original position. If it is a road, the backfilling will be followed by levelling and carpeting of road with bitumen;
- Proper lighting at night near trenches will be ensured; and
- Diversions, danger points and works at culverts, bridges and construction sites will have appropriate warning signs; this is particularly important at night to avoid accidents.

7.5 Operational and Maintenance Phase: Impacts and Mitigation Measures

The most focusable area in the impact assessment process of proposed project is operational and maintenance activities of Grid Station, Line Bay & Underground Transmission Line as impacts generated during these phases may have long term and continuous affects. During scoping exercise, several probable impacts have been evaluated with their appropriate mitigation measures. Potential operational issues include spills or release of oils or hazardous materials, EMF effects, occupational and community health and safety risks, risks from fires, earthquakes and Spills of transformer oil. Mitigation measures have been incorporated into the design to minimize them to acceptable levels.

7.5.1 Health Impacts

a. Human Exposure to Electromagnetic Fields (EMF)

Electromagnetic field (EMF) is the term used to describe electric emanations and the resultant magnetic fields caused by the movement of electrical current. The field is at its maximum near the conductor and the intensity drops away from the conductor. EMF is both a natural phenomenon and a consequence of anthropogenic sources (e.g. electrical generation, transmission, distribution and use of electrical equipment). According to some research that EMF can have a number of adverse health effects. These include both short term health problems (headaches, fatigue, anxiety, insomnia and muscle pain etc.), and long term health problems (childhood leukemia, Alzheimer's, breast cancer,

neurodegenerative diseases and miscarriage etc.). For years, scientists have conducted research linking EM radiation to serious diseases. After an extensive review of 2,000+ such studies, the National Institute of Environmental Health Sciences concluded EMFs "should be regarded as possible carcinogens." Forward-thinking nations around the world are starting to set stricter EMF safety limits.

However, in underground transmission line, the effect of EMF reduces due to increase in distance between the source and the receptor; and shield is also provided due to soil cover. Also the field of the three cables overlaps each other; thereby their collective effect is reduced.

Mitigation Measures

- Design the transmission line to ensure that electric and magnetic fields are minimized, given the voltage and load requirements;
- Design line accordingly as not to increase background EMF at sensitive receptors;
- Depth of trenches from living environment will provide a reduction in EMF exposure since Magnetic field strength attenuates rapidly with distance from the source; and
- Liaise with nearby residents and undertake EMF monitoring with them. Further, maintain the complaints register and supply up to date information to the community upon request regarding EMF.

7.5.2 Impact of Gaseous Emissions

The only source of gaseous emissions from the proposed project is the standby power generators and the vehicles of use during maintenance work.

Mitigation Measures

- All vehicles, power generators and other equipment used during the maintenance work will be properly tuned and maintained in good working conditions in order to minimize emission of pollutants; and
- Emissions from the machinery and vehicles will be monitored on regular basis to ensure compliance with SEQS.

7.5.3 Impact of Waste

The operation and maintenance activities of proposed project may generate some hazardous and non-hazardous waste such as wires and wild vegetation etc. which if not disposed of properly could have adverse impacts on the environment.

Mitigation Measures

- Ensure that all solid waste collected during operational or maintenance work is disposed of in an appropriate disposal site in the locality.

7.5.4 Property Value and Aesthetics

Post construction issues such as aesthetics and property values are usually less of an issue for underground lines as they are not visible after construction. However, during routine maintenance, the area aesthetics can be slightly affected.

Mitigation Measures

- The trench area during routine maintenance must be rehabilitated and where recommended should be re-vegetated/carpeted with bitumen immediately after the completion of maintenance activities.

7.5.5 Positive Socioeconomic Impact

Project operation will result in a number of significant positive socio-economic impacts including:

- Energy savings through the reduction of power losses due to the improved efficiency of the 132 kV Bulk Supply Contributing to long-term energy supply security;
- Generating employment for local people; and
- Improving the technical skills of local people.

Chapter 8 Environmental Management & Monitoring Plan

8.1 Introduction

8.1.1 General

This section discusses the implementation and management of mitigation measures that are required for proposed project that includes progressive report and techniques to assure that all necessary environmental protection measures are carried out in the future as planned and to reduce residual impact to acceptable levels and achieve the expected outcomes of the project. The Environmental Management and Monitoring Plan (EMMP) are based on the type, extent and duration of the identified environmental impacts. The EMMP has been prepared following the regulatory requirements and guidelines.

Environmental management and monitoring is mandatory activity to be undertaken by the administration over the entire project cycle showing its commitment towards meeting environmental regulations/standards as well as maintaining health and safety standards.

The environmental management and monitoring programs are implemented from the very early stages of planning and execution phases of the project. In fact the authorization of the project is the point of initiation of environmental management plan. The monitoring data, observations recorded and test results / analyses are vital and formulate legal documents to be kept in safe custody and may be provided to competent authority as and when required in accordance to Sindh Environmental Protection Act 2014.

EMMP is a dynamic and a live document that is under constant review having periodic revisions and may be updated as required. Any amendments in the procedures, information are notified to the concerned personnel after the approval from the competent authority for subsequent implementation. It also highlights the responsible personnel to work for the implementation of this EMMP.

The Proponent will be responsible for implementing the EMMP and ensuring that all personnel management are informed about the EMMP and the requirement to implement the procedures it contains. The EMMP is intended as a quick reference for Project personnel and regulators to monitor compliance.

8.1.2 Objectives of EMMP

The EMMP will serve as a principal execution module of the project that would not only mitigate adverse environmental impacts during the designing, construction, operational and maintenance phase of the project but also ensures that environmental standards and good housekeeping is maintained. Continuous environmental monitoring is exercised to ensure that preventive measures are in place and are effective; to sustain environmental integrity. Some of the key objectives of the EMP are to:

- Outline mitigation measures recommended in the EIA and define the responsibility and implementation of these measures;
- To outline functions and responsibilities of personnel;
- To state and implement standards and guidelines which are required under environmental legislations particular in context to the project,
- Facilitates the implementation of the mitigation measures by providing the technical details of each project impact, and proposing implementation schedule of the proposed mitigation measures;

- Define a monitoring mechanism and identify monitoring parameters to ensure that all proposed mitigation measures are completely and effectively implemented; and
- Identify training requirements at various levels and provide a plan for the implementation of training sessions

It is important that the recommendations and mitigation measures are carried out according to the spirit of the environmental assessment process and in line with the guidelines. The EMMP are presented in Table 8.1 and Table 8.2. Screening of potential environmental and social impacts has played a vital role in reconfirming typical mitigation measures and in identifying any different approaches based on the feasibility and detailed design assumptions and any alternatives available at this stage.

8.1.3 Legislation and Guidelines

Legislation and guidelines pertaining to this project have been discussed at length in chapter 3 of EIA study of 132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station. It shall ensure that the project activities during designing, construction and operation phases of the project would follow the relevant environmental legislations and guidelines. The staff of the proponent and contractor should also be aware of these laws.

8.2 Environmental Management Plan (EMP)

The impacts and their mitigation measures have been classified into those relevant to the designing, construction, operational and maintenance phase. The matrix provides details of the mitigation measures recommended for each of the identified impacts, time span of the implementation of mitigation measures, and the responsibility of the institution. The institutional responsibility has been specified for the purpose of the implementation and the supervision. The matrix is supplemented with a monitoring plan (Table 8.1).

The monitoring plan is designed based on the project cycle. During the designing period, the monitoring activities will focus on (i) checking the contractor's bidding documents, particularly to ensure that all necessary environmental requirements have been included and (ii) checking that the contract documents' references to environmental mitigation measures requirements have been incorporated as part of contractor's assignment and making sure that any advance works are carried out in good time. Where detailed design is required (e.g. for power distribution lines and avoidance of other resources) the inclusion and checking of designs must be carried out. During the construction period, the monitoring activities will focus on ensuring that environmental mitigation measures are implemented, and to guide any remedial action to address unexpected impacts. Monitoring activities during project operation will focus on recording environmental performance and proposing remedial actions to address unexpected impacts.

8.2.1 Institutional Framework for Implementation of EMP

This Framework illustrates the roles & responsibilities required for the implementation of EMP. The transmission line would be laid for KE who would also finance it. KE would provide technical staff for laying of that transmission line. Environmental management during different phases of proposed project would also be performed by KE. The contractors, staff and supervisors would be trained to ensure environmental safety. The EMP will be prepared to cover all phases of the project including designing, construction, operation and maintenance and the Proponent will ensure that all activities during all phases are in compliance with the EMP and SEQS. The brief Organizational structure for Environmental management is given in Figure 8.1.

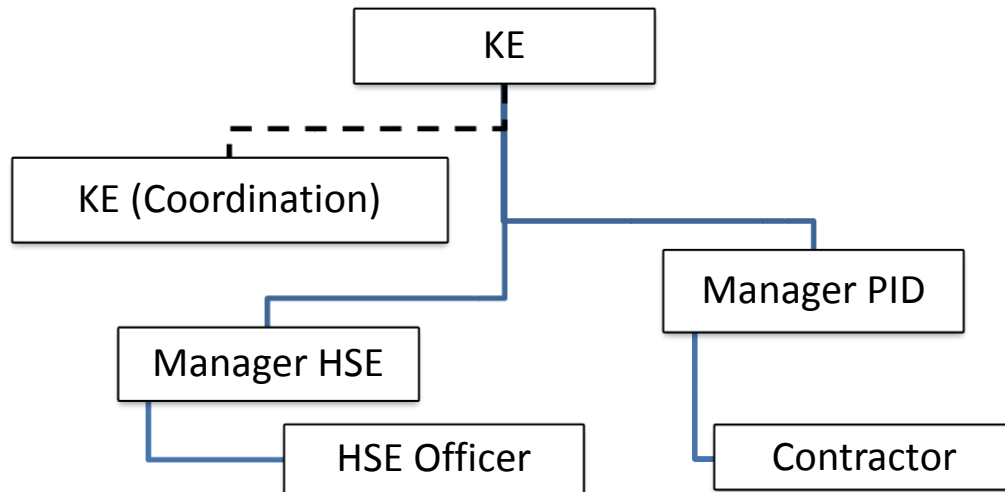


Fig. 8.1: Proposed Organizational setup for environmental management

The K-Electric (KE)

KE would perform the following roles and responsibilities:

- The K-Electric (KE) top management will be responsible for the successful execution of the project;
- KE will ensure that the project complies with regulatory requirements;
- KE is responsible and accountable for HSE performance;
- Provide physical and financial resources to ensure better performance of HSE department;
- It would also be ensured that EMP is followed, staff is properly trained and with requisite expertise and execution of project in accordance with approved plan;
- To keep in place emergency and rescue plans for safety of staff and general public.

HSE Manager

In management plan, the role of HSE Manager is always considered vital. Some roles and responsibilities of HSE Manager are as under:

- To improve the coordination and exchange of information between management, employees and contractors etc.;
- Ensure the health and safety of employees;
- Monitor the progress of development and implementation of EMP;
- To ensure that the point of views of staff and contractors are considered and placed in the EMP accordingly;
- Propose corrective and preventive measures wherever environmental deviations exceed compliance limits;
- To review EMP every year, tracking issues and change the EMP accordingly with the solutions and suggestions; and
- To contribute towards the actions to deliver the management plan and ensure its continued development.

HSE Officer

The role of HSE Officer will be authorized by HSE Manager. Some roles and responsibilities of HSE Officer are as under:

- Integrate as far as possible the aims and objectives of different users within an agreed plan;
- Maintain a balanced, holistic approach to the solution of concerned issues in accordance with the legislative requirements;

- Provide professional guidance on questions relating to the environmental management and issues raised by contractors/ relevant personnel; and
- Implement the suggestions and recommendations given in EMP.

Manager PID

- To consider and react to issues and solutions proposed by HSE department;
- To evaluate the progress of development and implementation of EMP; and
- To approve any change in decision making and authorities in consultation with HSE Manager, if appropriate.

Contractors

Some roles and responsibilities of Contractors are as under:

- To carry out development activities in environmentally sound manner;
- To coordinate with HSE Officer to resolve pertinent issues;
- To ensure that the project activities are undertaken in an environment friendly manner and the mitigation measures are implemented as per the recommendations of EIA;
- Evaluate compliance with SEQS, National and International Policies for Environmental Protection;
- To manage and implement environmental management practices as given in this EMP as well as HSE policies adopted/ prepared by the proponent.

8.3 Environmental Training

An environmental training program will be prepared to address the need of contractor's site staff and build their capacity to effectively implement project-specific EMMP. HSE Officer will coordinate with contractors to organize training for their staff and to help them establish system /infrastructure for future sustainability. In addition to the training arranged and imparted by the HSE officer for complete project team, the contractor will also plan small training sessions for workers involved in specific jobs. Cost of trainings and mitigation measures will be deemed included in contract cost. Environmental Training Plan is provided in Table 8.2.

8.4 GRIEVANCE Redress Mechanism (GRM)

KE and its Construction Contractor will adopt the Community GRM Procedure outlined below, which requires interaction, consultation, and timely resolution of legitimate grievances. This approach is aimed at building a reputation of responsiveness, concern and responsibility among the community, with a view to building and sustaining acceptance and support for the construction and operation of the project.

The grievance officer recruited by Construction Contractor will place a complaint register at an accessible location (Union Council office, mosque, or at camp site) for respective community so anyone can register their complaint in this register and on weekly basis, it will be checked by the GRC.

KE and its Contractor(s) shall foster a sense of working with the local community and demonstrate that the Project takes a proactive stance to grievances.

In implementing KE's Community Grievance Procedure, the Contractor(s) shall:

- Record all grievances using the template Grievance Form given at the end of this section;
- Assess and advise the resolution of the grievance in the time frame required by the assessment.

All grievances will be investigated and a response (outlining a resolution) provided by KE/Contractor(s) as soon as possible and not more than 30 days after receiving the grievance. If more time is required for resolution, the person raising the grievance and KE shall be kept informed.

While the Contractor(s) is not prevented from initiating the grievance resolution, any corrective action taken must be in coordination with KE.

KE and its Contractor(s) shall ensure sufficient resources are allocated on an ongoing basis to achieve effective implementation of this Plan. The Contractor Plan shall describe the resources allocated to and responsibility for the execution of each task and requirement contained therein, and shall describe how roles and responsibilities are communicated to relevant personnel.

Table 8.1: Environmental Management and Monitoring Plan							
Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
Designing Phase							
Sensitive Receptors and Existing Infrastructure	Intrusion to sensitive receptors and Existing Infrastructure	<ul style="list-style-type: none"> During the selection of ROW for underground transmission line, significant efforts should be made to avoid or minimize impacts on sensitive receptors or existing infrastructures; Sensitive receptors shall be avoided like schools and religious places; Prior notices shall be given to the school / religious places administrators before the starting commissioning activities near these sensitive locations; Prior notices shall be given to the legal shop owners and residents before the starting commissioning activities near these settings; GRM shall be followed in letter and spirit; Impacts on public utilities should be minimized by incorporating environment friendly construction methods in the engineering design; and Works around public utilities should be carried out in consultation with relevant authorities. 	CC	Review of complaint register Review the records of local consultations / Near Construction site	Before Construction on monthly basis / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
Barriers to Movement of People/Traffic	excavation & backfilling of underground transmission line ROW may result in obstruction	<ul style="list-style-type: none"> Cables that cross main roads will be achieved through thrust boring under the road; Cables that cross railway mainline will be achieved through thrust boring; and The excavation and backfilling activities should be scheduled (skipping peak hours) to minimize the impact of barrier to the movement of people and traffic. Proponent should ensure that during the construction works, all the gates of the schools/colleges are not blocked. Work should be carried out sequentially to allow access to some gates, while work is carried out in front of others. It is recommended that as summer vacations are only a few months away, the construction works in this area should be completed during those months. 	CC	Traffic diversion sites, check access routes of pedestrians and construction sites / At ROW along the roads and footpaths	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC

Table 8.1: Environmental Management and Monitoring Plan							
Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
Temporary Construction Camps	Deterioration of air & water quality, and social impacts	<ul style="list-style-type: none">Camps are to be located away from residents/commercial activities to minimize nuisance;Sanitation facilities in the camps if provided should be mobile and collect its wastewater or connected to the local sewerage system;Water consumption should be regularly checked and measures will be implemented to avoid wastage of water;Bathing of construction crew should be prohibited at the camp as it will required large quantity of water as well as wastage.	CC	Consumption in liters / Construction sites/camps	Measured on daily basis / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
Contract clauses	Contractor may disown to work in environmental friendly manner	<ul style="list-style-type: none">Construction Contractor/Waste Contractor shall be made responsible through contract documents for proper disposal of the spoil / excavated earth and not to dump these spoils/ earth near open plots / open spaces / open storm water drains / in front of residents or left unattended along the construction site. It should be disposed in KMC designated landfill site.A proper site rehabilitation plan shall be made by the contractor include the spoil / excavated earth disposal arrangementsContractors shall also be made responsible through contract documents to follow Sindh Environmental Quality Standards (SEQS) and applicable standards during all the construction operations and ensure compliance of the same through periodic environmental monitoring reports.Contractors shall be made responsible through contract documents to follow Standard Practices and Standard Operating Procedures (SOPs) to ensure health & safety of workers at the site and public during all construction operations.As the work is usually completed by contractors and sub-contractors, K-Electric should monitor their works to ensure proper task completion.	KE				
Construction Phase							
Soil Erosion	Blockage of surface drainage network, impact on quality of natural water and biological system may	<ul style="list-style-type: none">Construction activities should be scheduled to avoid runoff due to rain;The dredged soil must be contained in an enclosure to reduce the chances of runoff during the seasons of precipitation;	CC	Check any obstruction in existing drains due to construction, check lifting of waste	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
	cause potential environmental impacts that may also affect their users.	<ul style="list-style-type: none"> Stock piles of fine material should be wetted or covered with tarpaulin especially during windy weather conditions; Cut and fill should be balanced to the extent practical at each site in order to minimize the need for fill and for spoil disposal. Cut material should be used to level the site area or be disposed at designated spoil disposal sites; Excess spoil should only be directed to designated disposal areas and temporary quarries; no disposal in waterways is allowed. 		material, check waste management plan / At construction site			
Water Resources	Impact on Surface and ground water sources	<ul style="list-style-type: none"> All excavated soil left after backfilling should be completely removed; Debris and vegetation clogging culverts and drains should be regularly cleared; and Soil runoff from the site leading to off-site contamination (particularly during rainy season) should not be allowed. Construction works should ensure that the drains are not disturbed otherwise the entire road will be flooded. 	CC	Check drainage infrastructure / Construction sites near drainage infrastructure	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
Fuel, Oil & Chemical handling, storage and disposal	Soil contamination	<ul style="list-style-type: none"> Spillage of oil and grease from the vehicles should be avoided. Chemicals and oils should be stored in secure designated areas with temporary impermeable bunds at distance of at least 100 m from any water course; Refueling, oil changing and engine maintenance of machinery, equipment and vehicles should be avoided at construction site; Oil contaminated materials should be disposed at designated waste disposal facilities. 	CC	Check contamination on the ground, check waste disposal / Vehicles/ machinery in working areas	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
Construction Waste Disposal	This waste has the potential to cause negative impact on the surroundings if not properly managed and disposed of. Irregular storage of this waste is hazardous to the	<ul style="list-style-type: none"> A Comprehensive Waste management Plan for Construction phase should be developed; Construction sites should be equipped with temporary refuse bins, and construction wastes should be collected on a daily basis and contained in a temporary designated waste storage area on each site; Designated waste storage areas should not be within 50 m of water ways; 	CC	Domestic waste, Hazardous waste – Chemical waste, electro waste, Paper and Polythene material waste and Wood	Measured on daily basis and reported quarterly	CC/KE	Waste disposal cost will be evaluated by CC based in the quantity and type

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
	workers at the site as well	<ul style="list-style-type: none"> Any hazardous waste should be separated and stored in areas clearly designated and labeled, and disposal in environmental friendly manner. Wastes should be routinely collected from the designated area and disposed at licensed waste disposal facilities approved by SEPA; and Upon completion of activities at a construction site all solid wastes should be completely removed and the site should be re-contoured or prepared for natural re-vegetation. 		/ Collection, handling, storage areas and disposal			
Dust Emissions	Deterioration of local Air Quality	<ul style="list-style-type: none"> Dust emissions from soil piles and aggregate storage stockpiles should be reduced by keeping the material wet by sprinkling water at appropriate frequency and erecting windshield walls on three sides of the piles; It should be mandated by KE to Contractor to backfill the trenches after laying of the pipeline and rehabilitate the excavated area to its original position. If it is a road, the backfilling will be followed by levelling and carpeting of road with bitumen; Vehicular movement should be restricted to a specific time for dumping of supplies and construction materials; and Workers should wear dust masks and safety goggles, especially during dry and windy weather conditions to avoid health risk. 	CC	SPM, PM ₁₀ , PM _{2.5} , SO _x , NO, NO ₂ and CO / Near Construction site (if several construction sites with a buffer distance of 5 km working consecutively or together, each site will be monitored at in a month)	Measured monthly for 12 working hours / reported quarterly basis	CC/KE	Rs.20,000 per site per month
Exhaust Emissions	Deterioration of local Air Quality	<ul style="list-style-type: none"> All vehicles, generators and other equipment used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants; Emissions from the machinery and vehicles will be monitored on regular basis to ensure compliance of SEQS; Excessive engine idling will be discouraged and machinery causing excessive pollution (i.e. visible clouds of smoke) will be banned from sites; Standby generators for power supply will be kept away from pathways and will be placed at locations where probabilities of human intervention are limited; and The stack height of the generators used will be at least 3 m above the ground. 	CC	Smoke, CO, Noise, NO _x , PM, SO ₂ / All construction vehicles	Measured monthly/ reported quarterly basis	CC/KE	Rs.15,000 per vehicle per month

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
Noise and Vibration	Construction activities are expected to produce noise levels in the range of 80 – 95 dB and may cause discomfort to local residents	<ul style="list-style-type: none"> Machinery operation and high noise activities should be carefully planned and scheduled; To the extent practical batching plants and construction areas should not be located within 500 meters of a settlement; Where that is not possible, high noise activities should cease between 20:00 and 06:00 hrs at any construction site within 500 meters of a settlement, or if noise complaints are received from settlement residents. Vehicles and machinery will be equipped with silencers. Contractors will be required to fit noise shields on high noise construction machinery; Site labor working in high noise area such as where noise level exceeds 80 dB (A), will wear earplugs; The stationary sources of noise such as concrete mixers, batching plant, power generators and pumps will be selected and segregated from work areas and residents; and Occupational health, safety and environmental procedures and Environmental management plan for proposed project would be followed. 	CC	Noise Intensity (dB) / Near Construction site (if several construction sites with a buffer distance of 5 km working consecutively or together, each site will be monitored at in a month)	Monthly / reported quarterly basis	CC/KE	Rs.5,000 per site per month
ROW Clearance	Impacts on Ecology (Flora and Fauna), cutting of trees	<ul style="list-style-type: none"> Compensatory plantation shall be provided at a ratio of 1:3; Selection of plants for landscaping should consider the habitat suitability, trees of national interest, flowering trees and shrubs; and By using the best practice for vegetation clearing and disposal practices; will minimize the environmental risk associated with clearing and disturbance of vegetation communities. 	CC	Check tree cutting, compensatory plantation, inventory of cleared trees / plants / At construction alignment	Monthly / reported quarterly basis	CC/KE	Rs.5,000 per tree planting
Safety Precautions for the Workers	The construction of civil works poses an inherent risk of injury to workers from accidents and hazardous working environments. There may be either minor or	<ul style="list-style-type: none"> Preventive and protective measures including modification, substitution, or elimination of hazardous conditions, with particular attention to live power lines, working at height, working above water, EMFs, high noise levels, and exposure to chemicals will be made; Measures for the management and appropriate disposal of hazardous wastes will be undertaken to ensure protection of the 	CC	Accidents, PPEs, Annoyance, Fire Hazards, Safety Protocols, Spill on Land and Spill on Water	Continuous / reported quarterly basis	CC/KE	PPE cost will be borne by CC Rs.12,000 per set of PPE

Table 8.1: Environmental Management and Monitoring Plan							
Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
	major accidents due to different activities of construction phase	<p>workforce and the prevention and control of releases and accidents;</p> <ul style="list-style-type: none"> Appropriate fire extinguishers and fire response plans will be available at the site; Appropriately stocked first-aid equipment and stations at both work sites and temporary construction camps, including appropriately trained first aid staff on site and adequate transport facilities for moving injured persons to the nearest hospital will be available; Training for workers and appropriate incentives to use and comply with health and safety procedures and PPEs will be provided; Procedures for documenting and reporting occupational accidents, diseases, and incidents; Emergency prevention, preparedness, and response arrangements will be in place; There will be strict safety requirements for personnel assigned to construction work; To maintain safe conditions for the general public, all substations will be fenced and gated, that must be locked at all times; and Appropriate signage will be posted that shows the owner of the substation, the hazardous nature of the substation and contact information. 		/ All construction areas			
Traffic Movement near construction site	Traffic flow in the locality of project will slightly increase during construction activities of the project, which directly impact the traffic flow along the right of way of underground transmission lines and in the vicinity of grid	<ul style="list-style-type: none"> Traffic management plan will be developed and implemented during the construction phase; Excavation near schools and businesses should be done during non-peak hours and the construction should be done in pieces near sensitive areas; Construction activities will be scheduled to reduce the chances of traffic jams; Adequate and appropriate road signs will be erected to warn road users along the ROW of transmission lines; The movement of equipment (trucks) during the construction of the proposed project will be limited to 9:30 am - 4:30 pm per day; 	CC	<p>Traffic flow, timing of activities, near misses and injuries records and reporting</p> <p>/ At crossroads and along transmission line Right of Way</p>	Continuous / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC

Table 8.1: Environmental Management and Monitoring Plan

Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
	stations. This increase in traffic may congest the flow of traffic on Korangi road (used by schools, hospital, residents and laborers); and may cause some accidental injuries and deteriorate the air quality of ambient air.	<ul style="list-style-type: none"> Raw materials for construction work will be adequately covered within the trucks to prevent any escaping into the air and along the roadway; Vehicles will be maintained regularly to reduce the exhaust emissions; and Any complain launched by community member will be responded and appropriate action will be taken to avoid it in future. 					
Social Impacts	Community health & safety issues	<ul style="list-style-type: none"> Emergency response plan should be prepared and implemented during entire phase of construction; Procedures for interaction with local and regional emergency and health authorities should be made; In order to minimize traffic congestion (if applicable), deliveries of materials and equipment should avoid peak traffic hours between 6:30-8:30 am and 3:30-4:30 pm; It should be mandated by KE to Contractor to backfill the trenches after laying of the pipeline and rehabilitate the excavated area to its original position. If it is a road, the backfilling will be followed by levelling and carpeting of road with bitumen; CC should inform the community beforehand regarding the timings of the construction works and should respond to their complaints swiftly. Proper lighting at night near trenches will be ensured; and Diversions, danger points and works at culverts, bridges and construction sites will have appropriate warning signs; this is particularly important at night to avoid accidents. 	CC	Review of complaint register Local Consultations / Near Construction site	Monthly / reported quarterly basis	CC/KE	Mitigation cost will be evaluated and borne by CC
				Surface topography, Proper backfilling and carpeting / All excavated areas	Continuous / reported quarterly basis	CC/KE	Backfilling and carpeting cost will be evaluated and borne by CC
Operational and Maintenance Phase							
Human Exposure to	Adverse health effects	<ul style="list-style-type: none"> Undertake EMF monitoring as per KE predefined procedures. 	KE	Electromagnetic Field (EMF)	Conducted and reported annually	KE	Rs.8,000 per site per year

Table 8.1: Environmental Management and Monitoring Plan							
Environmental Aspect	Impacts	Mitigation Measures	Mitigation Responsibility	Monitoring Parameters / Location	Monitoring Frequency	Monitoring Responsibility	Cost Estimates
Electromagnetic Fields (EMF)				/ Transmission line Corridor			
Barriers to Movement of People/Traffic during maintenance of transmission line	excavation & backfilling of underground transmission line ROW may result in obstruction during maintenance	<ul style="list-style-type: none"> Excavation near schools and businesses should be done during non-peak hours and the construction should be done in pieces near sensitive areas; Backfilling the excavation / digging area and rehabilitate the excavated area to its original position will be required after each maintenance activity that involves excavation / digging; Hard barrication and safety and diversion signage will be provided at all maintenance areas. 	KE	check access routes of pedestrians and maintenance sites / Maintenance areas	During maintenance activities	KE	Mitigation cost will be evaluated and borne by KE
Gaseous Emissions	Air pollution	<ul style="list-style-type: none"> All vehicles, power generators and other equipment used during the maintenance work will be properly tuned and maintained in good working conditions in order to minimize emission of pollutants; and Emissions from the machinery and vehicles will be monitored on regular basis to ensure compliance with SEQS. 	KE	Smoke, CO, Noise, NOx, PM, SO ₂ / All maintenance vehicles	During maintenance activities	KE	Rs.15,000 per vehicle
Solid Waste	The maintenance activities may generate some hazardous and non-hazardous waste such as wires and wild vegetation etc.	<ul style="list-style-type: none"> Ensure that all solid waste collected during operational or maintenance work is disposed of in an appropriate disposal site in the locality. 	KE	Waste collection and disposal records / Maintenance areas	During maintenance activities	KE	Waste disposal cost will be evaluated by KE based in the quantity and type
Notes KE = K-Electric; CC = Construction Contractor; SEQS = Sindh Environmental Quality Standards; PM = Particulate Matter.							

Table 8.2: Environmental Training Plan			
Staff	Responsibilities	Areas	Schedule
Project staff	Contractor/HSE Officer	<ul style="list-style-type: none"> • Findings of EIA • Mitigation Measures • EMP • Waste disposal procedures • Camp Operation • Social and Cultural values of the Project areas • Environmental sensitivity of the Project area • Flora and Fauna of the area • Emergency Response Plan • Community Issues 	Prior to start of Project activities
Drivers	Contractor/HSE Officer	<ul style="list-style-type: none"> • Road safety • Road restrictions • Defensive driving 	Before and during construction activities
Camp/Site Staff	Safety Officer	<ul style="list-style-type: none"> • Waste Disposal • Housekeeping 	Before and during construction activities

8.5 Monitoring Forms

Environmental reviews will decide for necessary items to be monitored which are based on regular reports including measured data submitted by the project proponent. When necessary, the project proponent should refer to the following monitoring form for submitting reports.

Table 8.4 (A): Sample Forms for Ambient Air Quality Monitoring Record

<i>PM₁₀ (Respirable Particulate Matter)</i>						
Location	S.No.	Date	Time (Hrs: Min)	Result ($\mu\text{g}/\text{m}^3$)	SEQS ($\mu\text{g}/\text{m}^3$)	Remarks
	1				150	
	2				150	
	3				150	
	4				150	
	5				150	
	6				150	
	7				150	
	8				150	

Table 8.4(B): Sample Forms for Ambient Air Quality Monitoring Record

<i>CO, SO_x, NO_x</i>							
Location	S.No.	Parameter	Date	Time (Hrs:Min)	Result ($\mu\text{g}/\text{m}^3$)	SEQS ($\mu\text{g}/\text{m}^3$)	Remarks
	1	CO			..... (\text{mg/m^3)	5 (mg/m^3)	
	2	SO _x				120	
	3	NO _x				40	

Table 8.5 : Sample Form for Noise Quality Monitoring Record

Location	S.No.	Date	Time (Hrs:Min)	Analysis	Result dB(A)Scale	SEQS	Remarks
	1					65 / 55*	
	2					65 / 55	
	3					65 / 55	
	4					65 / 55	
	5					65 / 55	
	6					65 / 55	
	7					65 / 55	
	8					65 / 55	

***Limits are for Commercial Area, Day Time / Night Time**

(Domestic/residential/commercial solid wastes)

Location: _____ Date: _____ Source: _____ (domestic/commercial)

Table 8.6: Sample Form for Solid Waste Monitoring Board

Total Quantity (kg)	Components	Weight (as discarded)	% by weight (as discarded)	Recyclables	Non- recyclables	Organic waste
	Food/kitchen waste					
	Plastics					
	Metals					
	Paper					
	Textile/Rugs					
	Cardboard					
	Glass					
	Rubber					
	Others					
Total						

Generation Rate:

For domestic or residential units Total waste generated = _____ kg/capita/day

No. of persons in units

For commercial units Total waste generated = _____ kg/unit area

Total floor area of unit

Summary:

- Total Waste Generated (as collected) = _____ kg
- Recyclable waste quantity = _____ kg
- Non-Recyclable waste quantity = _____ kg
- Organic waste quantity = _____ kg
- %age of Recyclables = _____ %
- %age of Non-recyclables = _____ %
- %age of Organic waste = _____ %
- Total waste send for recycling = _____ kg
- Total waste send for landfill = _____ kg

Comments:

Location: _____ Date: _____ Source: _____ (domestic/commercial/Hospital)

[illegible]

Total floor area of unit

- Total Waste Generated (as collected) = _____ kg
- Recyclable waste quantity = _____ kg
- Non Recyclable waste quantity = _____ kg
- %age of Recyclables = _____ %
- %age of Non-recyclables = _____ %
- Total waste send for recycling = _____ kg
- Total waste send for disposal = _____ kg

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(Health & Safety)

Monitoring Items	Monitoring Results

Note: Needed during both the construction and operational phase

(Electromagnetic Fields)

Monitoring Items	Monitoring Results

Note: Needed during the operational phase

Chapter 09 Conclusion and Recommendations

9.1 Conclusion

This Environmental impact assessment study was carried out to identify the environmental and socioeconomic impacts of the project 132kV UG Single Circuit Transmission Line from Jacob Lines Grid Station to Gizri Grid Station.

During study, environmental and socioeconomic baseline information was collected from variety of sources including visit of project area, previous environmental reports and studies conducted in the area, published literature and field surveys. All these information were used to compose the profile of the physical, biological and socioeconomic environment of the area which is likely to be affected by the proposed project activities. Information for the project description was provided by the project management and their contractor.

On the basis of baseline and project description, potential environmental impacts were identified on the project's physical, biological and socioeconomic environments. The potential impacts during the construction phase of the proposed project included the generation of dust and gaseous emissions, traffic congestion/ diversions, noise, construction waste, flora and fauna, health and safety and socioeconomic effects. Similarly, the key environmental and social issues during the operation phase included the Electromagnetic field, periodic/fault maintenance.

The EIA process finds that the impacts of the project activities at the design, construction and operation stages have been adequately addressed and mitigation measures duly proposed wherever needed. Adoption of mitigation measures will ensure reduction of impact on the micro and macroenvironment as well as socio-economic conditions to acceptable levels. The development of this project will be compatible with the requirements of the Sindh Environmental Protection Act 2014, Sindh Environmental Protection Agency (Review of IEE/EIA) Regulations 2014, and Sindh Environmental Quality Standards (SEQS); as well as other regulatory requirements of Government of Sindh and Government of Pakistan. The issue of environment, health & safety has been duly incorporated in the design, construction & operations phases of the project.

On the basis of the findings of the EIA Study, it is possible to conclude that:

- Construction and Operation of Transmission line will, on adoption of the mitigation measures, have no significant impact on the physical as well as socio-economic composition of the microenvironment and macroenvironment of the project area;
- The likely impact of construction and operation of the Transmission line will be appropriately mitigated through proven technologies, careful planning and landscaping;
- The project will meet the forecasted demand for energy due to extension of the project;
- Employment opportunities will be enhanced and improved;
- The proposed 132 kV Supply Line; after commissioning will become an integral part of the microenvironment and a friendly component of its macroenvironment.

Mitigation will be assured by a program of environmental monitoring conducted to ensure that all measures are provided as intended, and to determine whether the environment is protected as envisaged. This will include observations on and off site, document checks, and interviews with workers and beneficiaries, and any requirements for remedial action will be reported to the EPA Sindh.

9.2 Recommendations

The study recommends and confirms that the proponent shall adopt all environmental management processes in full,

as prescribed by the national and international laws and guidelines and given in the EIA document. Following essentials recommendations which are also the part of EMP as mitigation measures will be followed by KE/Contractor in letter and spirit:

- During the selection of ROW for underground transmission line, significant efforts should be made to avoid or minimize impacts on sensitive receptors or existing infrastructures;
- Prior notices shall be given to the school / religious places administrators before the starting commissioning activities near these sensitive locations;
- Prior notices shall be given to the legal shop owners and residents before the starting commissioning activities near these settings;
- It should be mandated by KE to Contractor to backfill the trenches after laying of the pipeline and rehabilitate the excavated area to its original position. If it is a road, the backfilling will be followed by levelling and carpeting of road with bitumen;
- For cutting of trees, compensatory plantation shall be provided at a ratio of 1:3;
- A Comprehensive Waste management Plan for Construction phase should be developed;
- Wastes should be routinely collected from the designated area and disposed at licensed waste disposal facilities approved by SEPA;
- Protective measures against high noise intensity, soil erosion, traffic problem, land pollution and water contamination will be taken care of;
- The trench area during routine maintenance must be rehabilitated and where recommended should be re-vegetated/carpeted with bitumen immediately after the completion of maintenance activities;
- Proper traffic management plan should be developed and implemented to avoid the accidents and traffic jams;
- Emergency response plan should be prepared and implemented during entire phase of construction;
- Excavation near schools and businesses should be done during non-peak hours and the construction should be done in pieces near sensitive areas;
- Preventive and protective measures including modification, substitution, or elimination of hazardous conditions, with particular attention to live power lines, working at height, working above water, EMFs, high noise levels, and exposure to chemicals will be made; and
- The Project will thus respond to all aspects of sustainability: Economic, social and environmental and will thus be a sustainably viable project.

The study therefore recommends that the EIA report should be approved with the provision that the suggested mitigation measures will be adopted and the Environmental Management Plan will be followed in letter and spirit.

ANNEXURES

Annexure – I

Sindh Environmental Protection Act 2014

EXTRAORDINARY

Registered No. M324



The Sindh Government Gazette

Published by Authority

KARACHI THURSDAY MARCH 20, 2014

PART-IV

**PROVINCIAL ASSEMBLY OF SINDH
NOTIFICATION
KARACHI, THE 20TH MARCH, 2014.**

NO.PAS/Legis-B-06/2014- The Sindh Environmental Protection Bill, 2014 having been passed by the Provincial Assembly of Sindh on 24th February, 2014 and assented to by the Governor of Sindh on 19th March, 2014 is hereby published as an Act of the Legislature of Sindh.

THE SINDH ENVIRONMENTAL PROTECTION ACT, 2014.

• SINDH ACT NO. VIII OF 2014.

AN ACT

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

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

Preamble.

PART-I

It is hereby enacted as follows:-

1. (1) This Act may be called the Sindh Environmental Protection Act, 2014.

**Short title and
commencement.**

L iv- 302 , Ext -IV-11

(52)

Price Rs. 150.00

Definitions.

- (2) It extends to the whole of the Province of Sindh.
- (3) It shall come into force at once.

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

- (i) "adverse environmental effect" means impairment of, or damage to, the environment and includes—
 - (a) impairment of, or damage to, human health and safety or to biodiversity or property;
 - (b) pollution; and
 - (c) any adverse environmental effect as may be specified in the rules or regulations made under this Act;
- (ii) "Agency" means the Sindh Environmental Protection Agency established under section 5 of this Act;
- (iii) "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry residues from the use of fertilizers, pesticides and other farm chemicals and agricultural runoff;
- (iv) "air pollutant" means any substance that causes pollution of air and includes soot, smoke, dust particles, odor, light, electro-magnetic radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;
- (v) "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter-alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems;
- (vi) "biosafety" means the mechanism developing through policy and procedure to ensure human health and the environmentally safe application of biotechnology;
- (vii) "Council" means the Sindh Environmental Protection Council established under section 3 of this Act;
- (viii) "discharge" means spilling, leaking, pumping, depositing, seeping, releasing, flowing-out, pouring, emitting, emptying or dumping into the land, water or atmosphere;
- (ix) "ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;

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- (x) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;
- (xi) "emission standards" means the permissible standards established by the Agency for emission of air pollutants and noise and for discharge of effluent and waste;
- (xii) "environment" means-
 - (a) air, water, land and natural resources;
 - (b) all layers of the atmosphere;
 - (c) all organic and inorganic matters and living organisms;
 - (d) ecosystems and ecological relationships;
 - (e) buildings, structures, roads, facilities and works;
 - (f) all social and economic conditions affecting community life; and
 - (g) the inter-relationship between any of the factors in sub-clause (a) to (f) made under this Act;
- (xiii) "environmental aspect" means an organization's activities or services that can interact with the environment;
- (xiv) "environment audit" means a systemic scrutiny of environmental performance of an organization, factory, company or manufacturing and production unit regarding to its operations;
- (xv) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigation and compensatory measures, formulation of environmental management and training plans and monitoring arrangements, and framing of recommendations and such other components as may be prescribed;
- (xvi) "Environmental Management Plan" means a site specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with the environmental legislation;
- (xvii) "Environmental Protection Order" means an order passed under Section 21 made under this Act.
- (xviii) "Environmental Protection Tribunal" means the Environmental Protection Tribunal constituted under section 25 of this Act ;

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- (xxviii) "industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purposes;
- (xxix) "industrial waste" means waste resulting from an industrial activity;
- (xxx) "initial environmental examination" means a preliminary environmental review of the reasonably foreseeable qualitative and quantitative impacts on the environment of a proposed project to determine whether it is likely to cause an adverse environmental effect for requiring preparation of an environmental impact assessment;
- (xxxi) "local authority" means any agency set up or designated by Government, by notification in the official Gazette, to be a local authority for the purposes of this Act;
- (xxxii) "local council" means a local council constituted or established under a law relating to local government;
- (xxxiii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;
- (xxxiv) "municipal waste" includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;
- (xxxv) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;
- (xxvi) "non degradable plastic products" means a plastic product which are made from the non-biodegradable substances;
- (xxxvii) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;

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- (xxviii) "industrial activity" means any operation or process for manufacturing, making, formulating, synthesising, altering, repairing, ornamenting, finishing, packing or otherwise treating any article or substance with a view to its use, sale, transport, delivery or disposal, or for mining, for oil and gas exploration and development, or for pumping water or sewage, or for generating, transforming or transmitting power or for any other industrial or commercial purposes;
- (xxix) "industrial waste" means waste resulting from an industrial activity;
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- (xxxi) "local authority" means any agency set up or designated by Government, by notification in the official Gazette, to be a local authority for the purposes of this Act;
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- (xxxiii) "motor vehicle" means any mechanically propelled vehicle adapted for use upon land whether its power of propulsion is transmitted thereto from an external or internal source, and includes a chassis to which a body has not been attached, and a trailer, but does not include a vehicle running upon fixed rails;
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- (xxxv) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;
- (xxvi) "non degradable plastic products" means a plastic product which are made from the non-biodegradable substances;
- (xxxvii) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;

(xxxviii) "Oxo-biodegradable Plastic Products" means a plastic product made of a polymer by adding a pro-degrading additive containing a transition metal salt, except cobalt, which cause the plastic to degrade and bio-grade from oxidative and cell mediated phenomena either simultaneously or successfully;

(xxxix) "person" means any natural person or legal entity and includes an individual, firm, association, partnership, society, group, company, corporation, co-operative society, Government Agency, non-governmental organization, community-based organization, village organization, local council or local authority and, in the case of a vessel, the master or other person having for the time being the charge or control of the vessel;

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

(xii) "prescribed" means prescribed by rules made under this Act;

(xlii) "project" means any activity, plan, scheme, proposal or undertaking involving any change in the environment and includes-

• (a) construction or use of buildings or other works;

(b) construction or use of roads or other transport systems;

(c) construction or operation of factories or other installations;

(d) mineral prospecting, mining, quarrying, stone-crushing, drilling and the like;

(e) any change of land use or water use; and

(f) alteration, expansion, repair, decommissioning or abandonment of existing buildings or other works, roads or other transport systems, factories or other installations;

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- (xliii) "proponent" means the person who proposes or intends to undertake a project;
- (xliv) "regulations" means regulations made under this Act;
- (xlv) "rules" means rules made under this Act;
- (xlvii) "sewage" means liquid or semi-solid wastes and sludge from sanitary conveniences, kitchens, laundries, washing and similar activities and from any sewerage system or sewage disposal works;
- (xlviii) "Schedule Plastic Products" means all types of flexible plastic packaging and disposable plastic products made of Polythene, Polypropylene, Polystyrene and Poly-ethylene Terephthalate (PET), used for food and non-food items, like shopping bags, garbage bags, snacks packs, water and milk packaging, shrink wraps, bubble pellet wraps, films, liners, woven or non-woven bags, mulch films;
- (xlix) "Sindh Environmental Quality Standards" means standards established by the Agency under clause (e) of sub-section(1) of section 6 and approved by the Council under clause (c) of sub-section(1) of section 4 made under this Act;
- (l) "standards" means qualitative and quantitative standards for discharge of effluent and wastes and for emission of air pollutants and noise either for general applicability or for a particular area, or from a particular production process, or for a particular product, and includes the Sindh Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations;
- (ii) "strategic environmental assessment" mean an analysis of a proposed policy, legislation, plan or programme to determine whether the principles of sustainable development have been integrated therein and to identify its likely environmental effects and such components as require an initial environmental examination or environmental impact assessment;
- (li) "sustainable development" means development that meets the needs of the present generation without compromising the ability of future generations to meet their needs;

- (lii) "trans-boundary environmental impacts" means environmental impact arising from beyond the boundaries or limits of Sindh province and causing any adverse environmental impact or pollution in the air, land, water and coaster water of Sindh province;
- (liii) "waste" means any substance or object which has been, is being or is intended to be, discarded or disposed-of, and includes liquid waste, solid waste, waste gases, suspended waste, industrial waste, agricultural waste, nuclear waste, municipal waste, hospital waste, used polyethylene bags and residues from the incineration of all types of waste.
- (liv) "waters (coastal waters, internal waters, territorial waters and historical waters)" means such limits of the waters adjacent to the land territory as may be specified in the Territorial Waters and Maritime Zones Act, 1976 (LXXXII of 1976).

PART-II

THE SINDH ENVIRONMENTAL PROTECTION COUNCIL.

**Establishment of
the Sindh
Environmental
Protection
Council.**

3. (1) The Government of Sindh shall, by notification in the official Gazette, establish a Council to be known as the Sindh Environmental Protection Council consisting of-

- (i) Chief Minister or such other **Chairperson** person as the Chief Minister may nominate in this behalf.
- (ii) Minister-in-charge of the **Vice Chairperson** Environment Protection Department.
- (iii) Additional Chief Secretary, **Ex-officio Member** Planning and Development Department, Government of Sindh.
- (iv) Secretaries of the **Ex-officio Members** Environment, Finance, Public Health Engineering, Irrigation, Health, Agriculture, Local Government, Industries, Live Stock and Fisheries, Forest and Wildlife, Energy, Education, Departments of Government of Sindh and the divisional commissioners of Sindh.

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(v) Such other persons not exceeding twenty-five as Government may appoint from representatives of the Chambers of Commerce and Industry and industrial associations, representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, non-governmental organizations concerned with the environment and sustainable development, and scientists, technical experts and educationists.

Non-official Members

(vi) Director General, Sindh Environment Protection Agency Member / Secretary

(vii) Two Members of the Provincial Assembly of Sindh amongst the eleven Members of the Standing Committee on Environment nominated by the Speaker

2) The Members of the Council, other than ex-officio members, shall be appointed in accordance with the prescribed procedure.

(3) A non-official member, unless he sooner resigns or is removed, shall hold office for a term of three years and shall be eligible for re-appointment but shall not hold office for more than two terms.

(4) The Council shall frame its own Rules of Procedure.

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

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

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

**Functions and
Powers of the
Council.**

4. (1) The Council shall-
- (a) co-ordinate and supervise the enforcement of the provisions of this Act and other laws relating to the environment in the Province;
 - (b) approve comprehensive provincial environmental and sustainable development policies and ensure their implementation within the framework of a conservation strategy and sustainable development plan as may be approved by Government from time to time;
 - (c) approve the Sindh Environmental Quality Standards;
 - (d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources;
 - (e) coordinate integration of the principles and concerns of sustainable development into socio-economic and development policies, plans and programmes at the provincial, district and local levels;
 - (f) consider the annual Sindh Environment report and give appropriate directions thereon and cause it to be laid before the Provincial Assembly;
 - (g) deal with inter-provincial and federal-provincial issues, and liaise and coordinate with other Provinces through appropriate inter-provincial forums regarding formulation and implementation of standards and policies relating to environmental matters with an inter-provincial impact;
 - (h) provide guidelines for biosafety and for the use of genetically modified organisms; and
 - (i) assist the Federal Government or Federal Agency in implementation and or administration of various provision of United Nation Convention on Laws on Seas, 1980 (UNCLOS) in coastal waters of the province.
- (2) The Council may, either itself or on the request of any person or organization, direct the Agency or any Government Agency to prepare, submit, promote or implement projects for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, and the sustainable development of resources or to undertake research in any specified aspect of environment.

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PART-III

THE SINDH ENVIRONMENTAL PROTECTION AGENCY

5. (1) Government shall, by notification in the Official Gazette, establish the Sindh Environmental Protection Agency, to exercise the powers and perform the functions assigned to it under the provisions of this Act and the rules and regulations made thereunder.

**Establishment
of the Sindh
Environmental
Protection
Agency.**

(2) The Agency shall be headed by a Director General who shall be appointed by Government on such terms and conditions as it may determine.

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

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

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

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

6. (1) The Agency shall –

**Functions of the
Agency.**

- (a) administer and implement the provisions of this Act and the rules and regulations;
- (b) prepare, in co-ordination with the appropriate Government Agency or local council and, in consultation with the concerned Advisory Committees where established, environmental policies for the approval of the Council;
- (c) take all necessary measures for the implementation of the environmental policies approved by the Council;
- (d) prepare and publish an annual Sindh Environment Report on the state of the environment in the province;
- (e) prepare or revise and establish the Sindh Environmental Quality Standards with approval of the Council;

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

(f) ensure enforcement of the Sindh Environmental Quality Standards;

(g) where the quality of ambient air, water, land or noise so requires, the Agency may, by notification in the Official Gazette establish different standards for discharge or emission from different sources and for different areas and conditions as may be necessary;

Provided that where these standards are less stringent than the Sindh Environmental Quality Standards; prior approval of the Council shall be obtained;

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

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

(j) issue licences, approval for the consignment, handling, transport, treatment, disposal of, storage, handling or otherwise dealing with hazardous substances;

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

(l) identify the needs for and initiate legislation in various sectors of the environment;

(m) provide assistance to relevant Federal and Provincial Government Agencies in the management of environment accidents and natural and environmental disasters, including conduct of inquiry thereto;

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

Provided that the disclosure of such information shall be subject to the restrictions specified in Part XI (Access to Information);

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- (o) assist Government Agencies, local councils, local authorities and other persons to implement schemes for the proper disposal of wastes so as to ensure compliance with the Sindh Environmental Quality Standards;
 - (p) provide information and guidance to the public on environmental matters;
 - (q) recommend environmental courses, topics, literature and books for incorporation in the curricula and syllabi of educational institutions;
 - (r) promote public education and awareness of environmental issues through mass media and other means including seminars and workshops;
 - (s) establish and maintain mechanisms, including its own website, to disseminate information, subject to the provisions of this Act, regarding policies, plans and decisions of the Government, the Council and the Agency, relating to the environment;
 - (t) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned persons in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;
 - (u) review and approve mitigation plans and give guidance and directions, where necessary, relating to clean up operations ordered under this Act;
 - (v) encourage the formation and working of non-governmental organizations, community organizations and village organizations to prevent and control pollution and promote sustainable development;
 - (w) take or cause to be taken all necessary measures for the protection, conservation, rehabilitation and improvement of the environment, prevention and control of pollution and promotion of sustainable development; and
 - (x) perform any function that the Council may assign to it.
- (2) The Agency may -
- (a) undertake inquiries or investigation into environmental issues, either of its own accord or upon complaint from any person or organization;
 - (b) request any person to furnish any information or data relevant to its functions;

- (c) initiate, with the approval of Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;
- (d) recommend to Government and the Council the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including -
 - (i) taxes, duties, cesses and other levies; and
 - (ii) incentives, prizes, awards, rewards, subsidies, tax exemptions, rebates and depreciation allowances;
- (e) establish and maintain laboratories to help in the performance of its functions under this Act and to conduct research in various aspects of the environment and provide or arrange necessary assistance for the establishment of similar laboratories in the private sector;
- (f) arrange, in accordance with such procedure as may be prescribed, financial assistance for projects designed to facilitate in discharge of its functions; and
- (g) acquire assistance of concerned authorities of district administration and other relevant agencies, departments and police assistance for enforcement of this Act.

**Powers of the
Agency.**

7. Subject to the provisions of this Act, the Agency may-

- (a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both moveable and immovable;
- (b) sell, convey, mortgage, pledge, exchange or otherwise dispose of its property and assets;
- (c) fix and realize fees, rates and charges for rendering any service or providing any facility, information or data under this Act or its rules and regulations;
- (d) enter into contracts, execute instruments, incur liabilities and do all acts or things necessary for proper management and conduct of its business;
- (e) appoint, with the approval of Government and in accordance with such procedures as may be prescribed, such advisers, experts and consultants as it considers necessary for the efficient performance of its functions on such terms and conditions as it may deem fit;
- (f) summon and enforce the attendance of any person and require him to supply any information or document needed for the conduct of any enquiry or investigation into any environmental issue;

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- (g) Director General may authorize any officer or official to enter and inspect or under a search warrant issued by Environmental Protection Tribunal or a Court, search at any time, any land, building, premises, vehicle or vessel or other place where or in which there are reasonable grounds to believe that an offence under this Act has been, or is being, or likely to be committed;
- (h) take samples of any materials, products, articles or substances or of the effluent, wastes or air pollutants being discharged or emitted or of air, water or land in the vicinity of the discharge or emission;
- (i) arrange for the testing and analysis of samples at a certified laboratory;
- (j) confiscate any article used in the commission of the offence where the offender is not known or cannot be found within a reasonable time;

Provided that the powers under clauses (f), (g), (h) (i), and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898) or the rules and regulations and under the direction of the Environmental Protection Tribunal or a Court; and

- (k) establish the Sindh Environmental Co-ordination Committee comprising the Director-General as its Chairman and such other persons as Government shall appoint as its members to exercise such powers and perform such functions as shall be delegated or assigned to it by Government for carrying out the purposes of this Act and for ensuring coordination among Government Agencies in implementation of environmental policies.

PART-IV

SINDH SUSTAINABLE DEVELOPMENT FUND

**Establishment
of the Sindh
Sustainable
Development
Fund.**

8. (1) There shall be established a Sindh Sustainable Development Fund.

(2) The Sindh Sustainable Development Fund shall be derived from the following sources, namely—

- (a) allocations and grants made or loans advanced by the Government of Sindh or by the Federal Government;
- (b) aid and assistance, grants, advances, donations and other non-obligatory funds received from foreign governments, national or international agencies, and non-governmental organizations; and

- (c) voluntary contributions from private, corporate, multinational organizations and other persons.
- (d) Any fees generated under the provision of this act including the fines imposed against contraventions including penalties.
- (3) The Sindh Sustainable Development Fund shall be utilized, in accordance with such procedures as may be prescribed for -
 - (a) providing financial assistance to projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any specified aspect of the environment; and
 - (b) any other purposes which, in the opinion of the Board, will help achieve environment objectives and the purposes of this Act.

**Management of
the Sindh
Sustainable
Development
Fund.**

9. (1) The Sindh Sustainable Development Fund shall be managed by a Board known as the Provincial Sustainable Development Fund Board consisting of—

- (i) Additional Chief Secretary, **Chairperson**
Planning and Development
Department, Government of
Sindh,
- (ii) Such officers of Government, **Ex-officio Members**
not exceeding five (05), as
Government may appoint
including Secretaries of the
Environment, Finance,
Industries and Local
Government Departments,
Government of Sindh.
- (iii) Such non-official persons, not **Non-official Members**
exceeding five(05), as
Government may appoint,
including representatives of
the Chambers of Commerce
and Industry, non-
governmental organizations
and major donors.
- (iv) Director General, Sindh **Secretary/ Member**
Environmental Protection
Agency.

(2) The members of the Board, other than ex-officio members, shall be appointed in accordance with the prescribed procedure.

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(3) A non-official member of the Board, unless he sooner resigns or is removed, shall hold office for a term of three years and shall be eligible for re-nomination, but shall not hold office for more than two terms.

(4) The Board shall frame its own rules of procedure with the approval of Government.

(5) In accordance with such procedures and such criteria as may be prescribed, the Board shall have the power to —

- (a) sanction financial assistance for eligible projects;
- (b) invest moneys held in the Sindh Sustainable Development Fund in such profit-bearing Government bonds, saving schemes and securities as it may deem suitable; and
- (c) take such measures and exercise such powers as may be necessary for utilization of the Sindh Sustainable Development Fund for the purposes specified in sub-section (3) of section 8.

(6) The Board shall constitute committees of its members to undertake regular monitoring of projects financed from the Sindh Sustainable Development Fund and to submit progress reports to the Board which shall publish an Annual Report incorporating its annual audited accounts and performance evaluation based on the progress reports.

10. (1) The Agency shall maintain proper accounts of the Sindh Sustainable Development Fund and other relevant records and prepare annual statement of accounts in such form as may be prescribed. **Accounts.**

(2) The accounts of the Sindh Sustainable Development Fund shall be audited annually by the Auditor General of Pakistan,

PART-V

PROHIBITIONS AND ENFORCEMENT

11. (1) 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; or, where applicable, the standards established under Section 6(1)(g)(i); or direction issued under Section 17, 19, 20 and 21 of this Act; or any other direction issued, in general or particular, by the Agency. **Prohibition of certain discharges or emissions and compliance with standards.**

(2) All persons, in industrial or commercial or other operations, shall ensure compliance with the Environmental Quality Standards for ambient air, drinking water, noise or any other Standards established under section 6(1)(g)(i); shall maintain monitoring records for such compliances; shall make available these records to the authorized person for inspection; and shall report or communicate the record to the Agency as required under any directions issued, notified or required under any rules and regulations.

(3) Monitoring and analysis under sub-section (1) and (2), shall be acceptable only when carried out by the Environmental Laboratory certified by the Agency as prescribed in the rules.

**Prohibition of
import of
hazardous
waste.**

12. No person shall import hazardous waste into Sindh province or its coastal, internal, territorial or historical waters, except acquiring prior approval of the Agency.

**Handling of
hazardous
substances.**

13. Subject to the provisions of this Act, no person shall import, generate, collect, consign, transport, treat, dispose of, store, handle or otherwise use or deal with any hazardous substance except-

- (a) under a licence issued by the Agency; or
- (b) in accordance with the provisions of any other law, rule, regulation or notification for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Government is a party.

**Prohibition of
action adversely
affecting
Environment.**

14. (1) Subject to the provisions of this Act and the rules and regulations, no person shall cause any act, deed or any activity, including-

- (a) recycling or reuse of hospital waste and infectious waste;
- (b) disposal of solid and hazardous wastes at unauthorized places as prescribed;
- (c) dumping of wastes or hazardous substances into coastal waters and inland water bodies;
- (d) release of emissions or discharges from industrial or commercial operations as prescribed;
- (e) recycling or reuse or recovery of hazardous wastes or industrial by-products in an unauthorized or non-prescribed manner or procedure; and

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- (f) any activity which may cause adverse environmental affect due to trans boundary projects of Province of Sindh.

which lead to pollution or impairment of or damage to biodiversity, ecosystem, aesthetics or any damage to environment and natural resources as defined in section 2 (xxxvi) of this Act.

(2) No person shall generate, handle, transport, dispose of or handle the hospital waste and infections waste except in accordance with the Hospital Waste Management Rules and in such manner as may be prescribed.

(3) No person shall import, manufacture, stockpile, trade, supply, distribute or sell any scheduled plastic product which is non-degradable. The scheduled plastic products must be oxo-biodegradable and the pro-degradant used must be approved by the Agency or any other department or agency and in such manner as prescribed.

15. (1) Subject to the provisions of this Act, no person shall operate or manufacture a motor vehicle or class of vehicles from which air pollutants or noise are being emitted in an amount, concentration or level which is in excess of the Sindh Environmental Quality Standards or, where applicable, the standards established under sub-clause (i) of clause (g) of sub-section (1) of section 6.

Regulation of motor vehicles.

(2) For ensuring compliance with the standards mentioned in sub-section (1), the Agency may direct that any motor vehicle or class of vehicles shall install such pollution control devices or other equipment or use such fuels or undergo such maintenance or testing as prescribed.

(3) For ensuring compliance with the standards mentioned in sub-section (1), the Agency may direct that any manufacturer of motor vehicle or class of vehicles shall use such manufacturing standard or design or pollution control devices or other equipment or undergo such testing as may be prescribed.

(4) Where a direction has been issued by the Agency under sub-section (2) and (3) in respect of any motor vehicles or class of motor vehicles, no person shall operate or manufacture any such vehicle till such direction has been complied with.

16. (1) The monitoring, testing and analysis carried out in compliance or for the enforcement of any provisions of this Act

Certified Environmental Laboratory.

(2) The laboratory or organization having any facility for environmental monitoring, testing and analysis and intend to perform under sub-section (1) shall register with the Agency in accordance with the Environmental Laboratory Certification Rules as prescribed.

Initial
environmental
examination and
environmental
impact
assessment.

PART-VI
ENVIRONMENTAL EXAMINATIONS AND ASSESSMENTS

17. (1) No proponent of a project shall commence construction or operation unless he has filed with the Agency an initial environmental examination or environmental impact assessment, and has obtained from the Agency approval in respect thereof.

(2) The Agency shall –

(a) review the initial environmental examination and accord its approval, subject to such terms and conditions as it may prescribe, or require submission of an environmental impact assessment by the proponent; or

(b) review the environmental impact assessment and accord its approval subject to such terms and conditions as it may deem fit to impose or require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or decline approval of the environmental impact assessment as being contrary to environmental objectives.

(3) Every review of an environment impact assessment shall be carried out with public participation and, subject to the provisions of this Act, after full disclosure of the particulars of the project.

(4) The Agency shall communicate its approval or otherwise within a period of two months from the date that the initial environmental examination is filed, and within a period of four months from the date that the environmental impact assessment is filed complete in all respects in accordance with the regulations, failing which the initial environmental examination or, as the case may be, the environmental impact assessment shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations:

(5) The provisions of sub-sections (1), (2), (3) and (4) shall apply to such categories of projects and in such manner as prescribed:

(6) The Agency shall maintain separate registers for initial environmental examination and environmental impact assessment projects, which shall contain brief particulars of each project and a summary of decisions taken thereon, and which shall be open for inspection to the public during office hours.

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18. (1) All provincial government agencies, departments, authorities, local councils and local authorities responsible for formulating policies, legislation, plans and programmes to be implemented in Sindh province which may cause any environmental impact in the jurisdiction of the province shall, before submitting the same to the competent authority for approval, forward to the Sindh Environmental Protection Agency a strategic environment assessment containing —

**Strategic
environmental
assessment.**

- (a) description of the objectives and features of the proposed policy, legislation, plan or programme that are in consonance with the principles of sustainable development;
- (b) assessment of the adverse environmental effects, if any, likely to be caused during implementation of the policy, legislation, plan or programme alongwith proposed preventive, mitigation and compensatory measures;
- (c) analysis of possible alternatives; and
- (d) identification of those components of the policy, legislation, plan or programme, if any, in respect of which specific environmental impact assessment need to be carried out in due course.

(2) The Agency shall, in consultation with the concerned Government Agencies and Advisory Committees where established, review the strategic environment assessment, within sixty (60) days of its filing, and prepare a report containing its comments and recommendations in respect thereof which shall be forwarded to the initiating Government Agency, authority, local council or local authority and duly considered by it and the competent authority before approval or otherwise of the proposed policy, legislation, plan or programme.

(3) The provisions of sub-sections (1), and (2) shall apply to such categories of policies, plans and programmes and in such manner as may be prescribed.

19. (1) The Agency shall carry out or arrange environmental monitoring of all projects in respect of which it has approved an initial environmental examination or environmental impact assessment to determine whether the actual environmental impact exceeds the level predicted in the assessment and whether the conditions of the approval are being complied with.

**Environmental
monitoring.**

(2) For purposes of sub-section (1), the Agency may require the person in charge of a project to furnish such information as it may specify pertaining to the environmental impact of the project, including quantitative and qualitative analysis of -

**Environmental
Audit and
Review.**

- (a) discharge of effluents, wastes, emissions of air pollutants, noise and any other matter or action that may be found offensive under section 14 from the project on daily, weekly, monthly or annual basis;
 - (b) ambient quality of the air, water, noise and soil before, during and after construction and during operation of the project.
- (3) On review of the data collected by it and information provided, the Agency may issue such directions to the person in charge as it may consider necessary to ensure compliance with the conditions of the approval.
20. (1) The Agency shall from time to time require the person in charge of a project to furnish, within such period as may be specified, an environmental audit or environmental review report or environmental management plan containing a comprehensive appraisal of the environmental aspects of the project.
- (2) The report of a project prepared under sub-section (1) shall include -
- (a) analysis of the predicted qualitative and quantitative impact of the project as compared to the actual impact;
 - (b) evaluation of the efficacy of the preventive, mitigation and compensatory measures taken with respect to the project; and
 - (c) recommendations for further minimizing or mitigating the adverse environmental impact of the project.
- (3) Based on its review of the environmental audit report, the Agency may, after giving the person in charge of the project an opportunity of being heard, direct that specified mitigation and compensatory measures be adopted within a specified time period and may also, where necessary, modify the approval granted by it under section 17.

**PART-VII
ENVIRONMENTAL PROTECTION ORDER**

**Environmental
Protection
Order.**

21. (1) Where the Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of any provision of this Act, the rules or regulations or of the conditions of a licence, or is likely to cause, or is causing or has caused an adverse environmental effect, the Agency may, after giving the person responsible for such

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discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures as the Agency may consider necessary within such period as may be specified in the order.

(2) In particular and without prejudice to the generality of the foregoing power, such measures may include —

- (a) immediate stoppage, preventing, lessening or controlling the discharge, emission, disposal, handling, act or omission, or to minimize or remedy the adverse environmental effect;
- (b) installation, replacement or alteration of any equipment or thing to eliminate, control or abate on a permanent or temporary basis, such discharge, emission, disposal, handling, act or omission;
- (c) action to remove or otherwise dispose of the effluent, waste, air pollutant, noise, or hazardous substances;
- (d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonable in the circumstances, to the satisfaction of the Agency; and
- (e) impose a penalty as prescribed.

(3) Notwithstanding the provisions of sub-section (1), in an emergency situation where, for reasons to be recorded, the Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act and that circumstances of the case warrant immediate action in the public interest, it may pass an ad-interim order of the nature described in sub-sections (1) and (2) by providing reasonable opportunity of hearing.

**PART-VIII
OFFENCES AND PENALTIES**

22.(1) Whoever contravenes or fails to comply with the provisions of sections 11, 17, 18 and 21 or any order issued there under shall be punishable with a fine which may extend to five million rupees, to the damage caused to environment and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues:

Penalties.

Provided that if the contravention of the provisions of section 11 also constitutes a contravention of the provisions of section 15, such contravention shall be punishable under sub-section (2).

(2) Whoever contravenes or fails to comply with the provisions of sections 13, 14, 15 and 16 or any rule or regulation or conditions of any license, any order or direction, issued by the Agency, shall be punished with a fine, and in case of continuing contravention or failure with an additional fine which may extend to ten thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-sections (1) and (2), the Environmental Protection Tribunal and Court shall, as the case may be, in passing sentence, take into account the extent and duration of the contravention or failure constituting the offence and the attendant circumstances.

(4) Where an accused has been convicted of an offence under sub-sections (1) or (2), the Environmental Protection Tribunal or Court, as the case may be, shall endorse a copy of the order of conviction to the concerned trade or industrial association, if any, or the concerned Provincial Chamber of Commerce and Industry or the Federation of Pakistan Chambers of Commerce and Industry.

(5) Where a person convicted under sub-sections (1) and (2) had been previously convicted for any contravention of this Act and its rules or regulations, the Environmental Protection Tribunal, as the case may be, may, in addition to the punishment awarded thereunder-

- (a) sentence him to imprisonment for a term that may extend up to three years;
- (b) order the closure of the factory;
- (c) order confiscation of the facility, machinery and equipment, vehicle or substance, record, document or other object used or involved in contravention of the provisions of this Act;
- (d) order such person to restore the environment at his own cost, to conditions existing prior to the contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Agency; and
- (e) order that compensation be paid to any person or persons for any loss, or damage to their health or property suffered by such contravention.

(6) The Director General or an officer generally or specially authorised by him in this behalf may, on the application of the accused, compound an offence under this Act with the permission of the Environmental Protection Tribunal or Court in accordance with such procedure as prescribed.

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(7) Where the Director General is of the opinion that a person had contravened any provision of this Act, he may, subject to the rules, by notice in writing to that person require him to pay to the Agency a penalty in the amount set out in the notice for each day the contravention continues.

23. Where any contravention of this Act has been committed by a body corporate, and it is proved that such offence has been committed with the consent or connivance of, or is attributed to any negligence on the part of, any director, partner, manager, secretary or other officer of the body corporate, such director, partner, manager, secretary or other officer of the body corporate, shall be deemed guilty of such contravention along with the body corporate and shall be punished accordingly:

**Offences by
body corporate.**

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XLVII of 1984), only the Chief Executive as defined in the said Ordinance shall be liable under this section.

Explanation.— For the purposes of this Section, "body corporate" includes a firm, association of persons and a society registered under the Societies Registration Act, 1860 (XXI of 1860), or under the Co-operative Societies Act, 1925 (VII of 1925).

24. Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of, the Head or any other officer of Government Agency, local authority or local council, such Head or other officer shall also be deemed guilty of such contravention along with the Government Agency, local authority or local council and shall be liable to be proceeded against and punished accordingly.

**Offences by
Government
Agencies, local
authorities or
local councils.**

PART-IX

ENVIRONMENTAL PROTECTION TRIBUNALS AND COURTS

25. (1) Government may, by Notification in the Official Gazette, establish as many Environmental Protection Tribunals as it considers necessary and, where it establishes more than one Environmental Protection Tribunal, it shall specify territorial limits within which, or the class of cases in respect of which, each one of them shall exercise jurisdiction under this Act.

**Environmental
Protection
Tribunals.**

(2) An Environmental Protection Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as a Judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by Government, of which at least one shall be a technical member nominated from amongst the officers of the Agency with suitable professional qualifications and experience in the environmental field.

(3) For every sitting of the Environmental Protection Tribunal, the presence of the Chairperson and not less than one Member shall be necessary.

(4) A decision of an Environmental Protection Tribunal shall be expressed in terms of the opinion of the majority of its members, including the Chairperson, or if the case has been decided by the Chairperson and only one of the members and there is a difference of opinion between them, the decision of the Environmental Protection Tribunal shall be expressed in terms of the opinion of the Chairperson.

(5) An Environmental Protection Tribunal shall not, merely by reason of a change in its composition, or the absence of any member from any sitting, be bound to recall and rehear any witness who has given evidence, and may act on the evidence already recorded by, or produced, before it.

(6) An Environmental Protection Tribunal may hold its sittings at such places within its territorial jurisdiction as the Chairperson may decide.

(7) No act or proceeding of an Environmental Protection Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution, of, the Environmental Protection Tribunal.

(8) The terms and conditions of service of the Chairperson and members of the Environmental Protection Tribunal shall be such as may be prescribed.

**Jurisdiction and
powers of
Environmental
Protection
Tribunals.**

26. (1) An Environmental Protection Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act or the rules and regulations.

(2) All contraventions punishable under sub-section (1) of section 22 shall exclusively be triable by an Environmental Protection Tribunal.

(3) An Environmental Protection Tribunal shall not take cognizance of any offence triable under sub-section (2) except on a complaint in writing by—

(a) the Agency or any Government Agency or Local Council; and

(b) any aggrieved person, who has given notice of not less than thirty days to the Agency, of the alleged contravention and of his intention to make a complaint to the Environmental Protection Tribunal.

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(4) In exercise of its criminal jurisdiction, the Environmental Protection Tribunal shall have the same powers as are vested under the Code of Criminal Procedure, 1898 (Act V of 1898).

(5) In exercise of the appellate jurisdiction under section 27 the Environmental Protection Tribunal shall have the same powers and shall follow the same procedure as an appellate court in the Code of Civil Procedure, 1908 (Act V of 1908).

(6) In all matters with respect to which no procedure has been provided for in this Act, the Environmental Protection Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Protection Tribunal may, on application filed by any officer duly authorised in this behalf by the Director General, issue bailable warrant for the arrest of any person against whom reasonable suspicion exists, of his having been involved in contravention punishable under sub-section (1) of section 22:

Provided that such warrant shall be applied for, issued and executed in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898):

Provided further that if the person arrested executes a bond with sufficient sureties in accordance with the endorsement on the warrant he shall be released from custody, failing which he shall be taken or sent without delay to the officer in-charge of the nearest jurisdiction police station.

(8) All proceedings before the Environmental Protection Tribunal shall be deemed to be judicial proceedings within the meaning of sections 193 and 228 of the Pakistan Penal Code (Act XLV of 1860), and the Environmental Protection Tribunal shall be deemed to be a court for the purpose of sections 480 and 482 of the Code of Criminal Procedure, 1898 (Act V of 1898).

(9) No court other than an Environmental Protection Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Protection Tribunal extends under this Act and the rules and regulations.

(10) Where the Environmental Protection Tribunal is satisfied that a complaint made to it under sub-section (3) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

**Appeals to the
Environmental
Protection
Tribunal.**

27. (1) Any person aggrieved by any order or direction of the Agency under any provision of this Act or the rules or regulations may prefer an appeal with the Environmental Protection Tribunal within thirty days of the date of communication of the impugned order or direction to such person.

(2) An appeal to the Environmental Protection Tribunal shall be in such form, contain such particulars and be accompanied by such fees as prescribed.

**Appeals from
orders of the
Environmental
Protection
Tribunal.**

28. (1) Any person aggrieved by any final order or by any sentence of the Environmental Protection Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall lie before the High Court of Sindh.

**Jurisdiction of
Judicial
Magistrate.**

29. (1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contraventions punishable under sub-section (2) of section 22 shall exclusively be triable by the Court of Judicial Magistrate of First Class having of First Class having jurisdiction.

(2) A Judicial Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 22.

(3) A Judicial Magistrate shall not take cognizance of an offence triable under sub-section (1) except on a complaint in writing by—

(a) the Agency; and

(b) any aggrieved person.

**Appeals from
orders of the
Judicial
Magistrate.**

30. Any person aggrieved by any final order or sentence passed by a Judicial Magistrate under section 28 may, within thirty days from the date of the communication of such order or sentence, appeal to the Court of the District and Sessions Judge defined as Green Court under this Act, whose decision thereon shall be final.

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**PART-X
PUBLIC PARTICIPATION**

31.(1) The Agency shall cause relevant details of any proposed project regarding which an Environmental Impact Assessment has been received to be published, along with an invitation to the public to furnish their comments thereon within a specified period. **Public participation.**

(2) In accordance with such procedure as may be prescribed, the Agency shall hold public hearings to receive additional comments and hear oral submissions.

(3) All comments received under sub-sections (1) and (2) shall be duly considered by the Agency while reviewing the environmental impact assessment or strategic impact assessment, and decision or action taken thereon shall be communicated to the persons who have furnished the said comments.

**PART-XI
GENERAL**

32. The Agency may, by notification in the official Gazette, make and amend the schedule. **Power to make and amend schedule.**

33. No suit, prosecution or other legal proceedings shall lie against Government, the Council, the Agency, the Director General of the Agency, members, officers, employees, experts, advisors, committees or consultants of the Agency or Environmental Protection Tribunal or Court or any other person for anything which is done or intended to be done in good faith under this Act or rules or regulations. **Indemnity**

34. Any dues recoverable by the Agency under this Act and rules or regulations shall be recoverable as arrears of land revenue. **Dues recoverable as arrears of land revenue.**

35. The provisions of this Act shall have effect notwithstanding anything inconsistent therewith contained in any other law for the time being in force. **Act to override other laws.**

36. The Sindh Environment Protection Agency may, by notification in the Official Gazette, make rules for carrying out the purposes not in consistence of this Act with the approval of Government. **Power to make rules.**

37. (1) For carrying out the purposes of this Act, the Agency may, by Notification in the Official Gazette and with the approval of Government, make regulations not inconsistent with the provisions of this Act or the rules. **Power to make regulations.**

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may provide for —

- (a) submission of periodical reports, data or information by any Government Agency, local authority or local council in respect of environmental matters;
- (b) preparation of emergency contingency plans for coping with environmental hazards and pollution caused by accidents, natural disasters and calamities;
- (c) appointment of officers, advisors, experts, consultants and employees **as per prescribed rules**;
- (d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;
- (e) monitoring and measurement of discharges and emissions;
- (f) categorization of projects to which, and the manner in which sections 17, 18 and 20 applies;
- (g) laying down of guidelines for preparation of initial environmental examination, environmental impact assessment and strategic environmental assessment, and development of procedures of their filing, reviews and approval.
- (h) laying down standard operating procedures for environmental sampling, examination of water, waste water, gaseous emissions, solid waste and noise;
- (i) providing procedures for handling hazardous substances; and
- (j) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

**BY ORDER OF THE SPEAKER
PROVINCIAL ASSEMBLY OF SINDH**

**G.M.UMAR FAROOQ
SECRETARY
PROVINCIAL ASSEMBLY OF SINDH**

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Annexure – II

SEPA (Review of IEE/EIA) Regulations 2014



**GOVERNMENT OF SINDH
SINDH ENVIRONMENTAL PROTECTION AGENCY**

Karachi dated the 16th December, 2014.

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred by section 37 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of Government, is pleased to make the following regulations, namely:-

1. Short title and commencement

- (1) These regulations may be called the Sindh Environmental Protection Agency (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2014.
- (2) They shall come into force at once.

2. Definitions.-

- (1) In these regulations, unless there is anything repugnant in the subject or context -
 - (a) "Act" means the Sindh Environmental Protection Act, 2014 (VIII of 2014);
 - (b) "Agency" means the Sindh Environmental Protection Agency as defined under section 2(ii);
 - (c) "Committee" means the Environmental Assessment Advisory Committee constituted under regulation 24;
 - (d) "Director General" means the Director General of the Agency;
 - (e) "EIA" means an environmental impact assessment as defined in section 2(xv);
 - (f) "IEE" means an initial environmental examination as defined in section 2(xxx);
 - (g) "section" means a section of the Act.
 - (h) "Firm" means the Environmental Consulting Firm certified by the Agency;

- (i) "Environmental Sensitive areas" means the area which falls under sensitive sites like protected areas, or the sites which may have crucial and growing importance;
 - (j) "protected area" means any area which safeguards the earth's precious bio-diversity protect outstanding areas of natural beauty and conservation of cultural significance;
 - (k) "Schedule" means the Schedule to these regulations;
 - (l) "urban area" means an area within the limits of a town, municipality or city and includes any area declared as such by Government by notification in the official gazette;
- (2) All other words and expressions used but not defined in these regulations shall have the same meaning as are assigned to them in the Act.

3. Projects requiring an IEE

A proponent of a project falling in any category listed in Schedule-I shall file an IEE with the Agency, and the provisions of section 17 shall apply to such projects.

4. Projects requiring an EIA

A proponent of a project falling in any category listed in Schedule-II shall file an EIA with the Agency, and the provisions of section 17 shall apply to such projects.

5. Projects requiring checklist

A proponent of a project falling in any category listed in Schedule-III shall file environmental checklist with the Agency and the provisions of section 17 shall apply to such projects.

6. Projects not requiring an IEE or EIA

- (1) A proponent of a project not falling in any category listed in Schedules-I, II and III shall not be required to file an IEE or EIA:

Provided that the proponent shall file -

- (a) an EIA, if the project is likely to cause an adverse environmental effects;
- (b) an application for projects not listed in Schedules-I, II and III in respect of which the Agency has issued guidelines for construction and operation for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be fully complied with.

- (2) Notwithstanding anything contained in sub-regulation (1), the Agency may direct the proponent of a project, whether or not listed in Schedule I or II or III, to file an IEE or EIA or environmental check list, for reasons to be recorded in such direction:

Provided that no such direction shall be issued without the recommendations in writing of the Committee.

- (3) The provisions of section 17 shall apply to a project in respect of which an IEE or EIA or environmental checklist is filed under sub-regulation (1) or (2).

7. Preparation of IEE/EIA and environmental checklist

- (1) The Agency may issue guidelines for preparation of an IEE or an 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 particular sector.
- (2) Where guidelines have been issued under sub-regulation (1), an IEE or EIA or environmental checklist 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.

8. Review Fees

The proponent shall pay, at the time of submission of an IEE or EIA or environmental checklist, a non-refundable review fee to the Agency as per rates shown in Schedule-IV

9. Filing of IEE, EIA and environmental check list.

- (1) Ten hard copies and two electronic copies for an IEE and EIA reports shall be filed with the Agency prepared by Firm.
- (2) Every IEE and EIA shall be accompanied by -
 - (a) an application, in the form prescribed 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;
 - (d) the environmental check list as per its guidelines.

10. Preliminary scrutiny

- (1) Within fifteen working days of filing of the IEE or EIA or environmental check

list, the Agency shall –

- (a) confirm that the IEE or EIA or environmental check list is complete for purposes of initiation of the review process; or
 - (b) require the proponent to submit such additional information as may be specified; or
 - (c) return the IEE or EIA or environmental checklist to the proponent for revision, clearly listing the points requiring further study and discussion.
- (2) Notwithstanding anything contained in sub-regulation (1), the Agency may require the proponent to submit an additional information at any stage during the review process.

11. Public participation

- (1) In the case of an EIA, the Agency shall simultaneously with issue of confirmation of completeness under sub-regulation (2) of regulation 9, cause to be published in any English or Urdu national newspaper and in a local newspaper of general circulation in the area affected by the project, a public notice mentioning the type of project, its exact location, the name and address of the proponent and the places at which the EIA of the project can, subject to the restrictions in sub-section (3) of section 17, be accessed.
- (2) The notice issued under sub-regulation (1) shall fix a date, time and place of public hearing for any comments on the project or its EIA.
- (3) The date fixed under sub-regulation (2) shall not be earlier than fifteen days from the date of publication of the notice.
- (4) The Agency shall also ensure the circulation of the EIA to the concerned Government Agencies and solicit their comments thereon.
- (5) All comments received by the Agency from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the EIA.
- (6) The Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

12. Review

- (1) The Agency shall make every effort to carry out its review of the environmental checklist within thirty days, IEE within sixty days, and of the EIA within four months of issue of confirmation of completeness under regulation 9.

- (2) In reviewing the EIA, the Agency shall consult such Committee of Experts be constituted for the purpose by the Director General, and may also solicit views of concerned Advisory Committee, if any, constituted by the Agency.
- (3) The Director-General may, where he considers it necessary, constitute a committee to inspect the site of the project and submit its report on such matters as may be specified.
- (4) In reviewing the IEE, the Director General may constitute a committee of the officers from within the Agency on case to case basis in view of the jurisdiction and location of the project for the purpose to extend final recommendation about the approval or rejection of the IEE.
- (5) In reviewing of the IEE, the Director General may direct the proponent and Firm to present the report before the committee as given under sub-regulation (4) and the Director General may also invite environmental experts from outside the Agency for the purpose of assistance.
- (6) The review of the IEE or EIA by the Agency shall be based on quantitative and qualitative assessment of the documents and data furnished by the proponent, comments from the public and Government Agencies received under regulation 10, and views of the committees mentioned in sub-regulations (2) and (3) above.
- (7) The environmental check list shall be reviewed as per guidelines issued by the Agency.

13. Decision

- (1) Subject to regulation 9 and 11, the documentary evidence in the form of videos (soft copies) of public hearing shall be submitted by the proponent at the time of environmental approval or at any stage of review process, to the Agency.
- (2) On completion of the review, the decision of the Agency shall be communicated to the proponent in the form prescribed in Schedule-VI in the case of an IEE and environmental check list, and in the form prescribed in Schedule-VII in the case of an EIA and for environmental checklist.

14. Conditions of approval

- (1) Every approval of an IEE or EIA or check list shall, in addition to such conditions as may be imposed by the Agency, be subject to the condition that the project shall be designed and constructed, and mitigatory and other measures adopted, strictly in accordance with the IEE or EIA or environmental check list, unless any variations thereto have been specified in

the approval by the Agency.

- (2) Where the Agency accords its approval subject to certain conditions, the proponent shall -
 - (a) before commencing construction of the project, acknowledge acceptance of the stipulated conditions by executing an undertaking in the form prescribed in Schedule-VIII;
 - (b) before commencing operation of the project, obtain from the Agency written confirmation that the conditions of approval, and the requirements in the IEE or EIA or environmental check list relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

15. Confirmation of compliance

(1) The request for confirmation of compliance under clause (b) of sub-regulation (2) of Regulation 13 shall be accompanied by an Environmental Management Plan indicating the measures and procedures proposed to be taken to manage or mitigate the environmental impacts for the life of the project, including provisions for monitoring, reporting and auditing.

(2) Where a request for confirmation of compliance is received from a proponent, the Agency may carry out such inspection of the site and plant and machinery and seek such additional information from the proponent as it may deem fit:

Provided that every effort shall be made by the Agency to provide the requisite confirmation or otherwise within twenty days of receipt of the request, with complete information, from the proponent.

(3) The Agency may, while issuing the requisite confirmation of compliance, impose such other conditions as the Environmental Management Plan, and the operation, maintenance and monitoring of the project as it may deem fit, and such conditions shall be deemed to be included in the conditions to which approval of the project is subject.

16. Deemed approval

The period for communication of decision stipulated in sub-section (4) of section 17 shall commence from the date of filing of an IEE or EIA or environmental check list in respect of which confirmation of completeness is issued by the Agency under clause (a) of sub-regulation (1) of regulation 9.

17. Extension in review period

Where the Agency in a particular case extends the period of four months under the provisions of sub-section (4) of section 17, it may extend the further period as it may

deem fit, for the reasons to be recorded in writing thereof.

18. Validity period of approval

- (1) The approval accorded by the Agency under section 17 read with regulation 12 shall be valid, for commencement of construction, for a period of three years from the date of issue.
- (2) If construction is commenced during the initial three years validity period, the validity of the approval shall stand extended for a further period of three years from the date of issue.
- (3) After issue of confirmation of compliance, the approval shall be valid for a period of three years from the date thereof.
- (4) The proponent may apply to the Agency for extension in the validity periods mentioned in sub-regulations (1), (2) and (3), which may be granted by the Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change:

Provided that the Agency may require the proponent to submit a fresh IEE or EIA, if in its opinion changes in location, design, construction and operation of the project so warrant.

19. Entry and inspection

- (1) For the purpose of verification of any matter relating to the review or to the conditions of approval of an IEE or EIA or environmental check list prior to, before or during and after commencement of construction or operation of a project, duly authorized staff of the Agency shall be entitled to enter and inspect the project site, factory building and plant and equipment installed therein.
- (2) The proponent shall ensure full cooperation of the project staff at site to facilitate the inspection, and shall provide such information as may be required by the Agency for this purpose and pursuant thereto.

20. Monitoring

- (1) After issue of approval, the proponent shall submit a report to the Agency on completion of construction of the project.
- (2) After issue of confirmation of compliance, the proponent shall submit an annual report summarizing operational performance of the project, with reference to the conditions of approval and maintenance and mitigatory measures adopted by the project.

- (3) The proponent shall, in order to enable the Agency to effectively monitor compliance with the conditions of approval, furnish such additional information as the Agency may require.

21. Cancellation of approval

- (1) Notwithstanding anything contained in these regulations, if, at any time, on the basis of information or report received or inspection carried out, the Agency is of the opinion that the conditions of an approval have not been complied with, or that the information supplied by a proponent in the approved IEE or EIA or environmental check list is incorrect, it shall issue notice to the proponent for show cause within two weeks of receipt thereof as to why the approval should not be cancelled.
- (2) In case no reply is received or if the reply is considered unsatisfactory, the Agency may, after giving the proponent an opportunity of being heard -
 - (i) require the proponent to take such measures and to comply with such conditions within such period as it may specify, failing which the approval shall stand cancelled; or
 - (ii) cancel the approval.
- (3) On cancellation of the approval, the proponent shall cease construction or operation of the project forthwith.
- (4) Any action taken under this regulation shall be without prejudice to any other action that may be taken against the proponent under the Act or rules or regulations or any other law for the time being in force.

22. Registers of IEE,EIA and Check list projects

Separate Registers to be maintained by the Agency for IEE, EIA and environmental check list projects under sub-section (6) of section 17 shall be in the form prescribed in Schedule-IX.

23. Environmentally sensitive areas

- (1) The Agency may, by notification in the official Gazette, designate an area to be an environmentally sensitive area.
- (2) Notwithstanding anything contained in regulations 3, 4 and 5, the proponent of a project situated in an environmentally sensitive area shall be required to file an EIA with the Agency.
- (3) The Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessment process to plan and prepare projects located in environmentally sensitive areas.

- (4) Where guidelines have been issued under sub-regulation (3), the projects shall be planned and prepared, to the extent practicable, in accordance therewith and any departure therefrom justified in the EIA pertaining to the project.

24. Environmental Assessment Advisory Committee.- For the purpose of rendering advice on all aspects of the environmental assessment including guidelines procedure and categorization of projects, the following Advisory Committee shall be constituted:-

- | | |
|---|-----------------|
| (i) Director Technical, Sindh Environmental Protection Agency (EIA/IEE) | Chairman |
| (ii) Chief Environment, Planning and Development Department | Member |
| (iii) Four representative on each of industry, non-Governmental organization, legal and other experts | Members |

25. Repeal and Savings. (1) The provisions of the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Assessment Impact Regulations 2000, to the extent of the Province of Sindh are hereby repealed.

(2) All orders made, notification issued, actions taken under the repealed Regulations shall remain in force until amended, altered or repealed by the provisions of these Rules.

**DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION
AGENCY**

SCHEDULE I
(See Regulation 3)

A. Agriculture, Livestock and Fisheries

1. Poultry, livestock, stud and fish farms
2. Projects involving packaging, formulation, cold storage and warehouse of agricultural products.

B. Energy

1. Hydroelectric power generation less than 50 MW
2. Thermal power generation less than 100MW
3. Coal fired power plants with capacity less than 50 MW
4. Transmission lines less than 11 KV, and grid station
5. Waste-to-energy generation projects including bio-mass less than 25 MW
6. Solar project
7. Wind project

C. Oil and Gas projects:

1. Oil and gas 2D/3D Seismic survey and drilling activities
2. Oil and gas extraction projects including exploration and production located outside the environmentally sensitive areas
3. Construction of LPG storage facilities
4. Construction of LPG,CNG filling station and petrol pumps

D. Manufacturing and processing

1. Ceramics and glass units less than 500 million
2. Food processing industries with total cost less than Rs. 200 millions
3. Pharmaceutical units.
4. Marble units

5. Carpet manufacturing units
6. Rice mills, ghee/oil mills ,
7. Brick kilns
8. Stone crushing units
9. Man-made fibers and resin projects with total cost less than Rs. 200 millions
10. Manufacturing of apparel, textile garments unit , including dyeing, bleaching and printing, with total cost less than Rs.50 million
11. Wood products with total cost more than Rs.100 million
12. Steel re-rolling mills
13. Recycling plants

E. Mining and mineral processing

Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule II with total cost less than Rs.100 million

1. Crushing, grinding and separation processes
2. Smelting plants with total cost less than Rs100 millions

F. Transport

1. Flyovers, underpasses and bridges having total length less than 500 meters

G. Water management, dams, irrigation and flood protection

1. Dams and reservoirs with storage volume less than 25 million cubic meters of surface area less than 4 square kilometers
2. Small-scale irrigation systems and drainage system with total cost less than Rs. 100 million

H. Water supply and filtration

Water supply schemes and **filtration** plants with total cost less than 100 million (Including projects of maintenance, up gradation, reconstruction of existing projects.)

I. Waste disposal and treatment

1. Solid and non-hazardous waste with annual capacity less than 10,000 tons
2. Waste water treatment for sewage treatment facility with total cost less than 200M
3. Industry specific Waste water treatment facility for Industrial effluent (small scale plant)

J. Urban development

1. Housing schemes less than 10 acres
2. Mutli-story buildings having residential and commercial setup on the total plot size is less than 2000 sq.yards
3. Hospitals with capacity of 50 beds, health care unit/laboratories with 500 OPD/day.
4. Construction of Educational, Academic institutions on land less than 10 acres.

K. Other projects

Any other project for which filing of an IEE is required by the Agency under sub-regulation (2) of Regulation 6.

SCHEDULE II

(See Regulation 4)

List of projects requiring an EIA

A. Energy

1. Hydroelectric power generation over 50 MW
2. Thermal power generation over 100MW
3. Coal power projects above 50 MW
4. Transmission lines (11 KV and above) and distribution projects.
5. Nuclear power plants
6. Wind energy projects if falls under any sensitive, protected area.

B. Oil and Gas projects

1. Petroleum refineries.
2. LPG and LNG Projects(including LNG Terminals, re-gasification units) except LPG filling stations
3. Oil and gas transmission systems
4. Oil and gas gathering system, separation and storage.

C. Manufacturing and processing

1. Cement plants
2. Chemical manufacturing industries
3. Fertilizer plants
4. Steel Mills
5. Sugar Mills and Distilleries
6. Food processing industries including beverages, dairy milk and products, slaughter houses and related activities with total cost more than Rs. 200 Million
7. Industrial estates (including export processing zones)
8. Man-made fibers and resin projects with total cost of Rs 200M and above
9. Pesticides (manufacture or formulation)
10. Petrochemicals complex
11. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulping, plastic products, textiles (except apparel),printing and publishing, paints and dyes, oils and fats and vegetable ghee projects, with total cost more than Rs.

- 10 million
- 12. Tanning and leather finishing projects
- 13. Battery manufacturing plant

D. Mining and mineral processing

- 1. Mining and processing of coal, gold, copper, sulphur and precious stones
- 2. Mining and processing of major non-ferrous metals, iron and steel rolling
- 3. Smelting plants with total cost of Rs. 100 million and above

E. Transport

- 1. Airports
- 2. Federal or Provincial highways or major roads (including rehabilitation or rebuilding or reconstruction of existing roads)
- 3. Ports and harbor development
- 4. Railway works
- 5. Flyovers, underpasses and bridges having total length of more than 500m

F. Water management, dams, irrigation and flood protection

- 1. Dams and reservoirs with storage volume of 25 million cubic meters and above having surface area of 4 square kilometers and above
- 2. Irrigation and drainage projects serving 15,000 hectares and above
- 3. Flood Protection

G. Water supply and filtration

Large Water supply schemes and **filtration** plants.

H. Waste Disposal and treatment

- 1. Handling, storage or disposal of hazardous or toxic wastes or radioactive waste (including landfill sites, incineration of hospital toxic waste)
- 2. Waste disposal facilities for municipal or industrial wastes, with total annual capacity of 10,000 tons and above.
- 3. Waste water treatment facility for industrial or municipal effluents.

I. Urban development and tourism

1. Housing schemes above 10 acres
2. Residential/commercial high rise buildings/apartments from 15 stories and above.
3. Land use studies and urban plans (large cities)
4. Large scale public facilities.
5. Large-scale tourism development projects

J. Environmentally Sensitive Areas

All projects situated in environmentally sensitive areas

K. Other projects

1. Any other project for which filing of an EIA is required by the Agency under sub-regulation (2) of Regulation 5.
2. Any other project likely to cause an adverse environmental effect

SCHEDULE-III

List of projects requiring environmental screening (through check list)

- a. Construction of, offices and small commercial buildings (1-6 story),home industrial units, ware houses, marriage / banquet facilities, large scale motor vehicles workshops, restaurants / food outlets ,large baking unit subject to the compliance with existing zoning laws.
- b. Reconstruction / rehabilitation of roads (small roads in urban area and farm to market roads more than 2 km.
- c. On-farm dams and fish farms.
- d. Pulses mills.
- e. Flour Mills
- f. Projects promoting energy efficiency (small scale).
- g. Lining of existing minor canals and /or water courses.
- h. Canal cleaning
- i. Forest harvesting operations
- j. Rain harvesting projects
- k. Rural schools (Secondary and Higher Secondary) and rural and basic health units having at least ten beds capacity.
- l. BTS Towers
- m. Lime Kilns
- n. Ice factories and cold storage.
- o. Cotton oil mill
- p. Warehouses for pesticides and pharmaceuticals

Schedule-IV

(See Regulation 7)

Description	IEE	EIA	Environmental Check list
Projects	Rs.100,000	Rs.200,000	Rs.30,000 except BTS Towers which is Rs.15,000

SCHEDULE V
[See Regulation 8(2)(a)]
Application Form

1.	Name and address of Proponent		Phone: Fax: Telex:	
2.	CNIC No. of proponent			
3.	Description of project			
4.	Location of project			
6.	Objectives of project			
7.	IEE/EIA attached?	IEE/EIA	:	Yes/No
8.	Have alternative sites been considered and reported in IEE/EIA?		Yes/No	
9.	No Objection Certificate of relevant stakeholders		Name(s)	
10.	Existing land use		Land requirement	
11.	Is basic site data available, or has it been measured?	(only tick yes if the data is reported in the IEE/EIA)	Available	Measured
		Meterology (including rainfall)	Yes/No	Yes/No
		Ambient air quality	Yes/No	Yes/No
		Ambient water quality	Yes/No	Yes/No
		Ground water quality	Yes/No	Yes/No
12.	Have estimates of the following been reported, especially Quantitative Analysis?	Water balance Solid waste disposal Liquid waste treatment	Estimated Yes/No Yes/No Yes/No	Reported Yes/No Yes/No Yes/No
13.	Source of power		Power requirement	
14.	Labour force (number)	Construction: Operation:		
15.	Environmental Consulting Firm			

Verification. I do solemnly affirm and declare that the information given above and contained in the attached IEE/EIA is true and correct to the best of my knowledge and belief.

Date

Signature, name and _____
designation of proponent
(with official stamp/seal)

SCHEDULE VI
[See Regulation 12]

Decision on IEE/Environmental Check List

1. Name and address of proponent _____

2. Description of project
3. Location of project
4. Date of filing of IEE
5. After careful review of the IEE, the Agency has decided –
 - (a) to accord its approval, subject to the following conditions:

 - or (b) that the proponent should submit an EIA of the project, for the following reasons –

[Delete (a) or (b), whichever is inapplicable]

Dated

Tracking no.____

Director-General
Sindh Environmental Protection Agency
(with official stamp/seal)

SCHEDULE VII

[See Regulation 12]

Decision on EIA

1. Name and address of proponent _____

2. Description of project _____
3. Location of project _____
4. Date of filing of EIA _____
5. After careful review of the EIA, and all comments thereon, the Federation Agency has decided –
 - (a) to accord its approval, subject to the following conditions:

 - or (b) that the proponent should submit an EIA with the following modifications-

 - or (c) to reject the project, being contrary to environmental objectives, for the following reasons:

[Delete (a)/(b)/(c), whichever is inapplicable]

Dated

Tracking no.____

Director-General
Sindh Environmental Protection Agency
(with official stamp/seal)

SCHEDULE VIII
[See Regulation 13(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions dated , and undertake to design, construct and operate the project strictly in accordance with the said conditions and the IEE/EIA/Environmental Check List.

Signature, name and
designation of proponent
(with official stamp/seal)

Witnesses
(full names and addresses)

SCHEDULE IX
(See Regulation 21)
Form of Registers for IEE and EIA and Environmental Check List projects

<u>S. No.</u>	<u>Description</u>	<u>Relevant Provisions</u>
1	2	3
1.	Tracking number	
2.	Category type (as per Schedules I, II & III)	
3.	Name of proponent	
4.	Name and designation of contact person	
5.	Name of consultant	
6.	Description of project	
7.	Location of project	
8.	Project capital cost	
9.	Date of receipt of IEE/EIA/Environmental Check List	
10.	Date of confirmation of completeness	
11.	Approval granted (Yes/No)	
12.	Date of approval granted or refused	
13.	Conditions of approval/reasons for refusal	
14.	Date of Undertaking	
15.	Date of extension of approval validity	
16.	Period of extension	
17.	Date of commencement of construction	
18.	Date of issue of confirmation of compliance	
19.	Date of commencement of operations	
20.	Dates of filing of monitoring reports	
21.	Date of cancellation, if applicable	

Annexure – III

Sindh Environmental Quality Standards, 2016

EXTRAORDINARY

Registered No. M324



The Sindh Government Gazette

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KARACHI THURSDAY JANUARY 28, 2016

PART-I

GOVERNMENT OF SINDH
SINDH ENVIRONMENT PROTECTION
AGENCY

NOTIFICATION

NO.EPA/TECH/739/2014:- In exercise of the powers conferred under clause (g) of sub-section (1) of section 6 of the Sindh Environmental Protection Act, 2014, the Sindh Environmental Protection Agency, with the approval of the Sindh Environmental Protection Council, is pleased to establish the following standards:-

1. (1) These Standards may be called the Sindh Environmental Industrial Waste Water, Effluent, Domestic, Sewerage, Industrial Air Emission and Ambient Airs, Noise for Vehicles, Air Emissions for Vehicles and Drinking Water Quality Standards, 2015.

(2) These Standards shall come into force at once.

2. In these Standards, unless there is anything repugnant in the subject or context -

(a) "Government" means the Government of Sindh;

(b) "Standards" means the Sindh Environmental Quality Standards.

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Ext -I-8

(23)

Price Rs. 70.00

PART-I

THE SINDH GOVT. GAZETTE EXT. JAN. 28, 2016

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SINDH ENVIRONMENTAL QUALITY STANDARDS FOR MUNICIPAL AND LIQUID INDUSTRIAL EFFLUENTS (mg/l, UNLESS OTHERWISE DEFINED)

S. No.	Parameter	Standards		
		Into Inland Waters	Into Sewage Treatment ⁽⁵⁾	Into Sea ⁽¹⁾
1	2	3	4	5
1.	Temperature 40 ⁰ C or Temperature Increase *	≤3 ⁰ C	≤3 ⁰ C	≤3 ⁰ C
2.	pH value (H ⁺) .	6-9	6-9	6-9
3.	Biochemical Oxygen Demand (BOD) ₅ at 20 ⁰ C ⁽¹⁾	80	250	80**
4.	Chemical Oxygen Demand(COD) ⁽¹⁾	150	400	400
5.	Total Suspended Solids (TSS)	200	400	200
6.	Total Dissolved Solids (TDS)	3500	3500	3500
7.	Oil and Grease	10	10	10
8.	Phenolic compounds (as phenol)	0.1	0.3	0.3
9.	Chloride (as Cl ⁻)	1000	1000	SC***
10.	Fluoride (as F ⁻)	10	10	10
11.	Cyanide (as CN ⁻) total .	1.0	1.0	1.0
12.	An-ionic detergents (as MBAS) ⁽²⁾	20	20	20
13.	Sulphate (SO ₄ ²⁻)	600	1000	SC***
14.	Sulphide (S ²⁻)	1.0	1.0	1.0
15.	Ammonia (NH ₃)	40	40	40
16.	Pesticides ⁽³⁾	0.15	0.15	0.15
17.	Cadmium ⁽⁴⁾ ..	0.1	0.1	0.1
18.	Chromium (trivalent and hexavalent ⁽⁴⁾)..	1.0	1.0	1.0
19.	Cooper ⁽⁴⁾	1.0	1.0	1.0
20.	Lead ⁽⁴⁾	0.5	0.5	0.5
21.	Mercury ⁽⁴⁾	0.01	0.01	0.01
22.	Selenium ⁽⁴⁾	0.5	0.5	0.5
23.	Nickel ⁽⁴⁾	1.0	1.0	1.0
24.	Silver ⁽⁴⁾	1.0	1.0	1.0
25.	Total toxic metals	2.0	2.0	2.0
26.	Zinc	5.0	5.0	5.0
27.	Arsenic ⁽⁴⁾	1.0	1.0	1.0
28.	Barium ⁽⁴⁾	1.5	1.5	1.5
29.	Iron	8.0	8.0	8.0
30.	Manganese	1.5	1.5	1.5
31.	Boron ⁽⁴⁾	6.0	6.0	6.0
32.	Chlorine	1.0	1.0	1.0

Explanations:

1. Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Sindh Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.
 2. Methylene Blue Active Substances; assuming surfactant as biodegradable.
 3. Pesticides include herbicides, fungicides, and insecticides.
 4. Subject to total toxic metals discharge should not exceed level given at S. N. 25.
 5. Applicable only when and where sewage treatment is operational and BOD₅=80mg/l is achieved by the sewage treatment system.
 6. Provided discharge is not at shore and not within 10 miles of mangrove or other important estuaries.
- *. The effluent should not result in temperature increase of more than 3⁰C at the edge of the zone where initial mixing and dilution take place in the receiving body. In case zone is not defined, use 100 meters from the point of discharge.
- ** The value for industry is 200 mg/l
- *** Discharge concentration at or below sea concentration (SC).

- Note: 1. Dilution of liquid effluents to bring them to the STANDARDS limiting values is not permissible through fresh water mixing with the effluent before discharging into the environment.
2. The concentration of pollutants in water being used will be subtracted from the effluent for calculating the STANDARDS limits".

**"SINDH ENVIRONMENTAL QUALITY STANDARDS FOR
INDUSTRIAL GASEOUS EMISSION (mg/Nm³, UNLESS
OTHERWISE DEFINED)."**

S. No.	Parameter	Source of Emission	Standards
1	2	3	4
1.	Smoke	Smoke opacity not to exceed	40% or 2 Ringleman Scale or equivalent smoke number
2.	Particulate matter	(a) Boilers and Furnaces	
	(1)	(i) Oil fired	300
		(ii) Coal fired	500
		(iii) Cement Kilns	300

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		(b) Grinding, crushing, Clinker coolers and Related processes, Metallurgical Processes, converter, blast furnaces and cupolas.	500
3.	Hydrogen Chloride	Any	400
4.	Chlorine	Any	150
5.	Hydrogen Fluoride	Any	150
6.	Hydrogen Sulphide	Any	10
7.	Sulphur Oxides ^{(2) (3)}	Sulfuric acid/ Sulphonic acid plants	
		Other Plants except power Plants operating on oil and coal	1700
8.	Carbon Monoxide	Any	800
9.	Lead	Any	50
10.	Mercury	Any	10
11.	Cadmium	Any	20
12.	Arsenic	Any	20
13.	Copper	Any	50
14.	Antimony	Any	20
15.	Zinc	Any	200
16.	Oxides of Nitrogen	Nitric acid Manufacturing unit.	3000
	(3)	Other plants except power plants operating on oil or coal:	
		Gas fired	400
		Oil fired	600
		Coal fired	1200

Explanations:-

1. Based on the assumption that the size of the particulate is 10 micron or more.
2. Based on 1 percent Sulphur content in fuel oil. Higher content of Sulphur will case standards to be pro-rated.
3. In respect of emissions of Sulphur dioxide and Nitrogen oxides, the power plants operating on oil and coal as fuel shall in addition to Standards specified above, comply with the following standards:-

A. Sulphur Dioxide

Sulphur Dioxide Background levels Micro-gram per cubic meter ($\mu\text{g}/\text{m}^3$) Standards.

Background Air Quality (SO ₂ Basis)	Annual Average	Max. 24-hours Interval	Criterion I Max. SO ₂ Emission (Tons per Day Per Plant)	Criterion II Max. ground level increment to ambient (One year Average)
Unpolluted	<50	<200	500	50
Moderately Polluted*	50	200	500	50
Low	100	400	100	10
High	>100	>400	100	10

* For intermediate values between 50 and 100 $\mu\text{g}/\text{m}^3$ linear interpolations should be used.

** No projects with Sulphur dioxide emissions will be recommended.

B. Nitrogen Oxide

Ambient air concentrations of Nitrogen oxides, expressed as NO_x should not be exceed the following:-

Annual Arithmetic Mean	100 $\mu\text{g}/\text{m}^3$ (0.05 ppm)
------------------------	--

Emission level for stationary source discharge before missing with the atmosphere should be maintained as follows:-

For fuel fired steam generators as Nanogram (10^0 -gram) per joule of heat input:

Liquid fossil fuel	..	..	..	130
Solid fossil fuel..	..	..	..	300
Lignite fossil fuel	..	..	..	260

Note:- Dilution of gaseous emissions to bring them to the STANDARDS limiting value is not permissible through excess air mixing blowing before emitting into the environment.

PART-I

THE SINDH GOVT. GAZETTE EXT. JAN. 28, 2016

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Sindh Environmental Quality Standards for Motor Vehicle Exhaust and Noise

(i) For in-use Vehicles				
S. No.	Parameter	Standards (maximum permissible limit)	Measuring Method	Applicability
1	2	3	4	5
1.	Smoke	40% or on the Ringleman Scale during engine acceleration mode	To be compared with Ringleman Chart at a distance of 6 meters or more.	Immediate effect
2	Carbon Monoxide	6 %	Under idling conditions: Non- dispersive infrared detection through gas analyzer.	
3.	Noise	85 db (A)	Sound-meter at 7.5 meter from the source.	

For new Vehicles

EMISSION STANDARDS FOR DIESEL VEHICLES

(a) For passenger Cars and Light Commercial Vehicles (g/Km)

Type of Vehicle	Category/Class	Tiers	CO	HC+ NOx	PM	Measuring Method	Applicability
1	2	3	4	5	6	7	8
Passenger Cars.	M 1: with reference mass (RW).	Pak-II, IDI	1.0	0.7	0.08		All imported and local manufactured
	up to 2500 kg. Cars with RW over 2500 kg. to meet NI Category standards	Pak-II DI	1.0	0.9	0.10	NEDC (ECE 15+ EUDCI.)	Diesel vehicles with effect from 01-07-2012
Light Commercial Vehicles	NI-I (RW≤1250 Kg)	Pak-II IDI	1.0	0.70	0.08		
		Pak-II DI	1.0	0.90	0.10		
	NI-II(1250kg< RW < 1700 Kg)	Pak-II IDI	1.25	1.0	0.12		
		Pak-II DI	1.25	1.3	0.14		
	NI-III(RW< 1700 Kg)	Pak-II IDI	1.50	1.2	0.17		
		Pak-II DI	1.50	1.6	0.20		

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Parameter Standards (maximum permissible limit) Measuring method

Noise	85 db (A)	Sound-meter at 7.5 meters from the source
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(b) For Heavy Duty Diesel Engines and Large Goods Vehicles (g/Kwh)

Type of Vehicle	Category/ Class	Tiers	CO	HC	NOx	PM	Measuring Method	Applicability
1	2	3	4	5	6	7	8	9
Heavy Duty Diesel Engines	Turks and Buses	Pak-II	4.0	1.1	7.0	0.15	ECE-R-49	All Imported and local manufactured diesel vehicles with the effect 1-7-2012
Large goods Vehicles	N2(2000 and up	Pak-II	4.0	7.0	1.10	0.15	EDC	

Parameter Standards (maximum permissible limit) Measuring method

Noise	85 db (A)	Sound-meter at 7.5 meters from the Source
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Emission Standards for Petrol Vehicles (g/km)

Type of Vehicle	Category/ Class	Tier	Co	HC+ NOx	Measuring Method	Applicability
1	2	3	4	5	6	7
Passenger Cars.	M 1: with reference mass (RW): upto 2500 kg. Cars with RW over 2500 kg. to meet N1 Category standards	Pak-II	2.20	0.5	NEDC (ECE 15 + EUDCT)	All imported and new models * locally manufactured petrol vehicles with effect from 1 st July, 2009**

Light Commercial Vehicles	NI-I (RW<1250 kg)	Pak-II	2.20	0.5	
	NI-NI-II (1250kg> kg)	Pak-II	4.0	0.65	
	RW< 1700 Kg)	Pak-II	5.0	0.08	
	NI-III(RW> 1700 kg)				
Motor Rickshaws & Motor Cycles	2,4 strokes < 150 cc	Pak-II	5.5	1.5	ECER 40
	2,4 strokes > 150cc	Pak-II	5.5	1.3	

Parameter Standards (maximum permissible limit) Measuring method

Noise source 85 db (A) Sound-meter at 7.5 meters from the

Explanations:

- DI: Direct Injection.
- IDI: Indirect Injection.
- EUDCL: Extra Urban Driving Cycle.
- NEDC: New European Driving Cycle.
- ECE: Urban Driving Cycle.
- M: Vehicles designed and constructed for the carriage of passenger and comprising no more than eight seats in addition to the driver's seat.
- N: Motor vehicles with at least four wheels designed and constructed for the carriage of goods.
- * New model means both model and engine type change.
- ** The existing models of petrol driven vehicles locally manufactured will immediately switch over to Pak-II emission standards but no late than 30th June, 2012.

SINDH ENVIRONMENTAL QUALITY STANDARDS FOR AMBIENT AIR

Pollutants	Time-weight average	Concentration in Ambient Air	Method of measurement
Sulphur Dioxide(SO ₂)	Annual Average*	80 µg/m ³	Ultraviolet Fluorescence method
Oxides of Nitrogen as (NO)	Annual Average*	40 µg/m ³	Gas Phase Chemiluminescence
Oxides of Nitrogen as (NO ₂)	Annual Average*	40 µg/m ³	Gas Phase Chemiluminescence
O ₃	1 hour	130 µg/m ³	Non dispersive UV absorption method
Suspended Particulate Matters(SPM)	Annual Average*	360 µg/m ³	High Volume Sampling (Average flow rate not less than 1 l in 3/minutes)
Respirable Particulate Matter PM10	24 hours**	500 µg/m ³	B Ray absorption method
Respirable Particulate Matter PM2.5	Annual Average*	120 µg/m ³	B Ray absorption method
Lead Pb	24 hours**	150 µg/m ³	B Ray absorption method
	Annual Average*	40 µg/m ³ ***	B Ray absorption method
	24 hours**	75 µg/m ³	
	Annual Average*	1 µg/m ³	ASS Method after sampling using EPM 2000 or equivalent filter paper
	24 hours**	1.5 µg/m ³	
Carbon Monoxide(CO)	8 hours**	5 mg/m ³	Non Dispersive Infra Red(NDIR) method
	1 hours**	10 mg/m ³	

- *Annual arithmetic mean of minimum 104 measurements in a year taken twice a week, 24 hourly and at uniform interval.
- ** 24 hourly/8 hourly values should be met 98% in a year, 2% of the time. It may exceed but not on two consecutive days.
- ***Annual Average limit of $40\mu/m^3$ or background annual average concentration plus allowable allowance of $9\mu/m^3$, whichever is lower.

Sindh Standards for Drinking Water Quality

Properties / Parameters	Standard Values for Sindh	WHO Standards	Remarks
Bacterial			
All water intended for drinking (e Coli or Thermo tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system (E.coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period	Most Asian countries also follow WHO standards
Physical			
Colour	≤ 15 TCU	≤ 15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Acceptable	
Odour	Non	Non	

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	objectionable/Acceptable	objectionable/Acceptable
Turbidity	< 5 NTU	< 5 NTU
Total hardness as CaCO ₃	< 500 mg/l	---
TDS	< 1000	< 1000
pH	6.5 - 8.5	6.5 - 8.5
Chemical		
<i>Essential Inorganic</i>	<i>mg/Litre</i>	<i>mg/Litre</i>
Aluminium (Al) mg/l	≤ 0.2	0.2

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Antimony (Sb)	≤ 0.005 (P)	0.02	
Arsenic (As)	≤ 0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl)	< 250	250	
Chromium (Cr)	≤ 0.05	0.05	
Copper (Cu)	2	2	
<i>Toxic Inorganic</i>	<i>mg/Liter</i>	<i>mg/Litre</i>	
Cyanide (CN)	≤ 0.05	0.07	Standard for Pakistan similar to Asian developing countries
Fluoride (F)*	≤ 1.5	1.5	
Lead (Pb)	≤ 0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤ 0.5	0.5	
Mercury (Hg)	≤ 0.001	0.001	
Nickel (Ni)	≤ 0.02	0.02	

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Nitrate (NO ₃)	≤ 0.50	50	
Nitrite (NO ₂)	≤ 3 (P)	3	
Selenium (SE)	0.01 (P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source	---	
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries

Properties / Performance	Standard Values for Pakistan	Who Standards	Remarks
Organic			
Pesticides mg/L		PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20-58 may be consulted.***	Annex II
Phenolic compounds (as Phenols) mg/L		0.002	
Polynuclear aromatic hydrocarbons (as PAH g/L)		0.01 (By GC/MS method)	
Radioactive			
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

*** PSQCA: Pakistan Standards Quality Control Authority

Proviso:

The existing drinking water treatment infrastructure is not adequate to comply with WHO guidelines. The Arsenic concentrations in some parts of Sindh have been found high then Revised WHO guidelines. It will take some time to control arsenic through treatment process. Lead concentration in the proposed standards is higher than WHO Guidelines. As the piping system for supply of drinking water in urban centers are generally old and will take significant resources and time to get them replaced. In the recent past, Lead was completely phased out from petroleum

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products to cut down Lead entering into environment. These steps will enable to achieve WHO guidelines for Arsenic, Lead, Cadmium and Zinc. However, for bottled water, WHO limits for Arsenic, Lead, Cadmium and Zinc will be applicable and PSQCA Standards for all the remaining parameters.

Sindh Environmental Quality Standards for Noise

S. No.	Category of Area / Zone	Effective from 1 st Jan, 2015		Effective from 1 st January, 2015	
		Limit in dB(A) Leq *			
		Day Time	Night Time	Day Time	Night Time
1.	Residential Area (A)	65	50	55	45
2.	Commercial Area (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 a.m to 10:00 p.m
 2. Night time hours: 10:00 p.m to 6:00 a.m
 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
 4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.
 * dB(A) Leq: Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

3. Repeal and Savings.

- (1) The provisions of the Statutory Notification dated 10th August, 2000 and 18th October, 2010, issued by the Ministry of Environment, Government of Pakistan, to the extent of the Province of Sindh are hereby repealed.
- (2) All actions taken, proceedings initiated shall be deemed to have been taken and initiated validly under the provisions of these Rules.

**DIRECTOR GENERAL
SINDH ENVIRONMENTAL PROTECTION
AGENCY**

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