A Project of International Complex Projects Limited (ICPL)

Environmental Impact Assessment (EIA) for the DOLMEN CITY PROJECT

February 2010
Environmental Impact Assessment (EIA) for The Dolmen City Project

A Project of International Complex Projects Limited (ICPL)
**EXECUTIVE SUMMARY**

Dolmen City is among the most prestigious mixed use development projects of Pakistan. It is being built to serve corporate and commercial clients in an ultra modern business environment.

Pursuant to the requirements of the Pakistan Environmental Protection Act, 1997 (PEPA 1997), and compliance of the order of Sindh Environmental Tribunal, International Complex Projects Limited (ICPL) engaged Environmental Management Consultants (EMC) to carry out Environmental Impact Assessment (EIA) study of Dolmen City project. The study has, while taking note of completion of some parts of the Project, also carried out Environmental Audit of the activities and their impact on the environment.

The Project is located at the sea shore of Arabian Sea and is being constructed on a plot of land measuring approximately 37,666 sq.yds, proposed built up area of the entire project is app. 3.9 million square feet situated at HC-3, Block 4, KDA Scheme No. 5, Clifton, Karachi.

The salient features of the project are as under:

<table>
<thead>
<tr>
<th>Table 1: Salient features of the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner Company</td>
</tr>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Area of Land</td>
</tr>
<tr>
<td>Proposed Built up area of the entire Project</td>
</tr>
<tr>
<td>Components of the Project</td>
</tr>
<tr>
<td>Two basement levels for parking (1071 nos. vehicles)</td>
</tr>
<tr>
<td>5 levels of upper floor parking (1610 nos. vehicles)</td>
</tr>
<tr>
<td>Shopping mall on ground, first &amp; second floors</td>
</tr>
<tr>
<td>Office Tower 17 storey</td>
</tr>
<tr>
<td>Office Tower 19 storey</td>
</tr>
<tr>
<td>Office Tower 40 storey</td>
</tr>
<tr>
<td>Office Tower 40 storey</td>
</tr>
<tr>
<td>Facilities/Services available at the already operational office tower</td>
</tr>
<tr>
<td>High speed elevators</td>
</tr>
<tr>
<td>Reserved parking with parking management system</td>
</tr>
<tr>
<td>NFPA approved fire alarm/suppression system</td>
</tr>
<tr>
<td>24 hour security system</td>
</tr>
<tr>
<td>Access control system</td>
</tr>
<tr>
<td>Uninterrupted power supply</td>
</tr>
<tr>
<td>Central air-conditioning</td>
</tr>
<tr>
<td>Fibre optic telecommunications system</td>
</tr>
<tr>
<td>Emergency medical services</td>
</tr>
<tr>
<td>Centralized mail/cargo delivery system</td>
</tr>
<tr>
<td>Visitors parking facilities</td>
</tr>
</tbody>
</table>

**Present status of project:**
1. The Executive Tower has been completed in all respects.
2. The Harbour Front Tower has been completed in all respects.
3. Tower A’s structure has been built upto + 30,000 level only. Finishing has not been commenced yet.
4. Tower B’s structure has been built up to +41,600 level only. Finishing has not been commenced yet.

5. Shopping Mall structure has been completed. Finishing works are currently in progress.

6. The structure of the upper parking floors and function hall has been completed. Finishing has not been commenced except on 3rd floor parking which has been partially finished.

**Utilities Requirements**

- The water requirement for the Project excluding HVAC is 230,000 GPD.
- The gas consumption for air conditioning chillers is 167,000 Cft/hr.
- The total electricity consumption for the project is 20 MW including HVAC load.

**The EIA Methodology**

Various steps undertaken in the EIA preparation included understanding of the proposed operation; review of legislation and guidelines; collection of secondary data including physical environment, biological environment, socio-economic environment and heritage aspects; field data collection; impact identification; recommendations for mitigation and monitoring measures; development of Environmental Management Plan (EMP) and reporting.

**Baseline Environment**

Dolmen City Project is located in the microenvironment comprising the sandy beach of Clifton on the front, the large Baghe Jinnah in the immediate vicinity, and several residential complexes across the road from Karachi Port installations to the Sea View.

The macro-environment of the Project comprises the Karachi Port Trust property housing the oil installations, coal storage area, and the Manora Channel enclosing the harbor on the north and northwest; and a large number of architecturally, historically and archaeologically significant structures.

**Climate:**

The Project is located in the coastal area of Karachi and as a result has a relatively mild climate. It can be characterized by dry, hot and humid conditions. There is minor seasonal intervention of a mild winter from mid-December to mid-February into a long hot and humid summer extending from April to mid-September.

**Recent Trend in Monsoon Pattern:**

The cyclonic event that was incident on August 10 and 11 of 2007 brought unusually high rainfall of 107mm in 24 hours as compared with the normal of about 60mm for August. The wettest August ever experienced by the city of Karachi was in 1979, when over 262mm rainfall was recorded. The rainfall system that started on July 30 2006 was a repetition of the 50 year cycle since in 1956 the recorded rainfall was 400 mm. The regular monsoon system was rendered inoperative by the persistence of the El-Nino and La-Nina effects. That system seems to have been broken by the powerful Tsunami which was caused by the 1000 km long and 4 km wide rupture under the Indonesian Seas that initiated the propagation of sea waves. The powerful Tsunami waves were traveling at a speed of 700 km/hour and were cause for the disruption of the ocean current system of the Indian Ocean that had been operating.
under the El-Nino system.

Storms:

High heat content of the Arabian Sea that is adjacent to the extensive heat zone of Pakistan usually upsets the heat balance and hence the water-balance of the region, particularly because it is the destination of windstorms. Tropical cyclones generally develop over Arabian Sea in low latitude i.e. 5-20 degrees north and dissipate after they move over land. The maximum frequency of tropical cyclone formation occurs in April, May and June and in the October-November period. The month of June receives least tropical cyclones in the region. About 76% of tropical cyclones in Karachi approach from the south through east.

Tropical cyclones that come near the proximity of Karachi are generally weakened. The one that came near the coastal area on May 12, 1999 changed its direction and hit the coastal area of Badin, however Karachi was safe from this cyclone as it is located in the peripheral area and only rain showers of moderate intensity were recorded.

Ambient Air Quality:

Ambient air quality data are being continuously recorded by one or the other organization in Karachi. Secondary data are available from the archives of the consultants who are engaged in conducting air quality surveys suggest the level of different pollutant as recorded in Table 2.

### Table-2: Maximum, Minimum and Average Level of Major Pollutants (Nov.2006)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>Maximum</th>
<th>Average</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO2 (ppb)</td>
<td>12.5</td>
<td>10.0</td>
<td>7.4</td>
</tr>
<tr>
<td>NOx (ppb)</td>
<td>27.5</td>
<td>15.0</td>
<td>8.4</td>
</tr>
<tr>
<td>CO (ppm)</td>
<td>3.21</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>CO2 (ppm)</td>
<td>400</td>
<td>344</td>
<td>310</td>
</tr>
<tr>
<td>O3 (ppb)</td>
<td>39.9</td>
<td>25.0</td>
<td>11.2</td>
</tr>
<tr>
<td>PM10 (µg/m3)</td>
<td>165</td>
<td>103</td>
<td>68</td>
</tr>
</tbody>
</table>

Source: SUPARCO

Sea Water and Coastal Oceanography

The coastal oceanographic features of the coastal and near-shore waters of the Karachi coastal belt are typical of the North Arabian Sea which is characterized by high salinity, low precipitation, high evaporation rates, reversal of sea water circulation during the two monsoon periods, and high primary production rates.

Geology:

The topography of the Dolman city area is flat sandy plain built along the sea coast on the recently filled silt and sand sediments. In the Clifton area and in the vicinity of Dolman city, following three types of coastal sediments can be identified:

i) Sand bar deposits: The sand bar deposits comprise of medium to coarse sand, micaceous and shifting sand dunes.

ii) Coastal sand dune deposits: These are medium sized and shifting sand dunes.

iii) Beach sand deposits: These are medium to coarse grained, unconsolidated sand with pebbles and broken shells. These have been marked but keep on shifting by wind into small coastal dunes.
Seismology of the Area:
Clifton and its adjoining locations fall in the approach of Karachi Coastal area which is a part of Indus deltaic region. The seismic activity in the Indus deltaic region is mainly from active faults. The Indus Delta complex zone shows profound influence of various faults such as Nagar Parker fault/Luni-Sukri fault, Island Belt fault/Allah Band fault, Banni fault and Kach mainland fault. A list of earthquakes that have affected the Bundal Island and its vicinity from 1977 to 2001 is discussed in section 04 of EIA report.

Tsunamis:
Tsunamis in Indo-Pak region are relatively rare. Destructive tsunamis that may have occurred in the Arabian Sea have not been documented.

The 1945 Tsunami having a magnitude of 8.3 on Richter Scale was the deadliest. At Karachi, the tsunami arrived from the direction of Clifton and Ghizri. It ran along the oil installations at Keamari and flooded a few compounds. The waves were 6.5 feet or 2.0 meter high when they reached Karachi. There was a delay of more than one hour between the main shock and arrival of the damaging tsunami at Karachi.

The sea is 3.36 meter (11ft) below the road level and 2.7 meters (8.8 ft) below the average ground level at Dolmen City Project site and Baghe Jinnah in normal season. This would suggest that a tsunami of magnitude similar to the 1945 Tsunami would affect the 2.5 meter contour on the beach front of Dolmen City Project site and Baghe Jinnah.

Surface and Ground water Quality in Coastal Area of Karachi:
The surface water available in the area is sea water which is highly saline. The ground water table lies at 1.6 to 2.3 meters depth. The ground water quality is very saline having total dissolved solids about 20,000mg/l. The chloride content ranges from 7500 to 9550 mg/l and the concentration of sulfate ranges between 1188 to 1242. It is therefore, very poor quality ground water and unsafe for any use.

Biological Environment
Development activities, in particular construction of buildings and apartments has substantially removed the vegetative cover and reduced the biodiversity of terrestrial fauna and flora of the macroenvironment of Dolmen City Project. The species of flora still in existence at the shoreline are not in the IUCN Red list of Endangered Species.

In the foreshore and intertidal zone, the most important flora include seaweeds of different types such as Enteromorphas nitthimais, Enteromorpha sp., while Ulva reticulate and mangrove species Avicennia marina is very sparse.

Biodiversity of marine fauna which is an asset of the intertidal zone has likewise been reduced. Visits conducted and secondary data available on fauna in the in the inter-tidal zone indicate the presence of different molluscs, bivalves and crustacean species.

Species Distribution at Clifton Beach (Dolmen City):
Gastropods and bivalves showed a random distribution pattern at the ITM locations. Bivalve Tellina showed aggregation at the ITM, while the drifted green seaweed was observed to
aggregate at LTM locations.

In terms of the natural animal-sediment relationship, it has been observed that the Clifton Beach in front of Dolmen City Project site is composed of compact silt, and is high in content of organic matter. The species diversity is low and seems to have been reduced by the compact sediment which restricts the burrowing invertebrate fauna. The compactness of sediment is most likely the result of land based pollution discharged into Manora Channel and Gizri Creek which open into the open sea at locations only 2.5 km west and east of the site respectively; the organic and inorganic matter has contaminated the beach.

Socioeconomic Profile of Dolmen City Project Area

The macroenvironment of Dolmen City Project comprises the area that is part of the administrative areas of Saddar Town and Keamari Town. More specifically the Project is located in Union Council (UC) 11 Kehkeshan in Saddar Town and has UC 1, 2, and 3 of Keamari Town in its north, northwest and west. Union Council Kehkeshan includes the recently developed areas of Clifton and Khakeshan. Dolmen City Project site has the Sea View Apartments on the east; the large Baghe Jinnah on the immediate west and the Clifton Beach right on front on the south. Offices of Consul General Kuwait, and Consul General China, Ziarat Abdullah Shah Ghazi, Bilawal House, Jason Terrace, Ziauddin University of Medical Sciences, National Institute of Oceanography, warehouses and oil storage facilities, molasses storage tanks, and coal storage yard are all located on its north, northwest and west.

Education

Educational facilities in the surrounding area of the Project are excellent.

Water Supply

Clean and safe water is one of the major problems being faced by the residents of Project area. Water is supplied to the Clifton area by Karachi Water & Sewerage Board (KW&SB) through dedicated water pipelines.

Health

Health problems of the Project area are generally associated with lifestyle. As such lifestyle diseases like hypertension, heart attack, diabetes, liver disease and depression, and cancer are commonly reported in Clifton area.

The Clifton area is a major employer of service providers. It offers opportunities for employment primarily to unskilled labor, skilled labor as well as to the high level manpower.

Shrines

The Shrine of Abdullah Shah Ghazi is only 1.5 km from Project site.

Archaeological Sites

No known archaeological site is present within or around the Project area.
Transportation Network
Project site is served by the road network of the CDGK and HDA.

Screening of Potential Environmental Impacts and Mitigation Measures
The establishment of Dolmen City Project at Clifton comprises designing, construction and operation of the different units based on state of the art technologies. The environmental aspects of the project identified by situation analysis are related to:
1. Physical environment
2. Ecological environment and

Screening of potential environmental impacts on the physical environment is related to:
- Siting of the Dolmen City Project at Clifton
- Topography, Geology and Seismicity
- Vulnerability to land erosion
- Vulnerability to seismic shocks
- Vulnerability to Tsunami hazard
- Vulnerability to land submergence in case of rise in sea level
- Availability of safe drinking water at construction site
- Vulnerability of groundwater at construction site to sewage effluent discharges
- Vulnerability of Project site to storm and flood water drainage and land erosion
- Air, water and noise pollution and other forms of nuisance during construction at site, and in the microenvironment and macro environment of site
- Air pollution due to fugitive dust emission and operation of equipment during construction.

In acquiring the land the proponents have restored the status of the land which, as shown in the Survey of Pakistan Map of 1990 was Casino Building. Launching of the Project at the site in Clifton has responded to the principles of sustainable development that aim at "socially equitable and economically viable development to improve the quality of life for all citizens of the Earth, without altering the balance in the ecosystem".

- Building Structure is compliant with seismic code (Uniform Building Code) UBC-2B, for moderate-to-severe seismic risk. This responds to the seismic risks that have been highlighted during recent years.
- Building Structure is reinforced concrete (recommended by UNDP for Tsunami affected areas). This responds to the Tsunami hazard that has been highlighted during recent year.
- The sea is normally 3.36 meter (11ft) below the road level and 2.7 meters (8.8 ft) below the average ground level at Dolmen City Project site and at Baghe Jinnah. This would suggest that a tsunami of magnitude similar to the 1945 Tsunami would affect the 2.5 meter contour on the beach front of Dolmen City Project site and Baghe Jinnah. This would need to be mitigated by construction of adequately reinforced protection wall in the front of Dolmen City as well as Baghe Jinnah. Such
structure would also mitigate the likely impact due to sea level rise in the years to come.

**Construction Phase Impacts:**

**Water demand:**
Water required for numerous construction activities is being met from external sources such as tankers supplying water to the construction site. Conservation practices will nevertheless be adopted during the entire course of construction. Construction activities for the proposed development can have minor impact on hydrology and ground water quality of the area if the construction waste leaches into ground.

Following mitigation measures were adopted as conservation:

- Not allowing water to leave the construction site, the special geology of the site allows percolation of water to a very large extent without contaminating ground water.
- Disposal of construction debris in approved areas.
- Construction of storm water diversion channels to divert storm runoff from flowing over the construction areas.
- Installing oil and grease traps in construction workshop, portable DG sets and vehicle parking areas.
- Water consumption was monitored regularly.
- Water quality was regularly monitored for good quality concreting.
- Storage tanks were made leak proof.
- Monitoring of the ground water table was conducted to evaluate the impact of construction activity on ground water.

**Effluents:**
Construction activity generates two types of effluents: Sewage waste from temporary toilet facilities for site workers and flushed water/ground water generated from piling and flushing activities. Improper disposal of sewage water can cause local channels/ sewers to choke, while water generated from piling works and flushing of lines can cause localized flooding in the area that can impact road conditions and traffic flow.

Following mitigation measures were adopted for better management of effluents:

- All sewage was pumped through temporary piping into main sewer drain at the front of the construction site.
- All flushing material were first stored in a holding tank to allow settling of silt and other suspended solid particles. The outlet stream was pumped to main sewer drain located at the front of the construction site.
Operation Phase Impacts:

Utility services and consumption of resource

Water, electricity and natural gas will be used for domestic as well as in the plant for the operation of HVAC and operational units. For this large consumption and involvement of a network of utility transmission and distribution, there is likelihood for leakages and excessive usage. This may adversely impact the micro and macro environment due to uncontrolled and non-regulated use of the expendable resources. The demand and supply equation should be maintained in order to avoid shortage and deficiency of the consumables provided through utility systems to the occupants of the tower and nearby residential communities.

The following Mitigations Measures have been adopted to reduce the negative impacts:

- All consumption of natural gas to be metered for monitoring and optimization.
- Regular maintenance of gas transmission network, generators to ensure efficient usage.

Water consumption and conservation

The actual total demand is expected to be 600,000 gallons per day. The make-up water for cooling towers for air-conditioning as well as water for gardening will be provided from the treated sewage water. Any shortfall in municipal water will be made up by tanker water, for flushing and ablution. Considering the small number of users with defined usage pattern and readiness of the Project Management to supplement the municipal water supply with tanker water, no negative impact is anticipated in terms of water availability.

The following mitigation measures would reduce the negative impacts of water shortage:

- Water conservation strategy should be developed and implemented to avoid excessive use and wastage.
- Water storage and distribution system should be safe and faultless so that there is no contamination and leakage in the system.
- Water meters should be installed at key utility points to monitor and manage water usage.
- Re-use of water and recycling is a valid proposition to conserve water resources and to minimize the effect of depletion of the precious natural resource.

Wastewater discharge

There is likelihood that wastewater may not meet specifications stipulated in NEQS. Therefore, it may be necessary to treat the wastewater prior to disposal. The Project has provision for wastewater treatment plant which would be mandatory in case of non-compliance to NEQS. Wastewater treatment strategy may include grease interceptor and/or oil skimmers to be installed in wastewater receptacles to maintain oil levels within NEQS limits.

Impacts on Socio-economic Environment

The impacts have been analyzed for the population in the surrounding locality. The Project would promote economic uplift and raise the status of the commercial enterprises and social status. Creation of jobs and promotion of business and commercial activities is an additional feature of the
Project.

Environmental Management Plan

For the effective implementation and management of mitigation measures, an Environmental Management Plan (EMP) has been prepared which meets the requirement of the Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations 2000.

The EMP provides a delivery mechanism to address potential impacts of project activities, to enhance project benefits and to introduce standards of good practice in all project activities. The EMP has been prepared with the objective of:

- Defining legislative requirements, guidelines and best industry practices that apply to the project
- Defining mitigation measures required for avoiding or minimizing potential impacts assessed by the EIA
- Defining roles and responsibilities of the project proponent and the contractor
- Defining requirements for environmental monitoring and reporting

Conclusion:

This EIA Study has examined all environmental aspects critically and made assessment of the impacts during the pre-construction, construction and operation stages.

Ecological impacts may not be seen as the area is already inhabited by houses, apartment buildings and commercial buildings. The most appropriate and likely to occur environmental and socio-economic impacts have been identified, and have been presented in this EIA report. Mitigation measures that have been adopted by Dolmen City Project Management and their contractor(s) as per the environmental management and monitoring plan are a necessary part of the Report.

Considering the processes involved in construction and operation of The Project and keeping in view the relevant national legislations/guidelines, the impact analysis indicates major aspects which may cause problems are wastewater, solid waste and occupational safety. The Project has provisions for wastewater management, solid waste handling, control of air emissions in project design and for adoption of occupational safety measures.

The Project falls in Schedule-II requiring submission of EIA since:

- Dolmen City Project cost is above Pak Rupees 50 Million and
- The project is located in the microenvironment comprising the sandy beach of Clifton on the front; the large Baghe Jinnah in the immediate vicinity; and several residential complexes across the road, and the macro-environment of the Project comprising the Karachi Port Trust property housing the oil installations, coal storage area, and the Manora Channel enclosing the harbor on the north and northwest; and a large number of architecturally, historically and archaeologically significant structures that fall in the category of environmentally sensitive areas.

The study carried out for the preparation of this EIA finds that the environmental impact of different activities of The Project are localized to the microenvironment and are of short duration. The Study recommends and confirms that:
The Dolmen City Project shall adopt all environmental management processes as defined in the ACCOR Environmental Charter Guide, and the building codes prescribed by Karachi Building Control Authority.

The Project management as well as the CDGK which operates the Baghe Jinnah has to realize that the sea is normally 3.36 meter (11ft) below the road level and 2.7 meters (8.8 ft) below the average ground level at Dolmen City Project site and at Baghe Jinnah. This suggests that a tsunami of magnitude similar to the 1945 Tsunami would affect the 2.5 meter contour on the beach front of Dolmen City Project site and Baghe Jinnah. This would need to be mitigated by construction of adequately reinforced protection wall in the front of Dolmen City as well as Baghe Jinnah. Such structure would also mitigate the likely impact due to sea level rise in the years to come.

Appropriate solid waste handling mechanism and storage facilities will be developed at premises.

Grease interceptors as well as septic tank shall be provided and there would be provision for wastewater treatment plant.

It is anticipated that the wastewater shall comply with the prescribed NEQS limits.

Protective measures against air emissions and high noise intensity will be included in the design of The Project. ACCOR Environmental Charter Guidelines will be followed.

Traffic management plan has already been developed and is operational.

It is envisaged that the Dolmen City Project will be constructed and operated without creating adverse environmental impacts. The development is compatible with the aims and objectives of (a) Sustainable Development in promoting improvement in quality of life, and (b) CDGK as well as the Karachi Building Control Authority in promoting the development of construction industry nationwide and thus to sustainable economic development in Pakistan.

This EIA Study finds that launching of the Project at the site in Clifton would respond to the principles of sustainable development that aim at "socially equitable, and economically viable development to improve the quality of life for all citizens of the Earth, without altering the balance in the ecosystem".

The Study therefore recommends that the EIA should be approved.
## CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>1.1.1</td>
<td>The Project</td>
</tr>
<tr>
<td>1.1.2</td>
<td>Project Proponent</td>
</tr>
<tr>
<td>1.1.3</td>
<td>EIA Consultants</td>
</tr>
<tr>
<td>1.1.4</td>
<td>Objectives of Project</td>
</tr>
<tr>
<td>1.1.5</td>
<td>Project Status and Construction / Operation Schedule</td>
</tr>
<tr>
<td>1.2</td>
<td>Purpose of Environmental Impact Assessment</td>
</tr>
<tr>
<td>1.3</td>
<td>Categorization of Project</td>
</tr>
<tr>
<td>1.4</td>
<td>Scope of EIA Study</td>
</tr>
<tr>
<td>1.5</td>
<td>Methodology for Environmental Assessment</td>
</tr>
<tr>
<td>1.5.1</td>
<td>Understanding the Project Activities</td>
</tr>
<tr>
<td>1.5.2</td>
<td>Review of Policy, Legislation and Guidelines</td>
</tr>
<tr>
<td>1.5.3</td>
<td>Review of secondary date</td>
</tr>
<tr>
<td>1.5.4</td>
<td>Field data collection</td>
</tr>
<tr>
<td>1.5.5</td>
<td>Identification ans Assessment of Impacts</td>
</tr>
<tr>
<td>1.5.6</td>
<td>Recommendations for Mitigation and Monitoring Measures</td>
</tr>
<tr>
<td>1.5.7</td>
<td>Development of Environmental Management Plan (EMP)</td>
</tr>
<tr>
<td>1.5.8</td>
<td>Reporting</td>
</tr>
<tr>
<td>1.6</td>
<td>EIA Team</td>
</tr>
<tr>
<td>2</td>
<td>Project Description</td>
</tr>
<tr>
<td>2.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>2.2</td>
<td>The Project Background and its Features</td>
</tr>
<tr>
<td>2.3</td>
<td>Components of Dolmen City</td>
</tr>
<tr>
<td>2.4</td>
<td>Present Construction Status &amp; Construction Methodology of Towers</td>
</tr>
<tr>
<td>2.5</td>
<td>Description of Support Services During Operation</td>
</tr>
<tr>
<td>2.5.1</td>
<td>HVAC Facility</td>
</tr>
<tr>
<td>2.5.2</td>
<td>Water Consumption in Dolmen City</td>
</tr>
<tr>
<td>2.5.3</td>
<td>Gas Consumption</td>
</tr>
<tr>
<td>2.5.4</td>
<td>Electricity Consumption</td>
</tr>
<tr>
<td>2.5.5</td>
<td>Internal &amp; External Lighting System</td>
</tr>
<tr>
<td>2.5.6</td>
<td>Fire Alarm System</td>
</tr>
</tbody>
</table>
2.5.7 Gas Detection System

2.5.8 Communication

2.5.9 Earthing and Bonding

2.5.10 Lightning Protection

2.5.11 Audio Visual Systems

2.5.12 Fire Protection & Safety Systems

2.5.13 Integrated Building Management Systems

2.5.14 Solid Waste Disposal

2.5.15 Effluent Treatment

2.5.16 Health & Safety

2.5.17 Employment Generation

3 Legislative Framework

3.1 Introduction

3.2 National Policies and Plans

3.2.1 National Conservation Strategy

3.2.2 Biodiversity Action Plan

3.3 National Environmental Legislation

3.3.1 Pakistan Environmental Protection Act 1997

3.3.2 Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000

3.3.3 National Environmental Quality Standards (NEQS)

3.3.4 Sindh Wildlife Protection Ordinance, 1972 (SWPO)

3.3.5 Karachi Building and town Planning Regulations 2002 Notification No. SO (Land) HTP / KBCA-3 - 39 / 2000

3.3.6 Coastal Development Authority Act 1994

3.3.7 Antiquities Act 1975

3.4 National Environmental Guidelines

3.4.1 Environmental Assessment Procedures 1997

3.4.2 National Environmental Quality Standards (NEQS)

3.5 International Treaties and Guidelines

3.5.1 The Convention on Biological Diversity

3.5.2 The Convention on Conservation of Migratory Species of Wild Animals, 1979

3.5.3 The Convention on Wetlands of International Importance, Ramsar 1971
3.5.4 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) 06 of 08
3.5.5 IUCN Red List 06 of 08
3.5.6 World Bank Guidelines on Environment 06 of 08
3.5.7 International Convention on Biodiversity 07 of 08
3.5.8 Equator Principles 07 of 08
3.5.9 IFC Performance Standards on Social & Environmental Sustainability 07 of 08

4 Description of Environment 01 of 25

4.1 Physical Resources 02 of 25
4.1.1 Climate Conditions 02 of 25
4.1.2 Recent Trend in Monsoon Pattern 04 of 25
4.1.3 Storms 05 of 25
4.1.4 Ambient Air Quality 05 of 25
4.1.5 Noise 06 of 25
4.1.6 Water Resources for Karachi 06 of 25
4.1.7 Sea Water and Coastal Oceanography 07 of 25
4.1.8 Geology 07 of 25
4.1.9 Soil and land Form 07 of 25
4.1.10 Subsurface Geology 08 of 25
4.1.11 Structural Geology and Geomorphology 09 of 25
4.1.12 Seismology of the Area 09 of 25
4.1.13 Liquefaction Features Caused Earthquake 10 of 25
4.1.14 Tsunamis 11 of 25
4.1.15 Surface and Ground water Quality in Coastal Area of Karachi 11 of 25
4.2 Biological Environment 12 of 25
4.2.1 Animal & Bird Species 15 of 25
4.2.2 Ecological Habitat 16 of 25
4.2.3 Spatial Dispersal of Faunal Population 17 of 25
4.2.4 Species Distribution at Clifton Beach (Dolmen City) 18 of 25
4.3 Social Resources 19 of 25
4.3.1 Socioeconomic Profile of Dolmen City Project Area 19 of 25
4.3.2 Saddar Town 19 of 25
4.3.3 Keamari Town 20 of 25
4.3.4 Education 22 of 25
4.3.5 Water Supply 22 of 25
| 4.3.6 | Surface drainage and Sewerage system | 22 of 25 |
| 4.3.7 | Electricity Supply | 23 of 25 |
| 4.3.8 | Commercial and Residential Buildings | 23 of 25 |
| 4.3.9 | Health | 23 of 25 |
| 4.3.10 | Employment | 23 of 25 |
| 4.3.11 | Landscaping | 23 of 25 |
| 4.3.12 | Shrines | 24 of 25 |
| 4.3.13 | Archaeological Sites | 24 of 25 |
| 4.3.14 | Transportation Network | 24 of 25 |
| 4.3.15 | Economy | 24 of 25 |
| 4.3.16 | Shopping Centres | 24 of 25 |

5 | Screening of Potential Environmental Impacts and Mitigation Measures | 01 of 12 |
5.1 | Screening of Potential Impacts in Sitting of Dolmen City Project | 01 of 12 |
5.2 | Potential Environmental Aspects & Mitigation Measures at Pre- Construction & Construction | 02 of 12 |
5.2.1 | Building Structure | 02 of 12 |
5.2.2 | Erosion of Cleared areas | 03 of 12 |
5.2.3 | Deep Excavation | 03 of 12 |
5.2.4 | Air Emissions | 03 of 12 |
5.2.5 | Vibration & Noise | 04 of 12 |
5.2.6 | Traffic Flow | 04 of 12 |
5.2.7 | Water Demand | 04 of 12 |
5.2.8 | Effluents | 05 of 12 |
5.2.9 | Fuel Storage | 05 of 12 |
5.2.10 | Disposal of Demolition / construction Debris | 05 of 12 |
5.2.11 | marine Ecology | 06 of 12 |
5.2.12 | Safety of workers during construction | 06 of 12 |
5.2.13 | Employment | 06 of 12 |
5.3 | Potential Environmental Impacts at operation stage | 06 of 12 |
5.3.1 | Vibration and Noise Impact | 06 of 12 |
5.3.2 | Traffic Volume & Emissions | 07 of 12 |
5.3.3 | Utility Services & Consumption of Resource | 07 of 12 |
5.3.4 | Illumination | 07 of 12 |
5.3.5 | Fire & Emergency | 07 of 12 |
5.3.6 | Water Consumption & Conservation | 08 of 12 |
<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.7</td>
<td>Waste Water Discharge</td>
<td>08 of 12</td>
</tr>
<tr>
<td>5.3.8</td>
<td>Solid Waste Disposal</td>
<td>08 of 12</td>
</tr>
<tr>
<td>5.3.9</td>
<td>Energy: Requirement, Consumption &amp; Conservation</td>
<td>09 of 12</td>
</tr>
<tr>
<td>5.3.10</td>
<td>Eco-friendly &amp; green products</td>
<td>09 of 12</td>
</tr>
<tr>
<td>5.3.11</td>
<td>Employment</td>
<td>09 of 12</td>
</tr>
<tr>
<td>5.3.12</td>
<td>Land Use &amp; Aesthetics</td>
<td>09 of 12</td>
</tr>
<tr>
<td>5.3.13</td>
<td>Topography &amp; Geology</td>
<td>09 of 13</td>
</tr>
<tr>
<td>5.3.14</td>
<td>Ecology &amp; Biodiversity</td>
<td>10 of 12</td>
</tr>
<tr>
<td>5.3.15</td>
<td>Synergistic Impact</td>
<td>10 of 12</td>
</tr>
<tr>
<td>5.3.16</td>
<td>Impacts on Socio-Economic Environment</td>
<td>10 of 12</td>
</tr>
<tr>
<td>6</td>
<td>Environmental Management Plan</td>
<td>01 of 40</td>
</tr>
<tr>
<td>6.1</td>
<td>Introduction</td>
<td>01 of 40</td>
</tr>
<tr>
<td>6.1.1</td>
<td>Commitment to EHS</td>
<td>01 of 40</td>
</tr>
<tr>
<td>6.1.2</td>
<td>Purpose of EMP</td>
<td>01 of 40</td>
</tr>
<tr>
<td>6.1.3</td>
<td>Scope of EMP</td>
<td>01 of 40</td>
</tr>
<tr>
<td>6.1.4</td>
<td>Organization of EMP</td>
<td>02 of 40</td>
</tr>
<tr>
<td>6.1.5</td>
<td>Maintenance of EMP</td>
<td>02 of 40</td>
</tr>
<tr>
<td>6.2</td>
<td>Health &amp; Safety</td>
<td>03 of 40</td>
</tr>
<tr>
<td>6.2.1</td>
<td>Environmental Health &amp; Safety Management System</td>
<td>03 of 40</td>
</tr>
<tr>
<td>6.2.2</td>
<td>Worker Health &amp; Safety Plan</td>
<td>03 of 40</td>
</tr>
<tr>
<td>6.2.3</td>
<td>Emergency Response Plan</td>
<td>04 of 40</td>
</tr>
<tr>
<td>6.3</td>
<td>Responsibilities, Training &amp; Communication</td>
<td>08 of 40</td>
</tr>
<tr>
<td>6.3.1</td>
<td>Responsibilities</td>
<td>08 of 40</td>
</tr>
<tr>
<td>6.3.2</td>
<td>Training</td>
<td>13 of 40</td>
</tr>
<tr>
<td>6.3.3</td>
<td>Communications</td>
<td>13 of 40</td>
</tr>
<tr>
<td>6.4</td>
<td>Regulatory Requirements</td>
<td>13 of 40</td>
</tr>
<tr>
<td>6.4.1</td>
<td>Approvals, Authorizations &amp; Permits</td>
<td>13 of 40</td>
</tr>
<tr>
<td>6.4.2</td>
<td>Environmental Quality Objectives</td>
<td>14 of 40</td>
</tr>
<tr>
<td>6.4.3</td>
<td>Compliance Monitoring</td>
<td>14 of 40</td>
</tr>
<tr>
<td>6.5</td>
<td>Standard Operating Procedures</td>
<td>14 of 40</td>
</tr>
<tr>
<td>6.5.1</td>
<td>Erosion Control Requirements</td>
<td>14 of 40</td>
</tr>
<tr>
<td>6.5.2</td>
<td>Cleanup &amp; Site Restoration</td>
<td>15 of 40</td>
</tr>
<tr>
<td>6.5.3</td>
<td>Wastewater/Storm Water Management</td>
<td>15 of 40</td>
</tr>
<tr>
<td>6.5.4</td>
<td>Waste Management Plan</td>
<td>17 of 40</td>
</tr>
<tr>
<td>6.5.5</td>
<td>Air &amp; Noise Emissions</td>
<td>21 of 40</td>
</tr>
<tr>
<td>Section</td>
<td>Description</td>
<td>Page</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>6.5.6</td>
<td>Environmental Monitoring &amp; Inspection</td>
<td>22</td>
</tr>
<tr>
<td>6.6</td>
<td>Environmental Compliance</td>
<td>24</td>
</tr>
<tr>
<td>6.6.1</td>
<td>Audits</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>Conclusions</td>
<td>01</td>
</tr>
</tbody>
</table>

**Annex**

I. Order of Sindh Environmental Tribunal

II. Pakistan Environmental Protection Act, 1997

III. Pakistan Environmental Protection Agency (Review of EIA/IEE) Regulations 2000

IV. National Environmental Quality Standards (NEQS)
1.1 INTRODUCTION

This Environmental Impact Assessment (EIA) Report presents the appraisal of environmental impacts of the construction and operation of a commercial project namely “Dolmen City”.

The EIA Report has been produced in compliance with the requirements of Pakistan Environmental Protection Act, 1997 for submission to the Environmental Protection Agency for decision on its environmental viability of the Dolmen City Project.

1.1.1 THE PROJECT

The Project initiated by the International Complex Projects Limited (ICPL) is a Mixed Use Development Project covering an area of 37,666 square yards. The salient features of the project are as under.

<table>
<thead>
<tr>
<th>Table 1.1- Salient features of the Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owner Company</td>
</tr>
<tr>
<td>Location</td>
</tr>
<tr>
<td>Area of Land</td>
</tr>
<tr>
<td>Proposed Built up area of the entire Project</td>
</tr>
<tr>
<td>Components of the Project</td>
</tr>
<tr>
<td>● Two basement levels for parking (1071 nos. vehicles)</td>
</tr>
<tr>
<td>● 5 levels of upper floor parking (1610 nos. vehicles)</td>
</tr>
<tr>
<td>● Shopping mall on ground, first &amp; second floors</td>
</tr>
<tr>
<td>● Office Tower 17 storey</td>
</tr>
<tr>
<td>● Office Tower 19 storey</td>
</tr>
<tr>
<td>● Office Tower 40 storey</td>
</tr>
<tr>
<td>● Office Tower 40 storey</td>
</tr>
<tr>
<td>Facilities/Services available at the already operational office tower</td>
</tr>
<tr>
<td>● High speed elevators</td>
</tr>
<tr>
<td>● Reserved parking with parking management system</td>
</tr>
<tr>
<td>● NFPA approved fire alarm/suppression system</td>
</tr>
<tr>
<td>● 24 hour security system</td>
</tr>
<tr>
<td>● Access control system</td>
</tr>
<tr>
<td>● Uninterrupted power supply</td>
</tr>
<tr>
<td>● Central air-conditioning</td>
</tr>
<tr>
<td>● Fibre optic telecommunications system</td>
</tr>
<tr>
<td>● Emergency medical services</td>
</tr>
<tr>
<td>● Centralized mail/cargo delivery system</td>
</tr>
<tr>
<td>● Visitors parking facilities</td>
</tr>
</tbody>
</table>
1.1.2 PROJECT PROPONENT

The project proponent is International Complex Projects Limited (ICPL).

ICPL has formed an excellent team of highly reputed firms and individuals to undertake the project. All members of the team have executed numerous similar projects, and are fully capable of putting together a world-class state of the art project.

Modern management tools and work methodology is being used to implement the project on a fast and right track.

The Project has been undertaken by:

1) ICPL, the Developers, along with
2) M/s Arshad Shahid Abdulla, the Architects
3) M/s Consult-Tech, the Structural Consultants
4) M/s FND, the HVAC Consultants
5) M/s Matrix Consultants, the Electrical Consultants
6) M/s Y.S Associates, the Plumbing Consultants
7) M/s Paragon Constructors

ICPL galvanizes resources from skills to infrastructure comprising in depth industry knowledge, experience and best practices, enabling customers to focus on their core businesses while ICPL meets the customers infrastructure and management demands and expectations.
OFFICE LOCATION
International Complex Projects Limited
HC-3, Block 4, KDA Scheme No. 5,
Clifton, Karachi
Tel: +92-21-5296062-4
Fax: +92-21-5296061
Email: info@dolmengroup.com

CONTACT / RESOURCE PERSON
Mr. Jabir Hussain Dada
Senior Leasing Manager
International Complex Projects Limited
HC-3, Block 4, KDA Scheme No. 5,
Clifton, Karachi
Tel: +92-21-5296062-4
Fax: +92-21-5296061
Email: info@dolmengroup.com

1.1.3 EIA CONSULTANTS
Environmental Management Consultant (EMC)
Contact Person : Mr. Syed Nadeem Arif
Office # 503, Anum Estate Building,
Opp. Duty Free Shop, Main Shahrah-e-Faisal,
Karachi.
Tel: +92 21-4311466, 4311467,
Fax: 9221-4311467.
Email: nadeem@emc.com.pk, mail@emc.com.pk

1.1.4 OBJECTIVES OF PROJECT
Dolmen City is among the most prestigious mixed use development projects of Pakistan. It is built to serve corporate and commercial clients in an ultra modern business environment.

The Project has been initiated to respond to the principles of sustainable development initiatives that aim at socially equitable, and economically viable development to improve the quality of life for all citizens of the Earth, without altering the balance in the ecosystem.

1.1.5 PROJECT STATUS AND CONSTRUCTION/OPERATION SCHEDULE
Table 1.1 has provided the details of the project components The construction work at Dolmen City has been divided into five phases. Executive Tower has already been completed and is operational since 2006; The Harbour Front has also been completed and is operational since 2008; Shopping Mall structure has been completed; finishing works are currently in progress. and shall be complete by the 3rd quarter of 2010. Construction of two 40 storey towers: (a). Tower A’s structure has been built upto +30,000 level only. Finishing has not been commenced yet; (b). Tower B’s structure has been built upto +41,600 level only. Finishing has not commenced yet. The targeted date of completion for the two towers shall be last quarter of 2013.
Section 1
Environmental Management Consultants

Environmental Impact Assessment (EIA) for The Dolmen City Project
A Project of International Complex Projects Limited (ICPL)

Present Construction Status of Project
1.2 PURPOSE OF ENVIRONMENTAL IMPACT ASSESSMENT

The EIA study provides a review of the environmental conditions and evaluates the current status of the physical and ecological environment, along with the prevailing socioeconomic conditions. Detailed Environmental Impact Assessment has been carried out to fulfill the requirements of Section 12 of the Pakistan Environmental Protection Act (PEPA) 1997, Pakistan Environmental Protection Agency, Review of IEE/EIA Regulations-2000 and other obligations pertaining to the Project. The study has, while taking note of completion of some parts of the Project, also carried out Environmental Audit of the activities and their impact on the environment.

The EIA study has accordingly been designed to focus on making certain that:

- Environmental impacts, negative as well as positive, resulting from the past as well as present activities of the Project are correctly identified,
- If there is a negative impact, it is mitigated as far as possible through specified design and construction procedures, and
- Any residual short term or long term negative impact is identified clearly and made known to all stakeholders as well as those likely to be affected.

The main purpose of this Environmental Impact Assessment (EIA) study is to ensure that:

- All major and minor positive or negative impacts on the environment (physical, biological, social and ecological) during the different stages inception as well as pre-construction, construction and operation of Dolmen City Project are identified.
- Appropriate and adequate mitigation measures to minimize the adverse impacts are suggested and procedures for their implementation provided.

- Environmental Management Plan for sustainable operation of the project forms an essential part of the EIA document.

The EIA report has been prepared after identification of different environmental aspects and screening the potential impacts to ensure that:

- The past as well as proposed activities pertaining to the different stages of pre-construction, construction and operation of different components of "Dolmen City" project are environment friendly, and
- The environmental impact is assessed in accordance with applicable laws and regulations of Pakistan Environmental Protection Act 1997.

This EIA document responds to Section 12 of Pakistan Environmental Protection Act 1997 requires that no project involving construction activities or any change in the physical environment can commence without fulfillment of prerequisite i.e. to conduct IEE or EIA and a report submitted to the Federal or Provincial EPA. This requires that every new development project in Pakistan has to be preceded by an Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA) depending upon the nature and severity of impacts anticipated for the different stages of the project. This study has responded to the requirements of Section 12 since some parts of the Dolmen City Project have already been completed and hence an Environmental Audit of the activities and their impact on the environment forms an integral part of the EIA Report.

Sub-section 3 of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations 2000 requires for Projects that need to submit an EIA, “A proponent of a project falling in any category specified in Schedule II shall file an EIA with the relevant Environmental Protection Agency (EPA) and
the provisions of Section 12 shall apply to such project."

1.3 CATEGORIZATION OF PROJECT

This EIA Study has taken cognizance of the Guidelines of Government of Pakistan notification on Environmental Impact Assessment requirement for environmental classification of potential impacts of construction activities pertaining the Dolmen City Project into Category A or B:

- Projects are categorized A if they generate significant adverse environmental impacts that require a complex management plan, or
- If the subproject is located within or passes through:
  (a) Wildlife sanctuaries,
  (b) National parks,
  (c) Other sanctuaries,
  (d) Areas declared by the Government of Pakistan as environmentally sensitive,
  (e) Areas of international significance (e.g. protected wetland as designated by the Convention), or
  (f) Areas designated by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) as cultural heritage sites.

This category of projects requires EIA report including a detailed Environmental Management Plan (EMP).

- A project falls in category 'B' if the same is likely to have adverse environmental impacts, but of lesser degree or significance than those for category 'A' projects and all the mitigation measures to handle the impact are manageable. Such types of projects need IEE report including EMP.

Dolmen City Project falls in Schedule-II since:

- The project cost is above Pak Rupees 50 Million and also
- The project is located in the microenvironment comprising the sandy beach of Clifton on the front; the large Baghe Jinnah in the immediate vicinity; and several residential complexes across the road, and the macro-environment of the Project comprising the Karachi Port Trust property housing the oil installations, coal storage area, and the Manora Channel enclosing the harbour on the north and northwest; and a large number of architecturally, historically and archaeologically significant structures that fall in the category of environmentally sensitive areas.

1.4 SCOPE OF EIA STUDY

This EIA study investigates the impacts likely to arise from the construction and operation of Dolmen City project. The project site is located at Clifton Beach. The construction and operation of the proposed development have been further discussed in detail in section 02 of this report.

1.5 METHODOLOGY FOR ENVIRONMENTAL ASSESSMENT

1.5.1 UNDERSTANDING THE PROJECT ACTIVITIES

In a scoping session with the Proponent, different aspects of the Project were discussed in terms of various environmental issues. Details of the past and proposed project activities were collected from the proponent. The impacts associated with the project were reviewed and mitigation measures were specified. In subsequent meetings with the Proponent the observations were communicated. Details of the project activities and mitigation
measures are presented in section 02 of this report.

1.5.2 REVIEW OF POLICY, LEGISLATION AND GUIDELINES
The relevant national legislations, guidelines were reviewed to set the environmental standards and environmental management plan that ICPL would be required to adhere to during the construction and operation phase of the project. The synopsis of these legislations is provided in section 03 of this report.

1.5.3 REVIEW OF SECONDARY DATA
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, soils, water resources and climate
- Biological environment: habitat types, flora and fauna, habitats 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

1.5.4 FIELD DATA COLLECTION
The team comprising of environment specialists, ecologist and sociologist collected area-specific primary data during site visits. Where required, the collected secondary data was subjected to ground-truthing by the experts.
A description of baseline physical, biological and socio-economic conditions of the Karachi district and proposed site is provided in section 04 of this report.

### 1.5.5 IDENTIFICATION AND ASSESSMENT OF IMPACTS

The EIA covers potential effects due to construction and operation of the past and proposed project activities on various environmental receptors. The potential impacts related to the proposed project have been identified through professional judgment, experience, process understanding, and field observations. Impact significance has been assessed using a risk assessment approach based on the severity and likelihood of the potential impact.

### 1.5.6 RECOMMENDATIONS FOR MITIGATION AND MONITORING MEASURES

Mitigation measures to help prevent or minimize all potential adverse environmental impacts of the project were identified based on a range of options including management and monitoring practices, physical controls, or compensation. The proposed mitigation measures are based on an appreciation of the sensitivity and behavior of environmental receptors within the project area, past experience, case studies, legislative controls, environmental guidelines, and expert advice.

### 1.5.7 DEVELOPMENT OF ENVIRONMENTAL MANAGEMENT PLAN (EMP)

An environmental management plan for the proposed project activities was prepared. The EMP provides a framework for implementing and managing the mitigation measures recommended in the EIA. The EMP includes the following:

- Mitigation and monitoring plan
- Definition of roles and responsibilities of the proponent and contractors
- Requirements for communication, documentation and training during implementation of the project
- Change management plan to cover unforeseen events / environmental conditions during the project; and
- Training programme

### 1.5.8 REPORTING

The EIA study has been compiled in a report form. The format of the EIA report conforms to the guidelines provided in the Pakistan Environmental Assessment Procedures, 1997, and Review Procedures 2000.

The EIA report is presented in one volume and describes the proposed project activities, environment of the project area, relevant legislation and guidelines, assessment of the project impacts, recommendations for mitigation measures and an environmental management plan. The photographic records, various maps and tables assisting the written text have been provided in the relevant sections of the EIA report.

### 1.6 EIA TEAM

The study was assigned to Environmental Management Consultant, EMC organized and dedicated the following team for the study:

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name</th>
<th>Position in Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mr. Syed Nadeem Arif</td>
<td>Project Director</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Mirza Arshad Ali Beg</td>
<td>Environmental Expert</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Shahid Amjad</td>
<td>Marine Ecology Expert</td>
</tr>
<tr>
<td>4</td>
<td>Dr. Badar Munir Ghauri</td>
<td>Air Quality Expert</td>
</tr>
<tr>
<td>5</td>
<td>Dr. Vqar Hussain</td>
<td>Geologist</td>
</tr>
<tr>
<td>6</td>
<td>Mr. Mushtaq Mirani</td>
<td>Socioeconomic Expert</td>
</tr>
<tr>
<td>7</td>
<td>Dr. Mansoor Imam</td>
<td>Waste Management Expert</td>
</tr>
<tr>
<td>8</td>
<td>Mr. Saquib Ejaz Hussain</td>
<td>Project Coordinator &amp; Environmentalist</td>
</tr>
<tr>
<td>9</td>
<td>Ms. Shahla Ijtaba</td>
<td>Environmental Engineer</td>
</tr>
<tr>
<td>10</td>
<td>Ms. Samreen Ahmed</td>
<td>Environmentalist</td>
</tr>
</tbody>
</table>
2.1- Introduction

The Project is constructed on a plot of land measuring approximately 37,666 sq.yds, proposed built up area of the entire project is app. 3.9 million square feet situated at HC-3, Block 4, KDA Scheme No. 5, Clifton, Karachi.

The location of Dolmen City is shown in figure 2.1 below:

The features of the Project include, 24 hour security system, EN 54 (new European Standard) compliant fire alarm system, NFPA suppression system, uninterrupted power supply, central air-conditioning, fibre optic telecommunication system, emergency medical services, centralized mail/cargo delivery system, visitors parking facilities and valet parking.
2.2- The Project Background & Its Features

The initial construction of the project was started in the year 1992 on a commercial plot (previously an entertainment place (Casino) and then a children play land and restaurant). Due to some reasons, the construction work was stopped and was resumed in year 2006. The proponent did not file an EIA study before resuming the construction work and that's why the project was under litigation at Sindh Environmental Tribunal. As per the order of the tribunal issued on 2nd December 2009 (copy attached as Annex-I), the proponent of the project was directed to conduct an EIA study for approval from Sindh EPA. M/s Environmental Management Consultants (EMC) was appointed by ICPL to conduct this study. The study has, while taking note of completion of some parts of the Project, also carried out Environmental Audit of the activities and their impact on the environment.

The structure of the Dolmen City consists of low rise podium in two levels and 4 nos high rise towers. The low rise podium from grids 1 to 20 consists of two basements, ground and 7 upper floors whereas from grid 20 to 38 it consists of one basement, ground and two upper floors. This structure is based on raft foundations. The structure above the raft is a reinforced concrete framed structure with column grids at 7500X7500 mm. The floor slabs consist of flat slab system with drop panels.

The four high rise towers are founded on cast in place bored concrete piles going down and anchored into the stone strata. The piles are capped by pile caps on which columns of the high rise towers are founded. The superstructure consists of reinforced concrete framed structure. The slab system is a combination of flat slab and beam and slab system. High Performance Ready-mix Concrete has been used in the entire structure. Similarly High Grade Deformed reinforcement bars have been used throughout the structure. The basements have reinforced concrete retaining walls with membrane waterproofing on the outside to make the basements water tight.

Some of the main features of this project are:

- The project is located at the sea shore of the Arabian Sea.
- Building structure is compliant with seismic code (Uniform Building Code) UBC-2B, for moderate-to-severe seismic risk.
- Building structure is reinforced concrete (recommended by UNDP for Tsunami areas.) the shape of the building is designed perpendicular to the sea, which divides the impact of water flow in case of flooding.
- Curtain of the building is glazed and tempered with a 12mm insulating cavity.
- Building has pressurized fire extinguishers leading to the ground floor, one exiting inside and exiting outside the building.
- Fire escapes connect to the building at the Ground and 1st levels.
- Multiple exits and vast open rooftop access.
- Structure has been designed to cater for such natural disasters as recommended by zoning authorities.
- There are also high tech monitoring and communication devices allowing an immediate evacuation if required.
2.3- Components of Dolmen City

The project of Dolmen City comprises of the following Components,

- Two basement levels for parking (constructed and operational)
- 5 levels of upper floor parking
- Shopping mall on ground, first & second floors
- Office Tower 17 storey
- Office Tower 19 storey
- Office Tower 40 storey
- Office Tower 40 storey
The other main features considered for the Dolmen City building services system includes:

- Utility Services including on-site generation
- Chilled Water Distribution
- Air Conditioning and Ventilation
- Hot and Cold Water Distribution
- Foul and Storm Water Drainage
- Fire Protection & Life Safety Systems
- Car Park Ventilation
- Electrical Distribution
- Lighting Installations
- Emergency Lighting Installations
- Lightning Protection
- Building Management Systems
- Irrigation systems

2.4- Present Construction Status & Construction Methodology of towers:

1. The Executive Tower has been completed in all respects.

2. The Harbour Front Tower has been completed in all respects.

3. Tower A’s structure has been built upto + 30,000 level only. Finishing has not been commenced yet.

4. Tower B’s structure has been built upto + 41,600 level only. Finishing has not been commenced yet.

5. Shopping Mall structure has been completed. Finishing works are currently in progress.

6. The structure of the upper parking floors and function hall has been completed. Finishing has not been commenced except on 3rd floor parking which has been partially finished.

The towers are to be of reinforced concrete/steel framed structures. Shuttering will be erected sequentially from floor to floor. After placement of steel reinforcement as per design, concrete will be pumped through a pipeline running vertically in one of the available shafts. Heavy-duty concrete pumps will be used to pump the concrete. After the concrete has hardened, it will be covered with hessian cloth and sprinkled with water for 7 days. Thereafter the finishing will be taken up progressively starting from ground level and proceeding to the upper floors in sequence.

Precast Concrete Panels: Precast concrete panels have been provided on the elevation surfaces of The Harbour Front not covered with glass. The concrete panels have been casted using high strength premix concrete, which have very low permeability and have additionally been coated with sealants. The penetration of moisture thus has been ensured to be almost nil. The precast panels have hot dipped galvanized steel mesh as reinforcement, which will ensure that the steel does not start rusting.

Standard Operating Procedures (SOP): The construction site will be regularly sprinkled with water to reduce dust emission. The site will have adequate illumination both for safety and security reasons. Necessary safety measures like safety railings, safety helmets, construction safety shoes, construction hazard warnings, etc will be provided as part of standard operating procedures adopted by Dolmen City Project Management.
2.5- Description of Support Services During Operation

2.5.1- HVAC Facility

HVAC is an acronym that stands for "heating, ventilating, and air conditioning". This is sometimes referred to as climate control. In certain regions the term "Building Services" is also used, but may also include plumbing and electrical systems.

The design is based on the recommendations of the following:

- ASHRAE: Handbook of HVAC Applications
- ASHRAE: Handbook of HVAC Systems and Equipment
- ASHRAE: Standard 62: Ventilation for Acceptable Indoor Air Quality
- All applicable regulations and requirements of local utility companies having jurisdiction.

1. Cooling Load Analysis

A complete analysis of the thermal performance of the building has been carried out by using Carrier E20-II, HAP 3.23 software. Based on the basic architectural design and functional utilization of the spaces, and the design parameters indicating cooling loads are mentioned below:

<table>
<thead>
<tr>
<th>S. #</th>
<th>Description of Area</th>
<th>Approx. Covered Area (Sq.ft)</th>
<th>Cooling Load TR Connected</th>
<th>Operational</th>
<th>Connected</th>
<th>Operational</th>
<th>Connected</th>
<th>Operational</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Phase 1</td>
<td>Phase 2</td>
<td>Phase 3</td>
<td>Phase 4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Basement (-5000 Level)</td>
<td>155,000</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Basement (-2000 Level)</td>
<td>240,000</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Service Circulation + Lobby (Basement, Ground, 1st, 2nd &amp; 3rd Floors)</td>
<td>340,000</td>
<td>1,500</td>
<td>1,200</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Shopping / Retail Area (Basement, Ground, 1st, 2nd &amp; 3rd Floors)</td>
<td>370,000</td>
<td>2,000</td>
<td>1,900</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Food Court and Entertainment Area (2nd Floor)</td>
<td>100,000</td>
<td>700</td>
<td>500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Hyper Market (Carre Four) (Ground Floor)</td>
<td>120,000</td>
<td>800</td>
<td>600</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Executive Tower (16 Storied)</td>
<td>195,000</td>
<td>900</td>
<td>800</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Harbor Front (Triangular Tower) (19 Storied)</td>
<td>275,000</td>
<td>1,500</td>
<td>1,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Tower-1 (Offices) (37 Storied)</td>
<td>680,000</td>
<td>3900</td>
<td>3,300</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Tower-2 (Offices) (19 Storied)</td>
<td>475,000</td>
<td>2700</td>
<td>2,300</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Sub-Total Phase wise, TR</td>
<td>-</td>
<td>900</td>
<td>800</td>
<td>1,500</td>
<td>1,000</td>
<td>5000</td>
<td>4200</td>
</tr>
</tbody>
</table>
2. Central Chilled Water Plant
Due to the phasing of construction, and the constraints of availability of plant room space, the chiller plant is located in two areas, as noted below:

- **Location-1:** At 3rd Floor Level. Two direct-fired absorption chillers (2 X 1000 TR) are installed and have been commissioned, the first in 2006 and the second recently.

- **Location-2:** The balance of the Chilled water Plant will be located at the 8th floor level of the Tower 2 with n+1 chiller configuration for system redundancy. Therefore 8 X 1500 TR, natural gas operated direct-fired absorption chillers are proposed to be installed, depending on the actual operational diversity achieved when the project is commissioned.

Chilled water outlet temperature is specified to be 42°F.

The design is based on a primary-secondary distribution system for the chilled water. The Chilled Water Circuits have been designed for following:

- Executive Tower
- The Harbor Front
- Shopping Mall
- Tower - 1 Office
- Tower - 2 Office

3. Heat Rejection System
The heat collected by the air-conditioning system shall be rejected out of the building using draw-thru cross flow cooling towers.

4. Water Treatment System
Each cooling water circuit has been provided with automatic water treatment systems that will minimize corrosion, scaling and microbiological growths in the various water circuits. Anti-scaling chemical shall be fed into the system by monitoring the raw water make-up rate. Automatic bleed off shall be initiated by monitoring condenser water conductivity. Algaecides and biocides shall be fed through timer controls.

5. Basement Impulse Ventilation System
International standards, as noted below, require that where natural ventilation is not possible, as in the present case, a mechanical extract system be installed. Internationally the mechanical extraction is carried out by either of the following standards:

- ASHRAE (3.7 L/s per m2)
- NFPA (5.0 L/s per m2)
- BS EN12101

The basement ventilation system has been designed based on the BS EN12101. The basements have been divided into zones, with fresh air-intake stations and extract air-stations located.

6. Reduced Solar Heat Transfer
Double Glazing of all glass panels have been provided along the peripheries of The Harbour Front. The thickness of the two sheets of glass is 6 mm each and there is an air gap of 12 mm between the two sheets. Both the sheets are tempered. Outer sheet of glass is uncoated tinted non-reflective float glass whereas the inner sheet is Energy Advantage Low-e glass. The double glazing along with the air space and the low-e treatment results in considerable reduction in heat transfer with solar heat gain coefficient as low as 0.45, besides considerable savings in air-conditioning and energy costs.

2.5.2- Water Consumption in Dolmen City
The water requirement for the Project excluding HVAC is 230,000 GPD as shown in table 2.2.
1. Water Consumption for HVAC System

The water consumption for the Dolmen City for HVAC system is given in table 2.3.

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of Component</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Executive Tower</td>
<td>10,000 gallons</td>
</tr>
<tr>
<td>2</td>
<td>The Harbour Front</td>
<td>15,000 gallons</td>
</tr>
<tr>
<td>3</td>
<td>Shopping Mall</td>
<td>100,000 gallons</td>
</tr>
<tr>
<td>4</td>
<td>Tower A</td>
<td>60,000 gallons</td>
</tr>
<tr>
<td>5</td>
<td>Tower B</td>
<td>60,000 gallons</td>
</tr>
</tbody>
</table>

Table 2.3: Water Consumption for HVAC

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Description</th>
<th>Avg. Water Consumption per day (Gals/ day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Executive Tower</td>
<td>20,000</td>
</tr>
<tr>
<td>2</td>
<td>The Harbour Front</td>
<td>30,000</td>
</tr>
<tr>
<td>3</td>
<td>Shopping Mall</td>
<td>100,000</td>
</tr>
<tr>
<td>4</td>
<td>Tower-1 Office</td>
<td>80,000</td>
</tr>
<tr>
<td>5</td>
<td>Tower-2 Office</td>
<td>80,000</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$10,000</td>
</tr>
</tbody>
</table>

2.5.3- Gas Consumption

The gas consumption for air conditioning chillers is 167,000 Cft/hr.

2.5.4- Electricity Consumption

The total electricity consumption for the project is 20 MW including HVAC load.

Calculation is based on the connected load with applicable diversity for determining the Diversified load.
### Table 2.4: Electricity Consumption

<table>
<thead>
<tr>
<th>S#.</th>
<th>Description of Area</th>
<th>Covered Area SFT</th>
<th>Watt Per SFT</th>
<th>Load Watt</th>
<th>Connected Load</th>
<th>Diversity</th>
<th>Diversity Load</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Phase 1</td>
<td>Phase 2</td>
<td>Phase 1</td>
<td>Phase 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>PARKING (Lighting)</td>
<td>61,236</td>
<td>589,561</td>
<td>1.2 W</td>
<td>73,480</td>
<td>707,471</td>
<td>780,951</td>
</tr>
<tr>
<td></td>
<td>Parking (Ventilation)</td>
<td>61,236</td>
<td>589,561</td>
<td>0.69 W</td>
<td>42,342</td>
<td>40,7657</td>
<td>450,000</td>
</tr>
<tr>
<td>2</td>
<td>SERVICE CIRCULATION + LOBBY</td>
<td>103,280</td>
<td>265,888</td>
<td>5[1.5+3.5]/W</td>
<td>916,451</td>
<td>1,329,442</td>
<td>2,245,893</td>
</tr>
<tr>
<td>3</td>
<td>SHOPPING/RETAIL AREA</td>
<td>192,515</td>
<td>225,580</td>
<td>8(4+4)/W*</td>
<td>1,540,124</td>
<td>1,804,647</td>
<td>3,344,771</td>
</tr>
<tr>
<td>4</td>
<td>FOOD COURT &amp; ENTERTAINMENT AREA</td>
<td>102,743</td>
<td>16,022</td>
<td>8(5+3)/W</td>
<td>821,946</td>
<td>128,182</td>
<td>950,127</td>
</tr>
<tr>
<td>5</td>
<td>HYPER MARKET</td>
<td>-</td>
<td>127,975</td>
<td>8(4+4)/W*</td>
<td>-</td>
<td>1,023,800</td>
<td>1,023,800</td>
</tr>
<tr>
<td>6</td>
<td>EXECUTIVE TOWER</td>
<td>163,811</td>
<td>-</td>
<td>7(3+4)/W</td>
<td>1,146,682</td>
<td>-</td>
<td>1,146,682</td>
</tr>
<tr>
<td>7</td>
<td>TRIANGULAR TOWER</td>
<td>191,196</td>
<td>-</td>
<td>7(3+4)/W</td>
<td>1,338,378</td>
<td>-</td>
<td>1,338,378</td>
</tr>
<tr>
<td>8</td>
<td>TOWER-1</td>
<td>-</td>
<td>666,073</td>
<td>7(3+4)/W</td>
<td>-</td>
<td>4,662,511</td>
<td>4,662,511</td>
</tr>
<tr>
<td>9</td>
<td>TOWER-2</td>
<td>-</td>
<td>666,073</td>
<td>8(4+4)/W*</td>
<td>-</td>
<td>5,328,584</td>
<td>5,328,584</td>
</tr>
<tr>
<td>10</td>
<td>ELEVATORS + ESCALATOR</td>
<td>(16 + 4)</td>
<td>(30)</td>
<td>-</td>
<td>380,000</td>
<td>620,000</td>
<td>1,000,000</td>
</tr>
<tr>
<td>11</td>
<td>PLUMBING</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100,000</td>
<td>150,000</td>
<td>250,000</td>
</tr>
<tr>
<td>12</td>
<td>MIS + EXT 2%</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>250,000</td>
<td>150,000</td>
<td>400,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>894,795</td>
<td>2,557,174</td>
<td>6,587,061</td>
<td>15,904,837</td>
<td>22,472,022</td>
<td>19,518,764</td>
</tr>
</tbody>
</table>
Connectivity & Operation Philosophy of the power supply distribution scheme

The 11KV/400V scheme is based on UTILITY (KESC) 11KV & Generator 400V supply with combined devices (named synchronizing panel & ATS) which ensure the continuous i.e. UNINTERRUPTED power supply to the end users. The strategy of power supply and distribution scheme is as given below:

- 11KV supply coming from KESC GRID STATION & entering in UTILITY (KESC) power station situated within the Dolmen City Complex, which will then be feeding owners S/S through 11KV feeders.
- From 11KV/400V transformers LV supply are terminated in main supply panel through respective ATS. These ATS are connected through cables in power panel, installed near the transformer or through be connected through horizontal Bus teiduct installed in adjacent L.V cum synchronizing panel room.
- All out going synchronizing panel feeders are terminated in main power panel through ATS to bring the synchronizing panel in loop of utility power supply and generators supply.
- Generators feeders are directly terminated in synchronizing panel to complete the automation operation loop.

In presence of utility supply the end users will get power supply directly through main power panels but the generators on other hand as shown in will remain OFF position.

As soon as if there is a break down on K.E.S.C side or voltage drop in 11KVA line beyond tolerance limit (i.e. of below 10500V) occur, all the generators will start simultaneously and start supplying load to synch panel.

Synchronizing load sharing/shedding relay installed in synch cum take off panel will then sense the load being in used at end users side then generators running in parallel will switch ON & OFF accordingly to load requirement. This way the system will remain operative till the restoration of KESC power. This philosophy of operation will be continued till any fault occurs in the system or in one of the Breakers. In that situation, (Fault) half of the 11KV side will be tripped off.

2.5.5- Internal & External Lighting System

All light fitting with discharge lamps, Mercury vapour/Sodium vapour, Fluorescent tubes, etc, will incorporate capacitors to obtain a power factor of 0.9 or above, lagging.

1. Internal Lighting

The general principles that underpin the lighting scheme are listed below.

- Maximise the opportunities afforded by natural light.
- Provide adequate and appropriate levels of light for the functions and activities of different areas.
- Provide a balance between functionality, colour, texture and contrast.
- Provide an appropriate expression of the architecture within the building and outside of the building.
- Limit environmental impact and light pollution.
- Use low energy technologies wherever possible and appropriate without compromising visual comfort and utility.
- Use of long life source to assist in the reduction of maintenance costs.
- Use automated lighting control, presence detection and similar facilities to manage energy.
- Integrate with other systems to provide for the requirements of emergency lighting, fire alarm, security and cleaning, etc.
Integration with ceiling systems and mechanical designs.

- The appropriate lamp selection will take account of:
  - Lighting output
  - Colour rendering index
  - Colour temperature
  - Life
  - Cost in use
  - Environmental impact
  - Recommended applications
  - Flexibility of the system

System Controls: Lighting controls philosophy shall be customised for the following categories:

- Specialty Areas - Mood options, dimming, local control
- Conference Areas - Mood options, dimming, local control
- Large public spaces - Time of day levels, central control
- Small public spaces - Manual & Local control
- Back of the house areas - Central control of circulation areas & manual for Rooms
- Tenant spaces - Manual & local control, dimming available in Living Rooms
- External spaces - Time of day, special events.

The above system is user friendly. It allows energy efficient measures when in limited use.

2. External Lighting

The exterior lighting system serves three functions for the movement of vehicles and pedestrians over frequented route and places:

- Security
- Safety
- Representational lighting

Provide lighting for all primary and secondary roadways and other areas where pedestrian and vehicular traffic occurs. Circuits are arranged so that no single circuit failure will cause any two adjacent lights to fail.

System Performance: To enhance the Architectural presentation of the Project, the design is closely developed to meet the visual requirements of the architect.

System Controls: All outdoor lighting are dually controlled by photocell and timer to ensure maximum energy efficiency and managed by the Integrated Building Management System.

3. Emergency Lighting

Emergency lighting is part of the safety network of any premises which also includes fire alarm, sprinkler, fire fighting equipment, etc. The purpose of emergency lighting is to ensure that lighting is provide promptly, automatically and for a suitable time in a specified area when the normal power supply to the normal lighting fails (or switched “off” during fire conditions).

The emergency lighting is categorised in three sections as follows:

- Emergency escape lighting - for safe exit from location;
- Open area lighting - reducing the likelihood of panic and enabling safe movement towards escape routes;
- High risk task area lighting - illumination for the safety of people involved in a potentially dangerous process.

System Performance: The emergency lighting installation will be designed to comply with the above-mentioned standards. A minimum of 1 Lux is required within defined escape routes and 0.5 Lux in open plan areas. The emergency lighting will have a minimum
duration of three hours.

Emergency lighting is designed and placed on the escape route, fire alarm call points, all fire fighting equipment and indicating the various obstructions to escape. The design of the escape lighting fulfils the following functions:

- To indicate clearly and unambiguously the escape routes;
- To provide illumination onto and along such routes as to allow safe movement towards and through the exists provided to a place of safety;
- To ensure that fire alarm call points and fire fighting equipment provided along escape routes can be readily located and used;
- Contingency Plan: An emergency resulting from breakdown of the automatic lighting system will be dealt with by the contingency plan that has been provided in the Environment Management Plan.

2.5.6- Fire Alarm System

A dedicated fire alarm with integrated emergency voice communications and automatic detection system using analogue addressable components will be provided throughout the building. The system will meet the requirements of EN54, and local Civil Defence requirements.

System Controls: Intelligent analogue addressable, automatic fire alarm and detection system with time delay and facility within floors and phased evacuation control by an authorised persons.

System Description: The fire detection system is designed to comprise of the following systems:

- Main fire detection panel located in the main entrance or security control room. This panel will receive all alarm and status signals and have full functional control over the system and be capable of interfacing to a site wide system.
- Automatic and manual detection device such as smoke detectors, heat detectors, call points and air sampling tubes.
- Input and output devices to interface with plant such as smoke dampers, stairs pressurisation etc.
- Independence fire panels and zoning shall be installed for the tower and mall areas with an interlinking of both panels to communication alarms etc. in each facility.
- Smoke detection will be provide to all offices, Guest rooms, and service areas, plant rooms, function room, corridors, stairwell, air handling plant, lift lobbies, top of lift shaft, around the perimeter of opening through the floors and within areas of risk.
- Manual call points will be provided at all floor levels to manually activate the fire alarm system.

The fire detection system will control and monitor the following systems:

- Smoke vents;
- Smoke dampers;
- Make-up air vents;
- Smoke extract fans;
- Ventilation plant;
- Integrated Building Management System (Interfacing).

2.5.7- Gas Detection System

The Gas Detection System will operate in two areas.

- Basement covered car parking to provide carbon monoxide detection; this will be interlocked with the ventilation systems.

The system design shall comply with NFPA/EN regulations.

2.5.8- Communication

The purpose of the communications section is to identify all cable ways and space planning issues
required to provide a complete telephone, data and television system to areas requiring telephone, data and television systems.

Contingency Plan: An emergency resulting from breakdown of the automatic communication system will be dealt with by the contingency plan that has been provided in the Environment Management Plan.

1. Telephone System

i- Standards/Codes
The Telephone System shall comply with the following Standards / Codes.
- Telephone - PTCL, TIA/EIA, EIA wiring regulations

ii- Design Parameters for Tower
Following are the design parameters to be followed for tower.
- Telephone cabling shall be done using CAT 5e cable as a minimum standard.
- HC (Horizontal distribution cross connect) shall be provided at each floor for the distribution of floor telecom services.
- Outlets shall be provided in specific locations as per End user requirements.

iii- Design Parameters for Shopping Mall:
Following are the parameters to be considered in design of telephonic system:
- The infrastructure will be designed as per PTCL regulations.
- In Building communication system interconnecting all manned locations.

2. I.T. / Data
The Project is I.T enabled with all building/data services are deployed over the given infrastructure.

Contingency Plan: An emergency resulting from breakdown of the IT based system will be dealt with by the contingency plan that has been provided in the Environment Management Plan.

2.5.9- Earthing and Bonding
A complete earthing system for the building, the sub station earthing system and the telecom system will be provided. All earthing installations and equipment will comply with the requirement of BS7671, BS7473.

<table>
<thead>
<tr>
<th>Classification</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIN V ENV 61024-1 (VDE V 0185 Part 4): 2002-11</td>
<td>Protection against lightning Part 4: Electrical and electronic systems within structures</td>
</tr>
</tbody>
</table>
building earth systems will have a resistance of less than 3 Ohm. These earth electrodes are driven externally to the building structure.

2.5.10- Lightning Protection
Lightning protection has been provided as per the international standards shown in table 2.5.

2.5.11- Audio Visual Systems
This system will cover the provision of a background music/paging system.

1. Design Criteria
The systems will be designed to take into account any applicable special requirements of local regulations.

Background Music Paging System: The system will provide background music channels to loudspeaker systems throughout the Project. The system will also provide the means of public address paging. Where required by local code, a combination of emergency paging /voice evacuation system and annunciation devices will be used.

2.5.12- Fire Protection & Safety Systems

1. Life Safety Systems
Life safety systems in tall buildings recognise that:

- Fire floors are beyond the reach of civil defence equipment
- Fires pose great potential for stack effect
- Longer evacuation times are necessary

The design of life safety systems is a multidisciplinary solution with the architect detailing the fire stairs, evacuation routes, areas of refuge as well as the fire rating of the shafts and internal fire separation within the building. The structural engineers will specify the fire retardant materials that will protect the structure.

The active life safety systems comprise automatic sprinklers, standpipes, fire detection and alarm systems, fire suppression systems, stair and lobby pressurization systems. The primary fire safety codes will be NFPA 101 for fire suppression system EN54 for Fire Alarm System

Fire control systems comprise of detection and alarm systems, fire suppression systems and fire management systems.

Fire Detection and Alarm systems comprise:

- Smoke and heat detection in selected areas of the building
- Sprinkler detection throughout the building with zoned flow switches
- Manual call points
- Voice Evacuation signals

Fire suppression systems comprise:

- Automatic sprinkler systems
- Fire standpipe and hose systems

Fire management systems comprise:

- Smoke management systems
- Stairwell Pressurisation systems
- Emergency electric power systems
- Automatic elevator recall systems
- Communication and alarm notification systems
- A central fire command centre.

2. Fire Management Systems
Smoke Control: Active smoke control measures are proposed in addition to the containment principles, defined as follows:

- Fire control by sprinklers
- Pressurisation of designated escape stairways
Electromagnetic door closures

Sandwich Pressurization Scheme with smoke Extraction system

By Non Fire Floors including the stair case will be positively pressurized by automatically switching the plant for respective areas on fresh air

The main features of the fire venting strategy are as follows:

- Release of smoke and heat into the open air thus minimising fire migration to other fire compartments.
- Provision of safe escape routes and improve conditions for fire fighting and rescue operations.
- Prevention of back drafting, which can severely injure fire fighters.
- Assistance with the clearance of smoke after a fire.
- Smoke damage to the building fabric and finishes is reduced.
- The car parking areas will also have a dedicated extract air system capable of 6 air changes per hour.

3. Fire Protection Systems

The building will be served by an automatic sprinkler system fed by dedicated pumps. A combined system permitted under NFPA 14 is proposed where the sprinklers are fed from the same standpipe as the hose systems. Standpipes will be required to Class III standards. Outlet connections to Class III standpipes are required at every floor level of every required stairway above or below grade.

4. Automatic Sprinklers

All areas of the building will have automatic sprinklers. The automatic sprinkler system will be designed in accordance with NFPA Automatic Sprinkler Code NFPA13 and local code requirements. A combined system is proposed in accordance with NFPA 14. The fire water tanks will be combined with the water storage to ensure that water does not stagnate in the tanks. Each pump set will comprise one duty operation electric pump and one standby diesel pump to ensure a reliable supply.

Fire pumps will conform to NFPA 20. The sprinkler detection system will be provided with zone valves connected to the fire alarm panel.

Contingency Plan: An emergency resulting from breakdown of the automatic sprinkler system will be dealt with by the contingency plan that has been provided in the Environment Management Plan.

2.5.13- Integrated Building Management Systems (IBMS)

A centralised PC based operating station is proposed which will control all the services building provide suitable level of monitoring and the collection of data. The BMS system will utilise the site wide structured wiring system.

The central computer and control console will be located in a dedicated engineering office area with repeater panels at the communication centre and security office. The system will comprise the following features.

- Colour graphic floor plans and schematics for display of mechanical systems
- Monitor indoor air quality
- Monitor and provide programmable management of energy consumption
- Alarm management
- Fail safe protection to HVAC systems
- Interface with fire and smoke management systems
- Monitoring/control of plant area
- Integration with security, fire alarms, lighting control, lifts and property management systems.
Management of energy consumption
- Utility metering and sub metering
- Non-essential load shedding
- Graphical and tabular reporting

1. IBMS Control Software

IBMS control software deployed on a server will be used to control and monitor all aspects of the Building Controls. A full set of user-friendly graphics will be used for monitoring real-time data from the field-mounted devices. The graphics will be developed in conjunction with end user requirements and/or input.

The control software has a main user interface to monitor equipment malfunction and maintenance alarms and trend logging of control data; e.g. temperatures, humidity's and corresponding control actions.

The Control software has the capabilities of onward transmission alarms to alternative locations on different times.

In order to support good facilities management sufficient training will be provided to enable a trained operator to, as a minimum:

- View equipment status
- View and acknowledge alarms
- Adjust optimised time clocks and calendars
- Adjust set points and control parameters
- Investigate calculated value
- View plant hours run data
- Chart energy usage from the meters
- Create tenant utility bills

Create and view long term Trend Logs of controlled parameters in particular temperature and humidity in all areas to demonstrate control.

2.5.14- Solid Waste Disposal

Internationally recognised solid waste management methodologies will be adopted. The ACCOR's Environment Charter - Practical Guide will be followed for solid waste management; all the techniques as identified in the practical guide will be taken into consideration.

2.5.15- Effluent Treatment

Grease interceptors will be installed at all kitchen drains of Dolmen Mall to trap oil & grease. After removing oil & grease, wastewater will be discharged into the nearby community sewer line. A sewage treatment plant is proposed, the sewage waste before discharge will be treated into a sewage treatment plant to be installed at the basement of Dolmen City Building by ICPL.

2.5.16- Health & Safety

Standard operational procedures will be followed as recommended by ACCOR. Those standards are internationally recognised and shall be implemented in the Project.

2.5.17- Employment Generation

The Project would provide direct employment to about 500 workers. Indirect employment would open doors to over one hundred thousand persons over a period covering construction to completion.
Environmental Impact Assessment (EIA) for The Dolmen City Project
A Project of International Complex Projects Limited (ICPL)
Environmental Impact Assessment (EIA) for The Dolmen City Project
A Project of International Complex Projects Limited (ICPL)
Environmental Impact Assessment (EIA) for The Dolmen City Project
A Project of International Complex Projects Limited (ICPL)
03 Legislative Framework

3.1- INTRODUCTION
This chapter provides synopsis of policies, legislation, and guidelines that may have relevance to the project. The proponent of this project will comprehensively follow the relevant requirements of the policy documents and legislative framework as well as those recommendations as described in the national and international guidelines. Many of those guidelines have been incorporated in the mitigation measures and the Environmental Management Plant (EMP) which has been formulated for the better environmental management.

3.2- NATIONAL POLICIES AND PLANS

3.2.1- NATIONAL CONSERVATION STRATEGY
The National Conservation Strategy (NCS) is the primary policy document of the Government of Pakistan (GoP) on national environmental issues. The Strategy approved by the Federal Cabinet in March 1992 was also recognized by International Financial Institutions, principally the World Bank. The NCS had identified 14 core areas including conservation of biodiversity, pollution prevention and abatement, soil and water conservation and preservation of cultural heritage. It had also recommended immediate attention to the stated core areas in order to preserve the environment of Pakistan.

A mid-term review of the NCS in 2000 concluded that achievements under the NCS were primarily awareness raising and institutional building rather than meaningful improvement of the environment and natural resources and that the NCS was neither designed nor adequately focused as a national sustainable development strategy (GoP, November 2002). Thus the need for a more focused National Environmental Action Plan (NEAP) was formulated and approved by the Pakistan Environmental Protection Council in 2001 to practically improve the national environment with emphasis on poverty reduction, and economic as well as sustainable development.

NEAP now constitutes the national environmental agenda and its core objective is to initiate actions that would safeguard public health, promote sustainable livelihoods and enhance the quality of life of the people of Pakistan.

The GoP and United Nations Development Programme (UNDP) have jointly initiated an umbrella support programme called the NEAP-Support Programme that was signed in October 2001 and implemented in 2002. The development objective supported by NEAP-Support Programme is environmental sustainability and poverty reduction in the context of economic growth.

3.2.2- BIODIVERSITY ACTION PLAN
The key to protection of the biological heritage of Pakistan lies in the involvement of local people and in the support provided by competent institutions for conservation and sustainable use. The Government of Pakistan has recognized the importance of these measures in the preparation of National Conservation Strategy and in becoming a signatory to, and ratifying, the Convention on Biological Diversity (CBD) in 1994. Developing the Biodiversity Action Plan for Pakistan, 2000 has been the most significant direct steps towards addressing the biodiversity loss.
3.3- NATIONAL ENVIRONMENTAL LEGISLATIONS

3.3.1- PAKISTAN ENVIRONMENTAL PROTECTION ACT 1997

The Pakistan Environmental Protection Act, 1997 is the basic legislative tool empowering the government to frame regulations for the protection of environment.

The Act is broadly applicable to air, water, soil and noise pollution, as well as to handling of hazardous wastes. Penalties have been prescribed for those who contravene the provisions of the Act. The powers of the Federal and Provincial Environmental Protection Agencies (EPAs) were also considerably enhanced under this legislation and they have been given the power to conduct inquiries into possible breaches of environmental laws either of their own accord, or upon the registration of a complaint.

Under section 12 of Act, no project involving construction activities or any change in the physical environment can be commenced unless the fulfilment of prerequisite i.e. to conduct IEE or EIA and a report submitted to the Federal or Provincial EPA.

3.3.2- PAKISTAN ENVIRONMENTAL PROTECTION AGENCY REVIEW OF IEE AND EIA REGULATIONS 2000

The PEPA review of IEE and EIA regulations, 2000 (the ‘regulations’), prepared by the PEPA under the powers conferred upon it by the Pakistan Environmental Protection Act, provide the necessary details on the preparation, submission and review of the IEE and the EIA.

These regulations classify projects on the basis of expected degree of severity of environmental impacts and list them in two separate schedules. Schedule-I lists projects that may not have significant environmental impacts and require an IEE. Schedule-II lists projects of potentially significant environmental impacts requiring preparation of an EIA. Dolmen City Project falls in Schedule-II as the project cost is above Pak Rupees 50 Million and also the project located close to the sandy beach of Clifton with residential area on the hind that falls in the category of architecturally, historically and archaeologically significant and hence environmentally sensitive areas.

3.3.3- National Environmental Quality Standards (NEQS)

The NEQS were first promulgated in 1993 and were last revised in 2000. These are the basic guidelines for liquid effluent and gaseous emissions of municipal and industrial origin to comply with. These standards present the maximum allowable concentration for liquid effluent before its discharge into sea, inland water & sewage (total 32 parameters to comply with) and gaseous emissions in the ambient air from industrial sources (total 16 parameters to comply with).

3.3.4 Sindh Wildlife Protection Ordinance, 1972 (SWPO)

This ordinance provides for the preservation, protection, and conservation of wildlife by the 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. Activities such as hunting and breaking of land for mining are prohibited in national parks, as are removing vegetation or polluting water flowing through the park. 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.

### 3.3.5 Karachi Building and Town Planning Regulations 2002 Notification No. SO (Land) HTP/KBCA-3-39/2000

These Regulations, issued under the Sindh Buildings Control Ordinance 1979, provide exhaustive rules and procedures for construction and development activities in the city (section 1-2). They apply to all of Karachi except for cantonment areas (section 1-1.3). The government may also declare "special areas" that are exempt from the application of these Regulations (section 1-3).

The Regulations contain general standards for "coastline recreation development" (chapter 23). This development is to be carried out according to the Karachi Coastal Recreation Development Plan; under which the entire 40-mile strip of the city’s coastline has been declared "interim control area for the purpose of recreation and tourism" (section 23-1). The Coastal Development Plan designates what are described as "environmental planning zones"; which are to be considered in planning recreational schemes in the coastal areas (section 23-3).

The green turtle nesting areas, mangrove swamps, coral reef, oyster beds, rock pools, and bird roosting and nesting sites along the Hawks Bay, Manora and Sandspit beaches are classified as conservation areas; where controlled/limited infrastructural development and public access is permitted (section 23-3.1.2). An "area of concern" is one where "improvement [...] may be beneficial" (section 23-3.3) while the "restricted zone" covers a 2-kilometre radius around the Karachi Nuclear Power Plant (KANUPP), where no development is permitted (section 23-3.4).

A "utilization area"; meanwhile, is suitable for development (section 23-3.2). A wide range of projects are permitted here, including hotels, restaurants, marinas and clubs, casinos, "dolphin parks"; and other "modern types of amusements and water based recreation without damaging the natural environment of the coastline" (section 23-5.3.5). This development is subject to certain regulatory provisions, not all of which are compulsory. Safety measures to check marine pollution as a result of "beach activities" (section 23-4.26), for example, is a subject that "may be given special consideration" (section 23-4.2). The design of marinas and piers in a manner that does not obstruct the free flow of tides (section 23-4.2.4) is another such optional consideration.

Separate building regulations are provided for "recreation and amusement projects" in such areas, including a "proper feasibility" (section 23-5). Specific areas to be covered by such feasibility studies are not mentioned and the building regulations for coastal development, in contrast to the regulations for other parts of the city, are by no means comprehensive. Provisions are to be made for the disposal of waste "without pollutants the coastline" (section 23-5.1), 70 per cent of the project is to consist of an "open area with landscaping for recreation"(section 23-5.3.2), while a "large open space" is designated for car parking (section 23-5.3.6).

### 3.3.6 Coastal Development Authority Act 1994

This Act provides for the development, improvement and "beautification" of the coastal areas of Thatta and Badin districts, and establishes an Authority for this purpose. The Authority is responsible for the beautification of coastal areas and monitoring development schemes, as well as drinking water facilities, communication systems, electricity, drainage, development of fisheries, livestock, horticulture and forests (section 7(1) and 7(2)). It develops marketing facilities and constructs jetties and harbors (section...
7(2)). It acts as a coordinating agency for the federal and provincial governments, local authorities or autonomous bodies (section 7(3)), and collaborates with them in development and environmental protection activities (section 7(4)). The Authority provides technical guidance including technical services for development activities (section 7(5)) and carries out research for development planning (section 7(7)). It assists in the establishment of coconut palm plantations (section 7(10)) and the development of fish harbors and oil refineries (section 7(11) and 7(12)).

3.3.7 Antiquities Act 1975

The protection of cultural resources in Pakistan is ensured by the Antiquities Act of 1975. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments etc.

The act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area which may contain articles of archaeological significance. The project area however does not contain any sites notified as protected under this act.

3.4- NATIONAL ENVIRONMENTAL GUIDELINES

3.4.1- ENVIRONMENTAL ASSESSMENT PROCEDURES 2000

The guidelines pertaining to the review process of impact assessments were given regulatory status in the Review of IEE and EIA Regulations 2000. The package of regulations prepared by PEPA with relevance to this Environmental Assessment includes:

- Policy and Procedures for Filing, Review and Approval of Environmental Assessments;
- Guidelines for the Preparation and Review of Environmental Reports;
- Guidelines for Public Consultation
- Sectoral Guidelines for Environmental Reports - Housing Estates and New Town Developments

Policy and procedures for filing, review and approval of environmental assessments:

These guidelines define the policy context and the administrative procedures that will govern the environmental assessment process, from the project pre-feasibility stage, to the approval of the environmental report. According to the procedures laid out in the policy guidelines, IEE’s or EIA’s are to be filed with the EPA of the province where the project is to 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:

It requires proponents to prepare terms of reference for the environmental assessment reports. It requires that all studies should contain baseline data on the area and must contain an assessment of the potential environmental impacts and the recommended mitigation measures.

Guidelines for public consultation:

These guidelines are a part of a package of regulations and guidelines. It provides assistance throughout the environmental assessment of project by involving the public which can lead to better and more acceptable decision-making.

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 participants.

**Sectoral guidelines for environmental reports - Housing estates and new town developments:**

These guidelines are set for building housing estates and townships in Pakistan to look specifically at the environmental impacts. In the scenario of hotel and shopping mall development project, these guidelines consider the hotel as providing accommodation facilities and the nature of impacts are similar as they are in the housing projects.

The guidelines examine the alternatives on site and technology and impacts on the social and physical environment, during the construction and operation phases of the project besides proposals for mitigation measures. The environmental report is expected to deal with issues relevant to the project. The focus of the environmental report is required specifically on key environmental issues.

### 3.4.2- NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS)

The NEQS were first promulgated in 1993 and were last revised in 2000. These are the basic guidelines for liquid effluent and gaseous emissions of municipal and industrial origin to comply with. These standards present the maximum allowable concentration for liquid effluent before its discharge into sea, inland water & sewage (total 32 parameters to comply with) and gaseous emissions in the ambient air from industrial sources (total 16 parameters to comply with).

### 3.5 INTERNATIONAL TREATIES & GUIDELINES

#### 3.5.1 The Convention on Biological Diversity

The Convention on Biological Diversity was adopted during the Earth Summit of 1992 at Rio de Janeiro. The Convention requires parties to develop national plans for the conservation and sustainable use of biodiversity, and to integrate these plans into national development programmes and policies. Parties are also required to identify components of biodiversity that are important for conservation, and to develop systems to monitor the use of such components with a view to promoting their sustainable use.

#### 3.5.2 The Convention on Conservation of Migratory Species of Wild Animals, 1979

The Convention on the Conservation of Migratory Species of Wild Animals (CMS), 1979, requires countries to take action to avoid endangering migratory species. The term "migratory species" refers to the species of wild animals, a significant proportion of whose members cyclically and predictably cross one or more national jurisdictional boundaries. The parties are also required to promote or cooperate with other countries in matters of research on migratory species.

The Convention contains two appendices. Appendix I contain the list of migratory species that are endangered according to the best scientific evidence available. For these species, the member states to the Convention are required endeavor to:

- Conserve and restore their habitats.
- Prohibit their hunting, fishing, capturing, harassing and deliberate killing.
- Remove obstacles and minimize activities that seriously hinder their migration.
- Control other factors that might endanger them, including control of introduced exotic species.

Appendix II lists the migratory species, or groups of species, that have an unfavorable conservation status.
as well as those that would benefit significantly from the international co-operation that could be achieved through intergovernmental agreements.

### 3.5.3 The Convention on Wetlands of International Importance, Ramsar 1971

Pakistan is a signatory to the said Convention. The principal obligations of contracting parties to the Convention are:

- To designate wetlands for the List of Wetlands of International Importance.
- To formulate and implement planning so as to promote wise use of wetlands, to make EIA before transformations of wetlands, and to make national wetland inventories. To establish nature reserves on wetlands and provide adequately for their wardening and through management to increase waterfowl populations on appropriate wetlands. To train personnel competent in wetland research, management and wardening.
- To promote conservation of wetlands by combining far-sighted national policies with coordinated international action, to consult with other contracting parties about implementing obligations arising from the Convention, especially about shared wetlands and water system.
- To promote wetland conservation concerns with development aid agencies. To encourage research and exchange of data.

### 3.5.4 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

This convention came into effect on 03 March 1973 in Washington. In all 130 countries are signatory to this convention with Pakistan signing the convention in 1976. The convention requires the signatories to impose strict regulation (including penalization, confiscation of the specimen etc.) regarding trade of all species threatened with extinction or that may become so, in order not to endanger further their survival.

The Convention contains three appendices. Appendix I include all species threatened with extinction which are or may be affected by trade. The Convention requires that trade in these species should be subject to strict regulation. Appendix II includes species that are not necessarily threatened presently but may become so unless trade in specimens of these species is subject to strict regulation. Appendix III includes species which any contracting party identifies as subject to regulations in trade and requires other parties to co-operate in this matter.

### 3.5.5 IUCN Red List

The red list is published by IUCN and includes those species that are under potential threat of extinction. These species have been categorized as:

- **Endangered:** species that are sent to be facing a very high risk of extinction in the wild in the near future, reduction of 50% or more either in the last 10 years or over the last three generations, survive only in small numbers, or have very small populations.
- **Vulnerable in Decline:** species that are seen to be facing a risk of extinction in the wild, having apparent reductions of 20% or more in the last 10 years or three generations.
- **Vulnerable:** species that are seen to be facing a high risk of extinction in the wild, but not necessarily experiencing recent reductions in population size.
- **Lower Risk:** species that are seen to be facing a risk of extinction that is lesser in extent that for any of the above categories.
- **Data Deficient:** species that may be at risk of extinction in the wild but at the present time there is insufficient information available to make a firm decision about its status.
3.5.6- WORLD BANK GUIDELINES ON ENVIRONMENT

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


The first two publications listed here provide general guidelines for the conduct of an EIA, and address the EIA practitioners themselves as well as project designers. While the Sourcebook in particular has been designed with Bank projects in mind, 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 Sourcebook 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.

3.5.7 International Convention on Biodiversity

The International Convention on Biodiversity was adopted during the Earth Summit of 1992 at Rio de Janeiro. The Convention requires parties to develop national plans for the conservation and sustainable use of biodiversity, and to integrate these plans into national development programmes and policies. Parties are also required to identify components of biodiversity that are important for conservation, and to develop systems to monitor the use of such components with a view to promote their sustainable use.

3.5.8- Equator Principles

Project financing, a method of funding in which the lender looks primarily to the revenues generated by a single project both as the source of repayment and as security for the exposure, plays an important role in financing development throughout the world. Project financiers may encounter social and environmental issues that are both complex and challenging, particularly with respect to projects in the emerging markets.

The Equator Principles Financial Institutions (EPFIs) have consequently adopted these Principles in order to ensure that the projects we finance are developed in a manner that is socially responsible and reflect sound environmental management practices. By doing so, negative impacts on project-affected ecosystems and communities should be avoided where possible, and if these impacts are unavoidable, they should be reduced, mitigated and/or compensated for appropriately. We believe that adoption of and adherence to these Principles offers significant benefits to ourselves, our borrowers and local stakeholders through our borrowers’ engagement with locally affected communities. We therefore recognize that our role as financiers affords us opportunities to promote responsible environmental stewardship and socially responsible development. As such, EPFIs will consider reviewing these Principles from time-to-time based on...
implementation experience, and in order to reflect ongoing learning and emerging good practice. These Principles are intended to serve as a common baseline and framework for the implementation by each EPFI of its own internal social and environmental policies, procedures and standards related to its project financing activities. We will not provide loans to projects where the borrower will not or is unable to comply with our respective social and environmental policies and procedures that implement the Equator Principles.

There are major nine (9) principles that have been defined in the Equator Principles given as follow:

- Principle-1: Review and Categorization
- Principle-2: Social & Environmental Assessment
- Principle-3: Applicable Social & Environmental Standards
- Principle-4: Action Plan and Management System
- Principle-5: Consultation and Disclosure
- Principle-6: Grievance Mechanism
- Principle-7: Independent Review
- Principle-8: Covenants
- Principle-9: EPFI Reporting

3.5.9- IFC Performance Standards on Social and Environmental Sustainability

International Finance Corporation (IFC) applies the Performance Standards to manage social and environmental risks and impacts and to enhance development opportunities in its private sector financing in its member countries eligible for financing. The Performance Standards may also be applied by other financial institutions electing to apply them to projects in emerging markets.

Together, the eight Performance Standards establish standards that the client is to meet throughout the life of an investment by IFC or other relevant financial institution:

- Performance Standard-1: Social & Environmental Assessment and Management System
- Performance Standard-2: Labor and Working Conditions
- Performance Standard-3: Pollution Prevention and Abatement
- Performance Standard-4: Community Health, Safety and Security
- Performance Standard-5: Land Acquisition and Involuntary Resettlement
- Performance Standard-6: Biodiversity Conservation and Sustainable Natural Resource Management
- Performance Standard-7: Indigenous Peoples
- Performance Standard-8: Cultural Heritage

Certain objectives have been set in the IFC performance standards to achieve sustainable development. Those objectives are given below:

- To identify and assess social and environment impacts, both adverse and beneficial, in the project's area of influence
- To avoid, or where avoidance is not possible, minimize, mitigate, or compensate for adverse impacts on workers, affected communities, and the environment
- To ensure that affected communities are appropriately engaged on issues that could potentially affect them
- To promote improved social and environment performance of companies through the effective use of management systems.
Dolmen City Project is located in the microenvironment comprising the sandy beach of Clifton on the front, the large Baghe Jinnah in the immediate vicinity, and several residential complexes across the road from Karachi Port installations to the Sea View.

The macro-environment of the Project comprises the Karachi Port Trust property housing the oil installations, coal storage area, and the Manora Channel enclosing the harbor on the north and northwest; and a large number of architecturally, historically and archaeologically significant structures.

Description of the environment of Dolmen City Project requires baseline data on the existing resources of its microenvironment and macroenvironment, including the following:

(i) Physical Resources
(ii) Ecological Resources
(iii) Economic Development
(iv) Social and Cultural Resources

4.1 Physical Resources:
The physical environment of Dolmen City Project has been described in this study with respect to the airshed,
watershed, geology, soil characteristics and seismicity. Baseline data on the airshed describe the climatic conditions and quality of air in the microenvironment and macroenvironment and characterize the airshed in terms of level of pollution, viz. unpolluted, polluted or grossly polluted. Similarly baseline data on watershed describe the hydrology and quality of surface and groundwater as well as water availability. Data on Geology, geomorphology, soil characteristics and seismicity are needed to evaluate the terrestrial resources with respect to quality of minerals and soil characteristics particularly stability.

4.1.1 CLIMATIC CONDITIONS

The Project is located in the coastal area of Karachi and as a result has a relatively mild climate. It can be characterized by dry, hot and humid conditions. There is minor seasonal intervention of a mild winter from mid-December to mid-February into a long hot and humid summer extending from April to mid-September.

A. TEMPERATURE:

The air temperature in Karachi City District and its coastal areas are generally moderate throughout the year. During winter the range of variation of temperature is large for Karachi coast especially in respect of maximum and minimum temperatures. The air temperature for Karachi has an average annual range of about −6 to −42 °C. The highest temperatures (40 °C or above) occur in May, June and October. During SW monsoon in July and August the temperature is relatively moderate due to cloud cover but humidity remains high (~70%). The mean monthly maximum and minimum temperatures recorded at Karachi Airport Meteorological Station of Pakistan Meteorological Department are given in Tables 4.1 and 4.2, respectively.

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>27.2</td>
<td>29.6</td>
<td>33.1</td>
<td>34.6</td>
<td>35.1</td>
<td>34.8</td>
<td>32.1</td>
<td>32.3</td>
<td>33.1</td>
<td>36.0</td>
<td>33.5</td>
<td>30.4</td>
<td>32.6</td>
</tr>
<tr>
<td>2002</td>
<td>27.0</td>
<td>28.1</td>
<td>33.3</td>
<td>35.4</td>
<td>35.6</td>
<td>35.1</td>
<td>32.2</td>
<td>31.0</td>
<td>31.3</td>
<td>36.5</td>
<td>32.7</td>
<td>28.1</td>
<td>32.2</td>
</tr>
<tr>
<td>2003</td>
<td>27.6</td>
<td>28.5</td>
<td>32.3</td>
<td>36.6</td>
<td>35.7</td>
<td>34.8</td>
<td>34.1</td>
<td>33.5</td>
<td>32.5</td>
<td>37.0</td>
<td>32.2</td>
<td>28.3</td>
<td>32.8</td>
</tr>
<tr>
<td>2004</td>
<td>26.6</td>
<td>29.9</td>
<td>36.2</td>
<td>35.4</td>
<td>36.8</td>
<td>35.6</td>
<td>33.5</td>
<td>32.6</td>
<td>32.8</td>
<td>33.7</td>
<td>30.7</td>
<td>29.4</td>
<td>32.8</td>
</tr>
<tr>
<td>2005</td>
<td>24.9</td>
<td>26.2</td>
<td>31.4</td>
<td>35.3</td>
<td>35.4</td>
<td>36.1</td>
<td>33.2</td>
<td>33.2</td>
<td>34.2</td>
<td>35.2</td>
<td>33.1</td>
<td>28.2</td>
<td>32.1</td>
</tr>
<tr>
<td>2006</td>
<td>26.0</td>
<td>31.3</td>
<td>31.8</td>
<td>34.0</td>
<td>34.6</td>
<td>35.3</td>
<td>33.8</td>
<td>31.0</td>
<td>34.2</td>
<td>35.0</td>
<td>33.4</td>
<td>26.3</td>
<td>32.2</td>
</tr>
<tr>
<td>2007</td>
<td>26.9</td>
<td>29.4</td>
<td>31.4</td>
<td>37.7</td>
<td>36.0</td>
<td>36.4</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>33.0</td>
</tr>
<tr>
<td>2008</td>
<td>24.4</td>
<td>26.9</td>
<td>34.3</td>
<td>34.4</td>
<td>33.9</td>
<td>35.1</td>
<td>33.5</td>
<td>31.9</td>
<td>34.7</td>
<td>35.5</td>
<td>32.5</td>
<td>27.2</td>
<td>32.0</td>
</tr>
</tbody>
</table>

Source: Pakistan Meteorological Department

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>11.5</td>
<td>17.9</td>
<td>19.7</td>
<td>23.8</td>
<td>28.1</td>
<td>29.8</td>
<td>27.1</td>
<td>26.5</td>
<td>25.9</td>
<td>24.4</td>
<td>18.5</td>
<td>15.9</td>
<td>22.2</td>
</tr>
<tr>
<td>2002</td>
<td>12.6</td>
<td>13.8</td>
<td>19.5</td>
<td>23.9</td>
<td>27.0</td>
<td>28.1</td>
<td>26.9</td>
<td>25.6</td>
<td>24.7</td>
<td>22.2</td>
<td>17.6</td>
<td>14.8</td>
<td>21.4</td>
</tr>
<tr>
<td>2003</td>
<td>12.7</td>
<td>16.9</td>
<td>19.8</td>
<td>24.1</td>
<td>25.6</td>
<td>28.1</td>
<td>27.6</td>
<td>26.0</td>
<td>25.3</td>
<td>20.9</td>
<td>15.2</td>
<td>12.0</td>
<td>21.2</td>
</tr>
<tr>
<td>2004</td>
<td>12.9</td>
<td>14.5</td>
<td>19.1</td>
<td>24.8</td>
<td>27.3</td>
<td>28.7</td>
<td>27.7</td>
<td>26.3</td>
<td>25.3</td>
<td>22.4</td>
<td>17.9</td>
<td>15.4</td>
<td>21.9</td>
</tr>
<tr>
<td>2005</td>
<td>12.3</td>
<td>14.8</td>
<td>20.3</td>
<td>22.9</td>
<td>26.4</td>
<td>28.4</td>
<td>27.4</td>
<td>26.6</td>
<td>26.5</td>
<td>22.9</td>
<td>18.9</td>
<td>12.9</td>
<td>21.7</td>
</tr>
<tr>
<td>2006</td>
<td>11.7</td>
<td>18.1</td>
<td>19.6</td>
<td>24.5</td>
<td>27.5</td>
<td>28.5</td>
<td>28.3</td>
<td>26.3</td>
<td>26.8</td>
<td>25.7</td>
<td>19.4</td>
<td>14.0</td>
<td>22.5</td>
</tr>
<tr>
<td>2007</td>
<td>13.0</td>
<td>17.3</td>
<td>19.7</td>
<td>24.7</td>
<td>27.6</td>
<td>28.6</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>21.8</td>
</tr>
</tbody>
</table>

Source: Pakistan Meteorological Department
B. RAINFALL:
Rainfall in the Karachi coastal zone is extremely low and erratic. This places the coastal district in the semi-arid climatic zone. Table-4.3 shows the seven years precipitation data recorded at Karachi Airport station. The rainfall data indicate that Karachi received 156.8 mm rainfall during the first six months of 2007.

C. Visibility
Visibility depends on weather conditions such as fog, haze, rainfall and dust storms also to a certain extent on the amount of particulate matter present in the ambient urban atmosphere. Weather in Karachi is generally fine throughout the year with visibility ranging up to 10 nautical miles. Haze generally prevails in the morning, which clears by noon. In SW monsoon however, the visibility is reduced to about 2 to 5 nautical miles with sky mostly overcast while in NE monsoon sky is clear and visibility is often less than 1 nautical mile but it dissipates by afternoon. This occurs less than 3 to 4 days a month in winter.

D. WIND SPEED & DIRECTION
The wind velocity is high almost throughout the year. During summer it has direction from south-west to west while in winter, it is from north to northeast and shifts southwest to west in the evening hours. This high velocity wind usually carries sand and salt, resulting in severe corrosion and erosion. The wind velocity varies between 3-15 m/s. The wind direction and speed between the two monsoon seasons viz. summer and winter are rather unsettled or large variations are noted both with respect to speed and direction. The wind speed and direction are given in Table 4.4 and 4.5.
E. HUMIDITY

Due to the city’s proximity to the sea, humidity levels usually remain high throughout the year. Annual range is from 50% (December, driest month) to 85% (August, most moist month).

4.1.2 Recent Trend in Monsoon Pattern

The low cloud cover leading to increased sunshine and entailing rise in temperature of landmass in the hinterland has turned large territory of Pakistan into an extensive heat zone that serves as the main heat engine which can trigger heavy monsoon rains all over the Indo-Pakistan region, but only occasionally in the coastal area of Karachi. Such rise in temperature indicates onset of low-pressure zone, which can attract rain bearing winds in case they are around. Such attraction of did cause severe storms on August 17, 2006 and on August 21, 2007 and brought sudden heavy rains of as much as 50 mm in two hours and 80mm in 3 hours respectively. Earlier on 150 mm rain fell in 3 hours in 1967 and caused accumulation of 8 ft water in Shershah. In the 1977 monsoon season the incessant pouring brought 200 mm rains in five hours.

The cyclonic event that was incident on August 10 and 11 of 2007 brought unusually high rainfall of 107mm in 24 hours as compared with the normal of about 60mm for August. The wettest August ever experienced by the city of Karachi was in 1979, when over 262mm rainfall was recorded. The record for maximum rainfall within 24 hours was 166mm of rain on August 7, 1979. The heavy rainfall was thus not unusual particularly because it was caused by the system that travelled from across Rajasthan and lay over Sindh. The monsoon weather system did not move towards Baluchistan but the penetration of moist currents from Sindh brought scattered to heavy rain in southern Baluchistan, particularly along its coastal regions.

The rainfall system that started on July 30 2006 was a repetition of the 50 year cycle since in 1956 the recorded rainfall was 400 mm. The regular monsoon system was rendered inoperative by the persistence of the El-Nino and La-Nina effects. That system seems to have been broken by the powerful Tsunami which was caused by the 1000 km long and 4 km wide rupture under the Indonesian Seas that initiated the propagation of sea waves. The powerful Tsunami waves were traveling at a speed of 700 km/hour and were cause for the disruption of the ocean current system of the Indian Ocean that

Table 4.5: Wind Direction at 12:00 UTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
</table>

Source: Pakistan Meteorological Department

Table 4.6: Relative Humidity Data for Karachi

<table>
<thead>
<tr>
<th>Month</th>
<th>AM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td>January</td>
<td>63</td>
<td>3.6</td>
</tr>
<tr>
<td>February</td>
<td>72</td>
<td>6.4</td>
</tr>
<tr>
<td>March</td>
<td>79</td>
<td>8.3</td>
</tr>
<tr>
<td>April</td>
<td>87</td>
<td>4.9</td>
</tr>
<tr>
<td>May</td>
<td>88</td>
<td>0.0</td>
</tr>
<tr>
<td>June</td>
<td>86</td>
<td>3.9</td>
</tr>
<tr>
<td>July</td>
<td>28</td>
<td>64.4</td>
</tr>
<tr>
<td>August</td>
<td>90</td>
<td>44.8</td>
</tr>
<tr>
<td>September</td>
<td>89</td>
<td>22.8</td>
</tr>
<tr>
<td>October</td>
<td>83</td>
<td>0.3</td>
</tr>
<tr>
<td>November</td>
<td>68</td>
<td>1.7</td>
</tr>
<tr>
<td>December</td>
<td>64</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Source: Pakistan Meteorological Department
had been operating under the El-Nino system.

It seems that the disturbance caused by the Tsunami of December 2004 system was instrumental in bringing rains though still below average in Sindh. The disruption of the oceanic current system firmed up in the year 2006 and thus there was revival of the past system when there would be heavy rains after periods of drought.

The monsoon activity does not subside until mid September but in 2007 it was more than usual. One of the indicators of its activity is the up welling that comes along. Up welling had intensified during the year 2007 because of the increased input of sunshine over the land area of Pakistan. This has caused serious disturbances in the current pattern in the Arabian Sea leading to major cyclonic events during the year 2007.

4.1.3 Storms:

High heat content of the Arabian Sea that is adjacent to the extensive heat zone of Pakistan usually upsets the heat balance and hence the water-balance of the region, particularly because it is the destination of windstorms. Tropical cyclones generally develop over Arabian Sea in low latitude i.e. 5-20 degrees north and dissipate after they move over land. The maximum frequency of tropical cyclone formation occurs in April, May and June and in the October-November period. The month of June receives least tropical cyclones in the region. About 76% of tropical cyclones in Karachi approach from the south through east.

Tropical cyclones that come near the proximity of Karachi are generally weakened. The one that came near the coastal area on May 12, 1999 changed its direction and hit the coastal area of Badin, however Karachi was safe from this cyclone as it is located in the peripheral area and only rain showers of moderate intensity were recorded.

The cyclone in September 2006 proceeded towards coastal belt of Badin; but it did not hit the area and changed its direction. Although some cyclones have passed near the coastal belt of Badin but still it is classified outside the zone of cyclone activity for the Arabian Sea.

In late May 2007 the heat zone in Pakistan attracted the Tropical Cyclone Gonu, and by Tropical Cyclone 03A from the south of Mumbai, and thereafter by Tropical Cyclone 04B nicknamed Yemyin, and then a series of depressions travelling almost directly to the heat zone in Pakistan.

Soon after the beginning of June 07 the tropical cyclone Gonu visited the Coastal area of Oman for the first time in history and set the beginning of destruction over the coastal area of western Baluchistan. At this time it seemed that cyclone Yemyin was trekking westward south of Sindh and Baluchistan while also weakening, but numerical forecasts were indicating that a huge, strong system was developing high up in the sky diagonally on the path i.e. Arabia and Iran and thereby cutting off the impact and almost restraining the cyclonic system to proceed further from the Indus Delta and proceeding towards Karachi. On the night of July 3, 2007 Sindh especially lower Sindh received widespread rains, but luckily Karachi escaped from a high impact of this system. Scattered rains in Sindh with isolated heavy falls in eastern Sindh occurred.

4.1.4 AMBIENT AIR QUALITY

Transportation system and indiscriminate burning of garbage are the dominant source of air pollution in Karachi. Operation of defective vehicles, use of low quality fuel, and increase in the number of vehicles beyond the capacity of roads are the main reasons for deterioration of ambient air quality. However, the impact of air pollution emanating from transportation system has been found limited to the roadways and that too at traffic intersections and on the middle of the road. Emissions from stationary sources e.g. residential and business districts associated with fuel combustion for domestic use and power generation are significant but have limited extent.

Ambient air quality data are being continuously recorded.
by one or the other organization in Karachi. Secondary data are available from the archives of the consultants who are engaged in conducting air quality surveys suggest the level of different pollutant as recorded in Table 4.7.

Table-4.7: Maximum, Minimum and Average Level of Major Pollutants (Nov.2006)

<table>
<thead>
<tr>
<th></th>
<th>SO2 (ppb)</th>
<th>NOx (ppb)</th>
<th>CO (ppm)</th>
<th>CO2 (ppm)</th>
<th>O3 (ppb)</th>
<th>PM10 (µg/m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum</td>
<td>12.5</td>
<td>27.5</td>
<td>3.21</td>
<td>400</td>
<td>39.9</td>
<td>165</td>
</tr>
<tr>
<td>Average</td>
<td>10</td>
<td>15</td>
<td>1.8</td>
<td>344</td>
<td>25</td>
<td>103</td>
</tr>
<tr>
<td>Minimum</td>
<td>7.4</td>
<td>8.4</td>
<td>1.2</td>
<td>310</td>
<td>11.2</td>
<td>68</td>
</tr>
</tbody>
</table>

Source: SUPARCO

4.1.5 Noise

Dolmen City is located adjacent to Sea View on the south and Baghe Jinnah on the immediate north. Being in the open area the ambient noise level is low and has been found to range between 52 and 60 dB(A).

4.1.6 WATER RESOURCES FOR KARACHI

Karachi City District does not have significant natural freshwater source of its own. The City has to depend for its supplies from the River Indus. The Indus River about 120 km on the east of Karachi city and the Hub River, a perennial stream that originates in Balochistan and marks the boundary between Karachi Division and Balochistan are the sources of water in Karachi.

The Lyari and Malir Rivers that pass through Karachi City do not have any natural flow, except during the monsoons. Malir River is ephemeral and is made up from two major tributaries, i.e. Mol and Khadeji as well as some minor tributaries. The Malir and Khadeji River basins include dry hill torrents and flow depends upon precipitation during rains. Khadeji is a perennial stream that originates at Khadeji hills and gains flow during the rains as it travels across the Malir Basin. The flowing water is lost upstream of its confluence with Mol.

Groundwater resources in Karachi area are limited. The aquifers close to the coastal belt are mostly saline and unusable for domestic purposes. The aquifers near the Hub River bed were well developed and remained a source of water for agriculture and other domestic purposes until the construction and commissioning of Hub Dam in 1981. The aquifers that were estimated to lie at depths of 50-100 m have gone deep down and most wells along the Hub River have dried up.

The total estimated water supply to Karachi is about 2.27 million m³/d (500 mgd). Approximately 2.02 million m³/d (445 mgd), which amounts to 89% of the total supply to Karachi is transported to the city from the Kotri Barrage on the Indus River through a system of canals and conduits. The second source of surface water to Karachi is the dam on the Hub River located north of Karachi, which supplies about 0.13 million m³/d (29 mgd) of water to the city. In addition to these surface water sources, an estimated 0.09 million m³/d (20 mgd) is supplied from private and public groundwater wells in and around Karachi. Except for a few Karachi Water and Sewerage Board (KWSB) wells, all of which are connected to the piped supply system, the water from the groundwater wells is distributed through water tankers to various parts of the city.

Groundwater sources: Karachi city falls in a dry and arid zone with scanty and intermittent rainfall with prolonged period of drought. The Karachi District area comprises four (4) basin areas, namely, Malir River Basin, Gadap Basin, Lyari River Basin and Hub River Basin (partial).

The groundwater exists in these basins within the alluvial deposits of Quaternary age and Manchar conglomerate, sandstone, Gaj sandstone, limestone, Nari sandstone and silica sand.
Groundwater aquifer is available at different depths of different strata. Semi artesian condition has also been identified in deeper confined aquifers. The depths of aquifers and the water table in Karachi range from 20 feet (6 m) to 300 feet (91 m) below ground surface. The groundwater is recharged mainly by precipitation in the watershed of the basins. Since the major streams and nullahs are ephemeral in nature, most of the precipitation is lost through surface runoff. Some of this water percolates into the subsoil strata and contributes to recharge of groundwater.

At present, the groundwater is withdrawn from the open wells and tube wells. About 1000 existing dug wells and tube wells are provided with centrifugal or submersible pumps. The average pumping discharge of these wells has been estimated at 80 gallons per minute (363 litre/min) that amounts to a discharge of 53 cusecs (1.5 m³/sec.) against an estimated recharge of 91 cusecs (2.6 m³/sec.). The balance of approximately 38 cusecs (1.1 m³/sec.) represents a rough assessment of the present potential availability of groundwater sources. This quantity is partly represented in groundwater flows for springs, evaporation, evapo-transpiration and base flows of sub-soil storage. In the past, ground water at Dumloottee location was a major source of water for Karachi. The Khadeji, Thaddo Nullah, Mole tributary are the main sources of recharge to the Malir Basin area. However, with the passage of time and due to excessive lifting of sand from Malir River bed along with extensive use of ground water by farmers, the water table has gone deep down to 100 to 150 ft.

4.1.7 Sea Water and Coastal Oceanography

The Karachi coastal zone lies in the northeastern corner of the Pakistan coast bordering the northern Arabian Sea. The coastal oceanographic features of the coastal and near-shore waters of the Karachi coastal belt are typical of the North Arabian Sea which is characterized by high salinity, low precipitation, high evaporation rates, reversal of sea water circulation during the two monsoon periods, and high primary production rates. Turbulence, turbidity, high suspended solids, littoral drift and organic and inorganic pollutants are however more pronounced due to low depth of the in-shore and backwaters, and discharge of land-based pollution into the coastal waters of Karachi. This is cause for lowering the salinity and making a difference between the coastal water of Karachi and the Northern Arabian Sea.

4.1.8 Geology:

The topography of the Dolman city area is flat sandy plain built along the sea coast on the recently filled silt and sand sediments. In the Clifton area and in the vicinity of Dolman city, following three types of coastal sediments can be identified (Figure 4.2).

i) Sand bar deposits: The sand bar deposits comprise of medium to coarse sand, micaceous and shifting sand dunes.

ii) Coastal sand dune deposits: These are medium sized and shifting sand dunes.

iii) Beach sand deposits: These are medium to coarse grained, unconsolidated sand with pebbles and broken shells. These have been marked but keep on shifting by wind into small coastal dunes.

4.1.9 Soil and Land Form

The soil study was carried out by Soil Testing Services to identify the soil structure, texture and to evaluate the foundation design parameters. Borehole depth was selected at 80-90 ft and soil samples were collected at different depth to analyse the soil quality. The area has low gradient and is flat. The following characteristics were identified:

- Soil types identified in the area includes alternating beds of Silty Sand on surface, Silty Clay, Sand Stone on shallow subsurface and Mud Stone on deep subsurface strata of Oligocene to Pliocene epochs.
- The stratigraphic sequence exposed in the area is Manchar formation of Pliocene
- Specific gravity ranges from 2.59-2.68.
The subsurface geological bore hole data show that major sediments include filled material (water saturated) up to 6 meters depth, while, silty fine sand, medium hard siltstone and clay stone sediments occur up to 15 meters below the surface. Whereas, below this depth, there is solid strata comprising of hard sandstone and siltstone up to the depth of 46 meters (Table 4.8).
4.1.11 Structural Geology and Geomorphology

The geology and structural details of Karachi urban and coastal zone areas lying within Karachi synclinorium is known relatively with less certainty if an active fault lies concealed a few meters below the surface. The coastal zone lies in the south of Karachi region. It consists of vegetated tidal mud flats, beach sands, coastal dunes, coastal terraces, rock arches, wave cut platforms, bars and pits. The coast is emergent type. Offshore bars, beach barriers like sandspit indicate coastal emergence in recent times. Sandspit and Manora islands are part of an offshore bar behind which a lagoon is formed. This lagoon serves as Karachi Harbour.

Dolman city and the Clifton area is part of the coastal zone of Karachi. There are extensions of the active faults from east (Rann of Kutch Fault), west (Jhill and Manghopir faults) and north (Pab and Surjan faults) under the Karachi Metropolis, which might be running through coastal zones and also underneath Clifton and DHA buildings. In addition to the above faults, other such structures may be present concealed under the Recent sediments.

4.1.12 Seismology of the Area

Seismotectonics of Pakistan is related to interaction of the following three lithospheric plates: Indian, Arabian, and Eurasian plate (Fig. 4.3). In 1945, an inter-plate earthquake of M 8.1 struck the Makran coast of Pakistan and produced 1-3 meters of coastal uplift. Other large earthquakes hit Pakistan coast in 1765 and 1851. The dominant tectonic feature of the Karachi-Makran region is the extensive fold and thrust belt that extends from northwestern India to southern Pakistan. History of the region reveals that the seismically active areas around Karachi are: (a) Kithar fold and thrust belt/Ornach-Nal-Chaman transform fault zone, (b) Makran subduction zone, and (c) Intracratonic rift zone of Indian Gujrat. All these seismically active areas lie within a range of few hundred km from Pakistan's most populous and coastal city of Karachi. The structures associated within these areas have potential of generating highly damaging earthquakes and have already played significant part in the earthquake/seismic history of the region.
Indus offshore basin is an Atlantic-type passive margin basin, which straddles the continental crust of extension of Sindh platform and Kirthar Fore Deep as well as oceanic crust of Arabian Sea. West of Indus offshore, a mid-oceanic ridge was produced as an effect of rifting of the Indian plate and eventually thinning of the lithosphere of this plate is named Murray Ridge. Northward in Pakistan offshore, the Murray Ridge extends to unite the Ornach-Nal-Chaman Fault system onshore, displaying a strike-slip boundary between the major tectonic plates of India and Eurasia (Baloch and Quirk, 2003). Makran coast and its interior is one of the very active seismic regions. Earthquakes of high intensity have occurred here. The tectonic instability of this region lies in the large number of reverse and tear faults. The greatest earthquake that occurred in this region was on 27th November 1945. A shock of 8.1 magnitude hit the coastal areas of Makran. Its epicenter was about 60 miles from Makran coast and 160 miles north-west of Karachi. The City itself was rocked and people felt tremors strongly. The earthquake was accompanied by a tidal wave as high as 40 feet with a speed of 140 miles per hour. Many fishing villages of Sindh and Balochistan were swept away. Karachi luckily escaped because the tidal wave coincided with the ebb tide. Had it coincided with high tide, the Karachi Coast would have been under water within no time (KDA, 1970).

Clifton and its adjoining locations fall in the approach of Karachi Coastal area which is a part of Indus deltaic region. The seismic activity in the Indus deltaic region is mainly from active faults. The Indus Delta complex zone shows profound influence of various faults such as Nagar Parker fault/Luni-Sukri fault, Island Belt fault/Allah Band fault, Banni fault and Kach mainland fault. The Rann of Kutch is separated from the Thar Desert of Pakistan by the Nagar Parkar fault, which defines the boundary between two geologic provinces. The tectonic lineament shows signatures of reactivation during Pleistocene and is also well evidenced by frequent seismicity. A complex series of faults occurs between Karachi and Rann of Kutch. The main faults are generally oriented easterly and slightly concave to the north.

Historically this region has suffered a number of earthquakes. A list of earthquakes that have affected the Bundal Island and its vicinity from 1977 to 2001 is given in Table-4.9. The largest earthquake was in 1819. It had a magnitude of 8.0 and was felt over a wide sheathe of the Indian sub-continent. Eastern branch of the Indus River was blocked. Long tract of alluvial land uplifted as a result of earthquake. This earthquake was also associated with surface faulting and subsequent subsidence in the epicentre area. This fault produced a scarp called "The Allah Bund". Effects of recent earthquake on January 26, 2001 have been noticed in the deltaic areas. The earthquake occurred along an approximately East-West trending thrust fault at shallow (less than 25 km) depth.

4.1.13 Liquefaction Features Caused by Earthquake

Liquefaction is a total loss of strength due to undrained restructuring. Disturbance, by shearing or vibration, destroys soil skeleton, with loss of grain contact and decrease of porosity, soil load is transferred to pore water, water pressure > normal stress = 0, and soil acts as a liquid. Drainage reduces pore water pressure, allows grain contact and thixotropic recovery of strength
Strong shaking produces liquefaction in the fine sands and silts during the earthquake. This causes the mineral grains to settle and expel their interstitial water to the surface. If the pore-water pressure rises to a level approaching the weight of overlying soil, the granular layer behaves as a viscous liquid rather than a solid and leads to collapse of even engineered structures. Liquefaction has been abundant in areas, where groundwater lies within 10 meters of the ground surface (Husain et al., 2004). Investigators typically have designated sites as "Liquefied" on the basis of the presence of surficial liquefaction features, such as venting of sediment to the surface (i.e., sand boils), ground cracking associated with liquefaction (e.g., lateral spreading), or surface settlements. Other evidence of liquefaction include tilting or settling of overlying structures and floating of underground structures (Olson et al., 2002).

The liquefaction process is extremely damaging to all sorts of engineered structures, it has caused major destruction in both Alaska and San Francisco (Pinty, 2003). The ground failure that resulted from liquefaction during New Madrid, Bhuj and Hazara-Kashmir earthquakes was severe, which included the vertical displacement of 3 to 6 feet and lateral displacement up to 33 feet (Tuttle, 2001). A recurrence of that type of event would have severe consequences for engineered structures. The Bhuj earthquake provided an opportunity to study an earthquake that was very similar to the New Madrid event - it was a very large earthquake and it occurred in an intraplate like setting (Tuttle, 2001). The New Madrid and Kutch regions are both located more than 300 km from active plate boundaries. A study of modern earthquakes that produce liquefaction can better interpret the geologic record of liquefaction during past events. This would help anticipate what is likely to happen in the future, so that informed decisions about reducing and mitigating hazards can be made (Tuttle et al., 2002).

### 4.1.14 Tsunamis

Tsunamis in Indo-Pak region are relatively rare. Destructive tsunamis that may have occurred in the Arabian Sea have not been documented. The oldest known tsunami in North Indian Ocean are:

- 326 BC
- 1st April and 9th May 1008
- 1884
- 26thJune 1941
- 27th/28thNovember 1945 (origin Makran)
The 1945 Tsunami having a magnitude of 8.3 on Richter Scale was the deadliest. It originated off the Makran coast in Pakistan and was centred at 97.6 kilometres SSW of Pasni, 98.5 kilometres SE of Gwadar, and 408 kilometres W of Karachi. It reached a height of 40 feet in some Makran ports and caused great damage to the entire coastal region. The fishing village of Khudi, some 30 miles west of Karachi, was wiped out completely. All the inhabitants and their huts were washed away. The towns of Pasni and Ormara were badly affected. Both were reportedly under water after the tsunami.

At Karachi, the tsunami arrived from the direction of Clifton and Ghizri. It ran along the oil installations at Keamari and flooded a few compounds. The waves were 6.5 feet or 2.0 meter high when they reached Karachi. There was a delay of more than one hour between the main shock and arrival of the damaging tsunami at Karachi.

The sea is 3.36 meter (11ft) below the road level and 2.7 meters (8.8 ft) below the average ground level at Dolmen City Project site and Baghe Jinnah in normal season. This would suggest that a tsunami of magnitude similar to the 1945 Tsunami would affect the 2.5 meter contour on the beach front of Dolmen City Project site and Baghe Jinnah.

4.1.15 Surface and Ground water Quality in Coastal Area of Karachi

The surface water available in the area is sea water which is highly saline. The ground water table lies at 1.6 to 2.3 meters depth. The ground water quality is very saline having total dissolved solids about 20,000mg/l. The chloride content ranges from 7500 to 9550 mg/l and the concentration of sulfate ranges between 1188 to 1242. It is therefore, very poor quality ground water and unsafe for any use.

Management of Dolmen City has already completed geotechnical investigation of the proposed site through Soil Testing Services in order to analyse the soil and water quality at different depth. As per the geotechnical investigation report, water depth in the project area was encountered at the depth ranging from 5-6 ft below the existing ground level. Borehole technique has been used for water investigation. Nine water samples were collected for analysis. Taking the worse condition, analysis results are given in table 4.10 below:

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>13000 ppm</td>
</tr>
<tr>
<td>Chloride</td>
<td>7540 ppm</td>
</tr>
<tr>
<td>Sulphate</td>
<td>1720 ppm</td>
</tr>
<tr>
<td>pH</td>
<td>8.2</td>
</tr>
<tr>
<td>Electric Conductivity</td>
<td>20280 micro mohs/cm</td>
</tr>
</tbody>
</table>

Source: Soil Testing Services (STS)

The results indicate dissolved solids in the ground water are extremely high due to the presence of salts. Similarly chlorides and sulphates are high. This situation is common in the Clifton area due to the presence of sea in the proximity.

4.2 Biological Environment

Development activities, in particular construction of buildings and apartments has substantially removed the vegetative cover and reduced the biodiversity of terrestrial fauna and flora of the macroenvironment of Dolmen City Project. The species of flora still in existence at the shoreline are not in the IUCN Red List of Endangered Species. Native terrestrial vegetation if still present comprises a variety of bushes and shrubs. These are listed in the following table 4.11:
Because of extensive clearance of vegetation as well as saline environment, very few of the above species are found in the nearby areas of project location. The recent siting of Baghe Jinnah in the immediate neighbourhood has introduced some vegetation. Its extensive area is covered with lawn which is studded with seasonal flowers of foreign origin. Keeping the shortage of water in view, the Bagh is watered with sewage effluent available from the nallas in the City.

In the foreshore and inter-tidal zone, the most important flora include seaweeds of different types such as Enteromorpha intestinalis, Enteromorpha sp., while Ulva reticulate and mangrove species Avicennia marina is very sparse.

In the marine environment, the major flora includes the phytoplankton of different type such as (see table 4.12):

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Local Name</th>
<th>English Name</th>
<th>Specie Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Saib</td>
<td>Calotropis procera</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>-</td>
<td>Weed</td>
<td>Zygophyllum coccineum</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>Obligate Halophyte</td>
<td>Sueda nudiflora</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td>Soapy Wattle</td>
<td>Acacia holosericea</td>
</tr>
<tr>
<td>5</td>
<td>Babul</td>
<td>Mesquite</td>
<td>Prosopis juliflora</td>
</tr>
<tr>
<td>6</td>
<td>-</td>
<td>White Mangrove</td>
<td>Avicennia alba</td>
</tr>
<tr>
<td>7</td>
<td>-</td>
<td>Euphorbia</td>
<td>Euphorbia caudicifolia</td>
</tr>
<tr>
<td>8</td>
<td>Karir</td>
<td>Aphylla Capers</td>
<td>Capris aphylla</td>
</tr>
<tr>
<td>9</td>
<td>Khor</td>
<td>Gum Arabic</td>
<td>Acacia senegal</td>
</tr>
<tr>
<td>10</td>
<td>Khabar</td>
<td>Peelu</td>
<td>Salvador oleoides</td>
</tr>
<tr>
<td>11</td>
<td>Kandi</td>
<td>Kandi</td>
<td>Prosopis cineraria</td>
</tr>
<tr>
<td>12</td>
<td>Kikar/Babul</td>
<td>Thorny Mimosa</td>
<td>Acacia arabica</td>
</tr>
<tr>
<td>13</td>
<td>Lai</td>
<td>Salt Cedar</td>
<td>Tamarix gallica</td>
</tr>
<tr>
<td>14</td>
<td>Lai</td>
<td>Athel Pine</td>
<td>Tamarix aphylla</td>
</tr>
<tr>
<td>15</td>
<td>Kikar</td>
<td>Babul</td>
<td>Acacia nilotica</td>
</tr>
<tr>
<td>16</td>
<td>Bahan</td>
<td>Willow</td>
<td>Populus euphratica</td>
</tr>
<tr>
<td>17</td>
<td>-</td>
<td>Java Aerva</td>
<td>Aerva javanica</td>
</tr>
<tr>
<td>18</td>
<td>-</td>
<td>Maple</td>
<td>Abutilon sp.</td>
</tr>
<tr>
<td>19</td>
<td>Chaulai/ Mariro</td>
<td>Slender Amaranth</td>
<td>Amaranthus viridis</td>
</tr>
<tr>
<td>20</td>
<td>Lasora</td>
<td>Sebesten</td>
<td>Cordia gharaf</td>
</tr>
<tr>
<td>21</td>
<td>Urgalami</td>
<td>Harmal</td>
<td>Rhazya stricta</td>
</tr>
<tr>
<td>22</td>
<td>Keekar</td>
<td>Acacia/ Siris</td>
<td>Acacia lebbek</td>
</tr>
<tr>
<td>23</td>
<td>Pipal</td>
<td>Sacred Fig</td>
<td>Ficus religiosa</td>
</tr>
<tr>
<td>24</td>
<td>Imlee</td>
<td>Tamarind</td>
<td>Tamarindus indica</td>
</tr>
</tbody>
</table>

Source: EIA Studies of Indus Refinery Limited and ICI PTA Plant at Port Qasim
### Table 4.12: Phytoplankton Species Found in Coastal Waters of Karachi

<table>
<thead>
<tr>
<th>No.</th>
<th>Species</th>
<th>Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Amphora Salina</td>
<td>48</td>
</tr>
<tr>
<td>2</td>
<td>Amphora sp.</td>
<td>49</td>
</tr>
<tr>
<td>3</td>
<td>Asteramphaiis sp.</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Asterionella japonica</td>
<td>51</td>
</tr>
<tr>
<td>5</td>
<td>Bacillaria sp.</td>
<td>52</td>
</tr>
<tr>
<td>6</td>
<td>Bacteriastrium sp.</td>
<td>53</td>
</tr>
<tr>
<td>7</td>
<td>Bellarochea sp.</td>
<td>54</td>
</tr>
<tr>
<td>8</td>
<td>Biddulphia sinensis</td>
<td>55</td>
</tr>
<tr>
<td>9</td>
<td>Biddulphia granulate</td>
<td>56</td>
</tr>
<tr>
<td>10</td>
<td>Biddulphia mobilensis</td>
<td>57</td>
</tr>
<tr>
<td>11</td>
<td>Biddulphia sp.</td>
<td>58</td>
</tr>
<tr>
<td>12</td>
<td>Cocconeis pseudomarginata</td>
<td>59</td>
</tr>
<tr>
<td>13</td>
<td>Cocconeis distans</td>
<td>60</td>
</tr>
<tr>
<td>14</td>
<td>Ceratula sp.</td>
<td>61</td>
</tr>
<tr>
<td>15</td>
<td>Coscinodiscus sp.</td>
<td>62</td>
</tr>
<tr>
<td>16</td>
<td>Coscinodiscus perforatus</td>
<td>63</td>
</tr>
<tr>
<td>17</td>
<td>Chaetoceros curvisetwus</td>
<td>64</td>
</tr>
<tr>
<td>18</td>
<td>Chaetoceros dicharta</td>
<td>65</td>
</tr>
<tr>
<td>19</td>
<td>Chaetoceros teres</td>
<td>66</td>
</tr>
<tr>
<td>20</td>
<td>Chaetoceros wigarnii</td>
<td>67</td>
</tr>
<tr>
<td>21</td>
<td>Ceratium koloidei</td>
<td>68</td>
</tr>
<tr>
<td>22</td>
<td>Ceratium sp.</td>
<td>69</td>
</tr>
<tr>
<td>23</td>
<td>Chlamydomonas sp.</td>
<td>70</td>
</tr>
<tr>
<td>24</td>
<td>Cyclotella sp.</td>
<td>71</td>
</tr>
<tr>
<td>25</td>
<td>Cymbella sp.</td>
<td>72</td>
</tr>
<tr>
<td>26</td>
<td>Diploneis sp.</td>
<td>73</td>
</tr>
<tr>
<td>27</td>
<td>Dimilium sp.</td>
<td>74</td>
</tr>
<tr>
<td>28</td>
<td>Dimophysis sp.</td>
<td>75</td>
</tr>
<tr>
<td>29</td>
<td>Epithemia sp.</td>
<td>76</td>
</tr>
<tr>
<td>30</td>
<td>Eircampia Zodiacus</td>
<td>77</td>
</tr>
<tr>
<td>31</td>
<td>Grammatophora marina</td>
<td>78</td>
</tr>
<tr>
<td>32</td>
<td>Grammatophora angulosa</td>
<td>79</td>
</tr>
<tr>
<td>33</td>
<td>Grammatophora sp.</td>
<td>80</td>
</tr>
<tr>
<td>34</td>
<td>Conydoma sp.</td>
<td>81</td>
</tr>
<tr>
<td>35</td>
<td>Guinardia flaccid</td>
<td>82</td>
</tr>
<tr>
<td>36</td>
<td>Gyrosigma sp.</td>
<td>83</td>
</tr>
<tr>
<td>37</td>
<td>Hemidiscus sp.</td>
<td>84</td>
</tr>
<tr>
<td>38</td>
<td>Hidioneis sp.</td>
<td>85</td>
</tr>
<tr>
<td>39</td>
<td>Leptocylindricus danicus</td>
<td>86</td>
</tr>
<tr>
<td>40</td>
<td>Licmophora flabellate</td>
<td>87</td>
</tr>
<tr>
<td>41</td>
<td>Licmophora sp.</td>
<td>88</td>
</tr>
<tr>
<td>42</td>
<td>Lithodesmium sp.</td>
<td>89</td>
</tr>
<tr>
<td>43</td>
<td>Melosira moliniformis</td>
<td>90</td>
</tr>
<tr>
<td>44</td>
<td>Melosira granulata</td>
<td>91</td>
</tr>
<tr>
<td>45</td>
<td>Mastogloia sp.</td>
<td>92</td>
</tr>
<tr>
<td>46</td>
<td>Navicula cancellata</td>
<td>93</td>
</tr>
<tr>
<td>47</td>
<td>Navicula cruciformis</td>
<td></td>
</tr>
</tbody>
</table>

*Source: EIA Studies of Indus Refinery Limited and ICI PTA Plant at Port Qasim*
4.2.1 Animal & Bird Species

The fauna in the macroenvironment include birds and marine organisms residents of intertidal zone. A number of bird species as identified in the region are described in the following Table 4.13:

Biodiversity of marine fauna which is an asset of the intertidal zone has likewise been reduced. Visits conducted and secondary data available on fauna in the intertidal zone indicate the presence of different molluscs, bivalves and crustacean species. Some other species found on the shores of Karachi coast are given in table 4.14 below:

### Table 4.13: Birds of the Bin Qasim Region

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Local Name</th>
<th>English Name</th>
<th>Specie Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Purple Sunbird</td>
<td>Nectarinia asiatica</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Indian Robin</td>
<td>Saxicoloidea fulicata</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Isabelline Wheatar</td>
<td>Oenanthe isabellina</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Pied Bush Chat</td>
<td>Saxicola caprata</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>Common Babbler</td>
<td>Turdoides caudatus</td>
</tr>
<tr>
<td>6</td>
<td>Bulbul</td>
<td>White Cheeked Bulbul</td>
<td>Pycnonotus leucogenys</td>
</tr>
<tr>
<td>7</td>
<td>Cheel</td>
<td>Pariah Kite</td>
<td>Milvus migrans govinda</td>
</tr>
<tr>
<td>8</td>
<td>Chakor</td>
<td>Grey Partridge</td>
<td>Francolinus pondicerianus</td>
</tr>
<tr>
<td>9</td>
<td>Teetar</td>
<td>Sand Grouse</td>
<td>Pterocles senegalas</td>
</tr>
<tr>
<td>10</td>
<td>Falqta</td>
<td>Rock Dove</td>
<td>Columbia livia</td>
</tr>
<tr>
<td>11</td>
<td>Koyal</td>
<td>Indian Little Button Quail</td>
<td>Turnix sylvatica</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td>Eurasian Roller</td>
<td>Coracias garrulous</td>
</tr>
<tr>
<td>13</td>
<td>Talor</td>
<td>Houbara Bustard</td>
<td>Chlamydotis undulata</td>
</tr>
</tbody>
</table>

Source: EIA studies of Indus Refinery Limited and ICI PTA Plant at Port Qasim

### Table 4.14: Aquatic Fauna of Adjacent Shoreline to Project Area

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Species</th>
<th>S. No.</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Cerathium cingulatus</td>
<td>19</td>
<td>Penaeus merquiensis</td>
</tr>
<tr>
<td>2</td>
<td>Thais caranifera</td>
<td>20</td>
<td>Penaeus indicus</td>
</tr>
<tr>
<td>3</td>
<td>Talescopium telescopium</td>
<td>21</td>
<td>Penaeus monodon</td>
</tr>
<tr>
<td>4</td>
<td>Tibia curta</td>
<td>22</td>
<td>Scopimera sp</td>
</tr>
<tr>
<td>5</td>
<td>Babylonia sp</td>
<td>23</td>
<td>Uca lacta</td>
</tr>
<tr>
<td>6</td>
<td>Natica sp</td>
<td>24</td>
<td>Uca annulipes</td>
</tr>
<tr>
<td>7</td>
<td>Nerta sp</td>
<td>25</td>
<td>Scylla serrata</td>
</tr>
<tr>
<td>8</td>
<td>Bubble shell</td>
<td>26</td>
<td>Graspoid crabs</td>
</tr>
<tr>
<td>9</td>
<td>Littonna sp</td>
<td>27</td>
<td>Euraphis withersii</td>
</tr>
<tr>
<td>10</td>
<td>Crassostrea glomerata</td>
<td>28</td>
<td>Balanus Amphithrite</td>
</tr>
<tr>
<td>11</td>
<td>Crassostrea gyrphoides</td>
<td>29</td>
<td>Nerites</td>
</tr>
<tr>
<td>12</td>
<td>Pitar nobats</td>
<td>30</td>
<td>Perineries</td>
</tr>
<tr>
<td>13</td>
<td>Placenta placenta</td>
<td>31</td>
<td>Dioptra sp</td>
</tr>
<tr>
<td>14</td>
<td>Dosima sp</td>
<td>32</td>
<td>Dasychore sp</td>
</tr>
<tr>
<td>15</td>
<td>Solen truncates</td>
<td>33</td>
<td>Hesione sp</td>
</tr>
<tr>
<td>16</td>
<td>Talina sp</td>
<td>34</td>
<td>Serpulids</td>
</tr>
<tr>
<td>17</td>
<td>Metapenaeus affinis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: EIA study report of ICI PTA Plant at Port Qasim.
4.2.2 Ecological Habitat

An Ecological Habitat Survey (Rapid) was conducted on the front of the Dolmen City Project site on Clifton Beach for the purpose of identification of flora and fauna at the beach front.

Figure 4.4: Ecological Survey Station on the Clifton Beach. Using a Linear transect; High Water Mark (HWM), Intertidal Mark (ITM), and Low Water Mark (LWM).

Figure 4.5: Gastropods, Trachycardium spp and Babylonia spp.

Figure 4.6: Janthina spp and Bivalve Perna spp.
Methodology:
Three beach locations were identified on the exposed beach (tidal height was 0.06 m) using a linear transect, starting from the High Water Mark (HWM) to Intertidal Mark (Intertidal) and down to the Low Water Mark (LWM). A digital camera was used to capture images of the marine habitats and their assemblages. The marine invertebrate specimens (Gastropods, Bivalves, burrowing worms) encountered during the survey on exposed low tidal areas were enumerated, documented and identified to the genus level by referring to standard field guides.

4.2.3 Spatial Dispersion of Faunal Population
Biological Species diversity using Shannon Weiner Biodiversity Index was applied to assess and calculate the Biodiversity Index. Species distribution and dispersion in terms of their aggregation was also assessed. It would be useful to note that spatial and temporal changes in species population occur and species often show different dispersion patterns in response to environmental conditions and/or mode of reproduction. The species in a population can follow the basic types of spatial distribution; the dispersion of a population determines the relationships between the variance and the arithmetic mean.
4.2.4 Species Distribution at Clifton Beach (Dolmen City)

Gastropods and bivalves showed a random distribution pattern at the ITM locations. Bivalve Tellina showed aggregation at the ITM, while the drifted green seaweed was observed to aggregate at LTM locations.

Species Diversity.

Shannon-Wiener Species diversity index was calculated taking into account the number of individual and the number of all species in each of the habitat community surveyed.

The Diversity values are relatively low <4.0 suggesting low diversified faunal values, both at the LTM locations (0.6) and ITM zone (0.8) on the beach. At the HTM no fauna was observed, only a small insignificant patch of mangrove shrub was found in isolation.

In terms of the natural animal-sediment relationship, it has been observed that the Clifton Beach in front of Dolmen City Project site is composed of compact silt, and is high in content of organic matter. The species diversity is low and seems to have been reduced by the compact sediment which restricts the burrowing
invertebrate fauna. The compactness of sediment is most likely the result of land based pollution discharged into Manora Channel and Gizri Creek which open into the open sea at locations only 2.5 km west and east of the site respectively; the organic and inorganic matter has contaminated the beach.

From the Ecological Survey it can be concluded that the Clifton Beach Area at the project site has no significant habitat for commercial fishery, and also no spawning ground of commercial shellfish. This part of the Clifton Beach is used mostly as a recreational beach.

4.3 Social Resources

4.3.1 Socioeconomic Profile of Dolmen City Project Area

The macroenvironment of Dolmen City Project comprises the area that is part of the administrative areas of Saddar Town and Keamari Town. More specifically the Project is located in Union Council (UC) 11 Kehkashan in Saddar Town and has UC 1, 2, and 3 of Keamari Town in its north, northwest and west.

Union Council Kehkeshan includes the recently developed areas of Clifton and Khakeshan.

<table>
<thead>
<tr>
<th>UC 11 Kehkashan</th>
<th>Kehkashan Block 1,2,3,4, Clifton (Part) Block-2, Mazar Abdullah Shah Ghazi, Gizri (Lower), Gizri (Upper)</th>
<th>33,648*</th>
</tr>
</thead>
<tbody>
<tr>
<td>UC 1 Bhutta Village</td>
<td>Bhutta Village (Part), Shireen Jinnah Colony &amp; Generalabad, Gulshan-e-Sikandarabad, Sultanabad and Intelligence Colony</td>
<td>6,225*</td>
</tr>
<tr>
<td>UC 2 Sultanabad</td>
<td>Kiamari and Part of Bhutta Village</td>
<td>4,544*</td>
</tr>
<tr>
<td>UC 3 Kiamari</td>
<td></td>
<td>55,420*</td>
</tr>
</tbody>
</table>

*Population

Union Councils 1, 2, and 3 of Keamari Town include:

The macroenvironment of concern to the Dolmen City Project comprises the area that is separated from the other Union Councils of Saddar and Keamari Towns by the roadway that connects Sea View Apartment on the east and by Khyabane Ghalib to the Karachi Port installations on the west. Dolmen City Project site has

4.3.2 Saddar Town

This Town includes the old town areas of Kharadar, commercial area of Saddar, and recently developed areas of Clifton as well as Khakeshan. This Town is also the destination of all commercial activities mainly related to trading and maintaining an improved lifestyle.
Among the 18 towns of the city district Karachi, Saddar Town has been described as a VIP town because most important financial, commercial institutions and government offices are located in the area.

It is distinct from other towns because of its historical buildings, which include the official residences of the governor and chief minister, the Sindh Assembly, City Court, Sessions Court, and High Court, the Supreme Court’s Registry and the Quaide Azam’s Residence. The city’s main markets and head offices of various banks are located in this Town, besides several diplomatic missions.

With an estimated population of 616,000 (1998 Census, current estimates: 0.9 to 1.0 million) largely consisting of old city areas and new areas like Clifton and Kehkashan, the town comprises 11 Union Councils. The town is largely populated by trading communities such as Memons, Marwaris, Ghanchis and Gujratis besides Balochis, Sindhis and Lasis and it has also significant number of people who migrated from India.

The area south of Khayabane Ghalib of Union Council Kehkashan in Saddar Town is a major residential area that is home to the elites of the country as well as foreign missions besides those looking for a better quality of life. It provides safety and security and hence has attracted a large number of persons, trading centres, public sector organizations, port and defence establishments. Accordingly it comprises an elitist residential area, as well as one that caters to office needs and tourism.

4.3.3 Keamari Town

Keamari Town is the terminal point for many activities. It is connected from all sides by major roads. Merewether Tower, which is the terminus for many bus routes, is located at the fringes of UC 3. On the
east it is bordered by RCD Highway; industrial area of SITE and the shopping centre of Saddar Town; on the west by the coastline of Arabian Sea and in the north by Hub River estuary and Balochistan Province.

With an estimated population of 384,378 (1998 Census, Present estimates: 500,000 to 600,000), comprising eight union councils, Keamari Town consists of the coastal and rural areas including Baba, Bhit and Shamspir islands in old Karachi West. It houses some of the country’s major economic installations e.g. Karachi Port, Customs House, Fish Harbour, Naval and some military establishments, Shipyard & Engineering Works, a power plant and some industrial units. The port installations and oil piers, the Container Terminals and transportation of imported and export cargo demand heavy vehicular movements and Shireen Jinnah Colony in UC 1 of Keamari Town is home to operators of oil tankers and heavy vehicles including container carriers.

The population of the town is mainly made up of the original Sindhi, Balochi, Kachchi and Gujarati communities, besides accommodating a sizeable number of Pushto, Punjabi, Hazara and Urdu-speaking groups of people. A large number of people of the Town are involved in fishing or related activity or are engaged in dock or port functions.

The demography of the Town changed in the 1970s with the entry of Pushto and Punjabi-speaking people in the fisheries sector and their employment at Karachi Port, Shipyard and Dockyard. Majority of the population lives in poverty in coastal villages, in remote areas of Gabopat, and in katchi abadis and hence lack civic amenities, particularly water and sewerage systems. Despite poverty and acute civic problems, land grabbing has assumed alarming levels in Hawkesbay and Gabopat union council areas.
where private lands is being leased out to owners of mines and the families settled on these lands are being forced to vacate their ancestral abodes.

The Town can be described as a supplier of labor force to its own establishments from settlements comprising different communities distributed in the respective Union Councils, for example fishing communities in the coastal area and islands, farming communities in the rural areas of Gabopat and other labour force from the remaining UCs to the port and road transport operators. The area south of Khayabane Ghalib of Keamari Town is, however, a major recipient of non-resident high-level manpower traveling from other towns daily to the trading centres, public sector organizations, port and defence establishments besides other service providers. Accordingly this part of the macroenvironment of Dolmen City Project is either a non-residential area or one that caters to office needs and tourism.

The population in and around the Project site can be broadly placed in three categories: the elites, the managers in the higher hierarchy of decision making, and the people in the upper middle class. There does exist a category of persons that provides services as employees of the residents. Majority being literate and highly educated, the people are either decision makers or next in command in their organization or are well placed in the society.

4.3.4 Education

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.

Training in technical skills is equally adequate. Skilled labor consisting of drivers, mechanics, water pump attendants which are estimated to be less than 10 percent of the total population in the Project area, is provided by UCs in the surrounding Towns.

4.3.5 Water Supply

Clean and safe water is one of the major problems being faced by the residents of Project area. Water is supplied to the Clifton area by Karachi Water & Sewerage Board (KW&SB) through dedicated water pipelines.

4.3.6 Surface Drainage and Sewerage System

Sewerage and drainage systems in the Clifton area were 55-years old, and they had no provision for storm water drainage. The design capacities of the system, if provided at all were much lower than what was required. Keeping the demand analysis in view, the old sewerage system has been replaced by the new one which is now working effectively. Similarly, the old drainage system has been improved by City District Government Karachi (CDGK). Pre-cast storm water drains have been laid in the area which has established a new drainage network in Clifton and Bath Island area. The drains are on both sides from Clifton Bridge to Nehar-e-Khayam.
Most of the Storm water drains are being used as sewers along the project site at Clifton Beach. It is because of this indiscriminate discharge of waste and wastewater that certain areas of Clifton and Clifton Beach are heavily polluted.

4.3.7 Electricity Supply
Karachi Electric Supply Corporation (KESC) is authorised to supply electricity to all parts of Karachi City District. However, the present demand for electricity in Karachi is approximately 2,228 megawatts, while there is a shortfall of 600 to 800 MW.

4.3.8 Commercial and Residential Buildings
All the commercial and residential buildings come under the jurisdiction of CDGK which is working together with Defence Officer Housing Authority, Karachi. The high land value makes it unaffordable for the middle class to inhabit this area. That is why Clifton is not highly populated. By-laws are being strictly enforced by KBCA to follow the design of housing structures.

4.3.9 Health
Health problems of the Project area are generally associated with lifestyle. As such lifestyle diseases like hypertension, heart attack, diabetes, liver disease and depression, and cancer are commonly reported in Clifton area. Health facilities are quite adequate and of high standard. Ziauddin University of Health Sciences has the state of the art facilities for treatment of many of the above ailments.

4.3.10 Employment
The Clifton area is a major employer of service providers. It offers opportunities for employment primarily to unskilled labour, skilled labour as well as to the high level manpower.

4.3.11 Landscaping
The terrestrial and marine environment around the Project area consists of excellent recreation facilities. The Project site is located adjacent to Sea view and the Baghe Jinnah, both of which are recreational spots.

Figure 4.11: Domestic Sewage being discharged from the storm drains to the Clifton Beach.

Figure 4.12: Horse riding as well as polo at Project site and Sea View.
4.3.15 Economy
Economy of the microenvironment and macroenvironment of Dolmen City Project contributes substantially to the economy of Karachi. The two Towns just mentioned virtually form the financial capital of Pakistan. While Karachi City accounts for the lion’s share of Pakistan’s GDP and generates 65 percent of the national revenues, these two Towns contribute 65 percent of Karachi’s revenue. Most of the public and private banks have their head offices in these two Towns, with most of them converging on I.I. Chundrigar Road. Besides banking and the financial sector, they also host central offices of foreign Multinational Corporations as well as corporations based in Pakistan. They are home to the largest stock exchange of Pakistan: the Karachi Stock Exchange. Karachi Stock Exchange achieved the milestone of the best performing stock market of the world in early 2005. This financial boom helped Pakistan to achieve its ambitious goal of over 8 percent GDP growth which is the highest in Asia after China during fiscal year 2004-05.

The recent trend of ICT (Information and Communications Technology), Electronic Media, and Call Centres have become significant part of Karachi business hierarchy and these two Towns contribute substantially to this trend.

Currently, the Karachi Port is one of the two ports in Pakistan that is central to all shipping in Pakistan. For years Karachi and its port and airport served as the gateway to Asia and significant route to Middle East, Central Asia, and China.

4.3.16 Shopping Centres
The commercial areas of Saddar Town continue as the large and small shopping centres of Karachi. Shopping centres are, however, scattered all over the city but Tariq Road, Zamzama and Elphinstone Street are the most famous shopping areas in the city.
Saddar area is home to countless large and small markets dealing from everyday household items to clothing, fabrics and electronics. The Empress Market is a large Victorian era market, which along with the markets in the Old Markets is home to wholesale trade in grains, spices and other items. Saddar Town thus attracts thousands of shoppers to its markets.

Karachi also has a number of large modern malls, of which the Park Towers, The Forum, Millenium Mall and Dolmen Mall are notable in the respective Towns. More large and modern malls are currently under construction and completion which include the Atrium Mall, Jumeira Mall and the Dolmen City Mall.
This section of the EIA Report presents the screening process to identify the overall impacts of construction and operation activities on the physical, biological, and socioeconomic environment of Dolmen City Project and to provide mitigation measures that need to be adopted wherever necessary, to reduce, minimize or compensate for the negative impact.

The establishment of Dolmen City Project at Clifton comprises designing, construction and operation of the different units based on state of the art technologies. The environmental aspects of the project identified by situation analysis are related to:

1. Physical environment
2. Ecological environment and

Screening of potential environmental impacts on the physical environment is related to:

- Siting of the Dolmen City Project at Clifton
- Topography, Geology and Seismicity
- Vulnerability to land erosion
- Vulnerability to seismic shocks
- Vulnerability to Tsunami hazard
- Vulnerability to land submergence in case of rise in sea level
- Availability of safe drinking water at construction site
- Vulnerability of groundwater at construction site to sewage effluent discharges
- Vulnerability of Project site to storm and flood water drainage and land erosion

- Air, water and noise pollution and other forms of nuisance during construction at site, and in the microenvironment and macro environment of site
- Air pollution due to fugitive dust emission and operation of equipment during construction.

5.1- SCREENING OF POTENTIAL IMPACTS IN SITTING OF DOLMEN CITY PROJECT

Guidelines for classification of polluted and unpolluted sites with respect to their airshed, watershed, soil, sensitivity of ecosystem including fauna, flora, wildlife, aquatic life, historical and archaeological sites and their values have been reviewed.

The following review/screening provides an assessment of impact of different activities during construction and installation of machinery and the resulting emission of noise and gases, and wastewater discharges during operation of the Project. Such impacts usually occur at the microenvironment or local level and their intensity is much reduced in the macro environment comprising the built up environment on the north and the marine ecology on the south and southwest.

The earlier description of microenvironment and macroenvironment has already provided a classification of the site based on assessment of impact using secondary data on emission of gaseous pollutants, noise levels, and wastewater discharges from operation of proposed Project on microenvironment of the project area. This section has put forward the mitigation measures that have been taken and are being taken in all such cases where
the level of emission and discharges exceed the NEQS. The proposed site has been acquired by the International Complex Project Limited, the proponent of the project, and is the preferred alternative owing to availability of infrastructure facilities for the establishment of their Dolmen City, a mixed use development.

In acquiring the land the proponents have restored the status of the land which, as shown in the Survey of Pakistan Map of 1990 was Casino Building. Launching of the Project at the site in Clifton has responded to the principles of sustainable development that aim at "socially equitable, and economically viable development to improve the quality of life for all citizens of the Earth, without altering the balance in the ecosystem".

Furthermore the site is, for security reasons, an ideal location for clients aiming at shifting their activities from congested areas of the central districts and establishment of their commercial and/or non-commercial enterprises to a single modern 21st century state of the art facility.

The project site is reclaimed land having in total 37,666 sq. yds. area of which approximately 3.9 million sq ft would be utilised in the built up area of Project. The project interfaces two distinct ecosystems viz. terrestrial and marine. No significant activity exists in and around the project area, except recreation and residential. Transportation activity is limited to the road that passes on to Sea View Apartments and Khayabane Shamsheer on the east and Khayabane Ghalib on the west. As also mentioned in the text, the location of the Project is ideal from environmental and socio-economic considerations.

5.2- POTENTIAL ENVIRONMENTAL ASPECTS & MITIGATION MEASURES AT PRE-CONSTRUCTION & CONSTRUCTION STAGE

5.2.1 Building Structure

- Building Structure is compliant with seismic code (Uniform Building Code) UBC-2B, for moderate-to-severe seismic risk. This responds to the seismic risks that have been highlighted during recent years.
- Building Structure is reinforced concrete (recommended by UNDP for Tsunami affected areas). This responds to the Tsunami hazard that has been highlighted during recent year.
- The sea is normally 3.36 meter (11ft) below the road level and 2.7 meters (8.8 ft) below the average ground level at Dolmen City Project site and at Baghe Jinnah. This would suggest that a tsunami of magnitude similar to the 1945 Tsunami would affect the 2.5 meter contour on the beach front of Dolmen City Project site and Baghe Jinnah. This would need to be mitigated by construction of adequately reinforced protection wall in the front of Dolmen City as well as Baghe Jinnah. Such structure would also mitigate the likely impact due to sea level rise in the years to come.
- Flooding & Land Submergence
  - Storm Water Drainage
    - The site has its slope towards the seashore and after the 3-meter contour the flat land has its slope towards the creek known as Nahre Khayam. The Project site is located at the flat land, which does not allow accumulation of water and land submergence in case of flash floods during cloud burst. Karachi and its vicinity sometime receive heavy downpour during monsoon up to maximum of 200 mm in 24hrs.
    - Mitigation Measures
      - An efficient storm water collection and drainage system has been designed based on site topography to keep the Clifton area clear of rain water accumulation and the consequent land submergence during heavy downpour.
      - The storm water drainage scheme consists of rain water collection manholes with heavy duty grating along both sides of the road. All storm manholes will be piped to the nearest storm water culvert.
The project has a Fair Faced Concrete Façade and double glazed tempered Glass Curtain with a 12mm insulating cavity. This responds to the heat entrapment and light reflection issues that emerge in environment enclosed in glass panels.

All the components are connected to the Mall at the Ground, First and Second Levels. This and the following measures respond to the Evacuation Plan/ Contingency Plan.

The office tower starts from the third level height of (15 meters above ground level)

Floor to Ceiling height of a typical office floor is 3.3 meters

State of the art Integrated Building Management System (iBMS) - controlling all building subsystems, including electrical, plumbing, HVAC, security and fire systems

NFPA compliant Fire Alarm and Suppression System

Voice Evacuation System

Paramedic Facility 24/7 available for emergency medical treatment

Emergency Response Team - to deal with emergency situations, like fire, security, etc.

Control Room - To maximize the output of all the above system the Dolmen City complex has a centralized control monitoring system which monitors all building subsystems.

5.2.2 EROSION OF CLEARED AREAS

Generally, the exposed soil after excavation for foundations is vulnerable to erosions and runoffs by rains. Such a situation is of temporary nature and short duration. It lasts only during the landscaping and concreting phase of construction at the site.

The situation was mitigated by covering the open soil especially during the rainy season until concreting and landscaping was complete.

Intensification in fugitive dust emission caused by erosion of soil was mitigated by appropriate measures to reduce the level of impact to be of minor significance.

Control of air emission during construction was nevertheless the responsibility of International Complex Projects, Limited and their contractors who adopted the following mitigation measures:

Exposed surface were regularly wetted to effectively keep airborne dust levels to minimum

Stockpiles of fine material were wetted or covered with tarpaulin especially during windy conditions.

Site workers were required to wear dust masks especially during dry and windy weather conditions.

5.2.3 Deep Excavation

There are 2 levels of basement parking which needs excavation for providing columns. Once removed, the void space may impact surrounding structures integrity.

Mitigation: Engineering study of sub-soil structure includes study of impact and effect of surrounding structures.

5.2.4 AIR EMISSIONS

Diesel and other petroleum products used for the operation of construction machinery and transportation equipment cause air pollution besides polluting the soil through oil spills and localized nuisance. The impact from such activity at the Project was and is being mitigated by good housekeeping practices, including the following measures:

Allocation of specific timings during normal daytime working hours for movement of heavy construction machinery.

Development of schedule for movement of dump trucks that were initially used for hauling of excavated soil.

Night time activities were minimized.
Carrying out noise monitoring on regular basis especially during heavy mechanical operation.

Site labor working in high noise area > 85 dB (A) were required to wear ear plugs.

5.2.5 VIBRATION AND NOISE

Construction activity generates high levels of noise and vibrations in the immediate vicinity. These disturbances are mainly generated by heavy construction machinery, piling works, welding, cuttings, grinding etc. Diesel generators used for power supply during construction works are another continuous source of noise and vibration. These impacts are of short term duration and limited to the initial phase of construction works which involve erection of main structure of the building. Such impacts will be lower during later stages of the project when work will be carried out in the interior of the Project.

Mitigation

Following was and continues to be the mitigation strategy to reduce the impacts of noise and vibration:

- The vents of the generator exhaust were placed at adequate height so as not to cause localized dispersion.
- Generators used are new and are being regularly maintained.
- Emission levels are regularly monitored.
- In general, the impact of gaseous emission is of small consequence as the construction at Project is for limited duration.

5.2.6 TRAFFIC FLOW:

The area is calm in terms of traffic flow, however following mitigation measure have been adopted to reduce the impact of traffic flow:

- Development of effective traffic management plan that is being integrated into the overall construction management plan, with responsibilities assigned to key personnel to manage this aspect.

5.2.7 WATER DEMAND:

Water required for numerous construction activities is being met from external sources such as tankers supplying water to the construction site. Conservation practices will nevertheless be adopted during the entire course of construction.

Construction activities for the proposed development can have minor impact on hydrology and ground water quality of the area if the construction waste leaches into ground. Potential sources of impacts on the hydrology and ground water quality during the construction phase are as follows:

- Soil runoff from the site leading to off-site contamination (particularly during rainy season).
- Improper disposal of construction debris leading to off-site contamination of water resources.
- Spillage of oil and grease from the vehicles and wastewater stream generated from on site activities such as vehicles washing, workshop etc.

Mitigation

Precautions and preventive measure are being taken at the site during construction to avoid any ground and surface water contamination. Following mitigation measures were adopted as conservation:

- Not allowing water to leave the construction site, the special geology of the site allows percolation of water to a very large extent without contaminating ground water.
- Disposal of construction debris in approved areas.
- Construction of storm water diversion channels to divert storm runoff from flowing over the construction areas.
- Installing oil and grease traps in construction workshop, portable DG sets and vehicle parking areas.
Water consumption was monitored regularly.

Water quality was regularly monitored for good quality concreting.

Storage tanks were made leak proof.

Monitoring of the ground water table was conducted to evaluate the impact of construction activity on ground water.

5.2.8 EFFLUENTS

Construction activity generates two types of effluents: Sewage waste from temporary toilet facilities for site workers and flushed water/ground water generated from piling and flushing activities. Improper disposal of sewage water can cause local channels/sewers to choke, while water generated from piling works and flushing of lines can cause localized flooding in the area that can impact road conditions and traffic flow.

Mitigation

Following mitigation measures were adopted for better management of effluents:

- All sewage were pumped through temporary piping into main sewer drain at the front of the construction site.
- All flushing material were first stored in a holding tank to allow settling of silt and other suspended solid particles. The outlet stream were pumped to main sewer drain located at the front of the construction site.

5.2.9- FUEL STORAGE

Storage of fuel is vulnerable to leakage and this has the potential to initiate hazardous situations by causing serious harm to personnel nearby and accidents in case of uncontrolled release and fire.

The following Mitigation Measures have been adopted to minimize the hazards:

- Adequate numbers of Fire extinguishers have been kept near the fire points.

5.2.10 DISPOSAL OF DEMOLITION / CONSTRUCTION DEBRIS

Typical solid wastes generated during construction include waste concrete, steel scrap, wooden scaffolding, empty cement bags, excavated soil, wood remains etc. Earth-fill material will be in the form of bore-wash generated due to deep pile foundation. This waste has the potential to cause negative impact on the surroundings if not appropriately managed and disposed of. It is likely to block nearby drainage channels that can ultimately cause localized flooding during the monsoon. Improper storage of waste is hazardous to the workers at the site as well. Wind blown debris is a nuisance to the neighbourhood, in this case Baghe Jinnah and the beach. Poor waste management practices result in short term, and long term negative impact on the aesthetics of the surrounding.

Mitigation

The following mitigation measures were adopted in helping the minimising the impacts due to waste arising from demolition and construction activities:

- A comprehensive waste disposal plan was developed for effective management of waste being generated in large quantities.
- Effective and instant removal of unusable construction wastes such as broken bricks, damaged pipes, left over steel bars, wooden, glass and plastics pieces from the site for recycling has been made. The remaining non-separable waste such as concrete dust, plaster and soil (aggregate) are being immediately removed from the site and disposed of more appropriately in landfill or used as filling material, required at other construction sites.
- Exploring the possibilities of re-use of waste concrete material and construction waste from demolition works. Such waste material is being used as filling material in paving large concrete floors.
Reuse of excavated soil from deep excavation after testing for its suitability as construction material in other construction sites.

Arrangement of proper and adequate waste containment system for different types of waste generated daily at the construction site.

5.2.11 MARINE ECOLOGY

The proposed site is located adjacent to the sea and the large Baghe Jinnah. It would be appropriate to see during the construction phase that the material being used is not dumped into the sea or the seashore. Moreover, the fauna and flora being relatively scarce in the area, disposal of waste construction material may damage the marine flora and fauna. The construction phase would however be of limited duration and its impact would be localized to the Project site. It is therefore concluded that there will be no significant adverse impact on the marine ecology in the vicinity of the proposed site.

Mitigation

The adverse impact of construction would be of short term duration and localized to the microenvironment, mitigation measures suggested above and also those listed in environmental management plan would offset the negative impacts during this phase.

5.2.12 SAFETY OF WORKERS DURING CONSTRUCTION

The possibilities of accidents cannot be ruled out during the construction phase.

Following mitigation measures have been adopted to reduce the hazards of construction:

- Training of workers on health and safety during construction of building.
- Provision of first aid facilities for workers at site and for meeting the emergency needs of workers.
- Establishment of Health and Safety Department for provision of safe working environment for the employees and for implementing and monitoring various procedures adopted for the safety at site.

5.2.13 EMPLOYMENT

The Project would provide direct employment to about 500 workers. Indirect employment would open doors to over one hundred thousand persons over a period covering construction to completion. The Project will have positive impact on the local economy. Local human resource in the form of skilled and unskilled labor is being employed.

5.3 POTENTIAL ENVIRONMENTAL IMPACTS AT OPERATION STAGE

5.3.1- VIBRATION AND NOISE IMPACT

Under normal operations, there will be several sound and vibration generating units. It is expected that the noise levels close to the units will be at levels higher than 85 dB (A). Workers operating in the area can be affected with these operations over extended periods of time. In case of improper support and absence of vibration dampeners, the surrounding structures and immediate neighborhood can be vulnerable to impairment of health.

The following Mitigation Measures are adopted to reduce the impact of noise and vibrations:

- Engineering design of vibration and sound producing equipment such as generators, chiller pumps will take into account the impact of noise and vibration. This will be achieved by housing such units in enclosures and providing vibration dampeners in the supports.
- Equipment having low acoustic levels have and will have preference.
- Architects and acoustics consultants will cater for this aspect in of positioning of chillers, gas generators etc.
5.3.2- TRAFFIC VOLUME & EMISSIONS

Traffic load will increase as a result of Project development and increase in number of visits. There would also be accumulation of carbon monoxide and other gases in the parking areas in the basement. This situation may arise in case of failure of ventilation system and may create environmental health hazards to residents as well as visitors. Also, traffic congestion will cause nuisance to people visiting the area.

Mitigation

The Project has adopted following Mitigations Measures which reduce the negative impacts:

- Maintaining air evacuation system
- Monitoring all exhaust emissions regularly and rectifying deviations immediately
- Monitoring ambient air quality regularly at various points on the access road and immediately outside the hotel premises.
- Carrying out regular maintenance of generators, and gas fired absorption chillers.
- Provide adequate and proper parking for vehicles.
- It is also recommended that project proponent should conduct traffic study for preparation of effective traffic management plan.

5.3.3- UTILITY SERVICES AND CONSUMPTION OF RESOURCE

Water, electricity and natural gas will be used for domestic as well as in the plant for the operation of HVAC and operational units. For this large consumption and involvement of a network of utility transmission and distribution, there is likelihood for leakages and excessive usage. This may adversely impact the micro and macro environment due to uncontrolled and non-regulated use of the expendable resources. The demand and supply equation should be maintained in order to avoid shortage and deficiency of the consumables provided through utility systems to the occupants of the tower and nearby residential communities.

Mitigation

The following Mitigations Measures have been adopted to reduce the negative impacts:

- All consumption of natural gas to be metered for monitoring and optimization.
- Regular maintenance of gas transmission network, generators to ensure efficient usage.

5.3.4- ILLUMINATION

There will be extensive internal and external lighting in and around the Project. Purpose of external lighting is to provide security and safety, besides safe movement for vehicles and pedestrians over frequented routes. However at the same time external lighting has a potential to cause nuisance to the neighboring communities. It is to be noted that residential communities are located well apart from the Project building and may not have to face problems of infringement of privacy.

Mitigation

The following Mitigations Measures would reduce the negative impacts:

- Evaluation of minimum illumination requirement to be carried out for individual areas.
- Keeping the illumination levels at the minimum for all external lighting.

5.3.5- FIRE AND EMERGENCY

Fire is one major hazard against which service industries like commercial buildings are required to be extra careful. Fires can cause huge losses of life, property and the environment. In the absence of necessary controls complying international standards, the risks are high.

Mitigation

The following mitigations measures are being followed to reduce the negative impacts of fire hazards:
For all engineering designs, IBC (International Building Control), EN 54 & NFPA (National Fire Protection Authority) codes is being followed.

Standard fire and smoke detection and protection devices such as alarms, sprinklers, fire hoses and hydrants have been provided in all critical locations.

The facility should possess a detailed emergency and evacuation plan that must be regularly drilled to make sure that the responsible staff remains trained and alert at all occasions.

Procedures developed in the fire safety and protection design will be followed.

5.3.6- WATER CONSUMPTION AND CONSERVATION

The actual total demand is expected to be about 600,000 gallons per day. The make-up water for cooling towers for air conditioning as well as water for gardening will be provided from the treated sewage water. Any shortfall in municipal water will be made up by tanker water, for flushing and ablution. Considering the small number of users with defined usage pattern and readiness of the Project Management to supplement the municipal water supply with tanker water, no negative impact is anticipated in terms of water availability.

Mitigation

The following mitigation measures would reduce the negative impacts of water shortage:

- Water conservation strategy should be developed and implemented to avoid excessive use and wastage.
- Water storage and distribution system should be safe and faultless so that there is no contamination and leakage in the system.
- Water meters should be installed at key utility points to monitor and manage water usage.
- Re-use of water and recycling is a valid proposition to conserve water resources and to minimize the effect of depletion of the precious natural resource.

5.3.7- WASTEWATER DISCHARGE

There is likelihood that wastewater may not meet specifications stipulated in NEQS. Therefore, it may be necessary to treat the wastewater prior to disposal. Wastewater treatment strategy includes grease interceptor and/or oil skimmers to be installed in wastewater receptacles to maintain oil levels within NEQS limits. A sewage treatment plant of adequate capacity is also proposed in this project which shall treat wastewater before discharge.

5.3.8- SOLID WASTE DISPOSAL

There will be a considerably large quantity of solid waste generated from the commercial units of the project. The solid waste will mainly include food waste, paper and packaging material, plastic bottles and glass. If not properly managed and disposed of, this can pose serious environmental hazard to the occupants and visitors of the complex and also to the surrounding settlements.

The quantity of solid waste to be managed can be segregated at source into organic and recyclable components. Nearly half of the waste generated is expected to be of organic nature i.e. biodegradable and the remaining as recyclable. Therefore waste segregation can solve much of the solid waste management problem. The viable options after storing, collecting and transportation of segregated waste components for its ultimate safe disposal are composting and recycling, respectively which need to be carefully designed and managed appropriately.

Mitigation

The following Mitigations Measures would reduce the negative impacts of solid waste disposal:

- All solid waste shall be segregated into organic and recyclable waste at source and then collected, stored, and transported for ultimate safe disposal.
Handling and disposal of such waste shall be managed by a dedicated waste management contractor.

The solid waste management plan will be developed and facilities for collection, storage and transportation will be established and organised.

5.3.9- ENERGY: REQUIREMENT, CONSUMPTION AND CONSERVATION

Total energy requirement is expected to be around 20 MW that includes the energy for cooling, heating and power supply. Analyses were carried out for selection of equipment in terms of most energy efficient and clean fuel.

There is likelihood of energy leakage both in case of inefficient equipment selection and at the consumers end.

Mitigation

The following mitigations measures would cater to the concerned impacts on loss of energy:

- Contingency plans have been formulated and presented in the Environment Management Plan to deal with the leaks of energy to procure the beneficial energy loss.
- The fuel storage tank would be placed within a dyke that can contain 110 percent of the contents of the tank in the event of leakage or spillage.
- Sub-meters and real-time energy monitoring equipment, timers, thermostats, etc. would be installed at the Project site.

5.3.10- ECO-FRIENDLY AND GREEN PRODUCTS

Service industry has the potential to exert pressure on vendors and suppliers to produce eco-friendly products as there is an array of product items that if not labeled environment friendly can have a significantly adverse impact on the ecosystem. Such products not only include fixed items like lighting bulbs and refrigerators but also consumables such as detergents, aerosols etc.

It would be the policy of the management of the Project to promote use of green products and to avoid use of non-ecofriendly consumables and equipment.

5.3.11- EMPLOYMENT

Once on-stream, this project is expected to generate long term employment opportunities. It is expected that there will be more than 20,000 workers involved during the normal operational phase that will be a positive impact on the local economy.

The Project will also generate indirect employment opportunities since there will be commercial zones in the Building. The venues of employment would be created for low-income individuals of the local communities.

5.3.12- LAND-USE AND AESTHETICS

The Project falls in the appropriate category that permits the designated land-use by the City District Government Karachi.

The development and launching of the Project will have positive impact on the aesthetics of the urban environment. Having the Clifton Beach in front and Baghe Jinnah in the adjacent area, the Project would achieve its objective of providing a secure and safe place to those seeking improvement in quality of life values. This being a positive impact would be an indicator of achievement of the objectives of the Project. No mitigation measures are required.

5.3.13- TOPOGRAPHY AND GEOLGY

The region has a flat terrain on a 3-meter contour, thus the topography of the area would not be affected by the project. As the area is a filled up sandy, silty and gravelly land there is no specific important geological feature located in its environs. The Project is not likely to impose additional stress on these parameters and hence no
significant impacts are envisaged.

5.3.14- ECOLOGY AND BIODIVERSITY

The project site was devoid of any vegetation or any other feature. Thus the impacts on flora and fauna will not be an issue of concern at the Project site. The air and noise prediction has shown that the project is not contributing negative impacts to the surroundings. Hence, the overall impacts on ecology of the area would not be significant.

5.3.15- SYNERGISTIC IMPACT

The area around the complex covers an urban centre in which a number of projects, including road network, residential as well as commercial complexes are currently being developed. The contribution of the Project to the cumulative ecological impacts in this region is not expected to be high, as most of the affected areas have been developed previously. Project will not contribute to degradation of the physical environment. It will on the other hand restore the status of the place since it was a casino building, a structure that was not to the least liking of the traditional society in Pakistan. Furthermore the Project will upgrade the quality of microenvironment as well as macro environment. The cumulative ecological impacts of establishment of the Project as a commercial complex in the City of Karachi are not expected to be significant, as most of the alterations in ecology have already taken roots in the microenvironment, while the Project has ensured no further degradation through adoption of appropriate mitigation measures.

5.3.16- IMPACTS ON SOCIO-ECONOMIC ENVIRONMENT

The impacts have been analyzed for the population in the surrounding locality.

Table-5.1 presents an analysis of the socioeconomic impacts on the two domains of socioeconomic environment viz. macro environment and microenvironment. It may be seen from the Table that both domains have impact that is positive. The Project would promote economic uplift and raise the status of the commercial enterprises and social status as well as lifestyle of the would be occupants. Creation of jobs and promotion of business and commercial activities is an additional feature of the Project.

<table>
<thead>
<tr>
<th>Table 5.1: Nature and Degree of Positive Socioeconomic Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Construction Phase:</strong></td>
</tr>
<tr>
<td>Nature of positive impact</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Job opportunity</td>
</tr>
<tr>
<td>Wider economic impact</td>
</tr>
<tr>
<td><strong>II. Operation Phase</strong></td>
</tr>
<tr>
<td>Job opportunity</td>
</tr>
<tr>
<td>Improvement in quality of life</td>
</tr>
<tr>
<td>SCREENING QUESTIONS</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>A. PROJECT SITING</strong></td>
</tr>
<tr>
<td>IS THE PROJECT AREA...</td>
</tr>
<tr>
<td>Densely populated?</td>
</tr>
<tr>
<td>Heavy with development activities?</td>
</tr>
<tr>
<td>Adjacent to or within any environmentally sensitive areas?</td>
</tr>
<tr>
<td>Cultural heritage site</td>
</tr>
<tr>
<td>Protected area</td>
</tr>
<tr>
<td>Wetland</td>
</tr>
<tr>
<td>Mangrove</td>
</tr>
<tr>
<td>Estuarine</td>
</tr>
<tr>
<td>Buffer zone of protected area</td>
</tr>
<tr>
<td>Special area for protecting biodiversity</td>
</tr>
<tr>
<td>Bay</td>
</tr>
<tr>
<td><strong>B. POTENTIAL ENVIRONMENTAL IMPACTS</strong></td>
</tr>
<tr>
<td>Will the project cause...</td>
</tr>
<tr>
<td>Impacts on the sustainability of associated sanitation and solid waste disposal systems and provided their interactions with other urban services.</td>
</tr>
<tr>
<td>Deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?</td>
</tr>
<tr>
<td>Degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?</td>
</tr>
<tr>
<td>Dislocation or involuntary resettlement of people</td>
</tr>
<tr>
<td>Dislocation of indigenous communities and disadvantaged population</td>
</tr>
<tr>
<td>Degradation of cultural property, and loss of cultural heritage and tourism revenues?</td>
</tr>
<tr>
<td>Occupation of low-lying lands, floodplains and steep hillsides by squatters and low-income groups, and their exposure to increased health hazards and risks due to polluting industries?</td>
</tr>
<tr>
<td>Water resource problems (e.g. depletion/ degradation of available water supply, deterioration for surface and ground water quality, and pollution of receiving waters?)</td>
</tr>
<tr>
<td>Air pollution due to urban emissions?</td>
</tr>
</tbody>
</table>
### Table 5.2: Checklist for screening environmental impact

<table>
<thead>
<tr>
<th>SCREENING QUESTIONS</th>
<th>Yes</th>
<th>No</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social conflicts between construction workers from other areas and local workers?</td>
<td></td>
<td>X</td>
<td>Not expected</td>
</tr>
<tr>
<td>Road blocking and temporary flooding due to land excavation during rainy season?</td>
<td>X</td>
<td></td>
<td>Not envisaged but will be mitigated if some such situation emerges through better management practices</td>
</tr>
<tr>
<td>Noise and dust from construction activities?</td>
<td></td>
<td>X</td>
<td>Minor but will be minimized through better management practices</td>
</tr>
<tr>
<td>Traffic disturbances due to construction material transport and wastes?</td>
<td></td>
<td>X</td>
<td>The Project involves major construction activity. State of the art technology will be used. Construction material transportation to the site will be managed through recognized access roads and adoption of good management practices</td>
</tr>
<tr>
<td>Temporary silt runoff due to construction?</td>
<td></td>
<td>X</td>
<td>Not envisaged but will be mitigated if some such situation emerges through better management practices</td>
</tr>
<tr>
<td>Hazards to public health due to ambient, household and occupational pollution, thermal inversion, and smog formation?</td>
<td></td>
<td>X</td>
<td>Not envisaged but will be mitigated if some such situation emerges through better management practices and implementation of Environmental Management Plan</td>
</tr>
<tr>
<td>Water depletion and/or quality degradation?</td>
<td></td>
<td>X</td>
<td>Better management practices and conservation practices will be followed in view of constraints on availability</td>
</tr>
<tr>
<td>Overplaying of ground water, leading to land subsidence, lowered ground water table, and salinization?</td>
<td></td>
<td>X</td>
<td>Conservation practices will be followed and excessive use will be avoided</td>
</tr>
<tr>
<td>Contamination of surface and ground waters due to improper waste disposal?</td>
<td></td>
<td>X</td>
<td>Solid and Liquid waste Disposal system will be in place to prevent possible contamination of water resources</td>
</tr>
<tr>
<td>Pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?</td>
<td></td>
<td>X</td>
<td>Solid and Liquid waste Disposal system will be in place to prevent possible contamination of receiving waters.</td>
</tr>
</tbody>
</table>
6.1- Introduction

Environmental management planning is an important component of overall planning and implementation of massive projects. This EMP outlines the contents of construction and operational phases both. This document will be used as a contract document for use in the field by the contractor(s) and their personnel during construction as well as by the personnel of Project during operations.

The Project and its construction contractor, through its engineering and environmental consulting team, is responsible for implementing the EMP and ensuring that all personnel are informed about the EMP and the requirement to implement the procedures it contains. The EMP is intended as a quick reference for Project personnel and regulators to monitor compliance, and is structured to allow updates and revisions as work continues.

6.1.1- Commitment to Environment, Health and Safety

International Complex Project Limited (ICPL) hereinafter referred as “Client”, is committed to manage and operate its assets in a manner consistent with its core values to protect the health and safety of people and the environment and to comply with applicable Environment, Health and Safety (EHS) laws, regulations and internal EHS standards.

6.1.2- Purpose of the EMP

The primary purpose of this EMP is to establish the Environmental Protection Procedures to be implemented by the Project staff, consultants and contractors. Client has committed developing and implementing a comprehensive EMP to help ensure a high level of environmental protection throughout this undertaking. This EMP provides the protection procedures associated with both planned activities anticipated for the construction and operations of the Dolmen City as well as for accidental events such as fire hazard.

The purpose of the EMP is to:

- outline environmental protection measures which were and are being followed during construction;
- ensure that commitments to minimise environmental effects are met;
- document environmental concerns and appropriate protection measures;
- provide concise and clear instructions to Project personnel and contractors regarding procedures for protecting the environment and minimising environmental impact;
- provide a reference document for personnel when planning and/or conducting specific activities;
- provide contingency plans for accidental events;
- communicate changes in the program through the revision process; and

6.1.3- Scope of the EMP

The initial focus of the EMP is the protection of heritage and traffic management due to increase in visiting people as well as those activities under the direct control of project management where activities may give rise to significant environmental impacts. The EMP includes a number of priority strategies and actions relating to these locations. The EMP also supports collaboration and joint actions with affiliated
organisations, tenants and contractors within the project management's sphere of influence.

In line with the Environment Assessment, the following criteria will be used to determine priorities for attention:

- Impact on the physical and biological environment;
- Contribution to innovation and definition of best environmental practice;
- Compliance with statutory requirements and other environmental commitments;
- Availability of resources.

The EMP acknowledges the social and cultural dimensions of responsible environmental management alongside the biological and physical, reflecting a holistic view of the Client as a "human ecosystem".

The scope of the EMP includes the following functional areas:

- Management Systems: Those systems employed in the management of the Project's operational activities. It will include financial systems; engagement and supervision of contractors; purchasing policies, etc.
- Knowledge Systems: Those processes which build knowledge and capacity on environmental issues, principles and sustainable behaviours. It will include training; communications; campaigns; links with operational departments, etc.
- Energy Management: The energy-related aspects of the planning, design, construction, operation and maintenance of the Project and its facilities.
- Water Management: Aspects of supply, usage and disposal of water pertinent to the planning, design, construction, operation and maintenance of the Project and its facilities.
- Materials Management: Those services and activities which support the avoidance, resource recovery (e.g. reuse and recycling) and environmentally responsible disposal of solid and liquid waste materials.
- Planning, Design and Development: The planning, design and development of the Dolmen City’s built form and associated infrastructure.
- Pollution Prevention: Those aspects of planning and management which support minimisation of air and water pollution and contamination of land resulting from daily routine activities.
- Biodiversity and Open space: Those aspects of management and maintenance which support conservation and enhancement of biodiversity and environmentally sustainable use of open space across Project and other properties.

6.1.4- Organisation of the EMP

The EMP provides the procedures, organisation and instruction to ensure Project personnel understand and implement Environmental Protection Procedures for routine activities associated with the construction, commissioning and operation of the Project and its anticipated facilities. The organisation, style and format of the EMP is intended to enhance its use by Project personnel in the field and to provide an important support document between overall environmental management of the Project and various permits and authorisations issued for specific construction and commissioning related Project components and activities.

6.1.5- Maintenance of the EMP

EMP needs to be revised on timely basis to keep up-to-date as per the requirements comes up regularly. Therefore outlining the responsibilities and activities associated with the maintenance of the EMP is essential. The responsibilities of the Environmental Monitor should be detailed and procedures for requesting EMP revisions should also be outlined. EMP revision procedures must include requirements for notification of the appropriate government and municipal agencies so that their role is also played in the overall management process.
6.2- Health & Safety

6.2.1- Environmental Health and Safety Management System

Environmental, Health and Safety Management System is essential for the care of EHS issues which should outline mitigation measures and best management practices. This management system recommends carrying out a complete assessment, evaluating, monitoring, identifying and control all potential hazards and risks arise during the construction, operation and dissertation phases of the proposed project. It needs to ensure that the Health and Safety Plan (HSP) along with the Health and Safety Rules is established and enforced. The Plan should outline roles, responsibilities and expected outcomes with respect to the environmental health and safety management of the construction phase of the Project. These measures should be implemented to ensure that no significant adverse environmental, health and safety impacts are created by activities associated with the construction of the project.

Protection of the public and workforce health and safety during both construction and operations is paramount to Client. Utilising expert personnel and the Environment, Health and Safety Management System (EHSMS), the potential health and safety hazards and risks will be identified and assessed, then the subject of substantial planning, organisation, procedures for various facility are developed.

The Project and its facilities are designed which includes engineering control system, fire protection systems, multiple gas, flame, smoke and low- and high-temperature detectors and alarms, noise control system, energy conservation system and sustainable development mechanism. The efficiency and stability of operations will be maximised by the use of a high level of automation, regular preventive approach in maintenance, and safeguards. Prior to project commissioning, all personnel will be required to undertake an extensive training program to ensure safe operating practices. The training program and subsequent regular refresher programs will involve issues covering fire safety, emergency procedures and environmental management.

It is the responsibility of the management to provide the following basic information:

- Description of all potential hazards/ risks associated with the project;
- Health and Safety implications about all hazards;
- Description about management techniques including inspections, maintenance follow-up, reports and personnel protective gears in central utility plant;
- Outline of emergency response procedures including organisational structure of key trained personnel to act as emergency responders, action steps for entering and working within zone of hazards, evacuation procedures, protective gear requirements, decontamination procedures, lines of communication, emergency call centres' telephone numbers, map of nearest medical centres' route, etc.

6.2.2- Worker Health and Safety Plan

Worker Health & Safety Management Plan will also be outlined to implement mitigation measures and best management practices. Roles, responsibilities and expected outcomes will be defined. The plan should be implemented to ensure that no significant adverse worker's health and safety issues arise from activities associated with the construction of the project. Plan shall consider the following area specifically:

- Provide adequate worker training;
- Use proper personal protective equipment while working in central utility plant;
- Follow fire protection measures;
Arrange availability of appropriate emergency response, rescue, and first-aid personnel and services.

6.2.3- Emergency Response Plan

Emergency may be defined as a sudden event causing or has the potential to cause serious human injury and/or environmental degradation of large magnitude. The best "cure" for an emergency is, of course, "prevention". The probable emergency situation can be:

- a) Serious fire or explosion
- b) Major gas leakage.
- c) Natural calamity such as heavy rain, flooding, dust storm or earthquake, cyclone, etc.
- d) Bomb threat or any sabotage / terrorist activity
- e) Any other incident involving all or large part of the premises and its workers.

A project-specific Emergency Response Plan has been developed which primarily relates to the different construction activities of the project. It supports the EMP and addresses actions and required responses by all the Dolmen City personnel, employees and contractors.

Emergency Response Management is provided by a small team of senior managers (the "Control Committee") who in turn will direct all response activities through the Emergency Response Unit, plant security, communications, public relations, safety and environmental affairs and material procurement departments. Each of these departments has specific responsibilities to perform in the event of an emergency.

6.2.3.1- Objectives

The main objective of this plan is to establish the general guidelines for the actions to be taken in the event of fires, explosion, emergencies, accidents, disasters and sabotage, aimed at minimizing their effects and consequences, in order to protect:

- The lives of own or third-party personnel present in the building's facilities.
- The lives of the occupants of the Project
- The lives of the nearby residents and communities coming into the direct influence of the building's area.
- The lives of the ecological systems located in the surroundings of the Project.

6.2.3.2- Risk Situations

Due to the characteristics of the Project, the contingencies that could arise are the following:

Fire and explosion in context to evacuation process of the occupants may lead to situations beyond control which could be avoided due to proper planning and in-house emergency response and management system.

The above situation also applies to the natural disaster, in case of earthquake and other calamities.

6.2.3.3- Internal Risks

Risks arising from operational conditions or human error that could result in personal accidents, spills or fires, such as:

- Fire / explosions.
- Occupational accidents (serious or fatal), due to non-compliance to occupational health and safety guidelines, failure to comply with operating rules and procedures, negligence of the personnel, falls, burns, internal traffic accidents (drop zone and parking lot), acts of God, bad use of equipment and personal protection items, etc.
- Environmental Contamination due to improper storage and disposal of solid waste, contamination of drinking water, etc.

6.2.3.4- Natural Risks

Natural risks that may affect the facilities and their resulting damage to property and the personnel beyond
human control.
- Strong earthquake
- Tsunami
- Tropical Cyclones
- Floods

6.2.3.5- External risks
Risks arising from delinquent actions, terrorism or vandalism are regarded as external risks.

6.2.3.6- Personnel Transportation Risks
All personnel of the complex must be instructed that in the event of accidents while the personnel / occupant is being transported to / from the complex, using own or third-party transportation must immediately notify the Environment, Health and Safety (EHS) department so that it may be able to provide the necessary assistance for the injured, and proceed to issue notices not only to the health care centres but also to external support institutions (National Civil Defence, Coast Guard, Police, Fire Fighters, etc.).

6.2.3.7- Risk management
The management of contingencies at the complex shall be based on:
- Early detection of smoke and fire (alarms, detectors, setting off of safety elements);
- Confinement of emergency / affected area.
- Application of the adequate response procedure
- Follow-up and monitoring

6.2.3.8- Evacuation Plan:
The following alarm signal(s) will be used to begin evacuation of the complex and associated facilities (whichever applies):
- Bells
- Horns/Sirens
- Verbal (i.e. shouting, paging)
- Evacuation map is prominently displayed throughout the facility.

Note: An Assembly Point outside the building for the inhabitants in case of an emergency. A properly completed Site Plan satisfies contingency plan map requirements. This drawing (or any other drawing that shows primary and alternate evacuation routes, emergency exits, and primary and alternate staging areas) must be prominently posted throughout the complex in locations where it will be visible to personnel / staff, residents and visitors.

a. Emergency Contacts*:
Fire/Police/Ambulance
Phone No
Office of Civil Defence
Phone No
National Disaster Management Centre
Phone No
Coast Guard Karachi

b. Emergency Resources:
Nearest Hospital:
Name: Dr. Ziauddin Hospital
Address: 4/B, Shahrah-e-Ghalib, Block 6, Clifton, Karachi.-75600, Pakistan
Nearest Fire Station:
Name: Saddar & KPT Fire Stations
Address: Saddar and KPT area, Karachi
Nearest Police Station:
Name: Boat Basin Police Station
Address: Clifton Block 4, Karachi
c. Arrangements with Emergency Responders:
If the management has made special (i.e. contractual) arrangements with any police department, fire department, hospital, contractor, or State or local emergency response team to coordinate emergency services, describe those arrangements on the lines below:

6.2.3.9- Emergency Procedures:
Emergency Coordinator Responsibilities:
a. Whenever there is an imminent or actual emergency situation such as an explosion, fire, or flood, etc., the emergency coordinator (or a designee when the emergency coordinator is of duty) shall:
- Identify the character, exact source, amount, and extent of hazard.
- Assess possible hazards to occupants that may result from the explosion, fire, or flood.
- Activate internal facility alarms or communications systems, where applicable, to notify all facility personnel.
- Notify appropriate local authorities.
- Notify the State Office of Emergency Services.
- Monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment shut down in response to the incident.
- Take all reasonable measures necessary to ensure that fires, explosions, and releases do not occur or recur, or spread to other hazardous materials at the facility.
b. Before facilities at the complex are back to normal status and operations are resumed in areas of the facility affected by the incident, the emergency coordinator shall:
- Provide for proper storage and disposal of recovered waste, or any other material that has been destroyed results from an explosion, fire, or flooding at the facility.
- Ensure that no material is transferred, stored, or disposed of in areas of the facility affected by the incident until cleanup procedures are completed.
- Ensure that all emergency equipment is cleaned, fit for its intended use, and available for use.
- Notify the fire department that the facility is in compliance with requirements b-i and b-ii, above.

6.2.3.10- Post-Incident Reporting:
The time, date, and details of incident that requires implementation of this plan shall be noted in the facility's operating record.
Within 15 days of any accident or emergency incident which triggers implementation of this plan, a written Emergency Incident Report, including, but not limited to a description including the facility's response to the incident, must be prepared.
The report shall include:
- Name, address, and telephone number of the facility's owner / operator;
- Name, address, and telephone number of the facility;
- Date, time, and type of incident (e.g. fire, explosion, etc.);
- Damage occurred to life and property
- Name and quantity of material(s) involved;
- The extent of injuries, if any;
- An assessment of actual or potential hazards to human health or the built environment, where this is applicable;
- Estimated quantity and disposition of recovered material that resulted from the incident;
- Probable cause(s) of the incident;
- Actions Remedial measures taken to prevent re-occurring in response to the incident;
- Administrative or system controls designed to prevent such incidents in the future.

6.2.3.11- Emergency Equipment:
The Health and Safety Regulations require that emergency equipment at the facility be listed. An appropriate emergency equipment inventory Table needs to be developed for meeting the requirements.

6.2.3.12- Training:
1. Personnel are trained in the following:
   - Internal alarm / notification system
   - Evacuation Management System
   - Re-entry procedures & assembly point locations
   - Emergency incident reporting System
   - External emergency response organization System
   - Location(s) and contents of Emergency

6.2.3.13- Emergency Response Training
Appropriate training must be imparted to the concerned staff which will enable them to respond during the emergency situation. Emergency contact list and related information like the location of the emergency equipment must be kept handy.

6.2.3.14- Response levels
Two levels of response must be contemplated:
   a) With Internal Personals
   b) With External Agencies, such as Civil Defence, Fire Brigade, Police, Coast Guard, Ambulance services etc.

6.2.3.15- Response Strategy
Under the emergency the response plan will be undertaken as per the following sequence:
- First Stage: Notification
- Second Stage: Initial assistance / rescue
- Third Stage: Response operations
- Fourth Stage: Evaluation of the plan and damages

1- First Stage: Notification

Internal Communication
Wireless communication systems, will be established.

External Communication
In the event fire/explosion/emergency extending to the area of influence must be informed through the fastest means to the following personals/Authorities:
- Local Authorities will be advised by telephone.
- In the case of serious or fatal accidents, police will be notified.
- The relatives of the injured person shall be, as soon as they are evacuated to a hospital.
- To the extent possible, the press will be notified after the accident has been investigated through the personnel appointed / designated by Management.
- In the case of an accident that has affected the facilities; the insurance company will be notified in coordination with the administration and finance management.

2- Second Stage: Initial Assistance / Rescue
A joint evaluation report shall will be made of the status of the event, the conditions of the affected site, that warrant a safe development of rescue actions, first aid and transportation of the injured to a medical unit. Strategies will be adopted to determine own material
and human resources to be required, the deployment of
the resources to the emergency location, as well as the
estimated response time.

Trained emergency teams must be prepared to act as
required, and a reserve team must be available. All
personnel who are not essential to fight the emergency
must be evacuated to a safe place where there must be
communication equipment available to count the
number and condition of the personnel.

In the event of fire, the execution or fighting phase will
be implemented immediately.

3- Third stage: Response Operations
Response Operations refer to:

- Fire fighting using extinguishers or pressure water
  network or foam.
- Isolation and confinement of fire in the affected
  area.
- Medical assistance and evacuation of injured
  personnel and occupants.
- Evacuation of all personnel and occupants if their
  lives are in danger (in the event of earthquakes,
  flood or other natural calamities).
- Application of a monitoring program and a
  mitigation plan.

4- Fourth Stage: Evaluation of the
Plan and of Damages
Once response operations have concluded, the
development and results of the plan must be evaluated
in order to issue recommendations that allow correcting
deficiencies for the purpose of improving response
operations. These recommendations will then form part
of revision and subsequent annual approval of the
Contingency and Risk Prevention Manual.

A record of damages will be prepared as part of the final
emergency report. The resources used, lost and
recovered will be detailed in said register.

6.2.3.16- Emergency Response
Manuals
Based on the Quantitative Risk Assessment the Client's
has prepared written emergency plans for the complex
to cover emergency situations that could occur. It may
be required that Emergency Response Manuals will be
developed for various situations arising.

6.3- Responsibilities,
training and communication

6.3.1- Responsibilities
The roles and responsibilities of Dolmen City's Project
Manager, the Engineer, the Environmental inspection /
Quality assurance team, the contractors, all EMP
holders and all personnel will be defined. An
organizational chart of the overall management/
administration detailing management roles and
responsibilities will be developed according to the
format given in this section.

A- Project Manager
- The Project manager is responsible and
  accountable for the site's HSE performance.
- Develops, by action and example, a positive HSE
  culture and a clear understanding of specific
  responsibilities for direct reports.
- Approves and adopts local HSE policies, rules and
  procedures.
- Chairs the executive HSE committee (or its
  equivalent).
- Personally investigates fatalities, serious lost
  workday cases, environmental incidents or major
  property losses.
- Assigns management members to serve on
  various HSE committees.
- Reviews monthly HSE activity report and
performance statistics.

- Reviews lost workday Injury/Illness Investigation Reports.
- Reviews loss-control reports submitted by outside agencies.
- Makes plant-HSE audits on a regular basis in order to appraise program effectiveness.
- Reviews annually the program effectiveness and makes adjustments where necessary.
- Evaluates functional performance of the HSE staff and provides guidance training where necessary.

B- Manager Operations

Environmental Management Plan will be regulated by the Manager Operations of the Project. Some of the key role and responsibilities are described below:

- To consider and react to issues and solutions proposed by the HSE department.
- To cooperate and consult with relevant agency(s) and department(s) in order to improve performance.
- To approve any change in decision making and authorities in consultation with Manager HSE, if appropriate.

C- HSE Manager

The role of HSE manager is vital. The success of an EMP always depends on proper and effective management provided by HSE manager. Following are some of the roles and responsibilities given should be provided by HSE manager:

- To identify issues and where possible propose solutions for inclusion in the management plan review process.
- To ensure that the points of view of staff, contractor and HSE officers are considered and placed in the EMP accordingly.
- To improve coordination and exchange of information between top management, employees, contractors etc.
- To contribute towards the actions to deliver the management plan and ensure its continual development.
- To review EMP every year under the supervision of top management, taking issues and change EMP accordingly with the solutions and suggestions.
- To monitor the progress, development and implementation of this management plan.

D- HSE Officer

The role of HSE officer will be empowered by HSE manager. The superficial responsibilities which an HSE officer will have to perform include:

- To integrate, as far as possible, the aims and objectives of different users within an agreed plan.
- To maintain balanced, holistic approach to the solution of concerned issues in accordance with the compliance to the legislative requirements.
- To provide professional guidance on questions relating to the environmental management and issues raised by contractors/relevant personnel.
- To progress the EMP process through development towards implementation.

E- Construction Contractor

On behalf of chief construction contractor, the main responsibilities for all matters pertaining to environment will be looked after by field Construction Contractor and he will be responsible to report directly to HSE Manager. Major Roles to be performed by construction contractor are given below:

- To carry out construction activities in environmentally sound manner.
- To coordinate with the HSE officer to resolve issues arise during construction phase.
To manage construction crew and reduce the environmental impacts.

To appoint a dedicated environment officers that will understand and tackle environmental issues more easily.

To discuss weekly progress report with HSE Manager and issues concerned to environmental management with HSE Manager.

F- HSE Supervisor/Manager

- Provide overall coordination and guidance to the site HSE efforts.
- Develop programs that are designed to reduce exposure to loss via personal injury or illness, loss by accident, materials or waste, and comply with governmental regulations.
- Supervise and coordinate the efforts of the HSE department staff.
- Collaborate on a routine basis with the site manager in appraising the performance of all departments.
- Develop recommendations for improvement of procedures, practices and activities directly or indirectly involved in effective execution of HSE functions by the centre's management.
- Advise and/or represent centre's management in all matters concerning compliance with HSE regulations.
- Audit the functioning of the system from a regulatory and management perspective and recommend actions to address deficiencies.
- Participate in the review of all serious incidents, fatalities, and major disasters.
- Collaborate with the manager in the development and preparation of Executive HSE Committee Meeting agenda.
- Serve as a member of site committees for special HSE studies and program development.
- Consult with the Operations and Maintenance department on original plans; see that all plans and specifications for new or proposed changes in various procedures / processes, equipment or methods are reviewed from compliance with HSE standards before being accepted.
- Function as liaison with insurance companies, Corporate HSE, local fire and rescue organizations, etc. 
- Provides assistance in the implementation of new technologies such as behavioural-based safety management concepts.
- Reinforces safe behaviour and corrects unsafe behaviour.

G- HSE Coordinator

- Assist the site manager in coordinating all HSE activities.
- Reinforces behaviour and corrects unsafe behaviour.
- Be constantly alert for unsafe conditions and bring such conditions to the attention of the supervisor and, if necessary, the site manager, without delay.
- Participates in the complex's Executive HSE Committee.
- Accompany outside inspectors representing insurance carriers of fire, casualty, and workers' compensation insurance.
- See that HSE promotional and reference literature, such as monthly handouts, are available.
- Be thoroughly familiar with company HSE standards and assist the complex's management in implementing them.
- Maintain injury and incident statistics.
- Assist the manager in analyzing incident records, develop supervisory and employee educational
programs and stimulate a high level of interest in HSE through various employee-involvement activities.

- Understand current HSE regulations.
- Serves as the liaison between Corporate HSE and the management.
- Provides assistance to the complex's management for the implementation of new technologies such as behavioural-based safety management concepts.
- Regardless of the position the HSE Coordinator holds in the organization, his function as HSE Coordinator must be only advisory. Any corrective actions must be taken by the concerned line supervisor. It is most important that the HSE Coordinator's position be recognized as one of guidance not enforcement.

**H- Project Safety Supervisor**

The responsibilities of project safety supervisor are as follows:

a) Employee Training - Project Safety Supervisor is responsible for ensuring that each new employee, whether temporary or permanent, receives appropriate safety training at the start of employment. Supervisors are responsible for ensuring that their employees receive the necessary safety training based on the work that their employees perform.

b) Personal Protective Equipment - Keeping in mind the hazards of the work area, the type of protective equipment needed be determined and provided accordingly.

c) Accident and Injury Reporting - It is the supervisor's responsibility to report all accidents or injuries that occur to their employees while at work.

**I- Individual Employees**

Employees must assume a high level of responsibility to work safely and strive for an incident-free workplace by:

- Considering the consequences of their acts on their safety and that of fellow employees.
- Following all general and job related HSE work procedures and practices.
- Detecting, reporting and correcting unsafe work behaviour or conditions.
- Applying HSE work practices both on and off the job.
- Making or suggesting enhancement to the jobs at hand to reduce or eliminate the risk or stresses associated with job performance.
- Reinforcing safe behaviour.
- Working safely and with regard for the environment is a condition of employment and no employee should ever consciously perform an unsafe act.
6.3.2- Training

It's an important step for the implementation of the EMP. All the employees will require to be trained to work appropriately on EMP. Project Safety Supervisor will organize trainings in consultation with HSE Officer. It will make sure that employees understand the issues associated with the proposed activities. Trainings should be arranged on regular basis with notification that it should be attended all respective employees.

HSE Officer will determine the training requirements during both construction and operation phases. Induction will be the basis of all training courses for contractor and subcontractor during construction phase.

Trainings identified in EMP are given below:

- Site induction course
- Training for emergency response and preparedness
- Training for familiarization with site environmental controls
- Specific environmental training for relevant employees e.g. daily checks to maintain controls, waste minimization, etc.

6.3.3- Communications

For effective monitoring, management and documentation of the environmental performance during the construction and operational phase of the Dolmen City Project, the Health, Safety and Environmental (HSE) matters should be discussed by the management during daily. Steps given below will assist in effective communication and documentation.

6.3.3.1. Kick-off Meeting

The aim of organising the kick-off meeting is to define the environmental responsibilities, awareness to EMP to the managing staff and to streamline the work plan according to the EMP.

6.3.3.2- Quarterly Meetings

Aim of this meeting is to review the progress of activities performed, explore ideas and problems, and discuss about the progress in acquisition and analysis of information. Dead lines are re-evaluated in it and if necessary, the project program is revised in these meetings.

6.3.3.3- Peer Review

The aim of this review is to predict and modify the conclusions and interpretation of assessment phases in the light of other professional opinions that mainly not involved in the actual project, but just for the provision of a critical appraisal of the style and expression of documentation produced.

6.3.3.4- Minutes of Meetings

In the end of quarterly meetings, minutes will be issued which comprises of the discussions made in the meeting, issues discussed and decisions taken with the time frame for their implementation. Main points of minutes for general employees may be incorporated in the record register. These meeting minutes will also be provided to the higher authorities of Dolmen City and the contractor for their own record.

6.4-Regulatory requirements

6.4.1-Approvals, Authorisations and Permits

The list of potential approvals, authorizations and permits required for the Project from various agencies including, federal, provincial, municipal are given below:

- Sindh Environment Protection Agency (SEPA)
- Sanction of utilities from concern department such as Sui Southern Gas Company (SSGC), KESC, PTCL and other civic agencies including City District Government of Karachi, etc.
6.4.2-Environmental Quality Objectives
This section will outline criteria for management's quality objectives and generation of solid waste and wastewater quality, air and noise quality. The management of Dolmen City shall review Environmental Objectives once a year and try to complete them in the stipulated time frame. This will also include any applicable treatment criteria meeting the National Effluent Quality Standards (NEQS) as per Pakistan Environment Protection Act 1997.

6.4.3- Compliance Monitoring
It would be required by the management of Dolmen City to comply with the Environmental Monitoring Plan laid in the subsequent section. The compliance shall also required periodic reporting of the monitoring results in form of report submitted to the Environmental Protection Agency. During the construction phase, it will be on bimonthly basis and during the operation phase it will be done on quarterly basis.

It is also understood that monitoring shall be done by an independent consultant / organisation. It would be further required to make the annual environmental report public as laid under the Equator Principles.

6.5- Standard Operating Procedures

6.5.1- Erosion control requirements

6.5.1.1- Purpose
Erosion control in the projects construction and operation phase is to protect and reduce sediment pollution by minimizing the degrading effects of erosion.

6.5.1.2- Scope
Soil erosion by water and wind affects the natural environment around the project. Soil dispersion by wind and water, and its associated impacts, is one of the important considerations regarding the open spaces in the project that are part of the built-environment. The scope of this activity is to control the erosion through practice of preventing or controlling wind or water erosion.

6.5.1.3- Definitions
The natural process by which the surface of the land is worn away by the action of water, wind, or chemical action is termed as Erosion.

In this case of open spaces in the built-environment which are left exposed needs to be protected against wind and water actions that are agents of dispersal of dirt and soils.

6.5.1.4- Procedure
The best erosion control methods involve the restoration of natural environments by replanting bay grasses and shrubs. Structural barriers, such as bulkheads, compact soil, alter the composition of the land, etc.

Mulching - Applying plant residues or other suitable materials, not produced on the site, to the surface of the soil. This application will help conserve moisture; prevent surface compaction or crusting; reduce runoff and erosion; control weeds; and help establish plant cover.

6.5.1.5- Management Options
A conservation plan includes best management practices to address erosion and sedimentation control and protection of the soil resource. In the absence of a complete conservation plan, an erosion and sedimentation control plan consisting of appropriate numbers and locations of sediment removal best management practices, must be developed, installed and maintained.

6.5.1.6- Recording & Reporting
It is an ongoing process. The site environmental
coordinator (SEC) will document on a Daily Environmental Inspection Reports (DIR) the progress of erosion control activities and status of compliance.

6.5.2- Cleanup and site restoration

6.5.2.1- Purpose
This involves removal of excess excavated material (not used as backfill), restoring the site surface to final contours, and stabilization of slopes. After cleanup, disturbed areas are stabilized, smoothed, mulched, reseeded, and fertilized as required. After construction is complete and cleanup is in progress, temporary erosion controls may be removed and permanent landscaping and erosion control measures installed where required as part of final facility reinstatement.

6.5.2.2- Scope
Topsoil is segregated from sub-soil during this operation. Topsoil is stored in temporary topsoil stockpile areas for later use in re-vegetation programs. Regular visual inspection is conducted to monitor the growth of vegetation and to ensure that no erosion occurs on slope areas while the trees and other vegetation get established to protect the slope surfaces. The re-vegetation programs will be continued by the project. In case of no vegetation existing on the land prior to construction activity this activity may be regarded as an auxiliary activity to support and enhance erosion control in the operation phase of the project.

6.5.2.3- Definition
The process of rehabilitation of land after construction activity in order to restore its natural landscape may be regarded as cleanup and re-vegetation.

6.5.2.4- Procedure
The methods and procedures are more or less similar to erosion control together with horticulture

6.5.3- Wastewater/ storm water management

6.5.3.1- Purpose of Wastewater/storm water Management
The purpose of the adopted procedure is to provide guidelines and simplify the process of categorizing, quantifying, managing, and disposing of wastewater wherever and whenever arising during the project's construction and operation phase. Wastewater management is a critical component of centre’s operating policies. Wastewater management includes the proper disposal/recycling and reuse of the wastewater generated during construction and operation phase.

6.5.3.2- Scope
Wastewater as part of drilling and construction, operation is being managed as per this procedure. An integrated wastewater management system for Dolmen City is essential to reduce wastewater.
Substitute techniques must be investigated, including source reduction, recycling and reuse wherever possible with a view towards maximizing the benefits and minimizing the cost of each method of wastewater management.

6.5.3.3- Definitions

(i) Wastewater:
All water arising after use / consumption from the Project which can encompass a wide range of potential contaminants and concentrations.

(ii) Hazardous Wastewater:
All wastewater comes in the category of hazardous wastewater. If it has one or more of the following properties:
- Oily water
- Toxicity (wastewater containing chemicals and paints etc.)
- Concentration of contaminants too high above safe acceptable limits

(ii) Non-hazardous Wastewater:
All wastewaters are categorized as non-hazardous wastes, if they do not possess any of the hazardous contaminant mainly comprising of consumed water arising from washing area and sanitary wastewater.

6.5.3.4- Procedure
Main concern to manage the wastewater is listed below:

- Eliminate wastewater production wherever possible.
- Minimize wastewater production.
- Recycle or Reuse
- Wastewater disposal in an environmentally safe manner through adequately designed facility

a- Wastewater Minimization
Generation of wastewater will be minimized through the following steps taken by working personnel at the facility:

- Through efficient use of raw water (minimizing the wastewater).
- Extensive management schemes will be formulated for both phases during construction and operations (water management).
- It is expected that segregated and/or treated wastewater will be made available for subsequent use during operations phase (recycling and reuse).

b- Storage and Handling
Wastewater shall be stored / retained in specifically designed facility or storage tanks till proper treatment at sewage treatment plant is sought and subsequently disposed off.

c- Recycling
Reuse of wastewater is a best way to reduce the quantity of the wastewater that requires subsequent treatment and disposal. Recycled water may be used in the cooling plant and for horticulture purposes.

d- Treatment

- Biological treatment of wastewater through retention in septic tanks and through primary and secondary treatment processes.
- Sludge produced as a by-product of biological treatment be disposed off properly through sludge digestion or burial pits or transported to agricultural sites for use as raw manure (fertilizer).
- Some of the wastewater will be reused as mentioned in recycling of wastewater. The treated water should comply with National Environmental Quality Standards (NEQS).

e- Disposal
Proper disposal should be done following the treatment through discharge into water bodies or sewerage system where available.

6.5.3.5- Wastewater Management Options

- All storm water run-off from construction sites and facility will be inspected for the sediment load and may be directed to sedimentation basins to remove suspended solids (e.g., silt);
- Sewage may be collected and temporarily stored in tank(s) until it is transported to a designated wastewater treatment facility;
- Standard mobile sewage tankers may be engaged to collect and transport sewage from portable latrines and temporary storage tanks;
Direct discharge will only be considered as a contingency option.

At the operation stage the wastewater treatment plant committed to be installed shall be monitored on quarterly basis and report shall be submitted to the relevant organization on given frequency.

6.5.3.6- Drinking Water Quality and Wastewater Monitoring Plan

Refer attached Environmental Monitoring Plan for details of drinking water quality and wastewater monitoring plan at the Dolmen City complex site during construction and operation phase.

Performance Indicator

Monitoring results of water quality shall show the extent of contamination in the drinking water and shall regulate and maintain the quality of potable water for establishing its suitability for human consumption.

Monitoring results of wastewater quality shall show the concentration of pollutants in the sewage water and potential for contamination of ground water if not disposed off properly.

Record and Comments

Record would be kept with the laboratory report attached. A lay out of record keeping format for monitoring results is attached in the annexure at the end of this EMP.

6.5.3.8- Recording & Reporting

Visually acquired wastewater management-related monitoring data will be recorded in field logbooks. These logbooks will be maintained as part of the Wastewater Management Records at each designated area or facility wherever the stated wastewater management activities occur.

These monitoring data will include as applicable:

- Time, date and identify of individual performing the monitoring activity.
- Description of the process or activity being monitored.
- Findings or results of the monitoring activity.
- Description of activities to address deficiencies or problems; and
- Problems / Deficiencies, Remedial Measures.

It is responsibility of the management to identify and implement appropriate remedial measures based on identified problems / deficiencies and to properly record and verify all EMP compliance initiatives.

6.5.4- Waste Management Plan

6.5.4.1- Purpose

The purpose of this procedure is to provide guidelines and simplify the process of categorizing, quantifying, managing, and disposing of solid wastes. Waste management is a critical component of management's operating policies. Waste management includes the proper handling, collection, storage, manifesting, transportation, and disposal / recycling of the solid waste generated. The procedure is designed to assist in the management's wide effort to provide protection to the environment and to comply with company's corporate requirement, environmental laws and regulations regarding proper waste management.

6.5.4.2- Scope

The waste management plan has been developed to ensure that the Management of solid waste generated as a result of the construction and associated activities during the operation phase is consistent, efficient, and in conformance with the laws and regulations.

With respect to monitoring, the waste management sets out the following objective:

- To monitor and inspect waste management-related
facilities and activities directly resulting from executing the scope of the contract in order to ensure compliance with the WMP. Guidelines for proper handling, categorization, recording, minimization, recycling and disposal of all types of waste associated with company operations and projects are part of this procedure.

6.5.4.3- Definitions

(i) Waste:
Any material, for which no further use is intended, is considered a waste. It can be solid, semi solid or liquid. Additionally, abandoned materials and materials intended to be recycled are considered wastes. It is very important to understand this concept, because even though something is going to be recycled, it must be managed as a waste until it is actually recycled.

(ii) Hazardous Waste:
Waste is categorized as a hazardous waste if it has one or more of the following properties:
- Ignitability (flash point less than 60°C);
- Corrosivity (pH less than or equal to 2.0, or greater than or equal to 12.5);
- Reactivity (inherently unstable under ordinary conditions or when exposed to water);
- Irritability (when in contact with body causes inflammation)
- Toxicity (may cause risk of injury to health of organisms or the environment.)

(iii) Non-hazardous Waste:
The wastes are categorized as non-hazardous wastes, if they do not possess any of the hazardous characteristics as defined above. However, non-hazardous waste may still present hazards to employees who handle them. All recommended safety and handling practices must be followed.

6.5.4.4- Procedure
Priorities to manage the waste are listed below:
- Eliminate waste production whenever and wherever possible. Use the material only for its intended purpose on site
- Minimize waste production
- Reuse
- Dispose of waste through properly designed waste disposal facility.

a- Waste Minimization
To minimize waste, the following steps shall be taken by all personnel working on sites (during construction phase) and complex area (during operation phase):
- Only the needed amount of materials shall be ordered. Before purchasing hazardous material, all alternatives for non-hazardous material should be explored.
- Prior consideration shall be given to the sizes of containers available when ordering products that could potentially generate waste. The intent is to avoid unused products and / or their containers from becoming wastes that require special handling.

b- Waste Categorization
All wastes generated at facilities shall be categorized in two major categories (i.e. Hazardous wastes and Non-hazardous wastes) as per the definitions in section above. Each category has different types of requirement for handling, storage and disposal.

c- Labelling
- Name of the waste (e.g., waste oil, solvents).
- Waste category (e.g., toxic, ignitable).
- Facility name and address (disposal site, etc.).
Date of waste accumulation: (date when waste was placed in drum).

Wastes are segregated and located in designated areas to optimize control; storage areas.

d- Segregation

As there are no hazardous wastes in the Project therefore segregation among the waste will be done as per their matter.

The scheme of segregation is as follow:

(i) All hazardous waste if found shall be segregated from other types of hazardous wastes as well as non-hazardous wastes at the point of generation of waste.

(ii) At all facilities, following types of containers, with colour coding for easy identification, shall be kept to collect and segregate common wastes:

- Glass (blue);
- Metals (green);
- Plastic (white);
- Oily rags (black);
- Used oil (red);
- Rubbish/trash (yellow).

(iii) Food waste shall be collected in separate containers.

(iv) All containers must be properly and clearly labelled. The label must clearly mention the name or type of waste. Also, if the waste is hazardous, it should be clearly labelled on the container along with its hazardous characteristics (e.g. flammable, toxic, radioactive, etc.). This is important to workers and to emergency response teams, who need to know what they are dealing with. Missing or unreadable labels must be replaced.

e- Storage and Handling

(i) Waste shall be temporarily stored at waste storage facility that will be sent for recycling or off-site disposal shall be temporarily stored at waste storage facilities available at different sites such as junkyard, scrap yard, pits, etc.

(ii) The oily sludge, contaminated soil shall be stored in containers

(iii) All other wastes awaiting disposal shall be kept in closed containers/boxes separately. Care must be taken to prevent wastes giving rise to secondary environmental problems, such as odours or soil and groundwater contamination through rainwater leaching.

(iv) All stored wastes must be clearly labelled with type of waste and warning signs.

(v) Daily estimates of hazardous and no hazardous waste and volumes generated on site.

(vi) Waste segregation, waste storage containers, general housekeeping and the provision of adequate resources will be monitored.

(vii) All workers handling wastes shall use proper PPE.

f- Recycling

Recycling and reuse minimizes the quantity of waste requiring disposal. Some of the wastes can be reused within the facilities while others can only be recycled at off-site recycling centres. Waste shall not be sold to the unauthorized contractors/companies, who may not have proper recycling facilities, to avoid misuse and to reduce associated liabilities.

g- Treatment

Some of the wastes, such as sludge from wastewater, oily wastewater from process, etc., require proper treatment before disposal. This will be dealt in context to wastewater treatment and disposal to comply with National Environmental Quality Standards (NEQS).

h- Disposal

Disposal becomes the only available alternatives, if
reuse and recycling options are exhausted. A material should be classified as a waste for disposal only if no other useful purpose can be identified and if the material cannot be beneficially reused or recycled. The choice of a suitable disposal option for any waste depends on both environmental and economic considerations. The final disposal can only be off-site disposal facilities due to limited space available.

It requires properly designed and well-operated commercial waste disposal facilities such as sanitary landfill. All such facilities should be explored and evaluated for possible future use.

6.5.4.5- Waste Management Options

Waste will be managed accordance with the following requirements.

1. Garbage collection containers, which will be located inside the complex’s premises.

2. Environmental inspectors/technicians will document, in their daily report, the compliance to measures outlined in this plan.

3. Kitchen and food waste will be segregated from other waste materials will be collected in colour coded bags; the main collection container for these wastes will be emptied at least twice a day in the interests of health and hygiene.

4. Other wastes such as tins, glass, packaging, plastics, etc., will be placed in the appropriately designated collection container; the main waste containers will be emptied at an approved waste storage site.

5. All wastes will be segregated upon receipt at the waste storage area.

6. Inert waste will be segregated and stored to promote reuse; it will not be stored where it can be easily moved into a wetland or water body.

7. The waste from the main garbage collection container(s) will be regularly collected and transported to the designated disposal facility.

8. The impact caused by handling (including stockpiling, labelling, packaging & storage), collection, transportation and disposal of wastes shall be addressed in detail and appropriate mitigation measures shall be proposed. This assessment shall cover the following areas:
   - Potential hazards;
   - Air and odour emissions;
   - Noise;
   - Wastewater discharge;
   - Public transport; and landscape and visual impacts, if any.

6.5.4.6- Solid Waste Monitoring Plan

Monitoring of solid waste shall encompasses waste generation at source, characteristics of solid waste; its composition, the quantity of recyclables and non-recyclables and organic contents of waste. The data needs to be collected in order to design an effective solid waste management system for handling, storage, transportation and disposal. It will also suggest waste segregation and subsequent recycling potential of the waste leading to minimisation of waste and estimation of the quantity requiring disposal.

Refer attached Environmental Monitoring Plan for details of solid waste sampling for characterisation and monitoring at the Dolmen City complex site during construction and operation phase.

Performance Indicator

Monitoring results of solid waste characterisation suggests for effective waste management and options for ultimate safe disposal of waste.

Record and Comments

Record would be kept with the laboratory report.
attached. A lay out of record keeping format for monitoring results is attached in the annexure at the end of this EMP.

6.5.4.7- Recording & Reporting
The management has to record the information about source, composition, quantity, and final disposal of the waste. This information is needed for regulatory compliance, risk assessment and setting reduction targets and objectives as well as corporate statistics.

The routine track of waste shall be recorded. The information is documented while waste is being dispatched outside facility controlled location. It is the responsibility of the Team Leader to assign a suitable person (such as Lead Operator at all manned fields) to sign off the record of waste tracking before the waste is dispatched outside.

6.5.5- Air and Noise Emissions
6.5.5.1- Purpose
The purpose of this guideline is;

- To monitor contents of polluting substances in the atmospheric air;
- To control observance of approved limiting permissible emissions at man-made sources;
- To monitor natural sources and a number of man-made sources of emission at work sites at the construction phase;
- To identify sources of noise emissions and control noise pollution;
- To monitor noise emissions.

6.5.5.2- Scope
Scope of work include

- Evaluation of present ambient air quality and noise level at existing area.
- Evaluation of impact of traffic movement at the proposed site and noise level.
- Evaluation of impacts on roads and in the adjacent area due to construction and operation.
- Evaluation of impacts of air emissions and noise from various stationary sources.
- Recommendations for mitigation techniques to redress the expected impacts both for design phase and operational phase.

6.5.5.3- Definitions
Air pollution may be referred to as contamination of pollutants dispersed in air affecting ambient air quality that may be deleterious to life and property.

In common use the word noise means unwanted sound or noise pollution. Excessive noise permanently damages hearing, but a continuous low-level sound can be dangerous too.

6.5.5.4- Procedure
Air emissions (continuous or non-continuous) from facilities such as power generation plants, etc. are comprising of principal gases (green house gases) which typically include carbon monoxide (CO), carbon dioxide (CO2), water vapours and other gases such as nitrogen oxides (NOX), and, in case of sour gases, sulphur dioxide (SO2). Air quality impacts should be estimated by the use of baseline air quality assessments and atmospheric dispersion models to establish potential ground level ambient air concentrations during facility design and operations planning. These studies should ensure that no adverse impacts to human health and the environment result. All reasonable attempts should be made to maximize energy efficiency and design facilities to minimize energy use. The overall objective should be to reduce air emissions and evaluate cost-effective options for reducing emissions that are technically feasible.

The main noise emission sources include pumps, compressors, motors, generators and HVAC system.
Also vehicular emissions and noise due to traffic movement in and around the complex facility may of concern to be mitigated and monitored.

Atmospheric conditions that may affect noise levels include humidity, wind direction, and wind speed. Vegetation, such as trees, and walls can reduce noise levels. Installation of acoustic insulating barriers can be implemented, where necessary. Maximum allowable lo

Equivalent ambient noise levels that should not be exceeded and general recommendations for prevention and control of noise are described in the General EHS Guidelines.

6.5.5.5- Noise and air emissions Management Options

Noise and air emissions monitoring includes;

- Air quality modelling and monitoring of air and noise emissions.
- Indoor air quality management
- Pollution control technology assessment,
- Emission inventory development,
- Development of parametric monitoring, periodic monitoring, and compliance assurance monitoring.

6.5.5.6- Air and Noise Quality Monitoring

Refer attached Environmental Monitoring Plan for details of air and noise quality monitoring at the Dolmen City complex site during construction and operation phase.

Performance Indicator

Monitoring results of ambient air shall show the concentration of pollutant in ambient air.

Record and Comments

Record would be kept with the laboratory report attached. A lay out of record keeping format for monitoring results is attached in the annexure at the end of this EMP.

6.5.6- Environmental Monitoring and Inspection

6.5.6.1- Purpose

This procedure identifies environmental responsibilities for the project offices and for the construction site. It also provides procedural guidance for environmental training, inspection, monitoring functions during construction and operation.

It also serves the purpose of Regulatory Monitoring & reporting to regulatory agency (EPA) and Annual reporting to public to comply with Equator Principles clause (9) [Independent Monitoring & Reporting] & (10) [Equator Principle Financial Institution (EPFI) Reporting].

6.5.6.2- Scope

Primary scope of environmental monitoring / inspection is to comply with the environmental requirements of the project. Management is also responsible for inspecting, documenting, and ensuring that construction meets environmental responsibilities through an integrated program of personnel orientation and training, and inspection of construction activities. In addition, the company will assist in implementing environmental management plans through its program of construction inspection.

6.5.6.3- Definitions

Consists of examining construction activities in the field to verify and document that activities are carried out in compliance with construction and environmental Permits, specifications relating to environmental protection, and mitigation plans approved for Dolmen City.

6.5.6.4- Procedure

The company will establish a plan detailing the
procedures and documents required for implementing environmental management plan thereby complying with the environmental legislations and regulations during the construction and operational phase of the project.

An environmental inspector will be assigned to oversee the environmental compliance inspection process. In addition to performing duties, the environmental inspector (IE) will:

- Communicate with the Environmental Manager and the Chief Construction officers on a daily basis.
- Provide key liaison role in coordinating attendees and facilitating agreements in the field, as appropriate, with agency representatives.
- Coordinate daily with construction inspectors, the contractor, and monitors to ensure that required monitors are present when construction activities are scheduled in all requiring monitors.
- The EI will be on a peer status with other project construction inspection staff.
- The EI will act as a liaison between the contractor and agency field representative and will coordinate regularly with the various construction inspectors are apprised of the status of environmental issues in their respective areas.
- The EI will be responsible for determining non-compliance activities and anticipating activities and situation that could result in non-compliance to plan of development, environmental permits, and project stipulations.
- The EI will play a significant role suggesting methods to bring construction activity into compliance and/or to temporarily halt certain activities that may cause damage to sensitive environmental resources.

6.5.6.5- Management Options

Functions and responsibilities that will be assigned to Dolmen City complex's ES&H department include:

- Orientation of project personnel in environmental requirements and procedures particularly in context to the sensitive resource issues at the construction site.
- Environmental training particularly in environmental monitoring is to be imparted to all project personnel.
- Inspection of facilities construction activities for compliance with environmental regulations,
- Specifications, stipulations, drawings, mitigation plans, and procedures.
- Documentation of all training, inspection, and monitoring activities should be exercised.
- Coordinate with the management's environmental representatives and management personnel on environmental issues.
- Provide technical support to management for obtaining environmental permits or other authorizations as needed or modified during facilities construction.

6.5.6.6- Recording & Reporting

Environmental compliance records will be completed weekly (as applicable) on standard reporting forms during the construction phase. The same during the operation phase of the project will be done on monthly basis. Other records may include logbooks, meeting notes, correspondence, or records of telephone conversations. Compliance reports and other appropriate records will be logged into the field ES&H office and copies transmitted to the project office.

Forms will be used to document field inspection activities. They become permanent documents when completed by the Site Environmental Coordinator (SEC) / trainer and reviewed and signed by the appropriate supervisor, as required. Documentation that will be used by field environmental compliance personnel is summarized below.
a- Daily Environmental Inspection Checklist

The purpose of the checklist is to document the results of the environmental inspection activities conducted during the day with respect to compliance of observed construction activities relative to applicable environmental requirements.

The ES&H Manager reviews the report for adequacy and accuracy and identifies potential problem areas. Where sign-off is required only if there is a non-compliance requiring action and / or acknowledgement by the concerned. Copies of all checklists are filed in the site ES&H files.

The checklist is designed to be site specific and will remain dynamic throughout construction and operation phase to ensure it remains relevant to current activities.

b- Weekly Inspection Report

A weekly inspection report is prepared by the SEC after completing a general inspection of site and submitted to the field ES&H Manager with copies to the Environmental Lead. The report includes:

- Summary of inspection and monitoring efforts on the spread over the past week;
- Identification of any non-compliance and steps taken to correct non-compliance;
- Any other issues or problems encountered in carrying out inspection activities (e.g., schedule, delays);
- Government representatives on-site during the week;
- Inspection and monitoring plans and schedules for the upcoming week;
- General site audit and completion of the “Weekly Inspection Checklist”.

The management will have a standing invitation to accompany project personnel on this audit. The checklist will be modified over time to reflect pertinent issues related to the phase of construction presently occurring.

6.6- Environmental compliance

As confirmed in the Preliminary EMP, the management will be responsible for the regular audit and review of the environmental management and safety management. This will include both on-site auditing and review of performance reports. Additional onsite inspections and investigations will be undertaken in the event of significant environmental incidents. These will be undertaken in conjunction with the relevant government agencies.

The management will participate in the audits and inspections and investigations. The management will also be responsible for regular review of the environmental performance of the site and site personnel, and for the reporting on the implementation of commitments made in the EMP.

There is also likely to be some compliance auditing associated with for each government recommendation and management’s commitment, shall disclose the following information:

- The recommendation or management’s commitment being addressed;
- The issue to be addressed by the management;
- How the issue is to be addressed by the management;
- Where the issue is addressed in the EMP;
- When the issue is to be addressed by; and
- To whose satisfaction the issue is to be addressed.

The finalisation of the EMP will see the Compliance Audit Table completed, which will record dates of compliance by the proponent with recommendations and commitments and a reference to appropriate.
documentation from the relevant approving authority. It is envisaged that this table will be a live document and will be updated periodically throughout the life of the project.

6.6.1- Audits

In particular, there will be:

- Annual audit reports.
- A triennial review and improvement of the EMP.

Management recognises that periodic external compliance audits and inspections will be made to monitor, assess and validate the level of performance and compliance pursuant to the commitments made in the accepted Environmental Management Plan.

Management also proposes to conduct the following in-house audits:

A- Site Internal Environmental Audit

It is required in order to enable site management to assess the day-to-day environmental management of activities at the site. Environmental activities include all aspects of operations that result in emissions, effluent or wastes, etc.

B- Environmental Management Systems Audit

It is required to assess the implementation and operational success of the EMS at the site. This is achieved by assessing the objectives, organisational structure, responsibilities, procedures, processes and resources available at the site. The EMS Audit is a systems assessment, rather than an audit of environmental compliance, which is assessed through the Site Internal Environmental Audit.
### Table 6.1: Environmental management and Monitoring Plan- Construction and Operation Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The construction activities will be planned to minimize disturbance to soil</td>
<td>ICPL, CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.2</td>
<td>To the extent possible, equipment and materials would be staged in areas that have already been disturbed</td>
<td>ICPL, CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.3</td>
<td>Movement of construction equipment will be restricted to work areas only to avoid unnecessary disturbance to soil</td>
<td>CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.4</td>
<td>Routes of water tankers, dumper trucks and other project vehicles will be monitored for any signs of soil disturbance and road damage</td>
<td>CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.5</td>
<td>Area showing signs of unstabilised soil conditions will be compacted and watered</td>
<td>ICPL, CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.6</td>
<td>The assessment of settlement within affected zone due to dewatering will be conducted prior to dewatering</td>
<td>CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.7</td>
<td>The affected zone of settlement, if identified will be monitored regularly during dewatering activity</td>
<td>ICPL, CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.8</td>
<td>Proper drainage will be provided to construction camp, construction site, especially near excavations and around proposed facility</td>
<td>CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.9</td>
<td>Vehicle speed will be regulated and monitored to avoid excessive dust emissions</td>
<td>CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.10</td>
<td>Total land uptake by the towers and associated facilities will be kept to the minimum</td>
<td>ICPL, CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.11</td>
<td>Periodic trainings will be provided to drivers on mitigation measures related to off-road travel and speed limits</td>
<td>ICPL, CC</td>
<td>Check training records</td>
<td>During construction phase</td>
</tr>
<tr>
<td>1.12</td>
<td>The Dolmen City will have a storm water collection system so that the storm water effluent has minimal sediment load</td>
<td>ICPL, CC</td>
<td>Monitoring compliance</td>
<td>During design and construction phase</td>
</tr>
</tbody>
</table>
### Table 6.1: Environmental management and Monitoring Plan- Construction and Operation Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td><strong>Air Quality</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td><strong>Dust Emissions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.1</td>
<td>Water will be sprinkled daily or when there is an obvious dust problem on all exposed surfaces to suppress emission of dust. Frequency of Sprinklings will be kept such that the dust remains under control, particularly when wind is blowing towards the receptors</td>
<td>CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>2.1.2</td>
<td>Dust emissions from soil piles and aggregate storage stockpiles will be reduced by appropriate measures. These may include:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Keeping the material moist by sprinkling of water at appropriate frequency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Erecting windshield walls on three sides of the piles such that the wall project 0.5m above the pile, or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Covering the pile, for example with tarpaulin or thick plastic sheets, to prevent emissions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Locating stockpiles out of the wind direction</td>
<td>CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>2.1.3</td>
<td>All roads within the proposed Dolmen City Project will be paved as early as possible after the commencement of construction work. Until the roads are paved, they will be sprinkled regularly to prevent dust emission. Other temporary tracks within the site boundary will be compacted and sprinkled with water during the construction works.</td>
<td>ICPL, CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>2.1.4</td>
<td>Project traffic will maintain a maximum speed limit of 20km/hr on all unpaved roads within the proposed site area.</td>
<td>ICPL, CC</td>
<td>Check speed of vehicles</td>
<td>During construction phase</td>
</tr>
</tbody>
</table>
### Table 6.1: Environmental management and Monitoring Plan- Construction and Operation Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.5</td>
<td>Construction materials that are susceptible to dust formation will be transported only in securely covered trucks to prevent dust emission during transportation.</td>
<td>CC</td>
<td>Monitoring compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>2.1.6</td>
<td>The exposure of construction workers to dust will be minimized by provision of dust masks.</td>
<td>CC</td>
<td>Check for dust masks</td>
<td>During construction phase</td>
</tr>
</tbody>
</table>

#### 2.2 Vehicle Equipment and Exhaust.

| 2.2.1 | All vehicles, generators and other equipments used during the construction will be properly tuned and maintained in good working condition in order to minimize emission of pollutants. | ICPL, CC | Maintenance records of vehicles and equipments | During construction phase |
|       | The stack height of the generators during operation phase will be vented through vertical stacks to minimize exposure at ground level. | CC       | Monitor compliance | During construction phase |

#### 2.3 Generator Emissions

| 2.3.1 | The option of using natural gas as fuel in the back generators should be explored. | ICPL, Generator Vendor | Monitor compliance | During design phase |
|       | The generator will be properly tuned and maintained in good working condition in order to minimize exhaust emissions. | ICPL | Check maintenance records | During operation phase |
| 2.3.3 | The diesel generator should be used for a very short duration with the power switched back to the main power supply as quickly as possible. | ICPL | Monitoring compliance | During operation phase |
| 2.3.4 | NOx emission reduction techniques should be employed on a regular basis. | ICPL | Monitor NOx emissions | During operation phase |

#### 3 Construction Noise

<p>| 3.1 | Reduce equipment noise at source by proper design, maintenance and repair of construction machinery and equipment. | ICPL, CC | Check maintenance records | During construction phase |</p>
<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>Minimize noise from vehicles and power generators by use of proper silencers and mufflers.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>3.3</td>
<td>Use noise-abating devices wherever needed and practicable.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>4</td>
<td><strong>Water Sourcing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>A complete record of water consumption during construction and operation phase will be maintained</td>
<td>ICPL, CC</td>
<td>Check water</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>4.2</td>
<td>If a new water well is to be installed, it will be designed to abstract water preferably from deep aquifer not being used by local communities</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>4.3</td>
<td>Water conservation program will be initiated to prevent wastage of water.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>4.4</td>
<td>The water supply lines will be checked and repaired for leaks in order to reduce wastage of water.</td>
<td>ICPL, Maintenance Contractor</td>
<td>Check maintenance records</td>
<td>During operation phase</td>
</tr>
<tr>
<td>4.5</td>
<td>Recycle grey water for use for toilet flushing</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>4.6</td>
<td>Ensure that water efficient sanitary fittings are used throughout the development e.g., low flush toilets, water efficient shower heads, and aerators on faucets</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>5</td>
<td><strong>Soil Contamination</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>Fuels, lubricants, and chemical will be stored in covered bounded areas, underlain with impervious lining</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>5.2</td>
<td>Maintenance of vehicles and equipment will only be carried out designated areas. The area will be provided with hard surface or tarpaulin will be spread on the ground to prevent contamination of soil</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>5.3</td>
<td>Vehicles will only be washed at designated areas.</td>
<td>CC</td>
<td>Vehicle Inspection record</td>
<td>During construction phase</td>
</tr>
</tbody>
</table>
### Table 6.1: Environmental management and Monitoring Plan - Construction and Operation Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.4</td>
<td>Regular inspections will be carried out to detect leakage in construction vehicles and equipment</td>
<td>ICPL, CC</td>
<td>Check inspection / maintenance records</td>
<td>During construction phase</td>
</tr>
<tr>
<td>5.5</td>
<td>Appropriate arrangements, including shovels, plastic bags and absorbent materials, will be available near fuel and oil storage areas</td>
<td>CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>5.6</td>
<td>Contaminated soil will be removed and properly disposed after treatment such as incineration etc.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>6.1</td>
<td>Heavy traffic during construction phase will come to the project site during late night hours.</td>
<td>ICPL, CC</td>
<td>Traffic record</td>
<td>During construction phase</td>
</tr>
<tr>
<td>6.2</td>
<td>Project vehicles shall not be fitted with pressure horns</td>
<td>CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>6.3</td>
<td>During construction, regulate speed of vehicles</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>6.4</td>
<td>Designated parking areas will be provided for different type of project vehicles within and around the project site</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>6.5</td>
<td>Manage vehicle movement to avoid traffic jam and long queues</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>6.6</td>
<td>Prepare, implement and monitor the traffic management plan</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>6.6</td>
<td>Vehicles to use designated parking areas during operational phase.</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>6.8</td>
<td>Parking of vehicles along side the road should be prohibited at all time.</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
</tbody>
</table>
### Table 6.1: Environmental management and Monitoring Plan - Construction and Operation Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>Wastewater Generation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.1</td>
<td>Wastewater Generation During Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.1.1</td>
<td>Wastewater generated at the campsites will be stored temporarily in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>septic systems comprising of septic tanks from where it will be routed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>to a nearest drain/sewerage system.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>7.1.2</td>
<td>At the time of restoration, septic tanks will be dismantled in place and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>backfilled with at least 1m of soil cover above the surrounding natural</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>surface level</td>
<td>CC</td>
<td>Monitor compliance</td>
<td>After the completion of construction phase</td>
</tr>
<tr>
<td>7.2</td>
<td>Wastewater Generation During Operation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.2.1</td>
<td>The grey water will be recycled to be re-used again in toilets and kitchens etc.</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>7.2.2</td>
<td>Black water will be temporary stored in septic tanks and will be discharged into a nearby out fall sewer via trunk sewer</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During design, construction and operation phase</td>
</tr>
<tr>
<td>7.2.3</td>
<td>Waste segregation measures would be employed to minimize entry of solid waste into the wastewater stream</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>7.2.4</td>
<td>Water conservation strategies will be employed to avoid wastage of water</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>8</td>
<td>Solid Waste Generation and Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.1</td>
<td>Solid Waste Generation and Management during Construction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.1.1</td>
<td>Separate bins will be placed for different types of wastes- plastics, paper, metal, glass, wood, and cotton.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>8.1.2</td>
<td>Recyclable material will be separated at source. The recyclable waste will be sold to waste contractors for recycling</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
</tbody>
</table>
### Table 6.1: Environmental management and Monitoring Plan - Construction and Operation Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1.3</td>
<td>Non-hazardous non-recyclable wastes such as construction camp kitchen wastes will be disposed off in landfill site through municipal administration or approved waste contractor.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>8.1.4</td>
<td>No waste will be dumped at any location outside the proposed site boundary.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>8.1.5</td>
<td>All hazardous waste will be separated from other wastes. Hazardous wastes will be stored in designated areas with restricted access and proper marking. Hazardous wastes will be disposed off through approved waste contractors.</td>
<td>ICPL, CC</td>
<td>Check hazardous waste disposal records</td>
<td>During construction phase</td>
</tr>
<tr>
<td>8.1.6</td>
<td>Surplus construction materials including partially filled chemical and paint containers will be returned to suppliers. Inert construction wastes will be disposed off onsite as fill material or sold as scrap to contractors.</td>
<td>ICPL, CC</td>
<td>Check waste records</td>
<td>During construction phase</td>
</tr>
<tr>
<td>8.1.7</td>
<td>Records of all waste generated during the construction period will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register.</td>
<td>ICPL, CC</td>
<td>Check waste record register</td>
<td>During construction phase</td>
</tr>
<tr>
<td>8.1.8</td>
<td>Training will be provided to personnel for identification, segregation, and management of waste</td>
<td>ICPL, CC</td>
<td>Check training records</td>
<td>During construction phase</td>
</tr>
</tbody>
</table>

#### 8.2 Solid Waste Generation and Management during Operation

| 8.2.1 | Waste generation will be minimized by adopting waste management strategy of reduce, reuse and recycle | ICPL             | Monitor compliance               | During operation phase |
| 8.2.2 | A waste management plan will be prepared, implemented and monitored for the safe collection, storage and treatment/disposal of the building waste | ICPL             | Monitor compliance               | During operation phase |
| 8.2.3 | Records of all waste generated will be maintained. Quantities of waste disposed, recycled, or reused will be logged on a Waste Tracking Register | ICPL             | Check waste tracking register    | During operation phase |
### Table 6.1: Environmental management and Monitoring Plan- Construction and Operation Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.2.4</td>
<td>Training will be provided to personnel for identification, segregation, and management of waste</td>
<td>ICPL</td>
<td>Check training records</td>
<td>During operation phase</td>
</tr>
<tr>
<td>8.2.5</td>
<td>All inert and non-hazardous construction wastes will be disposed to the existing tipping sites within or outside of the city limits</td>
<td>ICPL, waste contractor</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>8.2.6</td>
<td>Hazardous wastes will be disposed through waste management contractors who will identified suitable disposal options for these waste such as recycling, metal recovery, incineration or bioremediation etc.</td>
<td>ICPL, waste contractor</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>8.2.7</td>
<td>Various waste containers for waste collection should be placed at appropriate locations in the building</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>8.2.8</td>
<td>Waste storage areas should be located within the facility and sized to the quantities of waste generated, with the following design considerations: Hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply, Secured by locks with restricted access Designed for access and regular cleaning by authorized cleaning staff and vehicles Protected from sun, and inaccessible to animals/rodents Equipped with appropriate lighting and ventilation Segregated from food supplies and preparation areas Equipped with supplies of protected clothing, and spare bags/containers</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During operation phase</td>
</tr>
<tr>
<td>9</td>
<td>Seismicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td>No specific mitigation measures other than to construct the facility in accordance with UBC Zone 2B</td>
<td>ICPL, Structure design consultant, CC</td>
<td>Monitor compliance</td>
<td>During project design phase</td>
</tr>
</tbody>
</table>
## Table 6.1: Environmental management and Monitoring Plan- Construction and Operation Phase

<table>
<thead>
<tr>
<th>No.</th>
<th>Impact and Mitigation Measures</th>
<th>Responsibilities</th>
<th>Monitoring</th>
<th>Timing</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td><strong>Sustainability</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.1</td>
<td>Best practice of energy efficiency will be incorporated in the building design</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During project design phase</td>
</tr>
<tr>
<td>10.2</td>
<td>Buildings to be constructed with high levels of thermal insulation</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During project design phase</td>
</tr>
<tr>
<td>10.3</td>
<td>Ensure that HVAC system, refrigeration equipment and fire suppression equipment do not contain HCFC's or Halons</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During project design phase</td>
</tr>
<tr>
<td>11</td>
<td><strong>Socio-economic Impacts</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1</td>
<td>Deliveries should be programmed to arrive and routed to minimize disturbance to residential areas, hospitals and offices.</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>11.2</td>
<td>Designated parking areas will be provided for different type of project vehicles within and around project site</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>11.3</td>
<td>Areas earmarked for recreation and commercial infrastructure will not be used for other purposes after construction</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>11.4</td>
<td>Employment preference will be given to Karachi residents</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>11.5</td>
<td>Local contractors will be given preference for hiring equipment and machinery during operation</td>
<td>ICPL, CC</td>
<td>Monitor compliance</td>
<td>During construction and operation phase</td>
</tr>
<tr>
<td>11.6</td>
<td>Ensure maximum quantity of water to be treated and reused in order to lessen its burden on the existing sewerage system.</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During design, construction and operation phase</td>
</tr>
<tr>
<td>11.6</td>
<td>Locals, surrounding business and city government are kept on the same page during all stages of the development of the project.</td>
<td>ICPL</td>
<td>Monitor compliance</td>
<td>During construction phase</td>
</tr>
<tr>
<td>11.8</td>
<td>A complaint register will be maintained on site during construction to record complaints of the nearby residents.</td>
<td>ICPL</td>
<td>Provision of complaint register</td>
<td>During construction phase</td>
</tr>
</tbody>
</table>
## Table 6.2: Environmental Monitoring Plan for Dolmen City

### Ambient Air Quality Sampling Plan

<table>
<thead>
<tr>
<th>Phase</th>
<th>Parameters</th>
<th>Locations</th>
<th>Frequency</th>
<th>Duration</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>SO\textsubscript{x}, NO\textsubscript{x}, CO, O\textsubscript{3}, Smoke, PM\textsubscript{10}</td>
<td>At the interface of complex and residential community</td>
<td>Twice Monthly</td>
<td>Continuous for 8 hours in a full working day</td>
<td>NAAQS (USEPA)</td>
</tr>
<tr>
<td>Operation</td>
<td>SO\textsubscript{x}, NO\textsubscript{x}, CO, O\textsubscript{3}, Smoke, PM\textsubscript{10}</td>
<td>At the interface of complex and residential community</td>
<td>Quarterly</td>
<td>Continuous for 8 hours in a full working day</td>
<td>NEQS (Pak EPA)</td>
</tr>
</tbody>
</table>

### Drinking Water Quality Sampling Plan

<table>
<thead>
<tr>
<th>Stages</th>
<th>Parameters</th>
<th>Locations</th>
<th>Frequency</th>
<th>Duration</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Heavy metals, TDS, TSS, pH, Total Coliform, Faecal Coliform</td>
<td>Ground water source and other sources</td>
<td>Monthly</td>
<td>Grab sampling</td>
<td>WHO drinking water quality guidelines</td>
</tr>
<tr>
<td>Operation</td>
<td>Heavy metals, TDS, TSS, pH, Total Coliform, Faecal Coliform</td>
<td>Drinking water sources</td>
<td>Quarterly</td>
<td>Grab sampling</td>
<td>WHO drinking water quality guidelines</td>
</tr>
</tbody>
</table>

### Wastewater Quality Sampling Plan

<table>
<thead>
<tr>
<th>Stages</th>
<th>Parameters</th>
<th>Locations</th>
<th>Frequency</th>
<th>Duration</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>BOD, COD, DO, TSS, TDS, pH, NO\textsubscript{3}, SO\textsubscript{4}, Oil &amp; Grease</td>
<td>Camp site discharge points into drains</td>
<td>Twice Monthly</td>
<td>Grab sampling</td>
<td>NEQS (Pak EPA)</td>
</tr>
<tr>
<td>Operation</td>
<td>BOD, COD, DO, TSS, TDS, pH, NO\textsubscript{3}, SO\textsubscript{4}, Oil &amp; Grease</td>
<td>Effluent from wastewater treatment plant</td>
<td>Twice Monthly</td>
<td>Composite sampling / Grab sampling</td>
<td>NEQS (Pak EPA)</td>
</tr>
</tbody>
</table>

### Noise Level Sampling Plan

<table>
<thead>
<tr>
<th>Stages</th>
<th>Parameters</th>
<th>Locations</th>
<th>Frequency</th>
<th>Duration</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Decibels [dB(A)Scale]</td>
<td>At the interface of complex and residential community</td>
<td>Twice Monthly</td>
<td>Continuous for 8 hours in a full working day</td>
<td>WHO Noise Guidelines NEQS for Noise (Pak EPA)</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td>At the interface of complex and facing road</td>
<td>Quarterly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td>6 meters from the equipment at construction site</td>
<td>Quarterly</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Solid Waste Sampling and Characterisation Plan

<table>
<thead>
<tr>
<th>Stages</th>
<th>Parameters</th>
<th>Locations</th>
<th>Frequency</th>
<th>Duration</th>
<th>Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>Waste generation rate, waste composition; recyclables and non-recyclables, hazardous waste</td>
<td>At main solid waste collection point from where the waste is transported from site</td>
<td>Monthly</td>
<td>24 hour sample collected during week days</td>
<td>EPA</td>
</tr>
<tr>
<td>Operation</td>
<td>Waste generation rate, waste composition; recyclables and non-recyclables, hazardous waste</td>
<td>At waste transfer facility of the complex prior to off-site disposal</td>
<td>Quarterly</td>
<td>24 hour sample collected during week days and holidays</td>
<td>EPA</td>
</tr>
<tr>
<td>Operation</td>
<td></td>
<td>6 meters from the equipment at construction site</td>
<td>Quarterly</td>
<td></td>
<td>(Pak EPA)</td>
</tr>
</tbody>
</table>

*Note: For air quality monitoring, duration of 8 hours is proposed instead of 24 hours as mentioned in EMP because the work duration for a full day is 8 hours.*
### Table 6.3: Sample Forms for Ambient Air Quality Monitoring Record

<table>
<thead>
<tr>
<th>Location</th>
<th>S.No.</th>
<th>Date</th>
<th>Time (Hrs:Min)</th>
<th>PM10 (Particulate Matter) Result (mg/Nm3)</th>
<th>USEPA Guidelines (mg/Nm3)</th>
<th>Comments*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***(H=High, L=Low)***

### Table 6.3: Sample Forms for Ambient Air Quality Monitoring Record

<table>
<thead>
<tr>
<th>Location</th>
<th>S.No.</th>
<th>Date</th>
<th>Time (Hrs:Min)</th>
<th>HC (Hydro - Carbon) Result (mg/Nm3)</th>
<th>USEPA Guidelines (mg/Nm3)</th>
<th>Comments*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>0.24 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>0.24 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>0.24 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>0.24 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>0.24 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>0.24 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td>0.24 ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>0.24 ppm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***(H=High, L=Low)***

**CO, SOx, NOx, Smoke**

<table>
<thead>
<tr>
<th>Location</th>
<th>S.No.</th>
<th>Parameters</th>
<th>Date</th>
<th>Time (Hrs:Min)</th>
<th>CO, SOx, NOx, Smoke Result (mg/Nm3)</th>
<th>NEQS Guidelines (mg/Nm3)</th>
<th>Comments*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>CO</td>
<td></td>
<td></td>
<td>800</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>SOx</td>
<td></td>
<td></td>
<td>1600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>NOx</td>
<td></td>
<td></td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Smoke</td>
<td></td>
<td></td>
<td>40% or 2 Ringelmann Scale or equivalent smoke number</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td>PM10</td>
<td></td>
<td></td>
<td>500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***(H=High, L=Low)***
### Table 6.4: Sample Form for Noise Quality Monitoring Record

<table>
<thead>
<tr>
<th>Location</th>
<th>S. No.</th>
<th>Date</th>
<th>Time (Hrs: Min)</th>
<th>Analysis Result [dB(A) Scale]</th>
<th>WHO Guidelines [dB(A) Scale]*</th>
<th>Comments**</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55 / 85</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55 / 85</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55 / 85</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55 / 85</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55 / 85</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55 / 85</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55 / 85</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>55 / 85</td>
<td></td>
</tr>
</tbody>
</table>

* 55 dB(A) for 15m and 85dB(A) for 6m from the source, ** (H=High, L=Low)

### Table 6.5: Sample Form for Drinking Water Quality Monitoring Record

<table>
<thead>
<tr>
<th>Location</th>
<th>Parameters</th>
<th>Date</th>
<th>Analysis Result</th>
<th>Guidelines (WHO / USEPA)</th>
<th>Comments*</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td></td>
<td></td>
<td>6.5-8.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Faecal Coliform</td>
<td></td>
<td></td>
<td>0.0 cfu/ 100 ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Coliform</td>
<td></td>
<td></td>
<td>0.0 cfu/ 100 ml</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Metals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(cfu=Coliform Unit), * (H=High, L=Low)

### Table 6.6: Sample Form for Wastewater Quality Monitoring Record

<table>
<thead>
<tr>
<th>Location</th>
<th>Parameters</th>
<th>Date</th>
<th>Analysis Result</th>
<th>NEQs Guidelines (mg/l)</th>
<th>Comments*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td></td>
<td></td>
<td>&lt;=3oC</td>
<td></td>
<td></td>
</tr>
<tr>
<td>pH</td>
<td></td>
<td></td>
<td>6 - 9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BOD</td>
<td></td>
<td></td>
<td>80 mg/l</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COD</td>
<td></td>
<td></td>
<td>150</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TSS</td>
<td></td>
<td></td>
<td>200</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TDS</td>
<td></td>
<td></td>
<td>3500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grease &amp; Oil</td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phenol Compounds</td>
<td></td>
<td></td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorides</td>
<td></td>
<td></td>
<td>1000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluorides</td>
<td></td>
<td></td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cyanide</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anionic Detergents</td>
<td></td>
<td></td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulphates</td>
<td></td>
<td></td>
<td>600</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulphides</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ammonia</td>
<td></td>
<td></td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesticides</td>
<td></td>
<td></td>
<td>0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadmium</td>
<td></td>
<td></td>
<td>0.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromium</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Copper</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead</td>
<td></td>
<td></td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mercury</td>
<td></td>
<td></td>
<td>0.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* (H=High, L=Low)
## Table 6.6: Sample Form for Wastewater Quality Monitoring Record

<table>
<thead>
<tr>
<th>Location</th>
<th>Parameters</th>
<th>Date</th>
<th>Analysis Result</th>
<th>NEQS Guidelines (mg/l)</th>
<th>Comments*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Selenium</td>
<td></td>
<td></td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Nickel</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Silver</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total Toxic metals</td>
<td></td>
<td></td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Zinc</td>
<td></td>
<td></td>
<td>5.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Arsenic</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Barium</td>
<td></td>
<td></td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Iron</td>
<td></td>
<td></td>
<td>8.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manganese</td>
<td></td>
<td></td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boron</td>
<td></td>
<td></td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chlorine</td>
<td></td>
<td></td>
<td>1.0</td>
<td></td>
</tr>
</tbody>
</table>

* (H=High, L=Low)
Table 6.7: Sample Form for Solid Waste Monitoring Record
(Domestic / residential / commercial solid wastes)

Location: __________, Date: __________, Source: __________ (domestic/commercial)

<table>
<thead>
<tr>
<th>Total Quantity (kg)</th>
<th>Components</th>
<th>Weight (as discarded)</th>
<th>% by weight (as discarded)</th>
<th>Recyclables</th>
<th>Non-recyclables</th>
<th>Organic waste</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Food/kitchen waste</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plastics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Metals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Paper</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Textile/Rugs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cardboard</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glass</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Rubber</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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 per 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:
____________________________________________________________________________________________
____________________________________________________________________________________________
____________________________________________________________________________________________
**Table 6.8: Sample Form for Solid Waste Monitoring Record**

(Hazardous solid wastes)

Location: ________, Date: __________, Source: _________ (domestic/commercial)

<table>
<thead>
<tr>
<th>Total Quantity (kg)</th>
<th>Hazardous waste Components</th>
<th>Weight (as discarded)</th>
<th>% by weight (as discarded)</th>
<th>Characteristics (corrosive, toxic, explosive, etc.)</th>
<th>Non-recyclables (requiring disposal)</th>
<th>Recyclables</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Whichever of the following applies:

For domestic or residential units

Total waste generated = _____________ kg/capita/day

No of persons in units

For commercial units

Total waste generated = _____________ kg per unit area

Total floor area of unit

Summary:

- 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

Comments:

____________________________________________________________________________________________
____________________________________________________________________________________________
____________________________________________________________________________________________
____________________________________________________________________________________________
07 Conclusion

This EIA Study has examined all environmental aspects critically and made assessment of the impacts during the pre-construction, construction and operation stages. Ecological impacts may not be seen as the area is already inhabited by houses, apartment buildings and commercial buildings. The most appropriate and likely to occur environmental and socio-economic impacts have been identified, and have been presented in this EIA report. Mitigation measures that have been adopted by Dolmen City Project Management and their contractor(s) as per the environmental management and monitoring plan are a necessary part of the Report.

Considering the processes involved in construction and operation of The Project and keeping in view the relevant national legislations/guidelines, the impact analysis indicates major aspects which may cause problems are wastewater, solid waste and occupational safety. The Project has provisions for wastewater management, solid waste handling, control of air emissions in project design and for adoption of occupational safety measures.

The Project falls in Schedule-II requiring submission of EIA since:

- Dolmen City Project cost is above Pak Rupees 50 Million and
- The Project is located in the microenvironment comprising the sandy beach of Clifton on the front; the large Baghe Jinnah in the immediate vicinity; and several residential complexes across the road, and the macro-environment of the Project comprising the Karachi Port Trust property housing the oil installations, coal storage area, and the Manora Channel enclosing the harbor on the north and northwest; and a large number of architecturally, historically and archaeologically significant structures that fall in the category of environmentally sensitive areas.

The study carried out for the preparation of this EIA finds that the environmental impact of different activities of The Project are localized to the microenvironment and are of short duration. The Study recommends and confirms that:

- The Dolmen City Project shall adopt all environmental management processes as defined in the ACCOR Environmental Charter Guide, and the building codes prescribed by Karachi Building Control Authority.
- The Project management as well as the CDGK which operates the Baghe Jinnah has to realize that the sea is normally 3.36 meter (11ft) below the road level and 2.7 meters (8.8 ft) below the average ground level at Dolmen City Project site and at Baghe Jinnah. This suggests that a tsunami of magnitude similar to the 1945 Tsunami would affect the 2.5 meter contour on the beach front of Dolmen City Project site and Baghe Jinnah. This would need to be mitigated by construction of adequately reinforced protection wall in the front of Dolmen City as well as Baghe Jinnah. Such structure would also mitigate the likely impact due to sea level rise in the years to come.
- Appropriate solid waste handling mechanism and storage facilities will be developed at premises.
- Grease interceptors as well as septic tank shall be provided and there would be provision for wastewater treatment plant.
- It is anticipated that the wastewater shall comply with the prescribed NEQS limits.
Protective measures against air emissions and high noise intensity will be included in the design of The Project. ACCOR Environmental Charter Guidelines will be followed.

Traffic management plan has already been developed and is operational.

It is envisaged that the Dolmen City Project will be constructed and operated without creating adverse environmental impacts. The development is compatible with the aims and objectives of (a) Sustainable Development in promoting improvement in quality of life, and (b) CDGK as well as the Karachi Building Control Authority in promoting the development of construction industry nationwide and thus to sustainable economic development in Pakistan.

This EIA Study finds that launching of the Project at the site in Clifton would respond to the principles of sustainable development that aim at "socially equitable, and economically viable development to improve the quality of life for all citizens of the Earth, without altering the balance in the ecosystem."

The Study therefore recommends that the EIA should be approved.
ENVIRONMENTAL PROTECTION TRIBUNAL, KARACHI

Complaint No.1 of 2009

Naeem Ahmed Mughal,
DG, EPA, Sindh. .................................................. Complainant.

Versus

Jabir Hussain Dada and another .................................. Respondents

02.12.2009

ORDER

The present Complaint is filed by the Director General, Environmental Protection Agency, Sindh against one Jabir Hussain Dada and Nadeem Riaz, Chief Executive Officer, International Complex Project Limited, under Sections 12 and 17 read with Section 21(3)(a) of the Pakistan Environmental Protection Act, 1997.

The facts in brief as stated in the complaint are that the Respondents are engaged in construction of multi-storeyed buildings at Clifton Beach in Block-02 covering thousands of square yards. The Environmental Protection Agency, Sindh had issued a Letter dated 26.03.2009 to Respondent No.1 advising him to comply with the environmental laws, else he would be prosecuted. It was further directed to submit the salient features of the project so that the requirement of ‘Environmental Impact Assessment’ and ‘Initial Environmental Examination’ of the project could be ascertained. But he did not respond to the letter nor did he submit any ‘Environmental Impact Assessment’ or ‘Initial Environmental Examination’ of the project through qualified Environmental Consultant and continued with construction work of a huge project, thus violating the provisions of the Pakistan Environmental Protection Act 1997.

Sd/- 02.12.2009
CHAIRPERSON
Annexure I

This being the position the present complaint was filed with the prayer that the Respondent is to be prosecuted under Section 21 of the Pakistan Environmental Protection Act, 1997 for violation of Section 12 of the Pakistan Environmental Protection Act, 1997.

It may not be out of place to mention here that initially the present complaint was filed against the Respondent No.1 only who had disowned his responsibility on behalf of International Complex Project Limited being its employee where-after the Complainant has joined Respondent No.2 also to these proceedings.

In response the Respondents filed their replies whereby they have denied the allegations levelled against them and have also categorically stated that no Notice dated 26.03.2009 as alleged by the Complainant was ever served upon them and that their project is almost complete. Further it is the case of the Respondents that the project in dispute actually commenced in the year 1992 whereas the “Environmental Protection Act” was enacted in the year 1997. Therefore, it cannot be applied retrospectively. Even the Environmental Impact Assessment Regulation, came into force in the year 2000, therefore, no violation of Section 12 of the Pakistan Environmental Protection Act, 1997 as alleged by the Complainant has accrued. In support of their contention they have also submitted Architectural Approval of building plan dated 25.10.1089 issued by the KBCA, NOC issued by the KBCA for advertisement of sale of flats and shops etc. dated 01.01.1990 and copy of approved plan by the KBCA dated 12.10.1992.

During the pendency of present complaint, the Respondents have filed Statement dated 03.11.2009, which reads as under:

“It is respectfully submitted on behalf of the Respondent No.2, that without prejudice to the contentions of the Respondent No.2 stated in the Respondent No.2’s Reply to the subject Complaint
Annexure I

and without admitting any liability on the part of the Respondent No.2 as alleged in the subject complaint, the Respondent No.2 shall submit an Environmental Impact Assessment Report to the Environmental Protection Agency, Sindh within a period of 2 months and comply with all provisions of the Pakistan Environmental Protection Act, 1997 as may be applicable.

It is therefore respectfully submitted that in view of the above, the instant Complaint be dismissed with the observations stated above, with no order as to costs.”

We have heard both the parties regarding maintainability of the present Complaint and have perused the case record. The Environmental Protection Agency, Sindh has not disputed the contention of the Respondents that their construction has started in the year 1992 before the enactment of the Pakistan Environmental Protection Act, 1997. Further the Department has also failed to show that Notice dated 26.03.2009 was served upon the Respondents.

Be that as it may as mentioned earlier that the Respondents have filed statement that they are ready to submit Environmental Impact Assessment Report to the Environmental Protection Agency, Sindh, within a period of 2 months and will comply with all the provisions of the Pakistan Environmental Protection Act, 1997. Therefore, it is hereby ordered that the Respondents shall submit an Environmental Impact Assessment Report within a period of two months in accordance with the provisions of Pakistan Environmental Protection Act, 1997. Put off to 03.02.2010 for further proceedings.

Sd/-02.12.2009
(Mrs. Ashraf Jahan)
CHAIRPERSON

Sd/-02.12.2009
(Dr. Sami uz Zaman)
MEMBER TECHNICAL

Sd/-02.12.2009
(Abdul Karim M. Memon)
MEMBER LEGAL
Environmental Impact Assessment (EIA) for The Dolmen City Project
A Project of International Complex Projects Limited (ICPL)

Annexure I

Date of Application 15.12.2009
Date of Assessment 15.12.2009
Date of Deposit Copy 15.12.2009
Copy Ready on 15.12.2009
Copy Delivered on 15.12.2009
Copy Charges Rs.
Urgent Fees Charges Rs.
Comparing Charges Rs.
Prepared by

Certified to be True Copy

READER
Environmental Protection Tribunal
Karachi
Government of Pakistan
ENVIRONMENTAL PROTECTION TRIBUNAL, KARACHI

Complaint No.1 of 2009

Naeem Ahmed Mughal,
Director General,
Environmental Protection Agency, Sindh, through,
its office at ST-2/1, Sector-23,
Korangi Industrial Area, Karachi ........................................ Complainant

Versus

1. Jabir Hussain Dada son of Muhammad (Late),
   Employee of International Complex Project Limited,
   resident of A-301, Bon Vista Apartment, Block-2,
   Clifton, Karachi; and

2. Nadeem Riaz son of Riaz-ud-din,
   Chief Executive Officer (CEO),
   International Complex Project Limited,
   resident of 37-R, Block-6, PECHS,
   Karachi ............................................................... Respondents/Accused

TITLE
Annexure II

Pakistan Environmental Protection Act, 1997

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, SATURDAY, DECEMBER 6, 1997

PART I
Acts, Ordinances, President’s Orders and Regulations

SENATE SECRETARIAT
Islamabad, the 6th December, 1997

No. F. 94/46/97-Legis: The following Acts of Majlis-e-Shoora (Parliament) received the assent of the Acting President on 3rd December, 1997 are hereby published for general information—

Act No. XXXIV OF 1997

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

WHEREAS it 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,

1. Short title, extent and commencement.—(1) This Act, shall be called the Pakistan Environmental Protection Act, 1997

(2) It extends to the whole of Pakistan.

(3) It shall come into force at once.

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

(i) “adverse environmental effect” means impairment of, or damage to, the environment and includes—

(a) impairment of, or damage to, human health and safety or to biodiversity or property;
(b) pollution; and
(c) any adverse environmental effect as may be specified in the regulations;
(ii) "agricultural waste" means waste from farm and agricultural activities including poultry, cattle farming, animal husbandry residues from the use of fertilizers, pesticides and other farm chemicals;
(iii) "air pollutant" means any substance that causes pollution of air and includes soot, smoke, dust particles, odour, light, electro-magnetic, radiation, heat, fumes, combustion exhaust, exhaust gases, noxious gases, hazardous substances and radioactive substances;
(iv) "biodiversity" or "biological diversity" means the variability among living organisms from all sources, including inter alia terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part, including diversity within species, between species and of ecosystems;
(v) "Council" means the Pakistan Environmental Protection Council established under section 3;
(vi) "discharge" includes spilling, leaking, pumping, depositing, seeping, releasing, flowing out, pouring, emitting, emptying or dumping;
(vii) "ecosystem" means a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit;
(viii) "effluent" means any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapour;
(ix) "emission standards" means the permissible standards established by the Federal Agency or a Provincial Agency for emission of air pollutants and noise and for discharge of effluent and waste;
(x) "environment" means—
(a) air, water and land;
(b) all layers of the atmosphere;
(c) all organic and inorganic matter and living organisms;
(d) the ecosystem and ecological relationships;
(c) buildings, structures, roads, facilities and works;
Annexure II

Pakistan Environment Protection Act, 1997

(f) all social and economic conditions affecting community life; and

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

(xii) "environmental impact assessment" means an environmental study comprising collection of data, prediction of qualitative and quantitative impacts, comparison of alternatives, evaluation of preventive, mitigatory 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;

(xiii) "Environmental Magistrate" means the Magistrate of the First Class appointed under Section 24;

(xiv) "Environmental Tribunal" means the Environmental Tribunal constituted under Section 20;

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

(xvi) "Factory" means any premises in which industrial activity is being undertaken;

(xvii) "Federal Agency" means the Pakistan Environmental Protection Agency established under section 3, or any Government Agency, local council or local authority exercising the powers and functions of the Federal Agency;

(xviii) "Government Agency" includes

(a) a division, department, attached department, bureau, section, commission, board, office or unit of the Federal Government or a Provincial Government;

(b) a developmentally or a local authority, company or corporation established or controlled by the Federal Government or Provincial Government; and

(c) a Provincial Environmental Protection Agency;

(d) any other body defined and listed in the Rules of Business of the Federal Government or a Provincial Government;

(xviii) "hazardous substance" means

(a) a substance or mixture of substances, other than a pesticide as defined in the Agricultural Pesticides Ordinance, 1971 (II of 1971), which, by reason of its chemical activity or toxic, explosive, flammable, corrosive, radioactive or other characteristics,
Pakistan Environmental Protection Act, 1997

(b) any substance which may be prescribed as a hazardous substance;

(xix) “hazardous waste” means waste which is or which contains a hazardous substance or which may be prescribed as hazardous waste and includes hospital waste and nuclear waste;

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

(xxi) “hospital waste” includes waste medical supplies and materials of all kinds, and waste blood, tissue, organs and other parts of the human and animal bodies, from hospitals, clinics and laboratories;

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

(xxiii) “industrial waste” means waste resulting from an industrial activity;

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

(xxv) “local authority” means any agency set up or designated by the federal Government or a Provincial Government, by notification in the official Gazette, to be a local authority for the purposes of this Ordinance;

(xxvi) “local council” means a local council constituted or established under a law relating to local government;

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

(xxviii) “municipal waste” includes sewage, refuse, garbage, waste from abattoirs, sludge and human excreta and the like;
Annexure II

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

(40) "noise" means the intensity, duration and character of sounds from all sources, and includes vibration;

(41) "nuclear waste" means waste from any nuclear reactor or nuclear plant or other nuclear energy system, whether or not such waste is radioactive;

(42) "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;

(43) "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 unfavourably the chemical, physical, biological, radiological, 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 unpleasant, noxious or impair or injurious, disagreeable or detrimental to the health, safety, welfare or property of persons or harmful to biodiversity;

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

(45) "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;

(46) "proponent" means the person who proposes or intends to undertake a project;

(47) "Provincial Agency" means a Provincial Environmental Protection Agency established under section 8;
(xxxviii) "regulations" means regulations made under this Act;

(xix) "rules" means rules made under this Act;

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

(xli) "standards" means qualitative and quantitative standards for discharge of 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 National Environmental Quality Standards, emission standards and other standards established under this Act and the rules and regulations;

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

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

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

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

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

(i) Prime Minister or such other person as the Prime Minister may nominate in this behalf: Chairperson

(ii) Minister in charge of the Ministry or Division dealing with the subject of environment. Vice Chairperson

(iii) Chief Ministers of the Provinces. Members

(iv) Ministers in charge of the subject of environment in the Provinces. Members

(iv) Such other persons not exceeding thirty-five as the federal Government may appoint, of which at least Members
Annexure II

Pakistan Environmental Protection Act, 1997

twenty shall be non-officials including five representatives of the Chambers of Commerce and Industry and industrial associations and one or more representatives of the Chambers of Agriculture, the medical and legal professions, trade unions, and non-governmental organizations concerned with the environment and development, and scientists, technical experts and educators.

(v) Secretary to the Government of Pakistan, in charge of the Ministry or Division dealing with the subject of environment Member/Secretary

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

(3) The Council shall frame its own rules of procedure.

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

(5) 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.

(6) 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.


(a) coordinate and supervise enforcement of the provisions of this Act; and

(b) approve comprehensive national environmental policies and ensure their implementation within the framework of a national conservation strategy as may be approved by the Federal Government from time to time;

(c) approve the National Environmental Quality Standards;

(d) provide guidelines for the protection and conservation of species, habitats, and biodiversity in general, and for the conservation of renewable and non-renewable resources.
Annexure II

Pakistan Environmental Protection Act, 1997

(c) co-ordinate integration of the principles and concerns of sustainable development into national development plans and policies;

(1) consider the National Environment Report and give appropriate directions thereon;

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

5. Establishment of the Pakistan Environmental Protection Agency.—-(1) The Federal Government shall, by notification in the official Gazette, establish the Pakistan Environmental Protection Agency to exercise the powers and perform the functions assigned to it under this Act and the rules and regulations made thereunder.

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

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

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

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

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


(a) administer and implement this Act and the rules and regulations made;

(b) prepare, in co-ordination with the appropriate Government Agency and in consultation with the concerned sectoral Advisory Committees, national environmental policies for approval by the Council;

(c) take all necessary measures for the implementation of the national environmental policies approved by the Council,
(d) prepare and publish an annual National Environment Report on the state of the environment;

(e) prepare, establish and revise the National Environmental Quality Standards with approval of the Council:

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

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

(g) establish standards for the quality of the ambient air, water and land, by notification in the official Gazette in consultation with the Provincial Agency concerned:

Provided that:

(i) different standards for discharge or emission from different sources and for different areas and conditions may be specified;

(ii) where standards are less stringent than the National Environmental Quality Standards prior approval of the Council shall be obtained;

(iii) certain areas, with the approval of the Council, may exclude from carrying out specific activities, projects from the application of such standards;

(h) co-ordinate environmental policies and programmes nationally and internationally;

(i) 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;

(j) 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;

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

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

Pakistan Environmental Protection Act, 1997

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

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

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

(o) provide information and guidance to the public on environmental matters;

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

(q) promote public education and awareness of environmental issues through mass media and other means including seminars and workshops;

(r) specify safeguards for the prevention of accidents and disasters which may cause pollution, collaborate with the concerned person in the preparation of contingency plans for control of such accidents and disasters, and co-ordinate implementation of such plans;

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

(t) 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

(u) perform any function which the Council may assign to it.

(2) The Federal 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 the Federal Government, requests for foreign assistance in support of the purposes of this Act and enter into arrangements with foreign agencies or organizations for the exchange of material or information and participate in international seminars or meetings;
Pakistan Environmental Protection Act, 1997

(d) recommend to the Federal Government the adoption of financial and fiscal programmes, schemes or measures for achieving environmental objectives and goals and the purposes of this Act, including—

(i) incentives, prizes awards, subsidies, tax exemptions, rebates and depreciation allowances; and

(ii) taxes, duties, cesses and other levies;

(c) 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 establishment of similar laboratories in the private sector; and

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

7. Powers of the Federal Agency.—Subject to the provisions of this Act, the Federal Agency may

(a) lease, purchase, acquire, own, hold, improve, use or otherwise deal in and with any property both 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 the 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;

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

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

(g) enter and inspect and under the authority of a search warrant issued by the Environmental Court or Environmental Magistrate, search at any reasonable time, any land, building, premises, vehicle or vessel or other place where or in which there are reasonable grounds to believe that an offence under this Act has been, or is being, committed;
(h) take samples of any materials, products, articles or substances or of the 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 test and analysis of the samples at a certified laboratory;

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

Provided that the power under clauses (i), (h), (i) and (j) shall be exercised in accordance with the provisions of the Code of Criminal Procedure, 1898 (Act V of 1898), or the rules made under this Act and under the direction of the Environmental Court or Environmental Magistrate, and

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

8. Establishment, powers and functions of the Provincial Environmental Protection Agencies. (1) Every Provincial Government shall, by notification in the official Gazette, establish an Environmental Protection Agency, to exercise such powers and perform such functions as may be delegated to it by the Provincial Government under sub-section (2) of section 26.

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

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

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

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

(6) For assistance of the Provincial Agency in the discharge of its functions, the Provincial Government shall establish Sectoral Advisory Committees for various sectors and appoint members from amongst eminent representatives of the relevant sector, educational institutions, research institutes and non-governmental organizations.
9. Establishment of the Provincial Sustainable Development Funds. (1) There shall be established in each Province a Sustainable Development Fund.

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

(a) grants made or loans advanced by the Federal Government or the Provincial Governments;

(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) contributions from private organizations and other persons.

(3) The Provincial Sustainable Development Fund shall be utilized in accordance with such procedure as may be prescribed for—

(a) providing financial assistance to the projects designed for the protection, conservation, rehabilitation and improvement of the environment, the prevention and control of pollution, the sustainable development of resources and for research in any aspect of environment; and

(b) any other purpose which in the opinion of the Board shall help achieve environmental objectives and the purposes of this Act.

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

(i) Chairman, Planning and Development Board/Additional Chief Secretary Planning and Development Department .... Chairperson

(ii) such officers of the Provincial Governments, not exceeding six, as the Provincial Government may appoint including Secretaries in charge of the Finance, Industries and Environment Departments .... Members

(iii) such non-official persons not exceeding ten as the Provincial Government may appoint including representatives of the Provincial Chamber of Commerce and Industry, non-governmental organisations, and major donors. .... Members

(iv) Director-General of the Provincial Agency Member/Secretary
(2) In accordance with such procedure 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 Provincial Sustainable Development Fund in such profit-bearing Government bonds, savings 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 Provincial Sustainable Development Fund for the purposes specified in sub-section (3) of section 9.

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

11. Prohibition of certain discharges or emissions. (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 or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards or, where applicable, the standards established under sub-clause (f) of clause (g) of sub-section (1) of section 6.

(2) The Federal Government may levy a pollution charge on any person who contravenes or fails to comply with the provisions of sub-section (1), to be calculated at such rate, and collected in accordance with such procedure as may be prescribed.

(3) Any person who pays the pollution charge levied under sub-section (2) shall not be charged with an offence with respect to that contravention or failure.

(4) The provisions of sub-section (3) shall not apply to projects which commenced industrial activity on or after the thirtieth day of June, 1994.

12. Initial environmental examination and environmental impact assessment. (1) No proponent of a project shall commence construction or operation unless he has filed with the Government Agency designated by Federal Environmental Protection Agency or Provincial Environmental Protection Agencies, as the case may be, or, where the project is likely to cause an adverse environmental effects an environmental impact assessment, and has obtained from the Government Agency approval in respect thereof.

(2) The Government Agency shall subject to standards fixed by the Federal Environmental Protection Agency.
(a) review the initial environmental examination and accord its approval, 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 conditions as it may deem fit to impose, require that the environmental impact assessment be re-submitted after such modifications as may be stipulated or reject the project as being contrary to environmental objectives.

(3) Every review of an environmental impact assessment shall be carried out with public participation and no information will be disclosed during the course of such public participation which relates to—

(i) trade, manufacturing or business activities, processes or techniques of a proprietary nature, or financial, commercial, scientific or technical matters which the proponent has requested should remain confidential, unless for reasons to be recorded in writing, the Director General of the Federal Agency is of the opinion that the request for confidentiality is not well-founded or the public interest in the disclosure outweighs the possible prejudice to the competitive position of the project or its proponent; or

(ii) international relations, national security or maintenance of law and order, except with the consent of the Federal Government; or

(iii) matters covered by legal professional privilege.

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

(5) Subject to sub-section (4) the appropriate Government may in a particular case extend the aforementioned period of four months if the nature of the project so warrants.

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

(7) The Government 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 to inspection by the public at all reasonable hours and the disclosure of information in such registers shall be subject to the restrictions specified in sub-section (3).
13. Prohibition of import of hazardous waste. No person shall import hazardous waste into Pakistan and its territorial waters, exclusive economic zone and historic waters.

14. Handling of hazardous substances.—Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any hazardous substance except

(a) under a licence issued by the Federal Agency and in such manner as may be prescribed; or

(b) in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party.

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

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

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

16. Environmental protection order.—(1) Where the Federal Agency or a Provincial Agency is satisfied that the discharge or emission of any effluent, waste, air pollutant or noise, or the disposal of waste, or the handling of hazardous substances, or any other act or omission is likely to occur, or is occurring, or has occurred, in violation of the provisions of this Act, rules or regulations or of the conditions of a licence, and is likely to cause, or is causing or has caused an adverse environmental effect, the Federal Agency or the Provincial Agency may, after giving the person responsible for such discharge, emission, disposal, handling, act or omission an opportunity of being heard, by order direct such person to take such measures that the Federal Agency or the Provincial 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—
Annexure II

Pakistan Environment Protection Act, 1997

(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; and

(d) action to restore the environment to the condition existing prior to such discharge, disposal, handling, act or omission, or as close to such condition as may be reasonably in the circumstances, to the satisfaction of the Federal Agency or Provincial Agency.

(3) Where the person, to whom directions under sub-section (1) are given, does not comply therewith, the Federal Agency or Provincial Agency may, in addition to the proceedings initiated against him under this Act, the rules and regulations, itself take or cause to be taken such measures specified in the order as it may deem necessary and may recover the reasonable costs of taking such measures from such person as arrears of land revenue.

17. Penalties. (1) Whoever contravenes or fails to comply with the provisions of sections 11, 12, 13 or section 16 or any order issued thereunder shall be punishable with fine which may extend to one million rupees, and in the case of a continuing contravention or failure, with an additional fine which may extend to one hundred thousand rupees for every day during which such contravention or failure continues:

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

(2) Whoever contravenes or fails to comply with the provisions of section 14 or 15 or any rule or regulation or conditions of any licence, any order or direction, issued by the Council or the Federal Agency or Provincial Agency, shall be punishable with fine which may extend to one hundred thousand rupees, and in case of continuing contravention or failure with an additional fine which extend to one thousand rupees for every day during which such contravention continues.

(3) Where an accused has been convicted of an offence under sub-sections (1) and (2), the Environmental Court and Environmental Magistrate, as the case may be, shall, 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-section (1) and the Environmental Court is satisfied that as a result of the commission of the offence
monetary benefits have accrued to the offender, the Environmental Court may order the offender to pay, in addition to the fines under sub-section (1), further additional fine commensurate with the amount of the monetary benefits.

(5) Where a person convicted under sub-sections (1) or sub-section (2) had been previously convicted for any contravention under this Act, the Environmental Court or, as the case may be, Environmental Magistrate may, in addition to the punishment awarded thereunder—

(a) 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;

(b) sentence him to imprisonment for a term which may extend to two years;

(c) order the closure of the factory;

(d) order confiscation of the factory, machinery, and equipment, vehicle, material or substance, record or document or other object used or involved in contravention of the provisions of the Act:

Provided that for a period of three years from the date of commencement of this Act, the sentence of imprisonment shall be passed only in respect of persons who have been previously convicted for more than once for any contravention of sections 11, 13, 14 or 16 involving hazardous waste;

(c) order such person to restore the environment at his own cost, to the conditions existing prior to such contravention or as close to such conditions as may be reasonable in the circumstances to the satisfaction of the Federal Agency or, as the case may be, Provincial Agency, and

(l) order that such sum be paid to any person as compensation for any loss, bodily injury, damage to his health or property suffered by such contravention.

(6) The Director-General of the Federal Agency or of a Provincial Agency or an officer generally or specially authorised by him in this behalf may, on the application of the accused compound an offence under this Act with the permission of the Environmental Tribunals or Environmental Magistrate in accordance with such procedure as may be prescribed.

(7) Where the Director-General of the Federal Agency or of a Provincial Agency is of the opinion that a person has contravened any provision of Act he may, subject to the rules, by notice in writing to that person require him to pay to the Federal Agency or, as the case may be, Provincial Agency an administrative penalty in an amount fixed in the notice for each day the contravention continues, and a person who pays an administrative
Annexure II

Pakistan Environmental Protection Act, 1997

penalty for a contravention shall not be charged under this Act with an offence in respect of such contravention.

(8) The provisions of sub-sections (6) and (7) shall not apply to a person who has been previously convicted of offence or who has compounded an offence under this Act who has paid an administrative penalty for a contravention of any provision of this Act.

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

Provided that in the case of a company as defined under the Companies Ordinance, 1984 (XI 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, 1922 (VII of 1922).

19. Offences by Government Agencies, local authorities or local councils. Where any contravention of this Act has been committed by any Government Agency, local authority or local council, and it is proved that such contravention has been committed with the consent or connivance of, or is attributable to any negligence on the part of, the Head or any other officer of the Government Agency, local authority or local 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.

20. Environmental Tribunals. (1) The Federal Government may, by notification in the official gazette, establish as many Environmental Tribunals as it consider necessary, and, where it establishes more than one Environmental Tribunals, 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.

(2) An Environmental Tribunal shall consist of a Chairperson who is, or has been, or is qualified for appointment as, a judge of the High Court to be appointed after consultation with the Chief Justice of the High Court and two members to be appointed by the Federal Government of which at least one shall be a technical member with suitable professional qualifications and experience, in the environmental field as may be prescribed.
Pakistan Environmental Protection Act, 1987

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

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

(5) An Environmental Tribunal shall not, merely be 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 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 Tribunal shall be invalid by reason only of the existence of a vacancy in, or defect in the constitution, of the Environmental Tribunal.

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

21. Jurisdiction and powers of Environmental Tribunals—(1) An Environmental Tribunal shall exercise such powers and perform such functions as are, or may be, conferred upon or assigned to it by or under this Act or the rules and regulations made thereunder.

(2) All contravention punishable under sub-section (1) of section 17 shall exclusively be triable by an Environmental Tribunal.

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

(a) the Federal Agency or any Government Agency or local council; and

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

(4) In exercise of its criminal jurisdiction, the Environmental Tribunals shall have the same powers as are vested in Court of Session under the Code of Criminal Procedure, 1898 (Act V of 1898).
(5) In exercise of the appellate jurisdiction under section 22 the Environmental Tribunals 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 Tribunal shall follow the procedure laid down in the Code of Civil Procedure, 1908 (Act V of 1908).

(7) An Environmental Tribunal may, on application filed by any officer duly authorised in this behalf by the Director-General of the federal Agency or of Provincial Agency, issue bailable warrant for the arrest of any person against whom reasonable suspicion exist, of his having been involved in contravention punishable under sub-section (1) of Section 17.

Provided that such warrant shall be applied for, issued, and executed in accordance with the provisions of the Code of Criminal Procedure, 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 police station.

(8) All proceedings before the Environmental Tribunal shall be deemed to be judicial proceedings within the meaning of section 193 and 228 of the Pakistan Penal Code (Act XV of 1860), and the Environmental 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 Tribunal shall have or exercise any jurisdiction with respect to any matter to which the jurisdiction of an Environmental Tribunal extends under this Act, the rules and regulations made thereunder.

(10) Where the Environmental Tribunal is satisfied that a complaint made to it under sub-section (5) is false and vexatious to the knowledge of the complainant, it may, by an order, direct the complainant to pay to the person complained against such compensatory costs which may extend to one hundred thousand rupees.

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

(2) An appeal to the Environmental Tribunal shall be in such form, contain such particulars and be accompanied by such fees as may be prescribed.
23. Appeals from orders of the Environmental Tribunal.—(1) Any person aggrieved by any final order or by any sentence of the Environmental Tribunal passed under this Act may, within thirty days of communication of such order or sentence, prefer an appeal to the High Court.

(2) An appeal under sub-section (1) shall be heard by a Bench of not less than two Judges.

24. Jurisdiction of Environmental Magistrates.—(1) Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898), or any other law for the time being in force, but subject to the provisions of this Act, all contravention punishable under sub-section (2) of section 17 shall exclusively be triable by a judicial Magistrate of the first class as Environmental Magistrate especially empowered in this behalf by the High Court.

(2) An Environmental Magistrate shall be competent to impose any punishment specified in sub-sections (2) and (4) of section 17.

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

(a) the Federal Agency, Provincial Agency, or Government Agency or a local council; and

(b) any aggrieved person.

25. Appeals from orders of Environmental Magistrates. Any person convicted of any contravention of this Act or the rules or regulations by an Environmental Magistrate may, within thirty days from the date of his conviction, appeal to the Court of Sessions whose decision thereon shall be final.

26. Power to delegate. (1) The Federal Government may, by notification in the official Gazette, delegate any of its or of the Federal Agency’s powers and functions under this Act and the rules and regulations to any Provincial Government, any Government Agency, local council or local authority.

(2) The Provincial Government may, by notification in the official Gazette, delegate any of its or of the Provincial Agency’s powers or functions under this Act and the rules and regulations to any Government Agency of such Provincial Government or any local council or local authority in the Province.

27. Power to give directions.—In the performance of their functions under this Act—

(a) the Federal Agency and Provincial Agencies shall be bound by the directions given to them in writing by the Federal Government; and
Annexure II

Pakistan Environmental Protection Act, 1987

(b) a Provincial Agency shall be bound by the directions given to it in writing by the Provincial Government.

28. Indemnity.—No suit, prosecution or other legal proceedings shall lie against the Federal or Provincial Governments, the Council, the Federal Agency or Provincial Agencies, the Director-Generals of the Federal Agency and the Provincial Agency, members, officers, employees, experts, advisers, committees or constituent of the federal or Provincial Agencies or the Environmental Tribunal or Environmental Magistrates or any other person for anything which is in good faith done or intended to be done under this Act or the rules or regulations made thereunder.

29. Dues recoverable as arrears of land revenue.—Any dues recoverable by the Federal Agency or Provincial Agency under this Act, or the rules or regulations shall be recoverable as arrears of land revenue.

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

31. Power to make rules.—The Federal Government may, by notification in the official Gazette, make rules for carrying out the purposes of this Act including rules for implementing the provisions of the international environmental Agreements, specified in the Schedule to this Act.

32. Power to amend the Schedule.—The Federal Government may, by notification in the official Gazette, amend the Schedule so as to add any entry therein or modify or omit any entry therein.

33. Power to make regulations.—(1) For carrying out the purposes of this Act, the Federal Agency may, by notification in the official Gazette and with the approval of the Federal Government, make regulations not inconsistent with the provisions of this Act or the rules made thereunder.

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

(a) submission of periodical reports, data or information by any Government agency, local authority or local council in respect 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, advisers, experts, consultants and employees;
Annexure II

Pakistan Environmental Protection Act, 1997

(d) levy of fees, rates and charges in respect of services rendered, actions taken and schemes implemented;

(e) monitoring and measurement of discharges and emissions;

(f) categorization of projects to which, and the manner in which, section 12 applies;

(g) laying down of guidelines for preparation of initial environmental examination and environmental impact assessment and Development of procedures for their filing, review and approval;

(h) providing procedures for handling hazardous substances; and

(i) installation of devices in, use of fuels by, and maintenance and testing of motor vehicles for control of air and noise pollution.

34. Repeal, savings and succession.—(1) The Pakistan Environmental Protection Ordinance 1983 (XXVII of 1983) is hereby repealed.

(2) Notwithstanding the repeal of the Pakistan Environmental Protection Ordinance, 1983 (XXVII of 1983), any rules or regulations or appointments made, orders passed, notifications issued, powers delegated, contracts entered into, proceedings commenced, rights acquired liabilities incurred, penalties, rates, fees or charges levied, things done or action taken under any provisions of that Ordinance shall, so far as they are not inconsistent with the provisions of this Act be deemed to have been made, passed, issued, delegated, entered into, commenced, acquired, incurred, levied, done or taken under this Act.

(3) On the establishment of the Federal Agency and Provincial Agencies under this Act, all properties, assets and liabilities pertaining to the Federal Agency and Provincial Agencies established under that Ordinance shall vest in and be the properties, assets and liabilities, as the case may be, of the Federal Agency and Provincial Agency established under this Act.
Annexure II

Pakistan Environmental Protection Act, 1987

SCHEDULE

(See section 31)


2. Plant Protection Agreement for the South-East Asia and Pacific Region (as amended), Rome, 1956.


5. Convention Concerning the Protection of World Cultural and Natural Heritage (World Heritage Convention), 1972.


PAKISTAN ENVIRONMENTAL PROTECTION AGENCY (REVIEW OF EIA AND EIA) REGULATIONS, 2000

S.R.O. 339 (1)/2000 - In exercise of the powers conferred by section 33 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), Pakistan Environmental Protection Agency, with the approval of the Federal Government is pleased to make the following Rules, namely :-

1. Short title and commencement

(1) These regulations may be called the Pakistan Environmental Protection Agency Review of Initial Environmental Examination and Environmental Impact Assessment Regulations, 2000.

(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 Pakistan Environmental Protection Act, 1997 (XXXIV of 1997);

(b) “Director-General” means the Director-General of the Federal Agency;

(c) “EIA” means an environmental impact assessment as defined in section 2(xv);

(d) “IEE” means an initial environmental examination as defined in section 2(xxiv); and

(e) “section” means a section of the Act.

(2) All other words and expressions used in these regulations but not defined shall have the same meanings 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 Federal Agency, and the provisions of section 12 shall apply to such project.

4. Projects requiring an EIA

A proponent of a project falling in any category listed in Schedule II shall file an EIA with the Federal Agency, and the provisions of section 12 shall apply to such project.
5. Projects not requiring an IEE or EIA

(1) A proponent of a project not falling in any category listed in Schedules I and II 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 effect;

(b) for projects not listed in Schedules I and II in respect of which the Federal Agency has issued guidelines for construction and operation, an application for approval accompanied by an undertaking and an affidavit that the aforesaid guidelines shall be fully complied with.

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

Provided that no such direction shall be issued without the recommendation in writing of the Environmental Assessment Advisory Committee constituted under Regulation 23.

(3) The provisions of section 12 shall apply to a project in respect of which an IEE or EIA is filed under sub-regulation (1) or (2).

6. Preparation of IEE and EIA

(1) The Federal Agency may issue guidelines for preparation of an IEE or an EIA, 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 shall be prepared, to the extent practicable, in accordance therewith and the proponent shall justify in the IEE or EIA any departure therefrom.

7. Review Fees

The proponent shall pay, at the time of submission of an IEE or EIA, a non-refundable Review Fee to the Federal Agency, as per rates shown in Schedule III.

8. Filing of IEE and EIA

(1) Ten paper copies and two electronic copies of an IEE or EIA shall be filed with the Federal Agency.
(2) Every IEE and EIA shall be accompanied by
   (a) an application, in the form prescribed in Schedule IV; and
   (b) copy of receipt showing payment of the Review Fee.

9. Preliminary scrutiny
   (1) Within 10 working days of filing of the IEE or EIA, the Federal Agency shall –
       (a) confirm that the IEE or EIA 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 to the proponent for revision, clearly listing the points requiring further study and discussion.

   (2) Nothing in sub-regulation (1) shall prohibit the Federal Agency from requiring the proponent to submit additional information at any stage during the review process.

10. Public participation
    (1) In the case of an EIA, the Federal Agency shall, simultaneously with issue of confirmation of completeness under clause (a) of sub-regulation (1) of Regulation 9, cause to be published in any English or Urdu national newspaper 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 12, be accessed.

    (2) The notice issued under sub-regulation (1) shall fix a date, time and place for public hearing of any comments on the project or its EIA.

    (3) The date fixed under sub-regulation (2) shall not be earlier than 30 days from the date of publication of the notice.

    (4) The Federal 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 Federal Agency from the public or any Government Agency shall be collated, tabulated and duly considered by it before decision on the EIA.
The Federal Agency may issue guidelines indicating the basic techniques and measures to be adopted to ensure effective public consultation, involvement and participation in EIA assessment.

11. Review

(1) The Federal Agency shall make every effort to carry out its review of the IEE within 45 days, and of the EIA within 90 days, of issue of confirmation of completeness under Regulation 9.

(2) In reviewing the IEE or EIA, the Federal Agency shall consult such Committee of Experts as may be constituted for the purpose by the Director-General, and may also solicit views of the sectoral Advisory Committee, if any, constituted by the Federal Government under subsection (6) of section 5.

(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) The review of the IEE or EIA by the Federal 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.

12. Decision

On completion of the review, the decision of the Federal Agency shall be communicated to the proponent in the form prescribed in Schedule V in the case of an IEE, and in the form prescribed in Schedule VI in the case of an EIA.

13. Conditions of approval

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

(2) Where the Federal 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 VII;
Annexure III

PAKISTAN ENVIRONMENTAL PROTECTION AGENCY (BIRTHDAY OF IEHP AND IEHP (REGULATIONS, 2001)

(b) before commencing operation of the project, obtain from the Federal Agency written confirmation that the conditions of approval, and the requirements in the IEE/RIA relating to design and construction, adoption of mitigatory and other measures and other relevant matters, have been duly complied with.

14. Confirmation of compliance

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

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

Provided that every effort shall be made by the Federal Agency to provide the requisite confirmation or otherwise within 15 days of receipt of the request, with complete information, from the proponent.

(3) The Federal 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.

15. Deemed approval

The four-month period for communication of decision stipulated in sub-section (4) of section 12 shall commence from the date of filing of an IEE or EIA in respect of which confirmation of completeness is issued by the Federal Agency under clause (a) of sub-regulation (1) of Regulation 9.

16. Extension in review period

Where the Federal Government in a particular case extends the four-month period for communication of approval prescribed in sub-section (5) of section 12, it shall, in consultation with the Federal Agency, indicate the various steps of the review process to be taken during the extended period, and the estimated time required for each step.

17. Validity period of approval

(1) The approval accorded by a Federal Agency under section 12 read with Regulation 12 shall be valid, for commencement of construction, for a period of three years from the date of issue.
Annexure III

(2) If construction is commenced during the initial three year 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 Federal Agency for extension in the validity periods mentioned in sub-regulations (1), (2) and (3), which may be granted by the Federal Agency in its discretion for such period not exceeding three years at a time, if the conditions of the approval do not require significant change.

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

18. Entry and Inspection

(1) For purposes of verification of any matter relating to the review or to the conditions of approval of an IFF or EIA prior to, during or after commencement of construction or operation of a project, duly authorized staff of the Federal 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 Federal Agency for this purpose and pursuant thereto.

19. Monitoring

(1) After issue of approval, the proponent shall submit a report to the Federal 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) To enable the Federal Agency to effectively monitor compliance with the conditions of approval, the proponent shall furnish such additional information as the Federal Agency may require.

20. 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 Federal Agency is of the opinion that the conditions of approval have not been complied with, or that the information supplied by a proponent in the approved IFF or EIA is incorrect, it
shall issue notice to the proponent to show cause, within two weeks of receipt thereof, why the approval should not be cancelled.

(2) If no reply is received or if the reply is considered unsatisfactory, the Federal 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) 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.

21. Registers of EIE and EIA projects

Separate Registers to be maintained by the Federal Agency for EIE and EIA projects under sub-section (7) of section 12 shall be in the form prescribed in Schedule VIII.

22. Environmentally sensitive areas

(1) The Federal 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 Federal Agency.

(3) The Federal Agency may from time to time issue guidelines to assist proponents and other persons involved in the environmental assessment process to plan and prepare projects located in environmentally sensitive areas.

(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 FIA pertaining to the project.

23. Environmental Assessment Advisory Committee

For purposes of rendering advice on all aspects of environmental assessment, including guidelines, procedures and categorization of projects, the Director-General shall constitute an Environmental Assessment Advisory Committee comprising –

(a) Director EIA, Federal Agency ... Chairman
Pakistan Environmental Protection Agency (Bureau of Environmental Regulations, 2000) 

(b) One representative each of the Provincial Agencies … Members
(c) One representative each of the Federal Planning Commission and the Provincial Planning and Development Departments … Members
(d) Representatives of industry and non-Governmental organizations, and legal and other experts … Members

24. Other approvals

Issue of an approval under section 12 read with Regulation 12 shall not absolve the proponent of the duty to obtain any other approval or consent that may be required under any law for the time being in force.
Annexure III

SCHEDULE 1
(See Regulation 3)

List of projects requiring an IEE

A. Agriculture, Livestock and Fisheries
   1. Poultry, livestock, stud and fish farms with total cost more than Rs.10 million
   2. Projects involving repacking, formulation or warehousing of agricultural products

B. Energy
   1. Hydroelectric power generation less than 50 MW
   2. Thermal power generation less than 200 KW
   3. Transmission lines less than 11 KV, and large distribution projects
   4. Oil and gas transmission systems
   5. Oil and gas extraction projects including exploration, production, gathering systems, separation and storage
   6. Waste-to-energy generation projects

C. Manufacturing and processing
   1. Ceramics and glass units with total cost more than Rs.50 million
   2. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost less than Rs.100 million
   3. Man-made fibers and resin projects with total cost less than Rs.100 million
   4. Manufacturing of apparel, including dyeing and printing, with total cost more than Rs.25 million
   5. Wood products with total cost more than Rs.25 million

D. Mining and mineral processing
   1. Commercial extraction of sand, gravel, limestone, clay, sulphur and other minerals not included in Schedule II with total cost less than Rs.100 million
   2. Crushing, grinding and separation processes
3. Smelting plants with total cost less than Rs. 50 million

E. Transport
1. Federal or Provincial highways (except maintenance, rebuilding or reconstruction of existing metalled roads) with total cost less than Rs. 50 million
2. Ports and harbor development for ships less than 500 gross tons

F. Water management, dams, irrigation and flood protection
1. Dams and reservoirs with storage volume less than 50 million cubic meters of surface area less than 8 square kilometers
2. Irrigation and drainage projects serving less than 15,000 hectares
3. Small-scale irrigation systems with total cost less than Rs. 50 million

G. Water supply and treatment
Water supply schemes and treatment plants with total cost less than Rs. 25 million

H. Waste disposal
Waste disposal facility for domestic or industrial wastes, with annual capacity less than 10,000 cubic meters

I. Urban development and tourism
1. Housing schemes
2. Public facilities with significant off-site impacts (e.g. hospital wastes)
3. Urban development projects

J. Other projects
Any other project for which filing of an IFE is required by the Federal Agency under sub-regulation (2) of Regulation 3
### Annexure III

**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 200 MW
3. Transmission lines (11 KV and above) and grid stations
4. Nuclear power plans
5. Petroleum refineries

**B. Manufacturing and processing**

1. Cement plants
2. Chemicals projects
3. Fertilizer plants
4. Food processing industries including sugar mills, beverages, milk and dairy products, with total cost of Rs.100 million and above
5. Industrial estates (including export processing zones)
6. Man-made fibers and resin projects with total cost of Rs. 100 M and above
7. Pesticides (manufacture or formulation)
8. Petrochemicals complex
9. Synthetic resins, plastics and man-made fibers, paper and paperboard, paper pulp, 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
10. Tanning and leather finishing projects

**C. Mining and mineral processing**

1. Mining and processing of coal, gold, copper, sulphur and precious stones
2. Mining and processing of major non-ferrous metals, iron and steel rolling
3. Smelting plants with total cost of Rs. 50 million and above
D. Transport
   1. Airports
   2. Federal or Provincial highways or major roads (except maintenance, rebuilding or reconstruction of existing roads) with total cost of Rs.50 million and above
   3. Ports and harbor development for ships of 500 gross tons and above
   4. Railway works

E. Water management, dams, irrigation and flood protection
   1. Dams and reservoirs with storage volume of 50 million cubic meters and above or surface area of 8 square kilometers and above
   2. Irrigation and drainage projects serving 15,000 hectares and above

F. Water supply and treatment
   Water supply schemes and treatment plants with total cost of Rs.25 million and above

G. Waste Disposal
   1. Waste disposal and/or storage of hazardous or toxic wastes (including landfill sites, incineration of hospital toxic waste)
   2. Waste disposal facilities for domestic or industrial wastes, with annual capacity more than 10,000 cubic meters

H. Urban development and tourism
   1. Land use studies and urban plans (large cities)
   2. Large-scale tourism development projects with total cost more than Rs.50 million

I. Environmentally Sensitive Areas
   All projects situated in environmentally sensitive areas

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


**Environmental Impact Assessment (EIA) for The Dolmen City Project**

**A Project of International Complex Projects Limited (ICPL)**

---

**Annexure III**


<table>
<thead>
<tr>
<th>Total Project Cost</th>
<th>IFF</th>
<th>EIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto Rs. 5,00,000</td>
<td>NII</td>
<td>NII</td>
</tr>
<tr>
<td>Rs.5,00,001 to 10,00,000</td>
<td>Rs.10,000</td>
<td>Rs.15,000</td>
</tr>
<tr>
<td>Greater than Rs.10,00,000</td>
<td>Rs.15,000</td>
<td>Rs.30,000</td>
</tr>
</tbody>
</table>

SCHEDULE III
(See Regulation 7)

IFF/EIA Review Fees

---

13
Annexure III

PAKISTAN ENVIRONMENTAL PROTECTION ACT (AMENDMENT OF 1997) REGULATIONS, 2000

(b) One representative each of the Provincial Agencies ... Members
(c) One representative each of the Federal Planning
    Commission and the Provincial Planning and
    Development Departments ... Members
(d) Representatives of industry and non-
    Governmental organizations, and legal and
    other experts ... Members

24. Other approvals

Issuance of an approval under section 12 read with Regulation 12 shall not absolve
the proponent of the duty to obtain any other approval or consent that may be required
under any law for the time being in force.
Annexure III

SCHEDULE V
[See Regulation 12]

Decision on I.E.F.

1. Name and address of proponent

2. Description of project

3. Location of project

4. Date of filing of I.E.I.

5. After careful review of the I.E.I, the Federation Agency has decided

   (a) to accord its approval, subject to the following conditions:

   [Signature]

   or (b) that the proponent should submit an E.I.A of the project, for the following reasons:

   [Signature]

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

Dated ______

Tracking no. ______

Director-General
Federal Agency
(with official stamp/seal)
Annexure III

SCHEDULE VI
[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:

   
   
   [Insert conditions]

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

   
   
   [Insert modifications]

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

   
   
   [Insert reasons]

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

Dated ______

Tracking no. ______

[Signature]

Director-General
Federal Agency
(with official stamp/seal)
Pakistani Environmental Protection Act (Regulation of Fossil Fuel Regulations, 2000)

Schedule VII
[See Regulation 13(2)]

Undertaking

I, (full name and address) as proponent for (name, description and location of project) do hereby solemnly affirm and declare that I fully understand and accept the conditions contained in the approval accorded by the Federal Agency bearing tracking no. dated ________, and undertake to design, construct and operate the project strictly in accordance with the said conditions and the EIA/FIA.

Date ________

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

Witnesses
(full names and addresses)

(1) ________

(2) ________
## Annexure III

### PAKISTAN ENVIRONMENTAL PROTECTION ACT (AMENDMENT OF 1986 AND 1993) REGULATIONS, 2000

**SCHEDULE VIII**

(See Regulation 21)

**Form of Registers for IPE and EIA projects**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Description</th>
<th>Relevant Provisions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tracking number</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Category type (as per Schedules I and II)</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Name of proponent</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Name and designation of contact person</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Name of consultant</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Description of project</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Location of project</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Project capital cost</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Date of receipt of IPE/EIA</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Date of confirmation of completeness</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Approval granted (Yes/No)</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Date of approval granted or refused</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Conditions of approval/reasons for refusal</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Date of Undertaking</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Date of extension of approval validity</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Period of extension</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Date of commencement of construction</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Date of issue of confirmation of compliance</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Date of commencement of operations</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Dates of filing of monitoring reports</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Date of cancellation, if applicable</td>
<td></td>
</tr>
</tbody>
</table>
Environmental Impact Assessment (EIA) for The Dolmen City Project
A Project of International Complex Projects Limited (ICPL)

Annexure IV

REGISTRATION No. M-302
L. 7646

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, THURSDAY, AUGUST 10, 2000

PART II
Statutory Notification (S.R.O)

GOVERNMENT OF PAKISTAN

MINISTRY OF ENVIRONMENT, LOCAL GOVERNMENT AND RURAL DEVELOPMENT

NOTIFICATION
Islamabad, the 8th August 2000

S.R.O. 549 (E) 2000___ In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to direct that the following further amendments shall be made in its Notification No. S.R.O. 742(I)/93, dated the 24th August, 1993, namely: ___

In the aforesaid Notification, in paragraph 2, ____

(1289)

[4138(2000)Ex.GAZ]

Price : Rs. 5.00
### Annexure IV

**National Environmental Quality Standards for Municipal and Liquid Industrial Effluents (mg/L, Unless Otherwise Defined)**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Existing Standards</th>
<th>Revised Standards</th>
<th>Into Inland Waters</th>
<th>Into Sewage Treatment</th>
<th>Into Sea (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Temperature or Temperature Increase *</td>
<td>40°C ±3°C</td>
<td>±3°C</td>
<td>±3°C</td>
<td>±3°C</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>pH value (H+)</td>
<td>6-10</td>
<td>6-9</td>
<td>6-9</td>
<td>6-9</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Chemical Oxygen Demand (COD) at 20°C (b)</td>
<td>80</td>
<td>80</td>
<td>250</td>
<td>80*</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Total Suspended Solids (TSS) (g/L)</td>
<td>150</td>
<td>150</td>
<td>400</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Total Dissolved Solids (TDS) (g/L)</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td>3500</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Oil and Grease</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Phenolic compounds (as phenol)</td>
<td>0.1</td>
<td>0.1</td>
<td>0.3</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Chloride (as Cl−)</td>
<td>1000</td>
<td>1000</td>
<td>1000</td>
<td>5C**</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fluoride (as F−)</td>
<td>20</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Cyanide (as CN−)</td>
<td>2</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Ammonia nitrogen (as NH₃-N)</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Sulphate (SO₄²⁻)</td>
<td>600</td>
<td>600</td>
<td>1000</td>
<td>5C***</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Sulphide (S²⁻)</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Ammonia (NH₃)</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Phosphorus (P)</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
<td>0.15</td>
<td></td>
</tr>
</tbody>
</table>

---

(1) For Annex I the following shall be substituted, namely:

**Annex I**
### Annexure IV

#### PART-II] THE GAZETTE OF PAKISTAN, EXTRA, AUGUST 10, 2000 1291

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Cadmium</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>18.</td>
<td>Chromium (trivalent) and hexavalent</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>19.</td>
<td>Copper</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>20.</td>
<td>Lead</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>21.</td>
<td>Mercury</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>22.</td>
<td>Nickel</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>23.</td>
<td>Zinc</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>24.</td>
<td>Silver</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>25.</td>
<td>Total toxic metals</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>26.</td>
<td>Zira</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
<td>5.0</td>
</tr>
<tr>
<td>27.</td>
<td>Arsenic</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
<tr>
<td>28.</td>
<td>Barium</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>29.</td>
<td>Iron</td>
<td>2.0</td>
<td>8.0</td>
<td>8.0</td>
<td>8.0</td>
</tr>
<tr>
<td>30.</td>
<td>Manganese</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>31.</td>
<td>Boron</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
<td>6.0</td>
</tr>
<tr>
<td>32.</td>
<td>Chlorine</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

#### Explanations:

1. Assuming minimum dilution 1:10 on discharge, lower ratio would attract progressively stringent standards to be determined by the Federal Environmental Protection Agency. By 1:10 dilution means, for example that for each one cubic meter of treated effluent, the recipient water body should have 10 cubic meter of water for dilution of this effluent.

2. Methylene Blue Active Substance, 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 BOD as 80mg/l is achieved by the sewage treatment system.
PART-II] THE GAZETTE OF PAKISTAN, EXTRA, AUGUST 10, 2000 1292

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 3°C 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 (S.C.).

Note: 1. Dilution of liquid effluents to bring them to the NEQS 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 substracted from the effluent for calculating the NEQS limits* and

(2) for Annex-II the following shall be substituted, namely:

---

**Annex II**

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

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Parameter</th>
<th>Source of Emission</th>
<th>Existing Standards</th>
<th>Revised Standards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Smoke</td>
<td>Smoke opacity not to exceed</td>
<td>40% or 2 R. S.</td>
<td>40% or 2 R. S, or equivalent smoke number</td>
</tr>
<tr>
<td>2</td>
<td>Particulate matter</td>
<td>(a) Boilers and Furnaces</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(i) Oil fired</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(ii) Coal fired</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(iii) Cement Kilns</td>
<td>200</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(b) Grinding, crushing, Clinker coolers and Related processes, Metallurgical Processes, converter, blast furnaces and cupolas.</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>3</td>
<td>Hydrogen Chloride</td>
<td>Any</td>
<td>400</td>
<td>400</td>
</tr>
</tbody>
</table>
### Annexure IV

**PART II: THE GAZETTE OF PAKISTAN, EXTRA, AUGUST 10, 2000**

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Chlorine</td>
<td>Any</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>5.</td>
<td>Hydrogen Fluoride</td>
<td>Any</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>6.</td>
<td>Hydrogen Sulphide</td>
<td>Any</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>7.</td>
<td>Sulphur Oxides (SOx)</td>
<td>Sulfuric acid/Sulphonic acid plants</td>
<td>Other Plants except power plants operating on oil and coal</td>
<td>400</td>
</tr>
<tr>
<td>8.</td>
<td>Carbon Monoxide</td>
<td>Any</td>
<td>800</td>
<td>800</td>
</tr>
<tr>
<td>9.</td>
<td>Lead</td>
<td>Any</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>10.</td>
<td>Mercury</td>
<td>Any</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>11.</td>
<td>Cadmium</td>
<td>Any</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>12.</td>
<td>Arsenic</td>
<td>Any</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>13.</td>
<td>Copper</td>
<td>Any</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>14.</td>
<td>Antimony</td>
<td>Any</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>15.</td>
<td>Zinc</td>
<td>Any</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>16.</td>
<td>Oxides of Nitrogen</td>
<td>Nitric acid manufacturing units</td>
<td>Other plants except power plants operating on oil or coal</td>
<td>400</td>
</tr>
</tbody>
</table>

### 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 cause standards to be reviewed.

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 National Environmental Quality Standards (NEQS) specified above, comply with the following standards:

   - Gas fired: 400
   - Oil fired: 600
   - Coal fired: 1200
Annexure IV

Environmental Impact Assessment (EIA) for The Dolmen City Project
A Project of International Complex Projects Limited (ICPL)

A. Sulphur Dioxide

Sulphur Dioxide Background levels Microgram per cubic meter (μg/m³) Standards.

<table>
<thead>
<tr>
<th>Background Air Quality (SO₂) (Basis)</th>
<th>Annual Average</th>
<th>Max 24-hours Interval</th>
<th>Citation I</th>
<th>Citation II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unpolluted</td>
<td>&lt;50</td>
<td>&gt;200</td>
<td>500</td>
<td>50</td>
</tr>
<tr>
<td>Moderately Polluted</td>
<td>50</td>
<td>400</td>
<td>100</td>
<td>10</td>
</tr>
<tr>
<td>High</td>
<td>&gt;100</td>
<td>&gt;400</td>
<td>100</td>
<td>10</td>
</tr>
</tbody>
</table>

*For intermediate values between 50 and 100 μg/m³ 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 NOₓ should not be exceed the following:

Annual Arithmetic Mean: 100μg/m³ (0.05 ppm)

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

For fuel fired steam generators as Nanogram (10⁹ gram) per joule of heat input:

<table>
<thead>
<tr>
<th>Fossil Fuel</th>
<th>Liquid fossil fuel</th>
<th>Solid fossil fuel</th>
<th>Lignite fossil fuel</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>300</td>
<td>260</td>
<td></td>
</tr>
</tbody>
</table>

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

[File No. 14/3/98-TÓ-FEPCC]

HAIFIZ ABDUalah Awan
DEPUTY SECRETARY (ADMN)

PRINTED BY: THE MANAGER, PRINTING CORPORATION OF PAKISTAN, PESHAWAR. PUBLISHED BY THE MANAGER OF PUBLICATIONS, KARACHI.