



Capital Development Authority



Environmental Impact Assessment of Development of Park Enclave Phase – III, Islamabad

Final Report

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Project Procurement International (PPI)

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Executive Summary

Introduction

Capital Development Authority (CDA) intends to develop Park Enclave Phase – III Project, Islamabad.

Policy, Legal and Administrative Framework

The Project has been reviewed against the environmental legislations applicable in Pakistan. However, the laws and acts related to the proposed project include:

- Pakistan Environmental Protection Act, 1997 (PEPA, 1997)
- Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations, 2000
- National Environmental Quality Standards (NEQS), 2000

The CDA, being the proponent of the project, will ensure that the construction and operational phases of the Project are in accordance with the recommendations of the EIA report, and the Environmental Management Plan will be implemented.

Need for the Project

There is a considerable shortage of housing in Islamabad and Rawalpindi. The private sector is fulfilling this demand through building schemes in the outskirts of Islamabad and Rawalpindi, where the land is primarily for agriculture. By going ahead with the proposed project, people will have options to buy houses to buy in government-funded schemes which are in synchronization with the master plan of the city.

The proposed project is conceived to be developed with an eco-friendly approach while assuring safe and secure living for the residents.

Project Description

The objective of the project is to provide small size residential plots for middle and low-income groups in the city. Islamabad is facing an acute shortage of housing, and the proposed project will improve the housing situation considerably.

The development of Park Enclave Phase – III Project has been proposed on a piece of land measuring 112.80 acres (902 kanal) located adjacent to the Park Enclave Housing Society, Phase – I on Park Road, Chak Shahzad.

The project includes a total of 1,047 residential plots, which will be built on an area of 453 Kanal. The commercial plots will be built on an area of 41 Kanal out of the total 902 Kanal. The project will also incorporate open spaces, parks, educational institutes, graveyards, and Roads.

For the development of Park Enclave Phase – III Project, the essential infrastructure works include storm drainage system, water supply, sanitary sewerage system, solid waste management system, electrification, streetlights, security, Sui gas works, sanitation, and external electrification by IESCO. CDA will also provide soft and hard landscaping, parks, playground, and other facilities in the proposed project.

The total estimated cost of the development of the Park Enclave Phase – III Project is Rs 3,084.49 Million. The time schedule for completion of the project is 12 months.

Analysis of the Alternatives

No Project Option: If we consider no project option, then we will lose all positive impacts that will be caused due to the project, like providing residential plots to all income groups, loss of potential employment and business opportunity.

Secondly, if the demand for the housing sector is not met through government schemes, the private sector will spring up residential housing societies in the suburbs and rural areas to meet the demand.

The “No Project Option” does not appear reasonable given the above facts. However, the expected negative impacts can be minimized by adopting appropriate mitigation measures.

Change in the Location: Change of the project site location is one of the alternatives to avoid some negative impacts like land-use change, damage to flora and fauna etc. However, Park Enclave Phase – III Project is in accordance with the Master plan of Islamabad and will be located at their respective site.

Build-As-Proposed-Option: Development of Park Enclave Phase – III Project is in accordance with the Islamabad Master Plan, and its location has already been agreed upon. However, the negative impacts due to the project construction and operation can be minimized, controlled, or eliminated if the proposed mitigation measures as suggested in the EIA report are effectively implemented.

Environmental Baseline Conditions

In order to work out the impacts and related mitigation measures, baselines environmental conditions of physical, ecological and socio-economic environment of the project area were studied as follows;

Physical Environment

Topography: Islamabad is located on the Northern edge of the track known as the Potohar Plateau. The Potohar Plateau has uneven land and is gradually rising in elevation from 500 to 600 meters above sea level, and the highest point is 1,600 meters above mean sea level. The land gradually slopes towards the South. The land is composed either of alluvium (clay or silt) or of gravel caps. A large part of the area is undulating, and at various places, it is badly dissected by gullies and ravines. The Kurang stream has been dammed at a place named Rawal to form the Rawal Lake. Another dam has been built on the Soan River to form Simly Lake.

The topography of the project site is undulating land, with the highest point located 519 m above sea level and the lowest point being 497 m. Similarly, the project site is bounded by Gumrah Kas Nullah in the South West.

Geology and Soil: The Potohar region has a complex geological history of mountain formation, alluvial-loessic depositions, and erosion cycles. Limestone is the characteristic rock of the Margalla range. In age, it ranges from the Jurassic to Triassic. It is usually reddish or bluish-white in colour mixed or alternating with its beds of red or bluish clay or shades or sandstones. The deposits contain small-sized rounded pebbles of sandstone, quartzite or granite and sand mixed or alternating with clayey deposits. They have been described as alluvial deposits, but it is equally probable that they have a glacial origin.

The soil in the Potohar region is shallow clayey of low productivity. Mostly, on the Southern and Western aspects of the Potohar plateau, the soil is thin and infertile. Streams and ravines cut the loose plain, affected by gully erosion and steep slopes. Such land is unsuitable for cultivation. However, large patches of deep fertile soil are found in the depressions and sheltered localities supporting quality small forests (Rakh) and rain-fed agriculture. The soil formed by the disintegration of shells, clay and sandstone occurs in scattered places.

Land use: The land allocated for the development of Park Enclave Phase – III Project Islamabad is vacant land. The PC-1 for the development of the Park Enclave Phase – III Project has been acquired. The land for Park Enclave Phase – III has been acquired by CDA.

Surface Water: Rawal Lake is located 3 km away from the project site, which is the main source of water in Islamabad and Rawalpindi. Gumrah Kas Nullah passes as a boundary to Park Enclave Phase – III Project.

Ground Water: Ground Water of the project site is available at a depth of 104 ft and used for drinking and other domestic purposes. Bore holes are dug to access ground water.

A chemical analysis test of the ground water in the project site was conducted. The samples of ground water were collected on 4th June 2021 and were received by the Environmental Services Pakistan on 4th June 2021 for analysis. The parameters that were analyzed include pH, Total Dissolved Solids, Chloride, Copper, Manganese, Zinc, Aluminum, Boron, Barium, Fluoride, and Nitrate whose concentrations were 7.3, 420 mg/L, 20.0 mg/L, 0.007 mg/L, 0.012 mg/L, 0.068 mg/L, 0.038 mg/L, 0.101 mg/L, 0.303 mg/L, 0.4 mg/L, and 9.6 mg/L respectively. Faecal Coliform was detected in the sample taken from the groundwater. This indicates the water supply will need to be chlorinated before consumption.

Apart from these parameters, the colour, taste, odour, turbidity, hardness was also tested, and it was found that all these parameters are within the permissible limit.

Climate: Islamabad has distinct seasons marked by wide variation in temperature. The climate remains very salubrious from April to October, but the winters get very cold. The coldest months are December, January, and February. The hottest months are June and July. Rainfall in April and May is occasional, but the heaviest rain is in July and August.

The temperature of the capital territory, Islamabad, ranges between -1 °C to 46 °C. The coldest month is January when the mean maximum temperature is 17 °C, and the mean minimum is 9 °C. From February to June, the temperature rises at the rate of 7.0 °C per month. The highest temperature reached in June, when the mean maximum temperature remains 41 °C.

Air Quality: The ambient air and noise level monitoring was conducted from 2nd June to 3rd June 2021 for 24 hours at the project site.

The concentrations of SO₂, CO, NO, NO₂, O₃, PM₁₀, PM_{2.5}, (i.e., 10.7 µg/m³, 0.87 mg/m³, 11.36 µg/m³, 15.69 µg/m³, 17.36 µg/m³, 128.96 µg/m³, 30.27 µg/m³) meet the NEQS limits (i.e., 120 µg/m³, 5 mg/m³, 40 µg/m³, 80 µg/m³, 130 µg/m³, 120 µg/m³, 35 µg/m³).

Noise and Vibration: Noise monitoring was carried out at the project site. The results for daytime and nighttime exceed the NEQS limits. The noise level in the project site was 58 dB(A) and 57dB(A). The reason for the noise level exceeding the NEQS limits can be associated with the fact the Kuri Road and Park Road have high traffic throughout the day.

Ecological Environment

Flora: The vegetation of Islamabad is representative of the Dry Subtropical Scrub Forest, which is dominated by *Acacia modesta* (Phulai), *Ziziphus mauritiana* (Ber); *Ziziphus nummularia* (Mullah), etc. Other associates existing in varying proportions include *Prosopis cineraria* (Jand), *Melia azadirachta* (Dharek); *Morus alba* (Mulberry-Shahtoot); *Dalbergia sissoo* (Tahli-Shisham); *Acacia nilotica* (Kiker). In the undergrowth *Cannabis sativa* (Bhang), *Calotropis procera* (Desi Ak), *Parthenium hysterophorous* (Gandi Booti), and *Ocimum bacilicum* (Niazbo) are predominant. It is observed that different floral species exists on the project site, including mature trees of Shisham, Kikar, Anjeer, Phulai, Eucalyptus, Paper Mulberry, etc.

Approximately 646 mature trees were found during a tree count carried out at the project site. The mature trees are mainly located in two dense vegetation covers located in the East and North-West of the project site.

Fauna: The region of Islamabad in general and the project area, in particular, has rich and eve-fauna species. These birds are surviving and flourishing due to a reasonable level of green belts and dense forest cover. Most birds species and water fowls, reside in the Margallah Hills National Park, and in the surrounding Rawal Dam, Simly Dam and other smaller water reservoir in Islamabad.

Among small mammals, species golden Jackal, Red fox, Pangolin, Porcupine and rats are reported to have resided in the surrounding of the project area. The snake, Russell's viper and lizards also inhabit in the project site. The black rat (*Rattus rattus*), also known as the ship rat, or roof rat or house rat, is a common long- tailed rodent. Porcupines are rodents with a coat of sharp spines, or quills that protect against predators. The Cape hare (*Lepus capensis*), also called desert hare, and sometime observed in the project area.

Socio-Economic and Cultural Environment

In order to assess the present socio-economic and socio-cultural conditions of the project area, PPI team visited Park Enclave Phase – III Project and consultations were carried out with the residents of the adjoining areas. During the roadside and focused group discussion, the communities were informed about the salient features of the development of the Park Enclave Phase – III Project, Islamabad.

Public Consultation

During this process, a number of personals and inhabitants of the project area were consulted. Different aspects of the proposed project were highlighted, like impacts on the physical, biological, and socio-economic environment of the project area. Stakeholders concerns regarding various aspect, existing environment, and impacts of the project were located and added in the EIA report.

Generally, the people of the area stated that this project would create employment opportunities during its construction and operational phases. They were of the view that the proposed project will also provide facilities like commercial markets and

schools and a better road network. However, few of the local inhabitants showed dissatisfaction with the compensation process against their property.

In addition to the local community, many institutions/offices such as Capital Development Authority Islamabad, National Agriculture Research Center (NARC), Islamabad Electric Supply Corporation (IESCO), PMAS Arid Agriculture University, Wildlife Department Lohi Bher, and Real Estate dealers located in Islamabad/Rawalpindi were visited, and their viewpoints regarding the project were solicited.

Generally, these organizations are in favour of the project and stated that this project would reduce the housing crisis in the twin cities. The main concerns of these organizations were about effective mitigation measures against the depletion of groundwater resources, loss of flora and fauna and treatment of wastewater before discharge into rivers and streams of the project area.

Furthermore, they recommended CDA introduce environmentally friendly features in the operational phase of the proposed project, which includes rainwater harvesting and solar panels for street lighting to make the project more sustainable.

Impacts and Mitigation Measures

Physical Environment

Impact: Soil related issues include soil erosion, slope stability, and soil contamination. Land clearing, levelling and grading, excavation and filling, construction activities and maintenance of equipment/vehicles may cause these issues. Soil may be contaminated because of fuel/oils/chemical spillage and leakage and inappropriate waste (solid as well as liquid) disposal.

Land-use change is expected during the construction phase, one at the borrow areas and another where the spoil or mucking material will be disposed of.

Construction machinery and project vehicles will release exhaust emissions containing Carbon Monoxide (CO), Oxides of Sulfur (SO_x), Oxides of Nitrogen (NO_x) and Particulate Matter (PM). In addition, various burning activities involved in roads construction will cause air pollution. These emissions can deteriorate the ambient air quality in the immediate vicinity of the project site. Furthermore, construction activities such as excavation, land levelling, filling and vehicular movement on unpaved tracks may also cause fugitive dust emissions.

Noise and vibration will be generated by construction machinery and vehicles.

Surface and ground water resources of the project area can be contaminated by solid waste disposal, sewerage disposal, and equipment/vehicles maintenance, spillage/leakage of fuels, oils and chemicals, and campsite sanitation facilities.

Mitigations: Soil erosion can be minimized by properly doing land clearing, levelling and grading. Excavated slopes will not be left untreated/unattended for long durations, especially around Nullahs. Appropriate slope stabilization measures will be taken per the design (i.e. stone pitching).

Temporary measures, such as the construction of temporary walls reinforced with brick lining bordering the construction areas to contain debris and spoil, will also be undertaken to avoid soil erosion and water contamination. The stone and gravel will not be extracted from the areas around Nullahs.

To prevent soil erosion at slopes, vegetation should be planted like *Buddleia asiatica*, *Cassia artemisooides*, *Ballerina cristata*, *Lantana indica*, *Hisbiscus rosasinensis* etc.

Vehicles and equipment will not be repaired at the project site. If unavoidable, impervious sheathing will be used to avoid soil and water contamination. For the domestic sewage from the contractor's camp, septic tanks with soaking pits will be constructed having adequate capacity. Waste oils will be collected in drums and sold to the recycling contractors. The recyclable waste from the project site (such as cardboard, drums, broken/used parts, etc.) should be sold to recycling contractors, or where appropriate, reuse/recycle. The hazardous waste should be kept separate and handled according to the nature of the waste. While storing, hazardous waste should be marked.

Construction machinery and vehicles will be kept in good working condition and properly tuned in order to minimize exhaust emissions. Fugitive dust emissions will be minimized by spraying water on the soil, where required and appropriate.

Careful selection and management of the borrow areas to avoid adverse impacts and to avoid obvious scars and blemishes on the landscape. Re-vegetation and landscaping of borrow areas and disposal sites consistent with acceptable aesthetic values for the surrounding landscape.

Ecological Environment

Impacts: The site preparation and construction activities may necessitate the removal of the natural vegetation from the areas where road, culverts and other buildings will be constructed.

Damage and/or loss of vegetation and clearing of other indigenous and introduced species, as well as undergrowth species, which comprising bushes, grass, etc., will also, lost. The construction crew can also indulge in tree/shrub cutting to obtain fuel wood for the camp.

The loss of natural vegetation discussed above and other project activities will potentially have adverse impacts on the faunal resources and habitats of the area. Smoke, chemicals, dust particles, and noise generated by heavy machinery are a scaring factor for wildlife. Rodents, hedgehogs, porcupines would lose their abode. In addition, the wildlife may be disturbed by illumination and the mere presence of the people.

Mitigations:

CDA has planned the Park Enclave Phase – III, keeping the topography and existing features of the project site. There is a provision of 6 parks in the Park Enclave Phase – III Project. CDA has planned parks at both the places where there are dense vegetation covers located in the East and North-West of the Park Enclave Phase – III. It is expected that only 5 to 10 % of the trees will be cut during the road infrastructure development in the project site.

Furthermore, if any tree is falling within the road networks, then all the trees having dia less than 10 inches will be transplanted within all the six parks at Park Enclave Phase – III. Therefore, there will be lesser cutting of trees will be due to astute planning by the CDA. Similarly, CDA's standard Plantation Plan would be implemented in Park Enclave Phase – III Project, Islamabad.

A plantation cover of appropriate trees/bushes, preferably evergreen, will be raised within the open green areas and along avenues, as well as medians.

For providing a healthy environment and to enhance the aesthetic value of the project area, the entire layout of the Park Enclave Phase – III Project, a proper landscape plan, will be devised and implemented.

The measures to restore natural vegetation loss in the area will benefit the area's fauna as well. The project staff should not be allowed to indulge in any hunting or trapping activities. Night-time construction works not be undertaken. Illumination levels at the site should be minimized as far as possible. Appropriate diffusers should be used to restrict the illumination within the project site. Blasting will not be undertaken at the site for excavation purposes. Porcupine population has increased, as it is not palatable because of its quills. Destruction of habitat and consequent check on the population of this pest may prove to be a boon to maintain ecological balance. Developmental activities and colonization of the project site would be a positive step to keep down the number of these undesirable species at the desirable level from human point of view.

Socio-Economic Environment Impacts:

Construction workers may be susceptible to eye and respiratory diseases due to their routine exposure to dust and exhaust emissions on the project site. Injuries could happen primarily by occupational-related accidents, animal bites, etc. Activities such as land clearing, tree felling, earthworks, and construction of facilities present various occupational hazards to the workers on the site.

There are no reported sites of archaeological or historical significance at Park Enclave Phase – III Project. However, one mosque and two graveyards are located at the project site, which will not be damaged during the construction or operational phase of the proposed project. The graves will be shifted to the Islamabad graveyard according to the laws applicable. In case any artifact of such significance is found during the construction activities, the Archeology Department, Government of Pakistan will be informed.

Mitigations:

Eye and respiratory diseases should be mitigated through routine health screening and training of contractor's employees. Physical injury should be mitigated through the provision of appropriate training and emergency response procedures. Protected fencing will be fixed around the construction site. Unauthorized access within the construction area will not be allowed. Vehicle speeds of 50 km/hr at the project site will be implemented. Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance caused by light pollution.

Environmental Management Plan (EMP)

The purpose of the Environmental Mitigation Plan (EMP) is to minimize the potential environmental impacts due to the proposed project. EMP provides a delivery mechanism to address the adverse environmental impacts of the proposed project during its execution and operation, to enhance project benefits and to introduce standards of best practices to be adopted for all phases of the project.

The cost estimates for implementing environmental monitoring & mitigation measures during the construction and operational phase for the proposed project is **Rs 506.292 Million**.

Conclusion and Recommendations

On the basis of the overall impact assessment, more specifically, the nature and magnitude of the residual environmental impacts identified during the present EIA, it is concluded that the Development of Park Enclave Phase – III Project, Islamabad is likely to cause environmental impacts mainly during its construction phase. However, these impacts can be mitigated provided the proposed activities are carried out as mentioned in the report, and the mitigation measures included in this report are completely and effectively implemented.

The EIA has made the following recommendations:

- CDA should procure tree transplantation equipment/tree spade to transport trees that fall in the ROW of roads.
- The Wastewater Treatment Plant (WWTP) to be installed at the Park Enclave Phase I should treat wastewater generated from Park Enclave Phase – III Project
- CDA should develop and implement an Integrated Solid Waste Management Plan for the proposed project.
- CDA should implement the Plantation Plan as described in the EIA Report. Furthermore, CDA should dedicate one of the open spaces for the development of Miyawaki Forest.
- CDA should implement an Integrated Solid Waste Management Plan, which should include;
 - Collection of solid waste from residential and commercial buildings
 - Segregation of solid waste into recyclable, biodegradable and non-biodegradable wastes. The recyclable wastes will be given away to recycling contractors: the biodegradable waste will be composted at the site to produce green manure, and the remaining waste will be transported to the waste disposal site.
- The implementation of the Environmental Monitoring Plan should be ensured by the contractor and proponent during the construction phase.
- Recruitment of Environmental Engineer/HSE officer for the construction phase of the Project.

There are no remaining issues that warrant further investigation. This EIA is considered adequate for the environmental and social justification of the project.

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List of Abbreviations

ADB	Asian Development Bank
CDA	Capital Development Authority
E	East
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
ECNEC	Executive Committee of the National Economic Council
Govt.	Government
GPD	Gallons per Day
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
N	North
NCS	National Conservation Strategy
NEQS	National Environment Quality Standards
NOC	No Objection Certificate
Nos	Numbers
Pak-EPA	Pakistan Environmental Protection Agency
PEPA	Pakistan Environmental Protection Act 1997
PEPC	Pakistan Environmental Protection Council
PPI	Project Procurement International
Pvt.	Private
WWTP	Wastewater Treatment Plant

List of Units

%	Percent (age)
°C	Degree centigrade
cm	Centimeter
dB (A)	Decibel
sq. ft.	Square foot
ft³	Cubic foot
km	Kilometer
km/h	Kilometer/hour
m	Meter
m²	Square meter
m³	Cubic meter



1 Introduction

1.1 Project Background and Overview

Islamabad, the Capital city, is a planned city and is being developed in accordance with a Master Plan. CDA, being an eco-friendly organization and trend setter in community planning, has successfully executed the development of Park Enclave Phase-I and Phase-II has been taken up and to be completed in 12 months time of completion as model Housing Project in Zone-IV of Islamabad. Phase-III is planned to be executed as a continuation of Park Enclave Phase-I & Phase-II.

The proposed project is conceived to be developed with an eco-friendly approach while assuring safe and secure living for the residents. The site is ideally located and has easy access to other sectors of Islamabad.

1.2 The Project

The proposed project is “Development of Park Enclave Phase – III Project, Islamabad”.

In order to comply with the regulatory requirement of environmental laws of Pakistan, Capital Development Authority has acquired the services of M/s Project Procurement International, an environmental engineering consultancy firm, to conduct an EIA of the Project.

This report gives an overview of the project description, impact identification and their assessment, proposed mitigation measures through environmental impact assessment study methodology. The key map of the project is provided in **Figure 1.1**.

1.3 The Proponent

Capital Development Authority, Islamabad, is the proponent of the project. CDA came into existence on June 14, 1960. The CDA board is composed of the Chairman and Members of Planning, Finance, Estate, Environment, Administration and Engineering.

Each member is in charge of various directorates comprising highly qualified, experienced and capable professionals in various fields and disciplines. The CDA is responsible for the development and upkeep of Islamabad. The official website of CDA is <http://www.cda.gov.pk/>.

1.4 Name of the Organization Preparing the Report

M/s Project Procurement International, an Environmental and Management Consultancy Firm, Islamabad, has prepared Environmental Impact Assessment of the Development of Park Enclave Phase – III Project, Islamabad.

Project Procurement International is working in the environment sector of Pakistan for the last 15 years and has carried out more than 300 environmental studies all over Pakistan.

The Project Procurement International engaged a team of experts for conducting EIA study, which included the following persons:

- Engr. Saadat Ali, Environmental Engineer/ Team Leader
- Mr. Aamir Saeed, Bio-diversity Expert
- Mr. Ali Abdullah, Environmental and Civil Engineer

- Ms. Fehmida Rafi, Environmental Scientist
- Mr. Ehsan Mustafa Hashmi, Environmental Engineer

The list of names, qualification and roles of team members carrying out the EIA has been attached in **Annexure-1**.

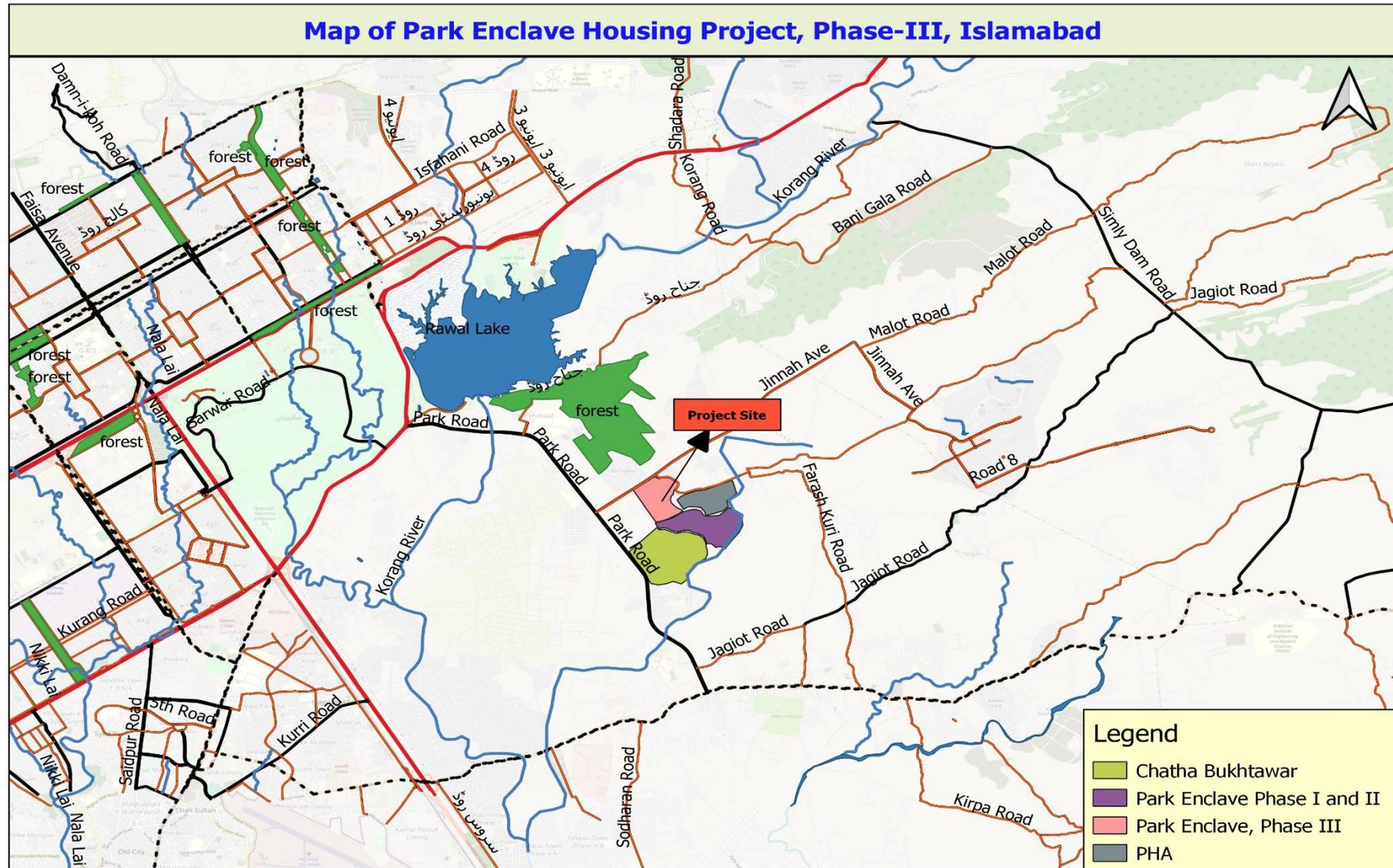
1.5 Environmental Impact Assessment

According to the Pakistan Environmental Protection Act, 1997, section 12 (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.”

The project falling in schedule II requires an EIA. Therefore, an EIA of Development of Park Enclave Phase – III Project, Islamabad is required.

Figure 1.1: Key Map of the Project Location



1.6 Scope of EIA

The project requires Environmental Impact Assessment to identify environmental impacts of construction and operational phases of the proposed Development of Park Enclave Phase – III Project, Islamabad.

The scope of EIA of the Development of Park Enclave Phase – III Project, Islamabad is as follows:

- The identification and assessment of all major and minor impacts during pre-construction, construction and operational phases,
- Identification of all significant impacts that may require detailed assessment,
- Propose mitigation measures to minimize, eliminate or to compensate the potential adverse impacts that may arise during pre-construction, construction and operational phases of the project,
- Public consultation with all the stakeholders of the proposed project,
- Preparation of Environmental Management Plan,
- Conclusions and recommendations, and
- Preparation of an Environmental Report for submission to Environmental Protection Agency, Pakistan.

The Terms of Reference for the EIA report has been attached in **Annexure-2**.

1.7 Contact Persons

In case of further details or clarifications regarding this EIA, please contact the proponent's representative or the consultant at the addresses provided in **Table 1.1**.

Table 1.1: Name and Addresses of Proponent's Representative and Consultant

Proponent's Representative	Consultant
<p>Mr. Muhammad Kashif Deputy Director, Roads (Div-I) Capital Development Authority, Room # 19, Old Naval Headquarter, Sector G-6, Islamabad Cell: +92-332-9194697</p>	<p>Engr. Saadat Ali Managing Director Project Procurement International 26, Second Floor, Silver City Plaza, G-11 Markaz, Islamabad, Tel: +92-51-2363624, Cell: +92-300-854 0195 Email: projectpi@gmail.com Web: www.projectpi.pk</p>

1.8 Approach and Methodology

1.8.1 Introduction

The approach for conducting Environmental Impact Assessment of Development of Park Enclave Phase – III Project, Islamabad is to follow the requirement of Pakistan Environmental Protection Agency (Review of IEE/EIA), Regulations 2000.

1.8.2 EIA methodology

Kick off Meeting with the Client: The Consultant team held a kickoff meeting with CDA management in Islamabad at the beginning of the EIA study. During the kickoff

meeting, all technical data regarding Development of Park Enclave Phase – III Project, Islamabad was obtained.

Collection of secondary data: The consultant team obtained published secondary data of Islamabad that included:

Physical conditions - includes topography, geology, soils, surface and groundwater resources and climate.

Ecological resources - includes flora and fauna.

Human and economic development – includes settlements, socio-economic conditions, infrastructure, and land use.

Heritage aspects – includes sites of cultural, archaeological, or historical significance.

The secondary data also collected provided a detailed insight into the biological environment of the area, which included work conducted by Environment Department of Capital Development Authority Islamabad.

Collection of Primary Data and Field Visits: PPI team visited the project site and adjoining areas in coordination with the CDA officials, for obtaining detailed knowledge of the environmental conditions of the area. During the field visits, the existing environmental conditions of Park Enclave Phase – III Project, Islamabad were studied. In addition, consultation/meetings were held with major communities in the project area i.e. Pakistan Housing Authority, Chatha Bakhtawar Village, and Newmal Bazaar.

The Rapid Social Appraisal method was applied to discover the facts, empirically verifiable observations or verifying the old facts, on the prevailing socio-economic and cultural conditions of the project area.

Analysis of alternatives: The EIA report gives the details of alternatives considered during the feasibility of the Project.

Public Consultation: Discussions on individual level were held with the selected stakeholders during the process of report preparation regarding the EIA of the Development of Park Enclave Phase – III Project, Islamabad. List of the people met during the consultation process is given in **Annexure-5**.

Review of Legal and Administrative Framework: The objective of the review of legal and administrative framework is to obtain information on all legislation pertaining to Development of Park Enclave Phase – III Project, Islamabad. The consultant team reviewed the environmental policies and national, international laws and guidelines relevant to the project. A synopsis of all relevant laws is included in the report.

Identification of Impacts: The identification of impacts is a key activity in the environmental assessment process, which is based on the professional judgment of our experienced team supported by national and international guidelines.

The impacts have been identified for the methodical consideration of likely or possible significant impacts on the environment because of Development of Park Enclave Phase – III Project, Islamabad. The aim of this task was to assess the associated risks with these impacts.

Evaluation of Impacts: Each impact identified has been evaluated against its significance in terms of its severity and likelihood of its occurrence. The impact evaluation process prioritized each potential impact and screen out insignificant or inconsequential impacts. The significance of the impacts has been assessed in terms of the effects on the natural ecosystem, level of public concern and conformity with

legislative or statutory requirements. The assessment of the severity was to consider the nature, magnitude, extent and location, timing and duration and reversibility of the potential impact. The evaluation of the significant impacts will form the basis for development of Environmental Management Plan.

Identification of Mitigation Measures: The objective of identification of mitigation measures is to identify practices, technologies or activities that would prevent or minimize all significant environmental impacts and propose physical and procedural controls to ensure that mitigation is effective. On the basis of the impact evaluation performed, changes or improved practices have been suggested, where practical, in the planned activities, to prevent and control unacceptable adverse impacts resulting from normal or extreme events. Monitoring requirements will be defined and institutional arrangements for monitoring will be suggested.

Development of Environmental Management Plan (EMP): An Environmental Management Plan (EMP) has been developed for effective implementation of the recommended mitigation measures. The EMP includes controls to minimize the identified impacts and monitoring program to monitor residual impacts, if any, during the operation. The EMP also lays down procedures to be followed during the operation of the project and identifies roles and responsibilities of all concerned personnel, including reporting in the operational phase.

1.9 Organization of the EIA Report

This report has been structured in the following manner:

Chapter 1 (*Introduction*) provides an overall introduction to the project and impact assessment methodology.

Chapter 2 (*Legal Framework*) describes the regulatory framework of Pakistan on environment and its implications on the project.

Chapter 3 (*Project Description*) provides the description of the proposed project, its layout plan and associated activities, raw material details and utility requirement.

Chapter 4 (*Analysis of Alternatives*) provides a description of the micro-environment and macro-environment of the proposed project sites. This chapter describes the physical, ecological and socioeconomic resources land of project areas and surroundings.

Chapter 5 (*Existing Environment*) provides a description of the micro-environment and macro-environment of the proposed project sites. This chapter describes the physical, ecological and socioeconomic resources land of project areas and surroundings.

Chapter 6 (*Public Consultation*) this chapter describes details of discussions held with primary and secondary stakeholders.

Chapter 7 (*Impact Assessment and mitigation measures*) describes the potential environmental and social impacts of proposed project on the different features of the micro and macro-environment using the matrix method.

Chapter 8 (*Environmental Management Plan*) explains the mitigation measures proposed for the project in order to minimize the impacts to acceptable limits. It also describes implementation of mitigation measures on ground and monitoring of environmental parameters against likely environmental impacts.

Chapter 9 (*Conclusion*) summarizes the report and presents its conclusions.

2 Legislative and Institutional Framework

2.1 Introduction

The enactment of comprehensive legislation on the environment, covering multiple areas of concern, is an ongoing phenomenon in Pakistan. Whereas, a basic policy and legislative framework for the protection of the environment and overall biodiversity in the country is now in place, detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation are mostly in place. Development of Park Enclave Phase – III Project, Islamabad has been assessed in compliance of existing legal framework on the environment in Pakistan as described henceforth.

2.2 National Conservation Strategy

The National Conservation Strategy (NCS) is the first policy document that pledged to balance Pakistan's economic development with the conservation of natural resources. It is the underlying goal of this document that all economic and statutory development in the country should be such that it does not conflict with the interests of nature conservation. The Pakistan Environmental Protection Act, 1997 is the basic legislative tool empowering the government to frame regulations for the protection of the environment. The World Bank environmental guidelines are used to bridge the gaps, wherever needed. The policy, laws, regulations and standards relevant to Development of Park Enclave Phase – III Project, Islamabad in the context of environmental protection are described in the following sections.

2.3 Biodiversity Action Plan

Pakistan is a signatory to the Convention on Biological Diversity, and is thereby obligated to develop a national strategy for the conservation of biodiversity. The Government of Pakistan has constituted a Biodiversity Working Group under the auspices of the Ministry of Environment, Local Government and Rural Development to develop a Biodiversity Action Plan for the country. After an extensive consultative exercise, a draft Action Plan has been developed. The Plan, which has been designed to complement the NCS and the proposed provincial conservation strategies, identifies the causes of biodiversity loss in Pakistan and suggests a series of proposals for action to conserve biodiversity in the country.

2.4 National Environmental Policy, 2005

The National Environment Policy (NEP) aims to protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development. In NEP, the further sectorial guidelines, Energy Efficiency and Renewable directly related to building energy code for newly constructed buildings were introduced.

2.5 Laws and Regulations

Pakistan has a number of laws concerned with the regulation and protection of the environment. However, the enactment of comprehensive legislation on the environment, in the form of an act of parliament, is a relatively new phenomenon. Most of the existing laws on environmental issues were enforced over an extended period of time, and are context-specific. The laws relevant to the developmental projects are briefly reviewed below.

2.5.1 Pakistan Environmental Protection Act, 1997

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

The requirement for environmental assessment is laid out in Section 12 (1) of the Act. Under this section, no project involving construction activities or any change in the physical environment can be undertaken unless an Initial Environmental Examination (IEE) or an Environmental Impact Assessment (EIA) is conducted, and approval is received from the Federal or relevant Provincial EPA. Section 12(6) of the act states that this provision is applicable only to such categories of projects as Pakistan Environmental Protection Agency (Review of IEE and EIA Regulations), 2000.

2.5.2 Pakistan Environmental Protection Agency (Review of IEE and EIA Regulations), 2000

The Pakistan Environmental Protection Agency (Review of IEE and EIA Regulations), 2000 (the Regulations) prepared by the Pakistan Environmental Protection Agency under the powers conferred upon it by the Act, provide the necessary details on preparation, submission and review of the IEE and the EIA. Categorization of projects for IEE and EIA is one of the main components of the Regulations.

Projects have been classified on the basis of expected degree of adverse environmental impacts. Project types listed in Schedule-I are designated as potentially less damaging to the environment and those listed in Schedule-II as having potentially serious adverse effects. Schedule-I projects require an IEE to be conducted, provided they are not located in environmentally sensitive areas. For the schedule-II projects, conducting an EIA is necessary. Salient features of the regulation, relevant to the proposed project are listed below:

- Categories of projects requiring IEE and EIA are issued through two schedules attached with the Regulations.
- A fee, depending on the cost of the project, has been imposed for review of EIA and IEE.
- The submittal is to be accompanied by an application in prescribed format included as schedule IV of the Regulations.
- The EPA is bound to conduct a preliminary scrutiny and reply within 10 days of submittal of report a) confirming completeness, b) asking for additional information, or c) requiring additional studies.

- The EPA is required to make every effort to complete the review process for IEE within 45 days and of the EIA within 90 days, of issue of confirmation of completeness.
- EPAs accord their approval subject to following conditions:
 - Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.
 - Before commencing operation of the project, the proponent is required to obtain from EPA a written confirmation of compliance with approval conditions and requirements of the IEE/ EIA.
- An EMP is required to be submitted with the request for obtaining confirmation of compliance.
- The EPAs are required to issue confirmation of compliance within 15 days of receipt of request and complete documentation.
- The IEE/ EIA approval will be valid for three years from the date of accord.
- A monitoring report is required to be submitted to the EPA after completion of construction, followed by annual monitoring reports during operations.

Development of Park Enclave Phase – III Project, Islamabad falls in schedule-II of the regulations. Hence, this type of project needs an EIA to be conducted.

2.6 National Environmental Quality Standards (NEQS), 2000

The NEQS, promulgated under the PEPA 1997, specify the following standards:

- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources,
- For power plants operating on oil and coal:
 - Maximum allowable emission of sulphur dioxide,
 - Maximum allowable increment in concentration of sulfur dioxide in ambient air,
 - Maximum allowable concentration of nitrogen oxides in ambient air, and
 - Maximum allowable emission of nitrogen oxide for steam generators as function of heat input.
- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment and sea (three separate set of numbers).

The NEQS for liquid effluents discharged to inland waters, gaseous emission from industrial sources and emissions from motor vehicles are provided as on the following web site. Web site: <http://www.environment.gov.pk/info.html>

The National Environmental Quality Standards (NEQS), 2000 specify the following standards:

- Maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged into inland waters, sewage treatment facilities, and the sea (three separate sets of numbers)

- Maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources
- Maximum allowable concentration of pollutants (02 parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles.
- Maximum allowable noise levels from vehicles.

These standards also apply to the gaseous emissions and liquid effluents generated by generator, process waste etc. The standards for vehicles will apply during the construction as well as operation phase of the project. Standards for air quality have not been prescribed as yet.

2.6.1 NEQS for Liquid Effluent

The National Environmental Quality Standards (NEQS) for discharge of effluent from industry are presented in **Table 2.1**.

Table 2.1: NEQS for Liquid Effluent Discharge

Parameters	Standards		
	Into Inland Waters	Into Sewage Treatment	Into Sea
Temperature	≤3°C	≤3°C	≤3°C
pH Value	6-9	6-9	6-9
Biological Oxygen Demand (BOD) ₅	80	250	80
Chemical Oxygen Demand (COC)	150	400	400
Total Suspended Solids (TSS)	200	400	200
Total Dissolved Solids (TDS)	3500	3500	3500
Grease & Oil	10	10	10
Phenolic Compounds (as phenol)	0.1	0.3	0.3
Chlorides (as Cl')	1000	1000	SC
Fluoride (as F')	10	10	10
Cyanide (CN') total	1.0	1.0	1.0
An-ionic Detergents (as MBAs)	2.0	20	20
Sulphate (SO'')	600	1000	SC
Sulphide (S')	1.0	1.0	1.0
Ammonia (NH ³)	40	40	40
Pesticides	0.15	0.15	0.15
Cadmium	0.1	0.1	0.1
Chromium (trivalent & hexavalent)	1.0	1.0	1.0
Copper	1.0	1.0	1.0
Lead	0.5	0.5	0.5
Mercury	0.01	0.01	0.01
Selenium	0.5	0.5	0.5
Nickel	1.0	1.0	1.0
Silver	1.0	1.0	1.0

Parameters	Standards		
	Into Inland Waters	Into Sewage Treatment	Into Sea
Total Toxic Metals	2.0	2.0	2.0
Zinc	5.0	5.0	5.0
Arsenic	1.0	1.0	1.0
Barium	1.5	1.5	1.5
Iron	8.0	8.0	8.0
Manganese	1.5	1.5	1.5
Boron	6.0	6.0	6.0
Chlorine	1.0	1.0	1.0

Source: NEQS, Pakistan Environmental Protection Agency

2.6.2 NEQS for Gaseous Emission

The National Environmental Quality Standards (NEQS) for permissible limits of gaseous emission from industry are presented in **Table 2.2**.

Table 2.2: NEQS for Gaseous Emission

Parameter	Source of Emission	Standards
Smoke	Smoke opacity not to exceed	40% or 2 Ringlemann Scale or equivalent smoke number
Particulate Matter	Boilers & Furnaces:	
	Oil Fired	300
	Coal Fired	500
	Cement Kilns	300
	Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500
Hydrogen Chloride	Any	400
Chlorine	Any	150
Hydrogen Fluoride	Any	150
Hydrogen Sulphide	Any	10
Sulphur Oxides	Sulfuric Acid/sulphonic Acid Plants	5000
	Other Plants except power plants operating an oil and coal	1700
Carbon Monoxide	Any	800
Lead	Any	50
Mercury	Any	10
Cadmium	Any	20
Arsenic	Any	20
Copper	Any	50
Antimony	Any	20
Zinc	Any	200

Parameter	Source of Emission	Standards
Oxides of Nitrogen	Nitric Acid Manufacturing Unit	3000
	Other plants except power plants operation on oil or coal:	400
	Gas fired	600
	Oil fired	1200
	Coal fired	

Source: NEQS, Pakistan Environmental Protection Agency

2.6.3 NEQS for Vehicular Emission

The National Environmental Quality Standards (NEQS) for permissible limits of exhaust emissions from vehicles are presented in **Table 2.3**.

Table 2.3: NEQS for Vehicular Emission

Parameters	Standards permissible limits)	(Maximum Measuring Method
Smoke	40% or 2 on the Ringleman Scale During engine acceleration mode	To be compared with Ringleman chart at a distance of 6 meters or more
Carbon Monoxide	Emission Standards: New Vehicle = 4.5% Used Vehicle = 6%	Under idling conditions: non-dispersive infrared detection through gas analyzer.
Noise	85 db (A)	Sound meter at 7.5 meter from the source

Source: NEQS Pakistan Environmental Protection Agency

2.6.4 NEQS for Drinking Water, 2010

The National Environmental Quality Standards (NEQS) for drinking water quality, 2010 are presented in **Table 2.4**.

Table 2.4: NEQS for drinking water quality

Parameter	Standard values for Pakistan	WHO Guidelines
Physical		
Color	≤ 15 TCU	≤ 15 TCU
Taste	Non acceptable	Non acceptable
Odour	Non acceptable	Non acceptable
Turbidity	< 5 NTU	< 5 NTU
Total hardness	< 500 mg/L	---
TDS	<1000	<1000
pH	6.5- 8.5	6.5- 8.5
Chemical		
Essential Organic	Mg/Litre	Mg/Litre
Aluminium	≤ 0.2	0.2
Antimony	≤ 0.005	0.02
Arsenic	≤ 0.05	0.01
Barium	0.7	0.7
Boron	0.3	0.3

Parameter	Standard values for Pakistan	WHO Guidelines
Cadmium	0.01	0.003
Chloride	≤ 250	250
Chromium	≤ 0.05	0.05
Copper	2	2
Toxic Inorganic		mg/Litre
Cyanide	≤ 0.05	0.07
Flouride	≤ 1.5	1.5
Lead	≤ 0.05	0.01
Mangnese	≤ 0.5	0.5
Mercury	≤ 0.001	0.001
Nickel	≤ 0.02	0.02
Nitrate	≤ 50	50
Nitrite	≤ 3	3
Zinc	5	3
Pesticides mg/L		PSQCA No.4639-2004.page No 4 Table No. 3serial No. 20-58
Phenolic Compounds		<0.002
Polynuclear aromatic hydrocarbons		0.01
Radioactive		
Alpha emitters bq/L	0.1	0.1
Beta emitters	1	1

Source: NEQS Pakistan Environmental Protection Agency

2.6.5 NEQS for Ambient Air and Noise, 2010

The National Environmental Quality Standards (NEQS) for Ambient Air and Noise, 2010 are presented in **Table 2.5** and **2.6**

Table 2.5: NEQS for Ambient Air

Pollutants	Time Weighted Average	Concentration in Ambient Air (ug/m ³)
		Effective from 1 st January, 2013
Sulphur Dioxide	Annual Average*	80
	24 hrs**	120
oxides of Nitrogen (NO)	Annual Average*	40
	24 hrs**	40
O ₃	1 hour	130
Suspended	Annual Average*	360
Particulate Matter	24 hours	500
Lead	Annual Average*	1
	24 hrs**	1.5

Carbon monoxide	8 hours	5mg/m ³
-----------------	---------	--------------------

** Annual Arithmetic mean of minimum 40 measurements in a year taken twice a week 24 hourly at uniform interval

* 24 hourly /8 hourly values should be met 98 % of the year, 2 % of time, it may exceed.

Source: NEQS Pakistan Environmental Protection Agency

Table 2.6: NEQS for Noise

Category of Area/ Zone	Effective from 1 st July, 2012	
	Limits in dB(A) Leq	
	Day time	Night time
Residential area	55	45
Commercial area	65	55
Industrial area	75	65
Silence area	50	45

Source: NEQS Pakistan Environmental Protection Agency

2.7 Building Energy Code of Pakistan, 2008

The scope of this code is to provide:

(a) Minimum energy-efficient requirements for the design and construction of:

- 1) New buildings and their systems.
- 2) New portions of buildings and their systems.
- 3) New systems and equipment in existing buildings.

(b) Criteria for determining compliance with these requirements.

The Building Energy Code of Pakistan 2008 is available at the following link;
<http://www.enercon.gov.pk/images/building%20code.pdf>

2.8 Antiquity Act, 1975

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

- Ensure that no activity is undertaken in the proximity of a protected antiquity, and
- If during the course of the project an archaeological discovery is made, it should be reported to the Department of Archaeology, Government of Pakistan.

2.9 The Cutting of Trees (Prohibition Act), 1975

Section 3 of this Act states “No person shall, without the prior written approval of the local formation commander or an officer authorized by him in this behalf, cut fell or damage or cause to cut, fell or damage any tree.”

2.10 The Protection of Trees and Bush wood Act, 1949

This Act prohibits cutting or chopping of trees and bush wood without permission of the Forest Department.

2.11 Pakistan Penal Code, 1860

This outlines the penalties for violations concerning pollution of air, water bodies and land. Sections 272 and 273 of this Act deal with the adulteration of food or drink. Noise pollution has been covered in Section 268, which defines and recognizes noise as a public nuisance. "A person is guilty of a public nuisance who does any act or is guilty of an illegal omission which causes any common injury, danger or annoyance to the public or to the people in general who dwell or occupy property in the vicinity, or which must necessarily cause injury, obstruction, danger or annoyance to persons who may have occasion to use any public right."

2.12 Islamabad Fire Fighting and Life Safety Regulations, 2010

The regulation was formulated to make more effective provision for the Fire Prevention and Life Safety measures in certain buildings and premises in the Islamabad Capital Territory. The regulation provides conditions for inspection of buildings and its premises to ensure safety of life and property. The regulation further provides power to the authority to seal a building or premises and whoever contravenes any provision of the regulation will be fined with five hundred thousand ruppes¹.

2.13 Institutional Set Up

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

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

Development of Park Enclave Phase – III Project is located at Islamabad. Therefore, the EIA report will be submitted to the Pakistan Environmental Protection Agency, Islamabad for obtaining approval for the project.

2.14 Environmental Guidelines

Three sets of guidelines, the Pak-EPA's Environmental Guidelines, the World Bank Environmental Guidelines, and ADB Environmental Guidelines are reviewed here.

2.14.1 Environmental Protection Agency's Environmental Guidelines

The Pakistan EPA has prepared a set of guidelines for conducting environmental assessments. The package of regulations, of which the guidelines form a part, includes the PEPA 1997 and the NEQS. The guidelines themselves are listed below:

- Guidelines for the Preparation and Review of Environmental Reports,
- Guidelines for public consultation,
- Guidelines for Sensitive and Critical Areas,
- Pictorial Guidelines.

It is stated in the Pakistan Environmental Protection Agency Review of IEE and EIA Regulations, 2000 that the EIA or IEE must be prepared, to the extent practicable, in

¹ <https://cda.gov.pk/documents/docs/safety-regulation-2010.pdf>

accordance with the Pakistan Environmental Protection Agency Environmental Guidelines.

2.14.2 Guidelines for the Preparation of IEE/EIA Reports

The GOP has also framed guidelines for the preparation of EIA of Projects in various developmental sectors.

2.14.3 World Bank Environmental Guidelines

The principal World Bank publications that contain environmental guidelines are as follows:

- Pollution Prevention and Abatement handbook 1998: Towards Cleaner Production, (WB/UNIDO/UNEP, 1999).
- Environmental Assessment Sourcebook, Volume I: Policies, Procedures, and Cross-Sectoral issues, (WB, 1991).

2.15 Obligation under International Treaties

Pakistan is a signatory to various international treaties and conventions on the conservation of the environment and wildlife protection. The country is obliged to adhere to the commitments specified in these treaties. The convention of 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 programs 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.

The Convention on the Conservation of Migratory species of Wild Animals, 1979 requires countries to take action to avoid endangering migratory species, where the term migratory species refers to species of wild animals of which significant proportions cyclically and predictably cross one or more national jurisdictional boundaries.

The parties are also required to promote or cooperate with research into migratory species. Under the international plant protection convention, 1951, Pakistan is required to take steps to ensure the protection of certain plant species that face the extinction threat.

2.16 Implication of Legislations to the Project

The implication of the above mentioned legislations to the pre-construction, construction and operational phase of the Development of Park Enclave Phase – III Project, Islamabad would be as follows:

- CDA being the proponent of the project shall ensure that construction and operational phases of the project will be carried out in accordance with the EIA report and Environmental Management Plan is implemented.
- The project will be subjected to four basic provisions relating to pollution control under the PEPA 97 are contained in section 11, 13, 14 and 15 as follows:
 - Section 11, prohibits discharge or emission of any effluent or waste or air pollutant or noise in excess of the NEQS, or the established ambient standards for air, water or land.

- Section 13, prohibits of hazardous wastes.
- Section 14, prohibits the handling of hazardous substance expect under license or in accordance with provision of any local law or international agreement.
- Section 15, prohibits operation of motor vehicles for each air pollutant or noise is being emitted in excess of the NEQS or the established ambient standard.

3 Description of the Project

3.1 Introduction

This Chapter provides a description about the project, its salient features, location, components and various phases.

3.2 Type and Category of the Project

The proposed project is the Development of Park Enclave Phase – III Project, Islamabad. The total area of the entire sector is 112.80 acres (902 Kanal).

The proposed project falls in Schedule II of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulation 2000 under category J any other project requiring EIA.

3.3 Objectives of the Project

The main objective of the project is to meet the growing requirements of housing units in Islamabad for all income groups.

- To provide residential accommodation for general public.
- To re-gain the trust of general public on CDA.
- To provide various services viz: roads, drainage, water supply and sanitary sewerage system, to the people living there.
- To reduce the pressure on already overcrowded housing in Pakistan particularly in Rawalpindi & Islamabad.
- To cope with the abnormally increased and pressing demand for government and general public housing units.
- To provide employment opportunities both directly (workers and employees) and indirectly by accelerating the business activities in the project area.
- The project will facilitate implementation of the Islamabad Master Plan, by developing the Park Enclave Phase – III Project Islamabad.
- Indirectly the project will improve the living standards of the people and strengthen the economy.

3.4 Project Location and Accessibility

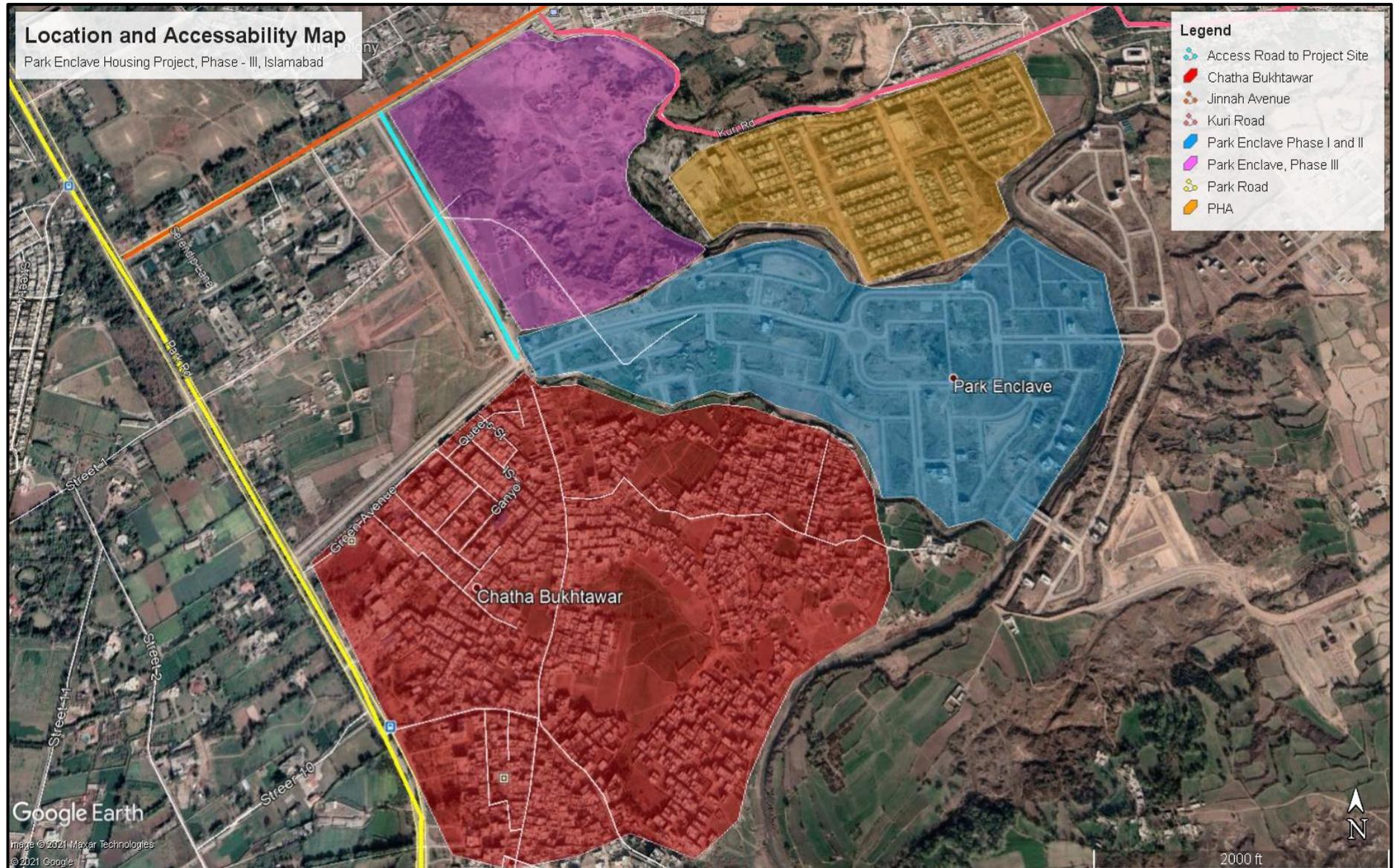
Park Enclave is ideally located on Park Road, Chak Shahzad at its intersection with Kurri Road 4 km away from Islamabad Club. The project area is conveniently accessible from all Major Roads, such as Kashmir Highway, Lehtrar Road and Islamabad Highway.

The GPS coordinates of the project site are 33°40'33.75"N and 73° 9'22.42"E.

North:	Newmal Bazaar
West	Park Road
South:	Phase-I and Chatha Bukhtawar Village
East	Pakistan Housing Authority

The project location and major roads in the project area are shown in **Figure 3.1**.

Figure 3.1: Location and Accessibility to Park Enclave Phase – III Project, Islamabad



3.5 Description of the Project

The development of Park Enclave Phase – III Project has been proposed on a piece of land measuring 112.80 acres (902 kanals) located adjacent to the Park Enclave Housing Society, Phase – I.

The project includes a total of 1,047 residential plots, which will be built on an area of 453 Kanal. The residential plots are of different size such as, there will be 271 plots of 25'X50', 588 plots of 35'X70', 124 plots of 40'X80', 64 plots of 50'X90'.

The commercial plots will be built on an area of 41 Kanal out of the total 902 Kanal. The Project will also incorporate open spaces, parks, educational institutes, graveyards, and Roads.

The number and size of the residential plots of the proposed project is shown in **Table 3.1**.

Table 3.1: Number and sizes of plots in Park Enclave Phase – III Project, Islamabad

Plot Size	Number of plots
50'x90'	64
40'x80'	124
35'x70'	588
25'x50'	271
Total	1047

Source: PC 1 for Development of Park Enclave Phase – III Project, Phase – III, Islamabad

For the development of Park Enclave Phase – III Project, the essential infrastructure works include storm drainage system, water supply, sanitary sewerage system, solid waste management system, electrification, streetlights, security, sui gas works, sanitation and external electrification by IESCO. CDA will also provide soft and hard landscaping, parks, playground and other facilities in the sector.

The total estimated cost of the development of Park Enclave Phase – III Project is Rs 3,084.49 Million. The time schedule for completion of the project is 12 months.

The layout plan of Park Enclave Phase – III Project Islamabad has been shown as **Figure 3.2**.

3.5.1 Land Acquisition

The land allocated for the development of Park Enclave Phase – III Project, Islamabad is a vacant land. The PC-1 for the development of Park Enclave Phase – III Project, Islamabad has been prepared. CDA has acquired the land and compensation of built up structures and graveyard will be carried out as per relevant legislation.

3.5.2 Land Use Analysis

The development of Park Enclave Phase – III Project, Islamabad will be carried out as per the master plan of Islamabad. A total of 112.80 acres (902 Kanal) of land adjacent to the Park Enclave I have been allocated for the development of Park Enclave Project, Phase – III, Islamabad.

The distribution of land is such that around 50.20% of the total land has been designated for residential purposes while 4.54% of the total land will be allocated to commercial activities. As the project will follow the master plan of Islamabad, which makes provision of landscaping and beautification of the housing project on around 18.40% of the total land and includes parks, playgrounds and green belts. Roads and streets will cover 21.88% of land whereas 3.88% land has been allocated for future use.

The land distribution for Park Enclave Phase – III Project, Islamabad is given in **Table 3.2**.

Table 3.2: Land use of Park Enclave Phase – III Project, Islamabad

Sr. No	Description	Area in Acers	Area in Kanal	Percentage Allocation of Land
1	Residential	56.625	453	50.20
2	Commercial	5.125	41	4.54
3	Parks / Playgrounds	20.75	166	18.40
4	Public Buildings	1.25	10	1.11
5	Future Use	4.375	35	3.88
6	Roads	24.675	197	21.88
	Total	112.80	902	100

Source: PC 1 for Development of Park Enclave Phase – III Project, Islamabad

3.5.3 Occupancy of Park Enclave Phase – III Project, Islamabad

There will be 1,047 residential plots in the of Park Enclave Phase – III Project, Islamabad. The estimated population of Park Enclave Phase – III Project, Islamabad will be 6,282 assuming the household size of 6. The expected population is shown in **Table 3.3**.

Table 3.3: Estimated Population of of Park Enclave Phase – III Project, Islamabad

Description	Units	Avg. Household Size	Population
Residential Plots	1,047	6	6,282

3.5.4 Project Components and Costs

The total cost is estimated to be PKR 3,084.49 million for the development of Park Enclave Phase – III Project, Islamabad. The individual cost of the items is given in the Table 3.4.

Table 3.4: Estimated Cost of Development of Park Enclave Phase – III Project, Islamabad

S #	Description	Amount (Rs. In Million)
A	DIRECT COST	
1	Boundary Wall	29.180
2	Gate House & Security Pickets	12.264
3	Roads / Streets	485.523
4	Drainage / Footpath Work	109.326
5	Nullah / Protection Works	174.587
6	Sewerage System	64.411
7	Sewerage Treatment Plant (STP)	375.000
8	Bridges & Culvert	153.667
9	Water Supply System	182.988
10	Sanitation Works	30.640
11	Landscaping (Soft + Hard)	127.067
12	E & M Works (Street Lights, Security System etc)	200.000
13	Irrigation System	50.862
B	BASE COST	1,995.515
1	Consultancy Charges @ 2% of Base Cost	52.339
2	Price adjustment/escalation @ 6.5% per Annum	136.082
3	Employers and Engineer's Facilities	14.954
4	Cost of Project Director & Staff	31.990
5	Cost of Security Services (Provisional)	10.098
6	Advertising Charges	75.000
7	Cost of Built Up/Land Compensation (Provisional)	20.000
8	I.E.S.C.O Charges (Underground external electrification / feeder) Provisional	450.000
9	S.N.G.P.L Charges (Sui Gas) (Provisional)	200.000
10	Shifting of Services (Provisional)	20.000
11	Contingencies @ 3% on Base Cost	78.509
Grand Total (A+B)		3,084.49

Source: PC 1 for Development of Park Enclave Phase – III Project, Islamabad

3.5.5 Infrastructure Development in Park Enclave Phase – III Project, Islamabad

Roads: The profiles of roads have been made for a design speed in no case greater than 60 km/hr and less than 20 km/hr, while having maximum longitudinal slope of 7%.

The pavements have also been given a minor cross slope of 2% for the purpose of surface drainage. The road network comprises of 50' wide street roads. The cost of road works comes to Rs.485.523 Million.

Storm Drainage System and Footpaths: Drainage facilities such as box / pipe culverts and longitudinal drains parallel to the roads will be provided. The storm drainage system has been designed to take runoff from the catchments areas resulting from maximum rainfall intensity as 3 inches per hour with impermeability factor as 0.8.

The slope of lines ranges from 3 per thousand to 30 per thousand. Grating chambers have also been provided to catch surface water. The disposal of storm water will be made into the nearby Nullahs. Footpaths will also be provided.

The cost for storm drainage system comes out to Rs.109.326 Million.

Nullah / Protection Works: A nullah passes through the project area known as Gumrah kas Nullah. An amount of Rs.174.587 million has been dedicated for the protection works of the Nullah.

Water Demand and Storage: The future average water demand for Park Enclave Phase – III Project, Islamabad is 393,876 gallons per day.

The main source of water supply for the residents of Park Enclave Phase – III Project, Islamabad will be groundwater. CDA will construct tube-wells for the extraction of groundwater. The water storage requirements and provisions calculated for Park Enclave Phase – III Project, Islamabad is given in **Table 3.5**.

Table 3.5: Water Balance Sheet for Park Enclave Phase – III Project, Islamabad

Proposed no. of Residential Units		1047	
Estimated no. of person per Unit		6	
			6,282
A	Domestic Water Demand (Residential)		
	Proposed no. of Person	6,282	-
	Average water demand g/c/d	40	-
	Sub Total for Residential water demand		251,280 g/d
B	Institutional and Commercial Water Demand		
B-1	For Public Building		
	Proposed no. of Person (20% of People of the total population)	1256	-
	Average water demand g/c/d	3	-
	Sub Total (B-1)		3,768 g/d
B-2	For Educational Institution and Commercial Area		
	Proposed no. of Person (15% of People of the total population)	942	-
	Average water demand g/c/d	8	-
	Sub Total (B-2)		7,536 g/d
Average water demand of Park Enclave Phase – III Project, Islamabad			
C.	Total of (sub-total A-C)		

For Peak Hour Water Demand		@ plus 50% on average
D.	Extra 50% of average water demand	131,292 g/d
Total Water Demand for Park Enclave Phase – III Project, Islamabad		393,876 g/d

This system has been designed in the shape of network resembling a grid-iron connected at intervals at street intersections. Water will be supplied from more than one direction and circulates continuously through out the system.

Repair can easily be carried out in the system without cutting off the total supply as water would be available from all other sides. The grid system of pipe lines will be analyzed on the basis of successive approximation by using Hardy Cross Method.

Capital Development Authority will also provide 04 Nos Tube Wells, Overhead and Underground Water Tanks. The minimum clear depth of the pipe lines will be kept at 3 ft from finished road levels. The pipe used would be HDPE.

Sanitary Sewerage system: The sanitary sewerage system has been designed at 80% of the average consumption of water per capita per day. Minimum diameter of pipe would be 8" with "British Standard specifications of RCC pipes.

However, 6" dia sewer shall be used for house connections. The minimum slope to the sewer line has been adopted for attaining self-cleansing velocity. Disposal of sewage has been made in the trunk sewer which ultimately ends at Sewerage Treatments Plant. The cost of Sanitary System component comes to Rs.64.411 Million.

Sewerage Treatment Plant: A sewerage treatment plant is to be designed for Park Enclave Phase – I Project which will be used to treat the sewerage generated from the Park Enclave Phase – III Project, Islamabad.

Soft and Hard Landscaping: For providing healthy environment and in order to enhance the aesthetic value of the project area, the entire layout of the Park Enclave consisting of roads, streets, avenues, commercial areas, masjids, play fields parks, nullah sides etc. shall be given proper Landscape Treatment.

Keeping in view the topographical features of the area earthwork like major / minor cutting / filling, leveling / grading by deploying earthmoving machinery as well as manual labor is to be carried out before taking up planting and turfing in the area.

For beautification of median strips of carriage ways, flowering shrubs, seasonal flowers etc. are to be added after completion of the earth work. Similarly parks and playgrounds which usually comprise hard and soft landscape operations.

Hard landscaping involves provision of pucca paths, flower boxes, concrete benches and umbrellas provision of playing equipment etc. whereas soft landscaping includes development of lawns raising of hedges, planting of flowering shrubs, shady trees, and seasonal/perennial flower beds.

Regular Maintenance Staff shall be employed for proper upkeep of Soft Landscaping Works. Cost of Soft and Hard Landscaping Works comes out to Rs.127.067 Million.

Solid Waste Management: CDA will have a proper solid waste management plan for Park Enclave Phase – III, Islamabad. Approximately 3.92 tons of solid waste per day will be generated at Park Enclave Phase – III Project, Islamabad based on the assumption of waste generation rate of 0.625 kg/c/day.

There are five main waste sources in the scheme that are: residential waste, commercial waste, institutional waste, green waste and construction and demolition waste.

The solid waste management will be the responsibility of CDA Sanitation Directorate. The solid waste from residential and commercial areas will be collected through bins placed at suitable locations in both residential and commercial areas.

Bins of 120 liters will be placed in the residential area whereas, bins having a capacity of 360 liters will be placed in the commercial areas. The solid wastes will be collected by sanitary workers from the bins and then loaded into mini tipper – 3-wheeler and mini tripper vehicles.

All the solid waste will be used to transport to a transfer station at the solid waste management site. The collected solid waste will be located in a compactor at the transfer station, and a Compactor will be transported to the designated dumping site at Islamabad/Rawalpindi.

Electrification, Street Lights and Security System: The facility would be underground. WAPDA / IESCO shall provide electricity to the proposed project and CDA shall provide street light facilities. The total cost of electrification, street lights comes out to Rs.200.000 Million. An amount of Rs.450.000 Million has been separately kept for IESCO charges.

Sui Gas: Sui gas would be provided by SNGPL. For this component an amount of Rs. 200.000 Million has been kept in the PC-1.

Sanitation Services: In order to keep the area neat/ clean to maintain proper hygienic conditions, sanitation charges component has been incorporated in the PC-I which includes cost for procurement of machinery and equipment, and running and maintenance cost. For this component an amount of Rs.30.640 million has been kept in the PC-1.

Community Buildings: The construction of community buildings including Club, Mosques, Admin Building, School and playground shall be carried out by the CDA. Its cost comes to Rs.621.451 Million.

3.5.6 Sustainable Features of the Project

Capital Development Authority is committed to developing its project in a sustainable way. The following sustainable features have been provided in this project:

- The planning & design of Development of Park Enclave Phase – III Project, Islamabad will be carried out, keeping in mind the natural topography, sun and wind direction.
- CDA has allocated 18.40% (166 kanals) for open spaces, parks, and playground. There are a total of 6 parks/ open spaces in the Park Enclave Phase – III. A plantation plan has been recommended to be implemented at Park Enclave Phase – III, Islamabad. These open areas will also serves as sites for groundwater recharge.
- CDA will provide sanitation services in order to keep the sector neat and clean to maintain proper hygienic conditions.
- A proper solid waste management system will be introduced for the collection, transportation and disposal of the solid waste produced during the operational phase of the project.

- A sewerage treatment plant will be constructed in Park Enclave Phase I to treat the wastewater generated from the proposed project.

3.5.7 Annual Maintenance Cost

The annual maintenance cost of Development of Park Enclave Phase – III Project, Islamabad after completion of the project as per PC-I is Rs. 111.659 million.

3.5.8 Manpower Requirement

During the construction phase of the project, a total of 100 staff would be engaged.

Table 3.6: Manpower requirement during construction Phase of Park Enclave Phase – III Project, Islamabad

No	Type/ Profession	For execution (Number)
		Park Enclave Phase – III, Islamabad
1	Engineers Civil, Environmental, Public Health etc.	10
2	Project Managers and Administrators	04
3	Support & Service Staff (for office & site)	07
4	Skilled Workers (Technicians, Plumbers, Labours)	36
5	Unskilled labour/ helpers	43
6	Foreign Consultants (Specify fields of work)	Nil
7	Others	Nil
Total		100

During the operational phase of the project, a total of 39 staff would be engaged.

Table 3.7: Manpower requirement during operational phase of the project

No	Type/ Profession	For operation (Number)
		Park Enclave Phase – III, Islamabad
1	Engineers Civil, Environmental, Public Health etc.	03
2	Project Managers and Administrators	02
3	Support and Service Staff (for office and site)	04
4	Skilled Workers (Technicians, Plumbers, Labours)	20
5	Unskilled labour/ helpers	10
6	Foreign Consultants (Specify fields of work)	Nil
7	Others	Nil
Total		39

Source: PC-1 for Development of Park Enclave Phase – III Project, Islamabad

3.5.9 Time Schedule

The development of Park Enclave Phase – III Project, Islamabad will be completed in 12 months. The time schedule of the project has been provided in **Table 3.9**.

Table 3.8: Time Schedule for Construction Phase of the Project

S#	Description	1	2	3	4	5	6	7	8	9	10	11	12
1	Boundary Wall												
2	Gate House & Security Pickets												
3	Roads (VRS / Streets) Work												
4	Storm Water Drainage/Footpath Work												
5	Protection Works												
6	Sewerage System												
7	Culverts												
8	Water Supply & Rain Water Harvesting Works												
9	Sanitation Works												
10	Landscaping (Soft + Hard)												
11	E & M Works (Street Lights, Security System etc.)												
12	Irrigation System												
13	Demobilization and Handover												

3.6 Project Phases

Development of Park Enclave Phase – III Project, Islamabad would be implemented in three phases i.e. Pre-construction/ design, Construction and operation.

3.6.1 Pre-construction/ Design Phase

Site Investigation: The key site investigation activities include area survey, land surveying and site investigations.

Geotechnical/Soil Investigation: A preliminary soil investigation of onsite soil conditions will be carried out for determining the suitability of the site to support the structures, roads maps and other development works. Extensive soil investigation will be carried out subsequently to firm up detailed working drawings.

Land Surveying: During this activity, topographical survey would be undertaken by the consultant to measure and demarcate the area, measure the ground elevation, and prepare maps, which are used during the subsequent development planning and design activities.

Subsequently, engineering details will be worked out and technical drawings, specifications for equipment and material would be prepared.

Selection of Contractor: Once, the engineering details are available; the tender documents for construction of works of the sectors would be prepared. CDA will float tender and contractor will be selected by the CDA as per Public Procurement Regulatory Authority guidelines and procedures.

3.6.2 Construction Phase

Contractor Mobilization: This component involves transportation of construction machinery and equipment to the project site, and establishment of the contractor's camp and office.

Site Preparation: Usually this activity involves operation of heavy earth-moving machinery and substantial land clearing, leveling and grading, as well as cutting and filling activities. The development works will be carried out as per design/profile by the CDA Design Wing.

The first task during this activity is to demarcate the road alignment and other bench marks, with the help of drawings prepared during the pre-construction and design phase of the project, on the spot changes will be employed to avoid, to the extent possible, cutting of trees. Once markings are complete; the land will be cleared and prepared for subsequent construction activities. The whole purpose is to develop the area as per Master Plan provisions, in line with other developed sectors.

Construction Activities: The construction activities will be carried out using the conventional methodology and sequence of work. The activities will include elementary earthwork to convert the natural surface into the required profile of road works, laying of sub-base, base course and Triple Surface Treatment on roads; Storm Drainage System to systematically collect and dispose of storm water in separate system into natural Nullahs.

The sewerage system will be developed to carry away sewage at outfall when Sewerage Treatment Plants will be constructed to treat final effluent. The piped drinking potable water will be arranged. The IESCO, SNGPL and PTCL will arrange their respective networks in respective corridor.

Staffing: Construction crews will be the responsibility of the civil contractor and its petty contractor. It is estimated that 100 personnel will be working at site at a given time

during peak construction period. These will essentially include masons, carpenter, electricians, painters, plumbers and general labors. For unskilled employment preference will be given to local residents of the project area.

Construction Machinery: The following construction machinery is expected to be present at the project site:

- Dozer
- Loader/Excavators/Jack Hammer
- Concrete Mixing plant
- Tractor Trolley
- Water tanker
- Water pumps
- Diesel generator
- Vehicles for personnel movement
- Compactors
- Road rollers
- Concrete mixer plants
- Asphalt mixing plants

Exact number of the above equipment and vehicles will vary depending upon the work schedule.

Construction Material: The construction material will include cement, sand, crush, bricks, steel bars, paint, piping material, electrical material and finishing material. Most materials will be procured from surrounding areas of Islamabad and Rawalpindi. The Bills of Quantities of the material will depend upon the construction activities.

Disposal of Excavated/ Construction Waste: Construction waste will be recycled by the contractor if possible, otherwise it will be disposed of at CDA designated site which will be decided at the time of award of contract with the contractors.

Electricity: Temporary connections will be obtained from IESCO for the construction activities and camp.

Green area: Proper landscaping will be carried out to ensure the aesthetic value and avoid soil degradation.

Camp Supplies: Camp supplies can be procured from Rawalpindi/Islamabad transported to the site via Park Road at its intersection with Kurri Road 4 K.M away from Islamabad Club.

Camp Site Sanitation Facilities: As sanitation facilities will be provided at the camp site, so the contractor will construct septic tank with soakage pit for treatment of wastewater from the camp site.

Traffic Load during Mobilization (and Demobilization) of the Contractor: All of the construction equipment and vehicles will be transported to the site via Park Road.

Traffic Load for Construction Materials Supplies: It is estimated that on average 5-10 truckloads per day will be supplying different types of material to the site during peak construction period.

Other Supplies Water: During the construction phase, maximum of about 15,000 gallons per day of water will be required for the construction activities and human consumption. The water supply will be arranged by the contractor.

Fuels: For the construction equipment and vehicle, diesel will be required. The peak consumption of diesel would be 1,000 liters per day. The diesel will be procured from the Islamabad/Rawalpindi to the project site.

3.7 Operational Phase

CDA will be responsible for operation and maintenance of Park Enclave Phase – III Project, Islamabad.



Figure 3.3: Pictorial presentation of the project site and the surrounding area of Park Enclave Phase – III Project, Islamabad



Exhibit 1: Project site of Park Enclave Phase – III Project, Islamabad



Exhibit 2: View of the entrance of Park Enclave Phase – I, Islamabad



Exhibit 3: View of the Project site



Exhibit 4: Visit of PPI Team at project site



Exhibit 5: View of the kachi abadi at the Project Site



Exhibit 6: National Institute of Health located at the Project Area



Exhibit 7: View of the a nursery at the Project Area



Exhibit 8: A graveyard at the Chatha Bukhtawar Village



Exhibit 9: A view of the access road to Chatha Bukhtawar Village



Exhibit 10: A view of the houses in PHA Society



Exhibit 11: A view of the Gumrakas Nallah



Exhibit 12: Graveyard located in the project site

4 Project Alternatives

4.1 Background

An analysis of available alternative is necessary to establish that the most suitable management and technology opt for a project.

The three significant alternative management options used therein are the 'no project option', 'site alternative option' and the 'build as proposed option'.

4.2 No Project Option

If we consider no project option then we will lose all positive impacts that will be caused due to the project; like providing residential plots to the all income groups, provision of basic infrastructure to the people that would live there, loss of potential employment and business opportunity.

Secondly, if the demand of housing sector is not met through government schemes. The private sector will spring up residential housing societies in the suburbs and rural areas to meet the demand. This will have a far greater impact on the environment.

The "No Project Option" does not appear reasonable given the above facts. However, the expected negative impacts can be minimized by adopting appropriate mitigation measures.

4.3 Build-As-Proposed-Option

The development of Park Enclave Phase – III Project, Islamabad is in accordance with the Islamabad Master Plan and its location is already agreed. However, the negative impacts due to the project construction and operation can be minimized, controlled or eliminated if the proposed mitigation measures as suggested in the EIA report are affectively implemented.

4.4 Site Alternative

Change of the project site location is one of the alternatives to avoid some negative impacts like land use change, damage to flora and fauna etc. However, Park Enclave Phase – III, Islamabad is in accordance with the Master plan of Islamabad and will be located at their respective site.

4.5 Economic Alternative

The immediate economic benefits of the proposed project are the generation of employment opportunities and revenues. The direct and indirect jobs creation will occur in a broad range of industries such as construction services, repair and maintenance, electricity supply, hardware and building supplies retailing, motor vehicles and parts retailing, water supply, sewerage and drainage services, waste collection, treatment and disposal services, gas supply, rental and hiring services, garden supplies retailing, cleaning and janitorial, pest control, printing, etc.

The negative impacts due to the projects construction and operational phases can be minimized, controlled, and eliminated, if the mitigation measures as suggested in the EIA report are implemented.

4.6 Environmental Alternative

The proposed project site is located on Park Road, Chak Shahzad at its intersection with Kurri Road 4 Km away from Islamabad Club. The project area is conveniently accessible from all Major Roads, such as Kashmir Highway, Lehtrar Road and Islamabad Highway. The project area comprises of housing societies and villages. There may be potential environmental and human health impacts of the proposed

project during the construction phase of the project. however, the proposed project will have a dedicated sewerage treatment plant, an efficient solid waste management system and features of the eco-friendly building such as the use of energy-efficient items have been planned in the scheme.

Considering the environmental protection measures to be taken during the construction and operational phase of the project and the sustainable features of the proposed project, it can be implied that the proposed project will enhance the environment of the project area during the operational phase of the project especially when looking at the alternatives to the project.

4.6 Conclusion

No alternative site has been identified. If the project is not implemented, then all positive impacts related to the housing project will be lost. So, the best option is to 'build as proposed' by mitigating its potential negative impacts.

5 Description of the Environment

5.1 Introduction

Islamabad is the capital city of Pakistan, and is located in the Potohar Plateau in the North-West of the country. Margalla Hills are located within the Islamabad Capital Territory, though the area has historically been a part of the cross roads of the Punjab region and the Khyber Pakhtunkhwa Province (the Margalla pass being a historic gateway to the Khyber Pakhtunkhwa, and the Potohar Plateau historically a part of the Punjab). Islamabad is located at 33°40'N, 73°10'E.

5.2 Project Area Location

The Park Enclave Phase – III Project, Islamabad is located adjacent to Park Enclave, Phase – I and can be accessible from all major roads such as Sri Nagar Highway, Lehtrar Road and Islamabad Highway.

Park Enclave is ideally located on Park Road, Chak Shahzad at its intersection with Kurri Road 4 km away from Islamabad Club.

The GPS coordinates of the project site are 33°40'33.75"N and 73° 9'22.42"E . The map showing sensitive environmental receptors is shown in **Figure 5.1**.

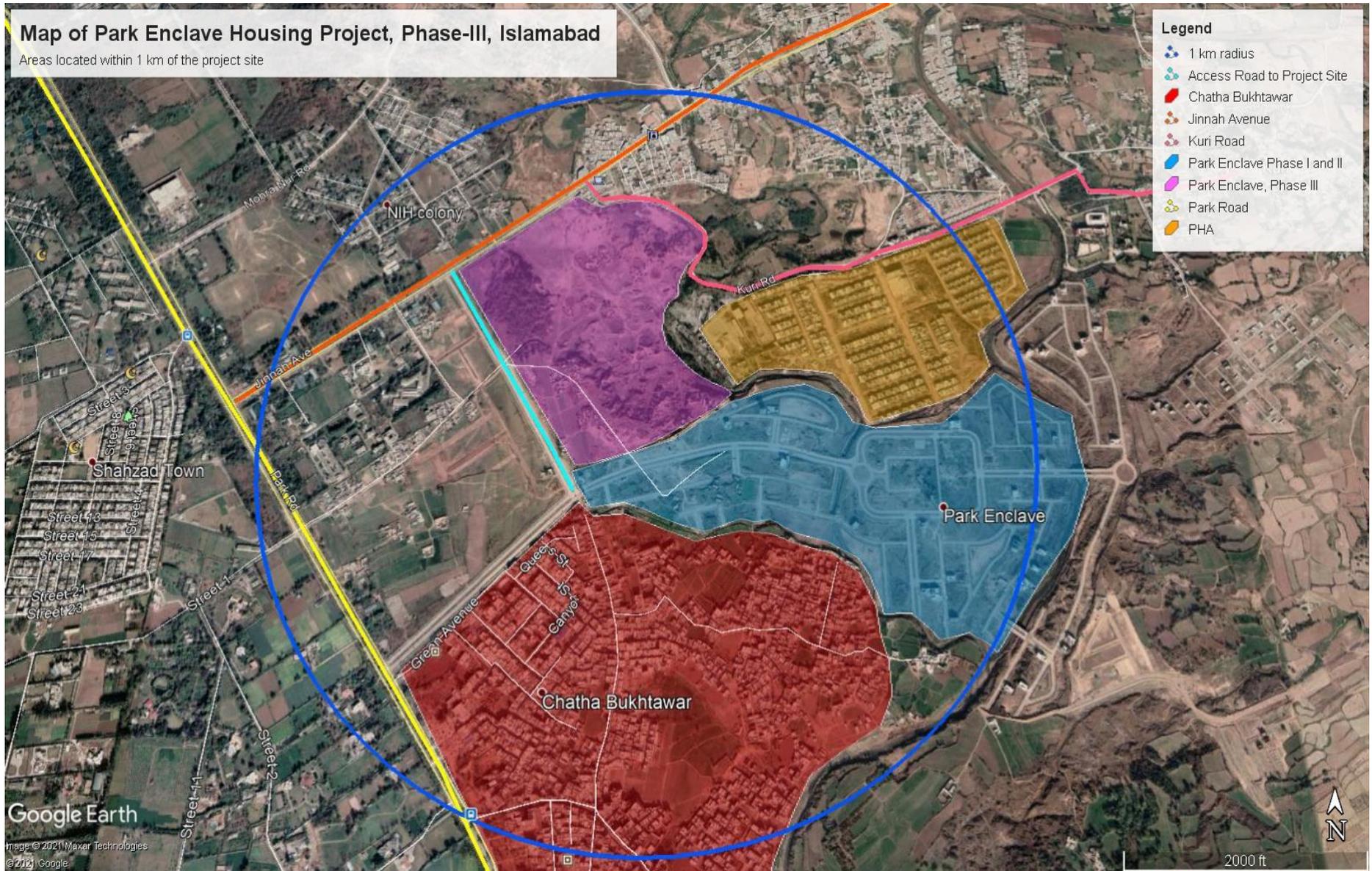
5.3 Physical Environment

5.3.1 Topography

Islamabad is located on the Northern edge of the track known as Potohar Plateau. The Potohar Plateau has an uneven table and land is gradually rising in elevation from 500 to 600 meters above the sea level and the highest point is 1,600 meters above mean sea level. The land gradually slopes towards the South. The land is composed either of alluvium (clay or silt) or of gravel caps.

The plains are formed of alluvial deposits laid by the past and the present river systems in varying thickness. A large part of the area is undulating and at various places it is badly dissected by gullies and ravines. The Kurang stream has been dammed at a place named Rawal to form the Rawal Lake. Another dam has been built on the Soan River to form the Simly Lake.

Figure 5.1: Sensitive Receptors around Project Site



The Potohar plateau is a well-defined physiographic unit of Pakistan between the Indus basin plain and the foothills of Himalayas. It covers about 11,200 km² area bounded by Kala Chita and Margallah hills in the North and the Salt Range in the South, Indus River in the West and Jhelum River in the East.

The plateau slopes from NE to SW, in the direction of flow of the River Soan, which is the main river of the area and joins the River Indus in North of Kalabagh. In the Eastern Potohar, Kanshi, Kahan and Bunha Rivers drain into the Jhelum River. Only the Soan and Kanshi Rivers are perennial while rests of the drainage are seasonal streams. The plateau has level to undulating topography with scattered gullies and gorges created through active water erosion.

Undulating land dissected by gullies, ravines, sparsely occurring tree growths and farming are the prominent physical features of the project area.

5.3.2 Geology and Soils

The Potohar region has a complex geological history of mountain formation, alluvial-loessic depositions, and erosion cycles. Limestone is the characteristic rock of Margalla range. In age it ranges from the Jurassic to Triassic. It is usually reddish or bluish white in color mixed or alternating with it beds of red or bluish clay or shades or sandstones. Adiala, Dhamial-Loibher forests are situated over alluvial deposits. The deposits contain small sized rounded pebbles of sandstone, quartzite or granite and sand mixed or alternating with clayey deposits. They have been described as alluvial deposits, but it is equally probable that they have a glacial origin.

The soil in Potohar region is shallow clayey of low productivity. Mostly, on the Southern and Western aspects of the Potohar plateau, the soil is thin and infertile. Streams and ravines cut the loose plain, affected by gully erosion and steep slopes. Such land is unsuitable for cultivation. However, large patches of deep fertile soil are found in the depressions and sheltered localities supporting quality small forests (Rakh) and rain fed agriculture.

The soil of the project area is composed of clay/ silt formed of alluvial deposits laid by the past and present river system in varying thickness. A large part of the area is undulating and at various places it is dissected by gullies and ravines.

5.3.3 Land Use

Patterns of land use in Islamabad have evolved through years and have been influenced by environmental and physical factors such as landforms, climate, and water availability as well as human factors such as population size, growth, economic demands and cultural practices or customs.

The project site is undulated land with sparse distribution of trees and shrubs. Surrounding the project sites are housing societies such as Pakistan Housing Authority, Park Enclave Phase – I, Green Valley and villages such as Chatha Bukhtawar.

5.3.4 Surface Water

Rawal Lake, which is the main source of water in Islamabad is located 3 km away from the project site. There are several nullahs that pass through the project area such as Gumrakas Nullah. Gumrakas Nullah is a natural nullah that is protected by the CDA by using wall barrier. The water supply from this nullah will be used for irrigation of gardens, lawns, and road side plants.

5.3.5 Ground Water

Ground Water of the project site is available at a depth of 104 ft. and used for drinking and other domestic purposes. Bore holes are dug to access ground water.

The groundwater sample was taken from the project site and tested in Pak-EPA approved laboratory Environmental Services Pakistan. The results indicate that the concentration of all the parameters for groundwater are well below the NEQS limits. Groundwater results are provided in **Annexure 9**.

A chemical analysis test of the ground water in the project site was conducted. The samples of ground water were collected on 4th June 2021 and were received by the Environmental Services Pakistan on 4th June 2021 for analysis. The parameters that were analyzed include pH, Total Dissolved Solids, Chloride, Copper, Manganese, Zinc, Aluminum, Boron, Barium, Fluoride, and Nitrate whose concentrations were 7.3, 420 mg/L, 20.0 mg/L, 0.007 mg/L, 0.012 mg/L, 0.068 mg/L, 0.038 mg/L, 0.101 mg/L, 0.303 mg/L, 0.4 mg/L, and 9.6 mg/L respectively. Fecal Coliform was detected in the sample taken from the groundwater. This indicates the water supply will need to be chlorinated before consumption.

Apart from these parameters, the color, taste, odor, turbidity, hardness was also tested, and it was found that all these parameters are within the permissible limit.

5.3.6 Climate

Islamabad has distinct seasons marked by wide variation in temperature. The climate remains very salubrious from April to October but the winters get very cold. The coldest months are December, January and February. The hottest months are June and July. Rainfall in April and May is occasional but the heaviest rain is in July and August.

The temperature of capital territory Islamabad ranges between -1 °C to 46 °C. The coldest month is January when the mean maximum temperature is 17 °C and mean minimum is 9 °C. From February to June the temperature rises at the rate of 7.0 °C per month. The highest temperature reached in June when the mean maximum temperature remains 41 °C.

The average hourly wind speed in Islamabad experiences mild seasonal variation over the course of the year. The windier part of the year lasts for 5.3 months, from January 25 to July 3, with average wind speeds of more than 9.08 km/h. Average relative humidity remains 42%. Islamabad receives 112.1 mm rain on average monthly basis.

Metrological Data of Islamabad including mean relative humidity, rainfall, mean minimum and maximum temperature, wind direction and wind speed (24 hours) for the year 2019 is quoted in **Table 5.1**. Graphical representation of Temperature and Rainfall are shown in **Figure 5.2 and 5.3**.

Table 5.1: Mean Monthly Meteorological Data of Islamabad (2019)

Months	Rainfall (mm)	Humidity (%)	Mean Temp. (°C)		Wind speed km/h
			Max.	Min.	
Ja nuary	77.8	42	17	9	8.6
February	156.2	54	18	10	9.1
March	110.5	48	23	13	9.4
April	57.9	36	32	21	10.5

Months	Rainfall (mm)	Humidity (%)	Mean Temp. (°C)		Wind speed km/h
			Max.	Min.	
May	35.7	26	36	25	11.2
June	28.9	24	41	29	11.5
July	257	45	38	30	10.4
August	323.7	59	36	27	8.8
September	157	52	34	25	8.8
October	52.3	41	30	21	7.3
November	55.2	46	24	15	7.2
December	33.4	37	20	10	6.2
Mean	112.1	42.5	29.08	19.58	9.08

Source: Pakistan Meteorological Department, NAMC, Islamabad

Figure 5.2: Mean Monthly Temperature of Islamabad in 2019

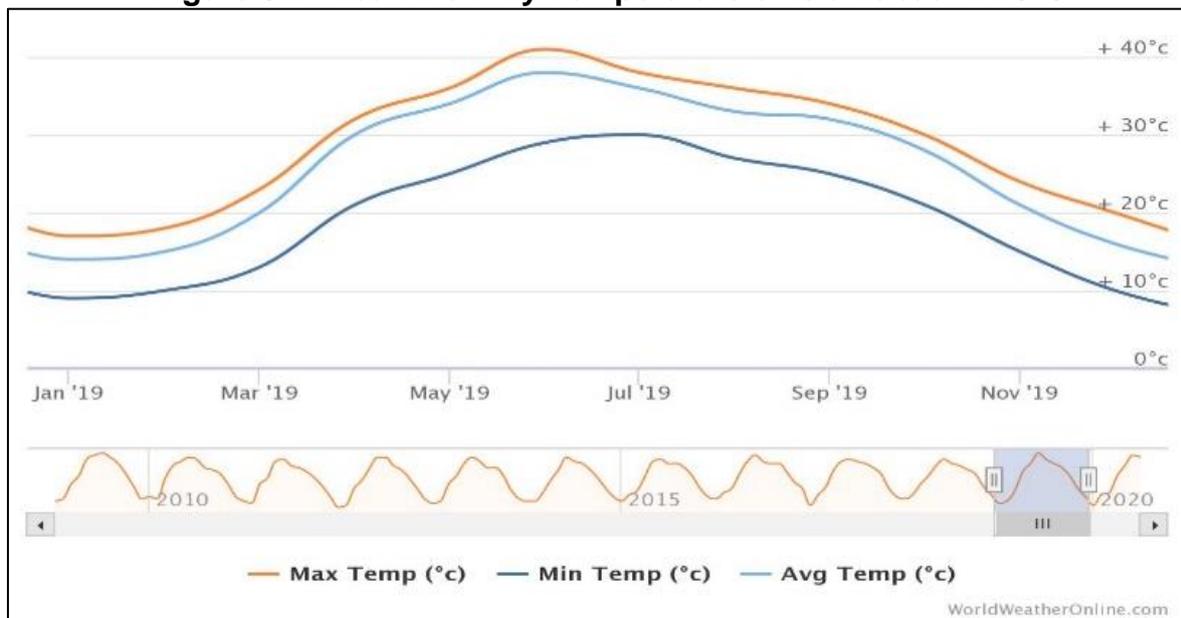
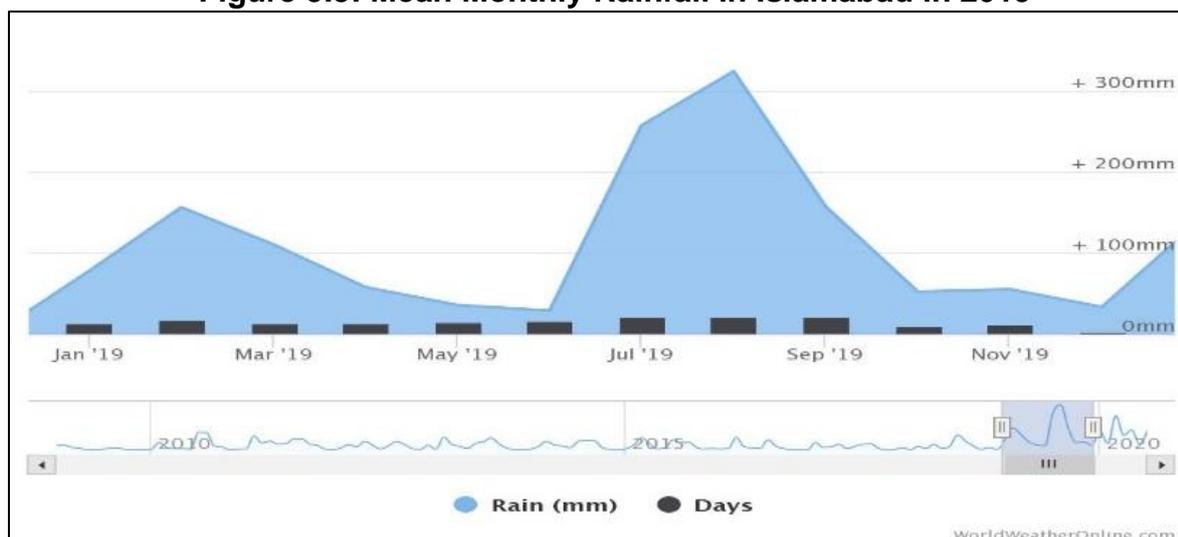


Figure 5.3: Mean Monthly Rainfall in Islamabad in 2019

5.3.7 Air Quality and Noise Monitoring

The Park Enclave Phase-III Project is located on Park Road, Chak Shahzad at its intersection with Kurri Road 4 K.M away from Islamabad Club. The project area comprise of various housing societies and villages, which means that there is heavy traffic on the roads during rush hours.

Proper plantation on green belts, avenues and green areas will help to maintain the air quality and noise level of the project area within the limit in the future.

The ambient air quality and noise level monitoring was conducted and compared against the National Environmental Quality Standards (NEQS) for Sulphur dioxide (SO₂), Oxide of Nitrogen (as NO), oxide of Nitrogen (as NO₂), Ozone (O₃), Suspended Particulate Matter (as SPM), Respirable Particulate Matter (as PM₁₀), Respirable Particulate Matter (as PM_{2.5}), and Carbon monoxide (CO) during 24 hours at the project site.

The ambient air and noise level monitoring was conducted from 2nd June to 3rd June 2021 for 24 hours at the project site Park Enclave Phase – III, Islamabad.

The ambient air quality and noise monitoring was carried out by Pak-EPA Certified laboratory, Environmental Services Pakistan (ESPAK).

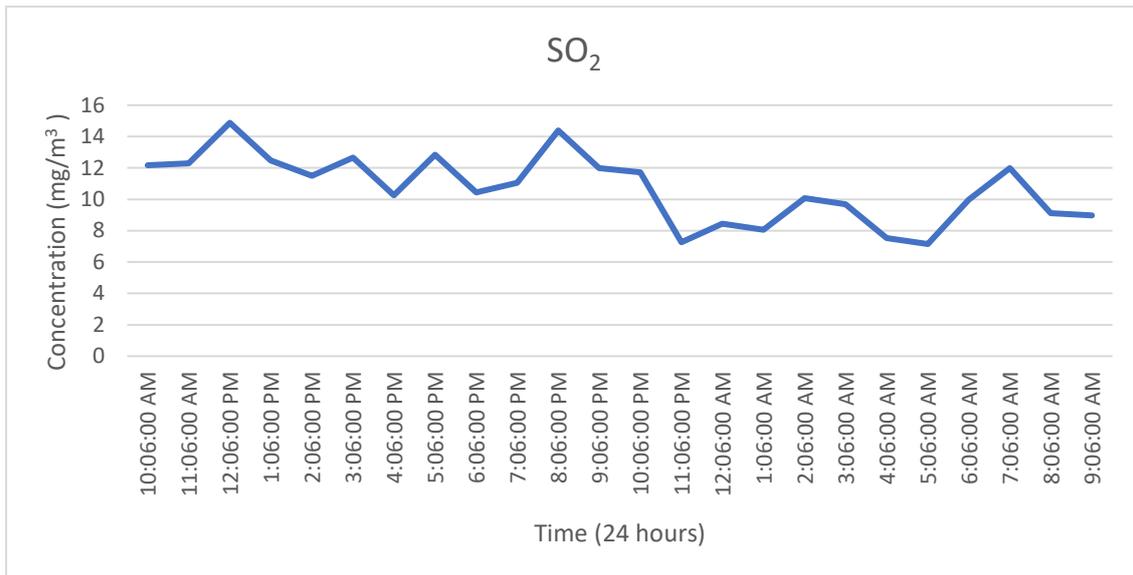
5.3.7.1 Ambient Air Quality Monitoring

Sulphur dioxide (SO₂): Sulphur dioxide (SO₂) is a colourless, poisonous gas with a strong odor. Coal and petroleum containing Sulphur compounds produce Sulphur dioxide after their combustion. It is one of the main contributors of acid rains because of oxidation of SO₂ in the presence of a catalyst such as NO₂ forms H₂SO₄. It irritates eyes, nose, and throat. It may impair lung function and aggravate respiratory diseases.

The 24h average concentration of SO₂ at the monitoring site was 10.7 µg/m³, which is in compliance with the NEQS (120 µg/m³) of Pakistan.

The hourly variation graph shows that the concentration of SO₂ varies between 7.149 µg/m³ to 14.877 µg/m³ during 24 hrs monitoring. This is because there is no major industry near the project site.

Figure 5.4: Hourly variation of (SO₂) at the project site



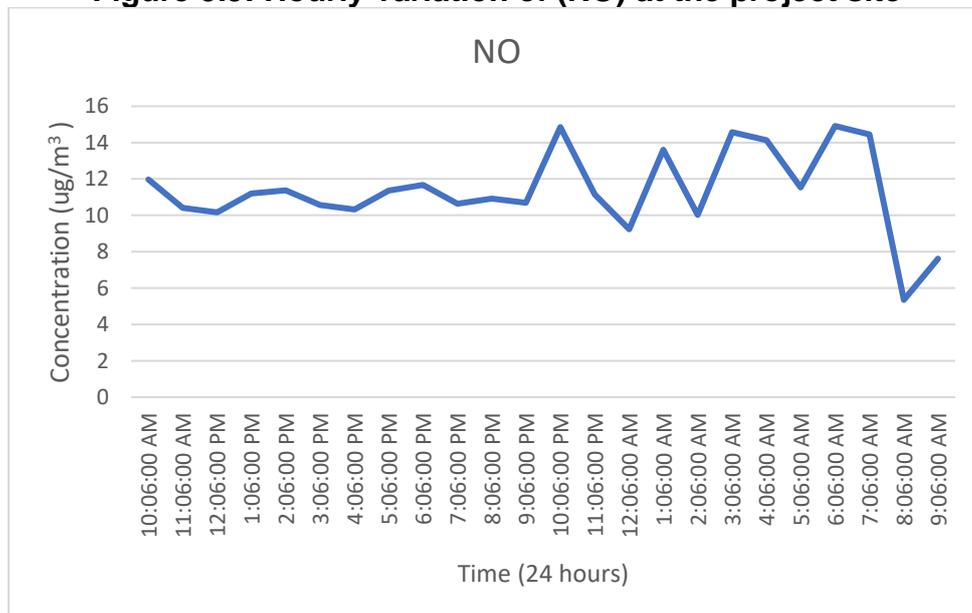
Nitrogen Monoxide (NO): Nitric oxide (nitrogen oxide, nitrogen monoxide) is a molecular, chemical compound with a chemical formula of NO. One of several oxides of nitrogen, it is a colourless gas under standard conditions. It is also produced naturally by the extremely high air temperatures produced along the path of lightning in thunderstorms.

Nitric oxide should not be confused with nitrous oxide (N₂O), an an aesthetic, or with nitrogen dioxide (NO₂), a brown toxic gas and a major air pollutant, the latter being a product to which nitric oxide is rapidly oxidized in air.

The averaged (24h) concentration of NO (11.36 µg/m³) remained within compliance with NEQS (40 µg/m³) at the ambient air quality monitoring site.

The highest concentration was 14.91 µg/m³ and he lowest concentration of NO was 5.35 µg/m³.

Figure 5.5: Hourly variation of (NO) at the project site



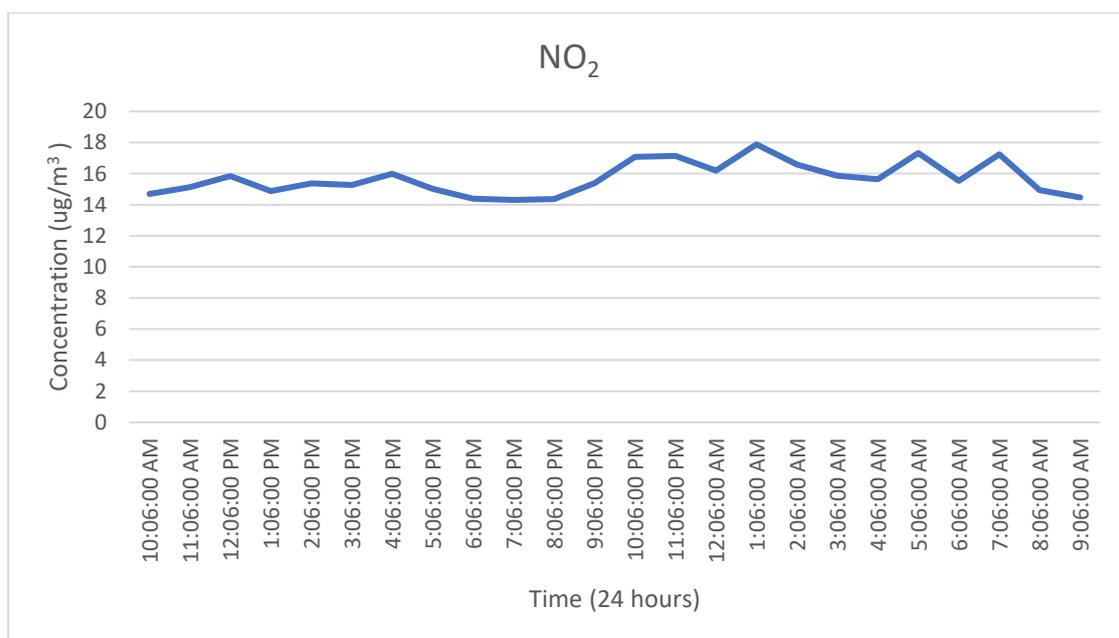
Nitrogen dioxide (NO₂): Nitrogen dioxide (NO₂) is a light brown gas that can become an important component of urban haze. It is likely that oxides of nitrogen are the second most abundant atmospheric contaminants in many cities, ranking next to Sulphur dioxide.

Nitrogen oxides usually enter the air as a result of high-temperature combustion processes, such as those occurring in automobiles and power plants.

The primary sources of nitrogen oxides (NO_x) are motor vehicles and thermal power generation. The averaged (24h) concentration of NO₂ (15.69 µg/m³) remained within compliance with NEQS (80 µg/m³) at the project site.

The highest hourly average concentration of Nitrogen dioxide was 17.88 µg/m³ and the lowest concentration monitored was 14.30 µg/m³. The load of traffic on the Park Road and Kuri Road near the project site is low therefore, the concentration of NO₂ is low.

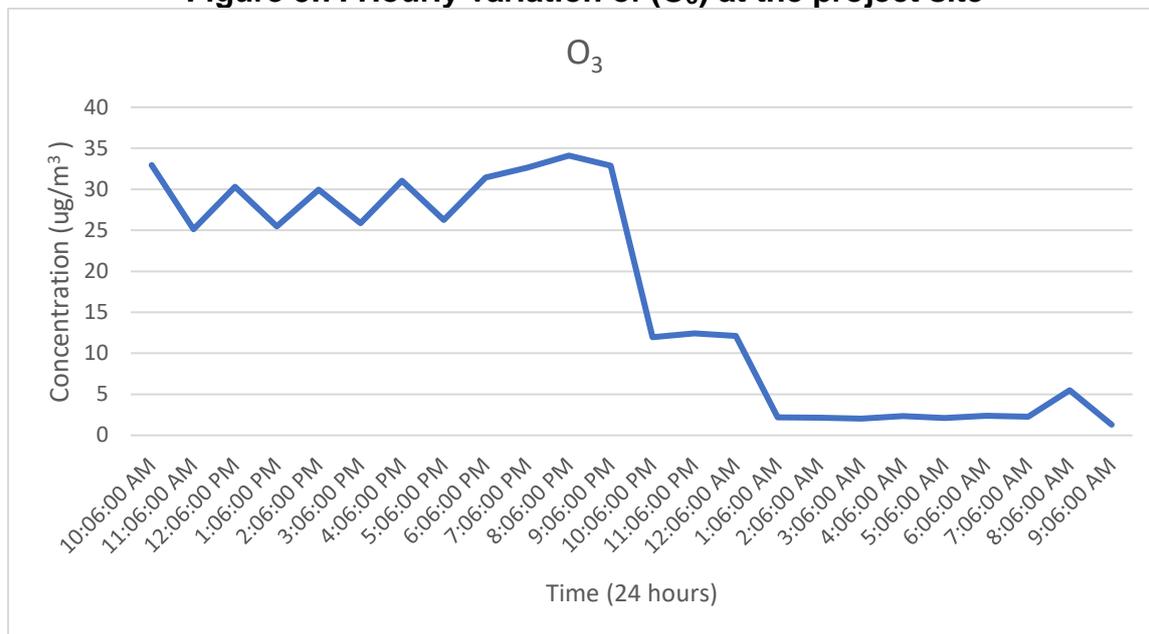
Figure 5.6: Hourly variation of (NO₂) at the project site



Ozone (O₃): Ozone or tri-oxygen is an inorganic molecule with the chemical formula O₃. It is a pale blue gas with a distinctively pungent smell. It is an allotrope of oxygen that is much less stable than the diatomic allotrope O₂, breaking down in the lower atmosphere to normal oxygen.

The 24-hour average concentration of Ozone was observed to be 17.36 µg/m³. Whereas, the highest amount of Ozone was 34.10 µg/m³ and lowest level was 1.29 µg/m³ at the project site. 1 hour concentration of ozone at the project site was recorded as 1.3 – 34.1 µg/m³ which remained within compliance limits of NEQS (130 µg/m³ for 1 hr). Ozone is formed indirectly by the action of sunlight on nitrogen dioxide.

As it can be seen in the graph that when the sunlight is not available particularly from 9:00 PM to 9:AM the concentration of Ozone has decreased at the project site.

Figure 5.7: Hourly variation of (O₃) at the project site

Particulate Matter: Particulate matter (PM) is a solid matter from smoke, dust, fly ash, or condensing vapours that can remain suspended in the air for a long period of time. PM₁₀ means the particulate matter is having an aerodynamic diameter of 10 micrometres while PM_{2.5} means the particulate matter is having an aerodynamic diameter of 2.5 micrometres or less. Particulates include an array of atmospheric materials, carbon-based matter such as soot, ashes, windblown dirt, sand, soil dust, metals, and plant matter such as pollens. The composition of particulate matter varies with the place, season, and weather conditions.

The fine PM can be sulfates, nitrates, organic matter (organic carbon compounds), elemental carbon (soot), and soil dust (crustal materials).

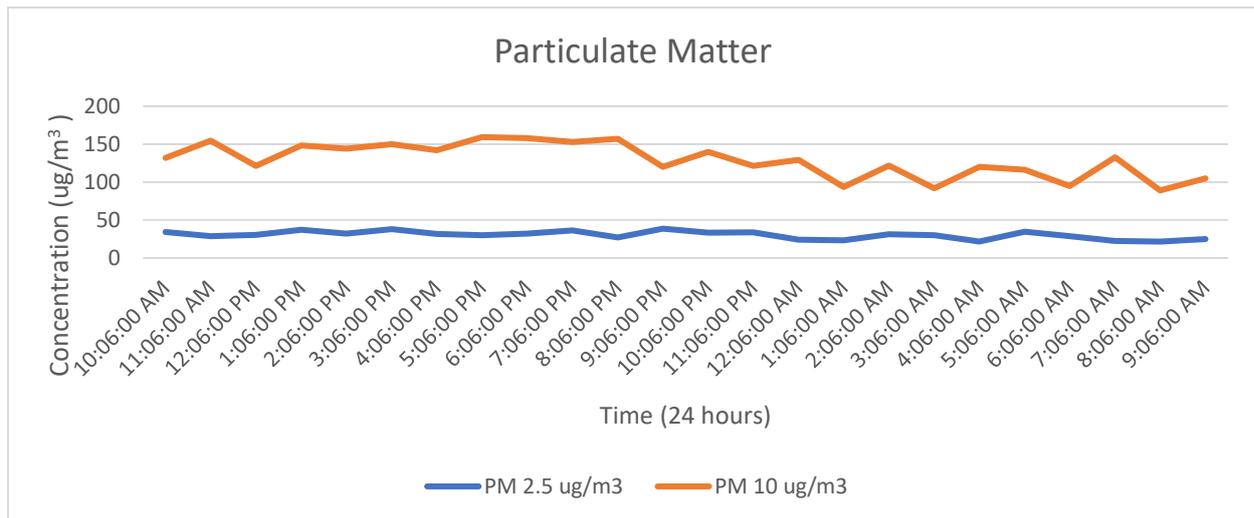
The time-averaged (24h) concentration of PM₁₀ is 128.96 µg/m³, and PM_{2.5} is 30.27 µg/m³ and were in compliance with the NEQS (150 µg/m³ and 35 µg/m³).

The concentration of PM₁₀ varies between 88.99 µg/m³ and 159.23 µg/m³ during the 24h monitoring at the project site.

The highest concentrations of PM_{2.5} varies between 21.69 µg/m³ and 38.64 µg/m³ during the 24h monitoring at the project site.

The trend of both PM₁₀ and PM_{2.5} are almost similar, which shows that whenever the concentration of PM_{2.5} has increased in the atmosphere, the concentration of PM₁₀ has also increased.

Figure 5.8: Hourly variation of PM₁₀ and PM_{2.5} at the project site

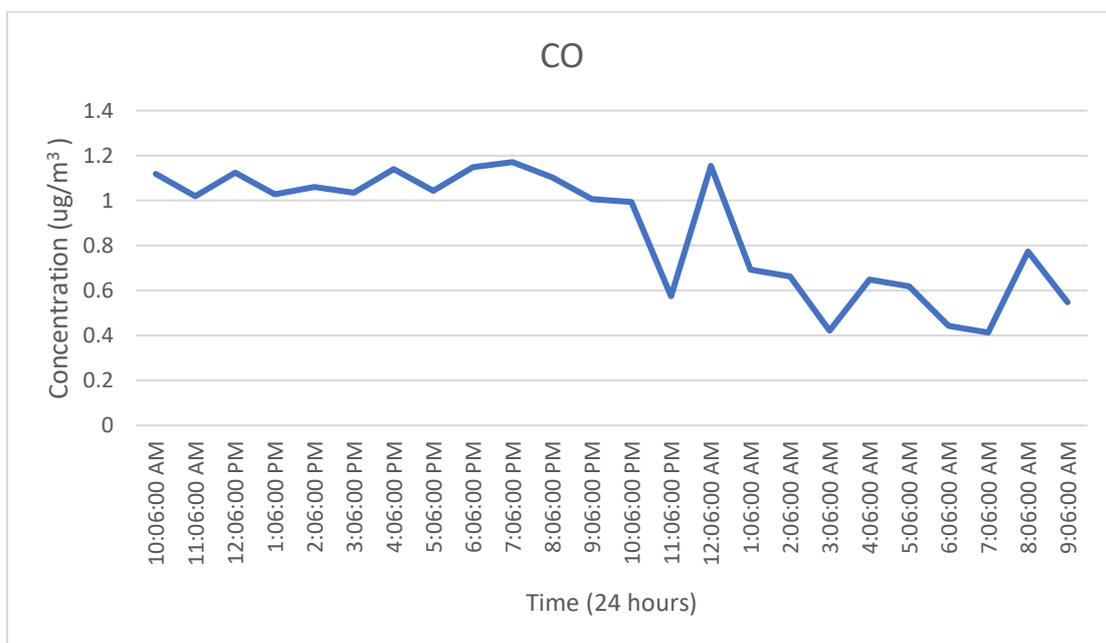


Carbon monoxide (CO): Carbon monoxide is an odourless, colourless and highly poisonous gas that has its major origin in the incomplete combustion of carbonaceous materials. Although industrial processes contribute to CO pollution levels, however, the principal source of CO is automobiles.

Vehicles operating at colder temperatures (in winter, during engine warm-up or in stop-and-go traffic) produce significant quantities of this deadly gas and is of particular concern in urban areas.

The Carbon monoxide (CO) concentration was monitored for 8h at the selected site. The average 8h concentration of CO at the project site was found to be 0.6 – 1.1 mg/m³ which is within the compliance limit of NEQS (i.e. 5 mg/m³).

Figure 5.9: Hourly variation of (CO) at the project site



5.3.7.2 Noise Level Monitoring

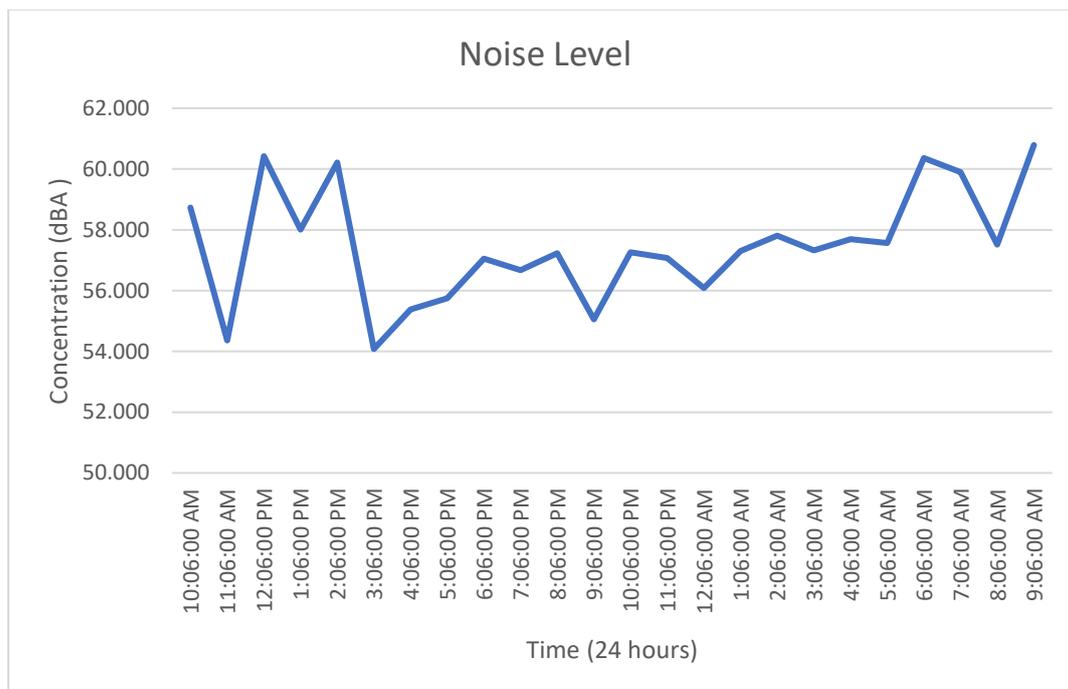
Ambient noise levels were also continuously recorded at the project site for 24 hours. The sound pressure level (dB) was frequency weighted on A-curve (dB (A)) and time-weighted (dB (A) Leq) on an hourly basis.

The hourly noise variation throughout the day reveals that noise levels are minimal and within the compliance limit of NEQS (i.e., 65 dB) at the project site.

The noise level at nighttime at the project site was monitored to be 57.29 dB whereas, during the day time it was 58.14 dB, which is within the prescribed limit of the NEQs.

As the graph below shows that the noise level is high during the peak hours that is around 2:00 PM and 8:00 AM when people are going to work and coming back from work.

Figure 5.10: Hourly variation of Noise Level at the project site



5.3.7.3 The Conclusion of Ambient Air Quality and Noise Level

The ambient air and noise level monitoring was conducted from 2nd June to 3rd June 2021 for 24 hours at the project site Park Enclave Phase – III Project, Islamabad.

The concentrations of SO₂, CO, NO, NO₂, O₃, PM₁₀, PM_{2.5}, (i.e., 10.7 µg/m³, 0.87 mg/m³, 11.36 µg/m³, 15.69 µg/m³, 17.36 µg/m³, 128.96 µg/m³, 30.27 µg/m³) meet the NEQS limits (i.e., 120 µg/m³, 5 mg/m³, 40 µg/m³, 80 µg/m³, 130 µg/m³, 120 µg/m³, 35 µg/m³).

The laboratory report detailing the ambient air and noise level monitoring report is attached in **Annexure-8**.

The SO₂, NO, NO₂, O₃, PM₁₀, CO concentrations meets the NEQS limits. A summary of ambient air quality and noise levels results are given in **Table 5.2** below:

Table 5.2: Summary of Ambient Air Quality and Noise Results at the Project Site

Parameter	Averaging Time	NEQS	Unit	Average Concentration at the project site	Method/Equipment Used
Sulphur dioxide (SO ₂)	24 h	120	µg/m ³	10.7	UV Fluorescence (UVF)
Nitric Oxide (NO)	24 h	40	µg/m ³	11.4	Chemiluminescence Detection
Nitrogen dioxide (NO ₂)	24 h	80	µg/m ³	15.7	Chemiluminescence Detection
Ozone (O ₃)	1 h	130	µg/m ³	1.3 – 34.4	Non Dispersive UV Absorption
Particulate Matter (PM ₁₀)	24 h	150	µg/m ³	129	Particulate Sensor
Particulate Matter (PM _{2.5})	24 h	35	µg/m ³	30.3	Particulate Sensor
Carbon monoxide (CO)	8 h	5	mg/m ³	0.6 – 1.1	Non Dispersive Infrared Absorption (NDIR)
Noise level	Day-Time	65	dB(A)	58	Sound Level Meter
	Night-Time	55	dB(A)	57	

5.4 Biological Environment

5.4.1 Flora

The vegetation of Islamabad is a representative of Dry Subtropical Scrub Forest which is dominated by *Acacia modesta* (Phulai), *Ziziphus mauritiana* (Ber), *Ziziphus nummularia* (Mullah), etc. Other associates existing in varying proportions include *Prosopis cineraria* (Jand); *Melia azadirachta* (Dharek); *Morus alba* (Mulberry-Shahtoot); *Dalbergia sissoo* (Tahli-Shisham); *Acacia nilotica* (Kiker). In the undergrowth *Cannabis sativa* (Bhang), *Calotropis procera* (Desi Ak), *Parthenium hysterophorus* (Gandi Booti) and *Ocimum bacilicum* (Niazbo) are predominant. The **Annexure-6** provides the list of floral species of the Islamabad.

It is observed that different floral species that exists on the project site, including mature trees of Shisham, Kikar, Anjeer, Phulai, Eucalyptus, Paper Mulberry, etc.

Approximately 646 mature trees were found during a tree count carried out at the project site. The mature trees are mainly located in two dense vegetation covers located in the East and North-West of the project site.

Table 5.3: List of the Floral Species at Found at the Project Site

x	Local Name of Plant	Scientific Name	Family	Total Trees
1.	Shisham	<i>Dalbergia sissoo</i>	Fabaceae	134
2.	Phulai	<i>Acacia modesta</i>	Fabaceae	116
3.	Kikar	<i>Acacia nilotica</i>	Fabaceae	13
4.	Kachnar	<i>Bauhinia variegata</i>	Caesalpiniaceae	3
5.	Wild fig	<i>Ficus canica</i>	Moraceae	124
6.	Semal	<i>Bombax ceiba</i>	Malvaceae	1

7.	Farash	<i>Tamarix aphylla</i>	Tamaricaceae	3
8.	Toot / mulberry	<i>Morus alba</i>	Moraceae	40
9.	Paper mulberry	<i>Broussonetia papyrifera</i>	Moraceae	104
10.	Poplar spp		Salicaceae	40
11.	Bakain/ China Berry	<i>Melia azedarach</i>	Maliaceae	10
12.	Siris / Sharee	<i>Albizia lebbek</i>	Mimosaceae	10
13.	Salix (Poplar)	<i>Populus deltoidi</i>	Salicaceae	
14.	Rubber Plant	<i>Ficus elastica</i>	Moraceae	1
15.	Eucalyptus			47
16.	Bhekarh	<i>Adhatoda vasica</i>	Acanthaceae	Scattered herbs
17.	Ack	<i>Calotropis procera</i>	Apocynaceae	Scattered herbs
18.	Narra	<i>Phragmites karka</i>	Poaceae	Scattered herbs
19.	Barru	<i>Sorghum helepense</i>	Poaceae	Scattered herbs
20.	Oriental fountain grass	<i>Pennisetum orientale,</i>	Poaceae	grass
21.	Dhab	<i>Desmostachya bipinnata</i>	Poaceae	grass
22.	Bhang	<i>Cannabis sativa</i>	Cannabaceae	Scattered herbs
				646 trees

5.4.2 Fauna

As population has increased in the project area, wildlife abundance and diversity has decreased to a minimum.

Among small mammals species still found are Jackal, Red fox, Pangolin, Porcupine and rats are reported to be resided in surrounding of project area. The snake, Russell's viper and lizards also inhabit in the project site. The black rat (*Rattus rattus*), also known as the ship rat, or roof rat or house rat, is a common long- tailed rodent. Porcupines are rodents with a coat of sharp spines, or quills that protect against predators. The Cape hare (*Lepus capensis*), also called desert hare, and sometime observed in the project area. The list of fauna found at the project site is given in **Table 5.4**. Distribution of Mammals and Reptiles is shown **Annexure 7**.

Table 5.4: List of the Fauna in the project area / Islamabad

S.No	Local Name of Animal	Scientific Name
1	Pied kingfisher	<i>Ceryle rudis</i>
2	Quail	Coturnix
3	Hoopoe	<i>Upupa epops</i>
4	Lesser golden-backed woodpecker	<i>Dinopium benghalense</i>
5	Common koel,	<i>Eudynamys scolopacea</i>

S.No	Local Name of Animal	Scientific Name
6	Crested lark	<i>Galerida cristata</i>
7	Large pied wagtail	<i>Motacilla maderaspatensis</i>
8	Grey wagtail	<i>Motacilla cinerea</i>
9	House crow	<i>Corvus splendens</i>
10	Common myna	<i>Acridotheres tristis</i>
11	House sparrow	<i>Passer domesticus</i>
12	Black drongo	<i>Dicrurus macrocercus</i>
13	Black kite	<i>Milvus migrans</i>
14	Shikra,	<i>Accipiter badius</i>
15	Grey wagtail,	<i>Motacilla cinerea</i>
16	White wagtail,	<i>Motacilla alba</i>
17	Little egret	<i>Egretta garzetta</i>
18	Grey heron	<i>Ardea cinerea</i>
19	Black Kite	<i>Milvus migrans</i>

Table 5.5: Flora and Fauna Observed During Site Visit



Exhibit 1: Bher plant located at the Project Site



Exhibit 2: Poplar tree at the project site near the kachi abadi area



Exhibit 3: Shahtoot and Bher at the project site



Exhibit 4: Shisham and Pulai located at the center of the project site



Exhibit 7: Silver Oak located at the project site



Exhibit 8: Bhang located at the project site

5.5 Socio-cultural Environment

In order to assess the present socio-economic and socio-cultural conditions of the project area, PPI team visited Park Enclave Phase – III Project, Islamabad and consultations were carried out with the residents.

Following are the details of the present socio-cultural and socio-economic conditions of the areas located in Park Enclave Phase – III Project, Islamabad.

5.5.1 Chatha Bukhtawar

The Chatha Bukhtawar village is also known as the Hostel City because there are many hostels in the village.

Population

There are approximately 1200 households in the village of Chatha Bukhtawar and thus a total population of the village is about 7200.

Ethnic Structure

The village of Chatha Bukhtawar comprise of people belonging to different ethnic groups such as Punjabi, Pathan and Siraiki. Apart form these groups there are various small ethnic groups found in the Chatha Bakhtawar Village. The people living in the village have come from different provinces of Pakistan with diverse cultures and ethnic background.

Agriculture

The project area has been developed according to the master plan of Islamabad therefore a dense settlement is found in the village. There are very few people who rely on agricultural activities.

Transportation

The public transport is more common in the village of Chatha Bakhtawar. The roads in the village are not in a very good condition and is congested. The streets are still not metalled. Most of the residents own vehicles.

Education

There are two main universities in the project area i.e. COMSAT University Islamabad and Abasyn University. Similarly, there are many private schools in the project area as well.

Public Health

Instead of the fact that there are more than 5000 people in the village, there is no hospital there. Some small clinics and dispensaries are however available. In the project area, two main hospitals are located where the people of the surrounding area go for health concerns. The main hospital in the project area is National Institute of Health.

Drinking water supply

The source of drinking water in the Chatha Bukhtawar Village is groundwater as many tube wells and bore have been installed at various locations through out the village. Groundwater is available at 150 ft.

Employment

Majority of the population in the village are engaged in labor and business. Apart from that most people are either serving in Government, having own businesses, working in private jobs or are working in Islamabad or Rawalpindi.

Other Facilities

Electricity, Sui Gas supply is available in the village. There are many banks, post office, telephone exchange, or any police post in the area.



6 Public Consultation

6.1 Approach to Public Hearing

The public consultation process with various stakeholders has been approached to involve public and other stakeholders from the earliest stages of the project. Public consultation has taken place during the planning and design phase of the project. The focus of attention has been the population near the proposed project site that may be affected by the project.

The viewpoints of the stakeholders have been taken into account, and their concerns and suggestions for possible improvements have been included in the EIA where appropriate.

The EIA team conducted a detailed survey to find such impacts and it was necessary to involve all the stakeholders both at the EIA stage to know their opinions, suggestions, concerns and issues. Therefore, detailed public consultation meetings were arranged at different levels.

6.2 Public Consultation

During this process, a number of persons and the residents of the project area were met. Different aspects and impacts of the proposed project were highlighted regarding their impacts on the physical, biological, and socio-economic environment of the project area.

Stakeholders concerns regarding various aspect, existing environment, and impacts of the project were added in the EIA report. List of the officials/local people met during public consultation is given in **Annexure 5**.

6.3 Objectives of Consultation

Public consultation plays a vital role in studying the effects of the project on the stakeholders and in the successful implementation and execution of the proposed projects. Public involvement is a compulsory feature of environmental assessment, which leads to better and more acceptable decision-making.

The overall objective of the consultation with stakeholders was identification of the environmental and social issues that have been presumed to arise and to identify those which are not known or are unique to the Development of Park Enclave Phase – III Project, Islamabad.

The main objectives of the Consultation process are:

- Information dissemination, education, and liaison;
- Identification of problems and needs;
- Collaborative problem solving;
- Reaction, comment and feedback on proposed Project; and
- Documenting mitigation measures proposed by the stakeholders.

6.4 Methodology

The consultant carried out public consultations at various locations around the proposed Project Site. The stakeholder's consultation targeted various NGOs and administrative and educational institutions in the project area. Following strategy was adopted for public consultation:

- Selection of the stakeholders for consultation, reconnaissance of the proposed project site and initial discussions with the residents, office workers and pedestrians etc.
- Appraising the targeted stakeholders initially for the purpose of consultation and designing a schedule for holding regular consultation meetings.
- Meetings of environmental consultants and social specialists with the stakeholders were held to document their opinions expressed during the meeting.
- All the meetings were held in friendly environment in which participants expressed their views freely.

6.5 Major Stakeholders Identified and Consulted

The stakeholders contacted during the survey belonged to different categories of people as shown in **Table 6.1**.

Table 6.1: Categories of Stakeholders Interviewed in the Project Area

No.	Stakeholder Category
1	Local People (living in the vicinity of proposed project)
2	Government Organizations
3	Environment & Social Experts (Public and Private Institutes/Academia)
4	Grass-root stakeholder discussions

6.6 Issues Discussed

Following issues were discussed during the stakeholder consultation:

- Overall activities of the project and their possible impacts;
- Possible impacts on natural vegetation, flora and fauna;
- Possible mitigation measures;
- Beneficial factors and involvement opportunities of the local people in the set of activities of the Project; and
- Management of traffic during construction and operational phase of the project.

5.7.1 Institutional/Governmental/International Stakeholders

The meetings were held with selected stakeholders to discuss major technical aspects of EIA for the project "Development of Park Enclave Phase – III Project, Islamabad", and their opinions/concerns/issues/suggestions are summarized below.

Date and Time	Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
02-June-2021 11:00am to 11:30am	Mr. Muhammad Kashif, Deputy Director (CDA)	CDA, Islamabad	<ul style="list-style-type: none"> ▪ Development of Park Enclave Phase – III Project is an environmentally friendly developmental project in which many sustainable features are added such as rain water harvesting, soft and hard landscaping of the project area and sewerage treatment plant. ▪ Development of Park Enclave Phase – III Project will yield huge revenue streams to CDA. On completion, the project will create new commercial areas and huge sources of revenue for CDA. These revenues will be utilized for infrastructural improvement of the city and to overcome the shortage of housing. ▪ CDA will develop 6 parks in the Park Enclave Phase – III Project which is probably the highest in any sector of Islamabad. To address that issue of trees at the project site the placement has been carried out in such a way that the pockets where trees are located are incorporated in these parks. ▪ It is expected that only 5 -10% of the trees present in the project site will be cleared during road infrastructure development. ▪ Secondly, CDA will rigorously implement the Plantation and Landscape Plan incorporated in the PC-1. ▪ All sensitive areas such as shrines and graveyards present in the region will be preserved and maintained during the construction and operational phase of the Project. ▪ Water resources are depleting in Islamabad, therefore, rainwater harvesting technology will be installed in each household (private and public buildings). ▪ Recycling of water for horticulture purposes. ▪ Wastewater from the Park Enclave Phase – III will be transported through trunk sewers to the main sewerage treatment plant in Park Enclave, Phase – I.
02-June-2021 11:30am-12:00am	Mr. Asif Majeed, Director Environment, Capital Development Authority	CDA, Islamabad	<ul style="list-style-type: none"> ▪ PPI team visited Director Environment, CDA Islamabad, Mr. Asif Majeed to discuss the ecological environment of the Park Enclave Project, Phase-III, Islamabad. ▪ He suggested that indigenous plants and environment friendly ornamental trees and shrubs should be planted on along the road and link road. ▪ He said that during construction phase of the project, many plant species will be cut down which will result in habitat loss. It will ultimately

			<p>lead to loss of wildlife such as small mammals, large mammals, reptiles and birds.</p> <ul style="list-style-type: none"> ▪ Moreover, he added that the proposed project should invest in development of green belts and green areas. Investing in green structures will help in making the project environment friendly. ▪ He further added that there should be proper plantation plan for the entire housing project. ▪ He said that environmental awareness in Pakistan is very low therefore raising awareness among the general public about the importance of environment is necessary. ▪ During the construction phase of the proposed project wildlife protection signboards should be installed along the road side to discourage illegal hunting and importance of birds and other wildlife of the area. ▪ Solid waste should be dumped on the CDA specified dumping sites and wastewater generated during both construction and operational phase should be treated before releasing in the sewerage line. ▪ A friendly environment between the residents and the environment is required for the coexistence and preservation of the ecology of the area. Artificial birdcages should be installed at different places within the sector with food. Plantation should be carried out in parking areas near commercial areas with indigenous trees and ornamental plants.
<p>4-June-2021 10:20am to 10:50am</p>	<p>Sher Afzal, Assistant Director, Environmental Social and safeguard section</p>	<p>IESCO, Islamabad</p>	<ul style="list-style-type: none"> ▪ Development of Park Enclave Phase-III Project will spur the local economy and create many jobs in the project area. Such projects are much needed particularly after the slump in economy caused by COVID-19. ▪ Development of Park Enclave Phase-III Project must be carried out according to the layout plan approved by CDA ▪ Park Enclave Phase-III Project must build a state-of-the-art wastewater treatment plant. ▪ Tree cutting should be minimized to the maximum extent possible through astute planning. ▪ Local people should be given employment during the development of the Project. ▪ Occupational health and safety measures may be adopted by the contractor during construction works for the safety of workers.

4-June-2021 10:50am to 11:10am	Muhammad Yasin, Manager Environment and Social Section	IESCO, Islamabad	<ul style="list-style-type: none"> ▪ The proposed project is based on ecofriendly measures such as the plantation in parks and playground comprise of 18 percent of the total area allocated for the project, which demonstrates the ecofriendly nature of the project. ▪ Rainwater harvesting should be carried out to reduce the already existing pressure on the water resources of Islamabad. ▪ Sewerage Treatment Plant needs to be installed at the project site to treat the sewerage generated from the Park Enclave Phase-III Project to ensure water security. ▪ To make the proposed project more environment friendly ecofriendly bricks should be used which is ecofriendly as well as economically viable. ▪ Solar Plates should be installed to ensure renewable source of energy and to reduce the pressure on non-renewable forms of energy.
5-June-2021 10:30am to 11:00am	Mr. Mukhtiar Shakir, Fire Audit Supervisor	Directorate of Municipal Administration Islamabad	<ul style="list-style-type: none"> ▪ While sharing his view on the proposed project, he explained that there is ordinance/law for construction of new buildings or housing schemes within the capital city Territory and CDA should follow the ordinance while construction the proposed project. ▪ He further added that Islamabad is divided into nine categories, and each has separate firefighting system. ▪ He urged that the proposed project should have their firefighting plan. Therefore, NOC must be taken from the Directorate of Municipal Administration Islamabad
5-June-2021 11:30am to 12:00am	Mr. Umar Farooq Principal Scientific Officer	Agro forestry Rangeland Research Institute, NARC, Islamabad	<ul style="list-style-type: none"> ▪ He was well aware of the Park Enclave Phase –III Project, Islamabad. He said that it is good opportunity for the local people in the surrounding of the proposed project as this project will create employment opportunities. ▪ However, he added that there will be great irreparable loss to habitat of wildlife, and natural forest vegetation and mature tree species. ▪ Moreover, the project area is recharge area in the vicinity of the Rawal Dam and Simly Dam. In long term, it will contribute to water shortage and crisis in the country. ▪ To make the project environment friendly, more trees should be planted and whenever possible cut down of trees during the construction phase should be minimized. ▪ Moreover, he added that after the construction work is completed the CDA should take measures to restore the environment to its original form.
22-June-2021 16:30 to 17:00	Mr Muhammad Rais, Assistant Professor, Department of Wildlife	PMAS Arid Agriculture University	<ul style="list-style-type: none"> • The positive impact of the project will be that urban development will take place due to the project. This will have overall positive impact on the local economy of the project area.

	Management, PMAS Arid Agriculture University		<ul style="list-style-type: none"> • The development of the housing scheme will convert natural environment into urban area. To reduce the mitigation measures of the project the following activities are suggested: <ul style="list-style-type: none"> ○ Plantation of native trees in the project site ○ Instead of leveling nullahs construct culverts and tunnels for the passage of wildlife ○ Maintaining lawns ○ Construction of artificial wetlands/ ponds/ rain water storage ponds ○ Proper planning of solid waste dumping to control population of nuisance species like crows, kites, mynas, boars and jackals
5-June-2021 2:30am to 2:50am	Mr. Moazaam Abbas and Mr. Muhammad Tanveer, Real Estate Agent, Fazal Builders	G-11, Islamabad	<ul style="list-style-type: none"> • Development of Park Enclave will prove to be beneficial for the economy as it will create direct and indirect employment opportunities. • State of the art facilities such as solid waste management facility, waste water treatment facility, rain water harvesting, solar system etc. must be provided in Park Enclave. • Proper Solid waste and wastewater management system should be planned. Solid waste generated during the construction and operational phase of the proposed project should be disposed away from the Park Enclave Phase – III Project • In order to preserve the Nullah passing through the project area, proper measures should be taken. • To reduce the chances of health and safety risks medical camp should be installed at the project area during the construction phase.

5.7.2 Consultation with the Communities

A customer satisfaction survey and public consultation was carried out with local community living in the vicinity of Park Enclave Phase – III Project, Islamabad.

For this purpose, a series of roadside discussions were carried out with the local community. During the roadside discussion, the community was informed about the salient features of the project, its location, and activities. Exhibits of roadside public consultation are in **Figure 6.1**.

Respondents in the majority showed a positive attitude towards the project. The viewpoints of respondents are as follows:

- When people were asked about their satisfaction level on the facilities provided by CDA in Park Enclave – I and II, most of the respondents were happy about the facilities provided; however, some of the residents feel that improvements are required.
- The local community believes that the proposed project will provide basic facilities such as electricity supply, gas, and water supply provided by CDA, which will enhance the existing condition of infrastructure in the project area.
- The residents of Chatha Bakhtawar village mentioned that the propose project will generate employment opportunities for the local community during the construction phase of the project.
- The residents of PHA share the same view that the proposed project will help in generating employment opportunities however, they also mentioned that the unmanaged extraction of groundwater can lead to degradation of groundwater table thus increasing the issue of water scarcity.
- Furthermore, some residents of Chatha Bukhtawar complained that there is issue of land acquisition in the Park Enclave Phase – I and Phase – II.

Figure 6.1: Pictorial Representation of Public and Stakeholders Consultation for Project



Exhibit 1: Consultation with a shopkeeper at Newmal Bazaar



Exhibit 2: Consultation with an aged person in Newmal Bazaar



Exhibit 3: Consultation with a Data Entry Operator



Exhibit 4: Consultation with a whole sale store owner



Exhibit 5: Consultation with the residents of PHA



Exhibit 6: Consultation with residents of PHA



Exhibit 7: Consultation with the residents of Kacha Abadi at the project site



Exhibit 8: Consultation with residents of Chathi Bukhtawar



Exhibit 9: Stakeholder consultation with the Deputy Director CDA

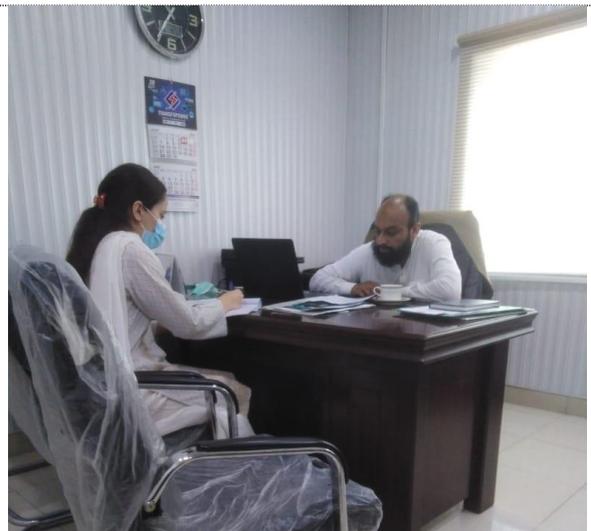


Exhibit 10: Stakeholder Consultation with the Manager Environment and Social Sector, IESCO



Exhibit 11: Stakeholder Consultation with Real Estate Agents, Fazal Builders, G-11



Exhibit 12: Stakeholder Consultation with Umar Farooq, NARC Islamabad

7 Impact Assessment and Mitigation Measures

7.1 Introduction

This Chapter provides detail environmental impact assessment of different aspects of the proposed project, “Park Enclave Phase – III Project, Islamabad”. It assesses the significance of the potential impacts and recommends mitigation measures to minimize if not eliminate the potentially adverse impacts of the project.

The nature and the significance of the impacts depend on the nature and magnitude of the different activities and also on the type of pollution control technologies to control or minimize the pollution related with the different activities of the project.

The significance of these impacts has been assessed using a risk assessment approach based on the severity and likelihood of occurrence of the individual potential impact. Moreover, mitigation measures have also been proposed based on the regulatory requirements and guidelines. These mitigation measures include the use of alternative technologies, management and physical controls or compensation in monetary terms.

For residual impacts (impacts remaining after applying the recommended mitigation measures) and for impacts in which there can be some level of uncertainty in prediction at EIA stage, monitoring measures have been recommended to abet these impacts during the course of the project.

For the effective implementation and management of the mitigation measures an Environmental Management Plan (EMP) has been prepared.

7.2 Environmental Screening of the Project

For Development of Park Enclave Phase – III Project, Islamabad, environmental screening matrix was developed, as part of the present EIA focusing on the potential environmental impacts of the project during pre-construction, construction and operation phases. The matrix examines the interaction of project activities with various components of the environment.

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

- High negative (adverse) impacts,
- Low negative impact,
- Insignificant impact,
- High positive (beneficial) impacts,
- Low positive impact, and
- No impact.

The screening matrix unmitigated is provided in **Table 7.1**.

The negative impacts predicted in this manner are the ‘unmitigated’ impacts. Appropriate mitigation measures have been recommended as part of this EIA. The occurrence possibility and severity of the potentially adverse impacts identified in **Table 7.1** will be reduced as a consequence of the incorporation of the mitigation measures into the project design/management.

The negative impacts screened through this process are discussed later in the Chapter.

Table 7.1: Environmental Screening Matrix (unmitigated)

Description	Physical			Biological		Social and Socio-economic				
	Soil	Air Quality	Surface and Ground Water	Flora	Fauna	Noise and Vibration	Land Acquisition and Compensation Issues	Safety Hazard, Public Health and Nuisance	Employment	Historical or Archeological Sites
Project Siting										
Project Site, Land Use and Design	-1	0	0	-2	-1	0	-1	N	N	N
Visual Impacts	-1	0	0	-1	-1	0	-1	N	N	N
Construction Phase										
Land Acquisition	N	N	N	N	N	N	N	N	N	N
Contractor Mobilization	0	-1	0	N	0	-2	N	-1	0	N
Construction Camp Establishment	-1	-1	-1	-1	-1	-1	N	-1	+1	N
Construction Camp Operation	0	-1	-1	-1	-1	-1	N	-1	+1	N
Site Preparation	-2	-1	-1	-2	-2	-1	N	-1	+1	N
Construction Works	-1	-1	-1	-2	-2	-2	N	-1	+1	N
Laying of Services	-1	-1	-1	-1	0	-1	N	-1	+1	N
Construction of Buildings	-1	-1	-1	0	0	-2	N	-1	+1	N
Construction Materials Supply	-1	-1	N	0	-1	-1	N	-1	+1	N
Construction Crew Transportation	0	-1	N	0	0	-1	N	-1	+1	N
Solid Waste Disposal	-1	-1	-1	-1	-1	N	N	0	0	N
Waste Effluent Disposal	0	-1	-2	-1	-2	N	N	-1	0	N
Demobilization of Contractor	0	-1	0	0	0	-1	N	-1	0	N

Description	Physical			Biological		Social and Socio-economic				
	Soil	Air Quality	Surface and Ground Water	Flora	Fauna	Noise and Vibration	Land Acquisition and Compensation Issues	Safety Hazard, Public Health and Nuisance	Employment	Historical or Archeological Sites
Operation Phase										
Operation of Park Enclave Phase – III Project, Islamabad	N	-1	0	-1	-2	-1	N	0	+1	N
Solid Waste Disposal	-2	-1	-2	-1	-2	0	N	0	0	N
Waste Effluent Disposal	-2	-1	-2	-1	-2	N	N	0	0	N

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

7.3 Environmental Impact Characterization

During Screening of “Development of Park Enclave Phase – III Project, Islamabad”, the predicted impacts were characterized. Various aspects of the impact characterization include:

- Nature (direct/indirect)
- Duration of impact (short term, medium term, long term)
- Geographical extent (local, regional)
- Timing (Project phase)
- Reversibility of impact (reversible/irreversible)
- Likelihood of the impact (certain, likely, unlikely)
- Impact consequence severity (severe, moderate, mild)
- Signification of impact (High, medium, low)

The above aspects of environmental characterization are defined in **Table 7.2**.

Table 7.2: Impact Characterization

Categories	Characteristics
Nature	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes as a result of change in another parameter
Duration of impact	Short-term: lasting only for the duration of the project such as noise from the construction activities. Medium-term: lasting for a period of few months to a year the project before naturally reverting to the original condition such as loss of vegetation due to clearing of campsite, contamination of soil or water by fuels or oil. Long term: lasting for period much greater than medium term impact before naturally reverting to the original condition such as loss of soil due to soil erosion.
Geographical extent	Local, regional (spatial dimension)
Timing	Construction and Operation
Reversibility of impact	Reversible: when a receptor resumes its pre-project condition Irreversible: when a receptor does not or cannot resume its pre-project condition
Likelihood of the impact	Almost Certain: Impact expected to occur under most circumstances Likely: Impact will probably occur under most circumstances Possibly: Impact may possibly occur at some time Unlikely: Impact could occur at some time Rare: Impact may occur but only under exceptional circumstances
Impact consequence severity	Major: When an activity causes irreversible damage to a unique environmental feature; causes a decline in abundance or change in distribution over more than one generation of an entire population of species of flora or fauna; has long-term effects (period of years) on socioeconomic activities of significance or regional level. Moderate: When an activity causes long-term (period of years), reversible damage to a unique environmental feature; causes reversible damage or change in abundance or distribution over one generation of a population of

Categories	Characteristics
	<p>flora or fauna; has short-term effects (period of months) on socioeconomic activities of significance on regional level.</p> <p>Minor: When an activity causes short-term (period of few months) reversible damage to an environmental feature; slight reversible damage to a few species of flora or fauna within a population over a short period; has short term (period of months) effects on socioeconomic activities of local significance.</p> <p>Negligible: When no measurable damage to physical, socioeconomic, or biological environment above the existing level of public concern; and conformance with legislative or statutory requirements.</p>
Significance of impact	<p>Categorized as High, Medium, or Low</p> <p>Based on the consequence, likelihood, reversibility, geographical extent, and duration; level of public concern; and conformance with legislative or statutory requirements.</p>

Subsequent to the characterization, appropriate mitigation measures were identified, in order to minimize, if not completely eliminate, the adverse impacts associated with project activities. Finally, residual impacts were identified.

The impact characterization of the predicted impacts, mitigation measures and residual impacts are discussed below:

7.4 Pre-Construction Impacts

7.4.1 Project Sitting Impacts

The impacts associated with the project sitting are those which relate to its location at the designated site. These impacts are different from those which are associated with the project's construction and operation phases, in the sense that the construction and operation impacts are associated with the activities such as land clearing, waste disposal, whereas the sitting impacts relate to the mere presence of a facility at the given location.

For the proposed project, the following two aspects of the project sitting were considered:

- Project site, land use and design
- Visual Impacts (aesthetic value)

These are characterized in **Table 7.2**, and discussed below:

7.4.2 Project Site, Land Use and Design

The project site of Park Enclave Phase – III Project, Islamabad land use and its design should be in line with the Master Plan of Islamabad for housing project. As water shortage problem also prevails in other parts of Islamabad, it may also be faced by the inhabitants of the proposed project as well as the people living in the adjoining areas of the Park Enclave Phase – III Project, Islamabad.

The land allocated for the development of Park Enclave Phase – III Project, Islamabad, Islamabad is undulated land, therefore there is a lot of chance of soil erosion due to heavy rain and wind.

Moreover, approximately fifty household are settled in the project site, who may be displaced from their homes due to the proposed project.

The unmitigated impact associated by not following the Master Plan of Islamabad or its design does not meet the minimum requirement of a housing society in Islamabad are characterized as follows.

- Nature: Indirect
- Duration: Long term
- Geo extent: Local
- Reversibility: Irreversible
- Likelihood: Possibly
- Consequence: Severe
- Impact significance: High.

Mitigation Measures

Project site: CDA is developing Park Enclave Phase – III Project, Islamabad which can be accessed via Park Road and Kuri Road.

- To avoid any conflict that is likely to occur, the people living currently in the project site will be compensated through money or by giving a plot in the proposed project.
- In order to reduce soil erosion, water sprinklers will be used.
- Excessive extraction of groundwater will be restricted in order to provide time for the aquifers to get recharged.
- Policies should be made and implemented which should include national laws, international agreements, effective law enforcement and environment friendly economic policies.

Land Use: The land use of Park Enclave Phase – III Project, Islamabad is in line with other housing projects in Islamabad. The land use of the proposed project will be in line to the Master Plan of Islamabad.

Design: CDA has designed Park Enclave Phase – III Project, Islamabad on sustainable basis and all utilities like water, natural gas, sanitary sewerage, drainage and electrification would be provided as per respective design standard being followed by the CDA.

7.4.3 Visual Impact

The Park Enclave Phase – III Project, Islamabad is being developed in an area where new housing schemes are under construction such as Park Enclave Phase – I, Park Enclave Phase – II and Pakistan Housing Authority, etc.

There is a need to maintain much of its natural landscape and vegetation. This natural landscape has an aesthetic value, although not very significant importance, but indeed is a valuable asset of the area. “Development of Park Enclave Phase – III Project, Islamabad” can potentially damage the natural landscape and visual impact will be impacted.

The unmitigated impact associated with the aesthetic value of the area is characterized as follows:

- Nature: Direct
- Duration: Long term

- Geo extent: Local
- Reversibility: Irreversible
- Likelihood: Possibly
- Consequence: Severe
- Impact significance: High

Mitigation Measures

For the project, the visual impact will be minimized at different levels, as described below.

- The design of the proposed project should be adopted in a manner that minimizes the changes in the topography, landscape and damage to the natural vegetation.
- CDA Planning and Design Wing has allocated provision of 6 parks and 18.40% of the total land for Park Enclave Phase – III Project, Islamabad is allocated for the provision of parks and open spaces.
- A plantation plan as proposed by CDA should be implemented in Park Enclave Phase – III Project, Islamabad.
- Certain areas must be marked and left untouched to preserve natural vegetation.

Residual Impacts

As a result of the above mitigation measures, the visual impact of the project will be greatly reduced. There will be some residual impact; however, its significance is expected to be low.

Impacts associated with project sites are those which relate to the placement of Park Enclave Phase – III Project, Islamabad at the designated sites. These impacts are different from those which are related to construction and operational activities i.e., land clearing and waste disposal.

Major aspects considered are:

- Aesthetic Value
- Cumulative Impacts

7.4.4 Aesthetic Value

The natural landscape has an aesthetic value and any developmental activity would cause damage to it. So far as the project site is concerned, it does not preserve the natural features in its entirety because of the past human interference in the form of construction of semi pacca houses.

It is thus likely that an impact of low intensity i.e. low negative will occur, as a result of development.

Mitigation Measures

- It is understood that under the Master Plan, minimum changes will be done to the topography, landscape and natural vegetation.
- The residents of the Kachi abadi will be provided compensation for their houses.
- An appropriate landscape and afforestation plan would be developed to compensate and even improve the loss inflicted to the site.

7.4.5 Cumulative Impacts

It is apprehended that as a result of the development of Park Enclave Phase – III Project, Islamabad by the CDA, a cumulative negative impact on the site will occur, involving large scale land clearing, loss of natural vegetation, loss of wildlife, increased load on the natural resources of the area and population influx to the project site.

Mitigation Measures

Development of housing societies for housing and commercial purposes is governed by CDA policy. Hence, this process cannot be stalled or put to end. However, in order to mitigate the negative effects, measures as proposed in the foregoing paras, should be adopted. In this context a careful planning, implementation of environmental legislation, adequate integrated solid waste management, etc. should be ensured.

7.5 Construction Phase Impacts

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

- Physical Environment
 - Soil degradation and contamination
 - Air quality deterioration
 - Surface and Ground water contamination
 - Solid Waste
- Biological Environment
 - Loss of vegetation
 - Damage to Wildlife
- Social Environment
 - land acquisition
 - Noise and vibration
 - Safety hazards, Public health and nuisance issues
 - Sites of Archaeological or Historical Significance

These impacts are characterized in **Table 7.2** and can be readily pre-empted and mitigated. The mitigation measures recommended in this section will need to be incorporated in the construction of the project.

These impacts and their respective mitigation measures are discussed below:

7.5.1 Soil Degradation and Contamination

The soil-related issues include soil erosion, slope stability, and soil contamination. These may be caused by the land clearing, leveling and grading, excavation and filling, construction activities and maintenance of equipment/vehicles.

Soil may be contaminated as a result of fuel/oils/chemical spillage and leakage, and inappropriate waste (solid as well as liquid) disposal.

Extraction of stone and gravel from the area may potentially lead to soil erosion in the project site.

The unmitigated impacts related to soil erosion and contaminations are characterized below.

- Nature: Direct
- Duration: Long term
- Geo extent: Local
- Reversibility: Irreversible
- Likelihood: Certain
- Consequence: Moderate
- Impact significance: High

Mitigation Measures

The followings mitigation measures will minimize the soil erosion and contamination:

- Land clearing, leveling and grading be minimized, and carried out in a manner to minimize soil erosion.
- Excavated slopes will not be left untreated/unattended for long durations especially around water bodies. Appropriate slope stabilization measures will be taken as per the design (i.e. Stone pitching). Temporary measures, such as construction of temporary walls reinforced with brick lining bordering the construction areas to contain debris and spoil, will also be undertaken to avoid soil erosion and water contamination.
- The stone and gravel will not be extracted from the areas around Nullahs.
- Vehicles and equipment will not be repaired in the project site. An unavoidable, impervious sheathing will be used to avoid any soil contamination.
- For the domestic sewage from the contractor's camp, septic tanks with soaking pits will be constructed having adequate capacity. Waste oils will be collected in drums and sold to the recycling contractors.
- The recyclable waste from the project site (such as card board, drums, broken/used parts, etc.) should be sold to recycling contractors, or where appropriate reuse/recycle it. The hazardous waste should be kept separate and handled according to the nature of the waste.
- While storing, hazardous waste should be marked.
- Domestic solid waste will be disposed in a manner that does not cause soil contamination/water contamination (one of the options available is to dispose the recyclable material, and the remaining waste at a suitable location).

Residual Impacts

Appropriate construction practices and management actions as listed above will greatly minimize the soil erosion and contamination. The significance of the residual impacts is therefore expected to be 'low'.

7.5.2 Air Quality Deterioration

Construction machinery and project vehicles will release exhaust emissions, containing Carbon Monoxide (CO), Oxides of Sulfur (SO_x), Oxides of Nitrogen (NO_x) and Particulate Matter (PM). Also various burning activities involved in construction will cause air pollution. These emissions can deteriorate the ambient air quality in the immediate vicinity of the project site. Furthermore, construction activities such as excavation, land leveling, filling and vehicular movement on unpaved tracks may also cause fugitive dust emissions. During operational phase traffic may increase and will cause more air pollution.

The unmitigated impacts related to air quality deterioration are characterized below:

- Nature: Direct
- Duration: Short term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Likely
- Consequence: Minor
- Impact significance: Medium

Mitigation Measures

The following mitigation measures will minimize the emissions and their impacts:

- Construction machinery and vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.
- Fugitive dust emissions will be minimized by spraying water on soil, where required and appropriate.
- Traffic plan should be prepared once the project enters into its operational phase. That will help to minimize the air pollution.

Residual Impacts

The above measures will reduce the magnitude of the adverse impacts on the ambient air quality. The significance of the residual impacts on the air quality is expected to be low.

7.5.3 Surface Water and Groundwater Contamination

The project activities that can contaminate soil may also contaminate the surface water and groundwater. These include;

- Solid waste disposal
- Sewerage disposal
- Equipment/ vehicles maintenance
- Spillage/ leakage of fuels, oils and chemicals
- Camp site sanitation facilities

The unmitigated impacts of the proposed construction activities on the water resources of the area characterized below:

- Nature: Direct and indirect
- Duration: Short to medium term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Likely
- Consequence: Major
- Impact significance: High

Mitigation Measures

- Protection of the groundwater reserves from any contamination.
- Water required for construction should be obtained in such a manner that water availability to the local community remains unaffected.
- Prohibit the washing of vehicles and machinery at the project site.
- Concrete should be brought in concrete mixers and used.
- Rainwater harvesting shall be practised for the collection of stormwater from the roofs and pavements for possible horticultural use.
- The mitigation measures recommended forestalling soil contamination will also prevent surface and groundwater contamination.

Residual Impacts

If the recommended mitigation measures are effectively employed, the residual impacts of the project activities on the water resources of the area will be negligible.

7.5.4 Loss of Vegetation

The project area has a natural vegetation cover. The site preparation and construction activities may necessitate removal of the natural vegetation from the areas where road, culverts and other buildings will be constructed. Damage and/or loss of vegetation and clearing of other indigenous and introduced species, as well as undergrowth species which comprising bushes, grass, etc. will also lost.

Construction crew can also indulge in tree/shrub cutting to obtain fuel wood for the camp.

The unmitigated impacts of the proposed activities on the floral resources of the area are characterized below.

- Nature: Direct
- Duration: Medium to long term
- Geo extent: Local
- Reversibility: Irreversible (reversible in medium to long term)
- Likelihood: Certain
- Consequence: Severe

- Impact significance: High

Mitigation Measures

The following mitigation measures will minimize any negative impacts on the floral resources of the area:

- Endeavors will be made to compensate the loss by enhancing the environment, through plantation of trees and ornamental plants.
- Park Enclave Phase – III Project has provision of 6 parks and open spaces which constitutes 18.40 % of the total project site. The vegetation and trees are in two concentrated pockets in the project site. One of the concentrated pockets of vegetation does fall partially in a proposed area of park. This planning will certainly reduce the number of trees to be cut during the development of infrastructure.
- CDA has planned the Park Enclave Phase – III, keeping the topography and existing features of the project site. There is a provision of 6 parks in the Park Enclave Phase – III Project. CDA has planned parks at both the places where there are dense vegetation covers located in the East and North-West of the Park Enclave III.
- A plantation cover of appropriate trees /bushes will be raised within the open available spaces and along roads. Ornamental trees, bushes and climbers have been included to improve the scenic and aesthetic value of the sectors. A mixture of shady trees with heavy foliage will be required to counter the air and noise pollution, possibly along the roads, where underground or overhead cables do not interfere with the plantation plan. Small green areas in and around various factories as a part of local landscape plans, should be set aside, where ornamental shrubs will be grown.
- Selection of species to be planted may not be strictly confined to the proposed plantation plan of CDA, as local factors such as available quantity of irrigation water and edaphic limitations will also govern the choice of plants. It is further recommended that a small nursery may be established comprising of fast growing trees.
- Plantation plan of CDA will be implemented in Park Enclave Phase – III Project, Islamabad.
- An average space of 10 ft. x 6 ft. will be maintained. However the plant to plant distance might vary depending upon the site conditions and/or the growth characteristics of the trees species.
- All preventive measures will be adopted to control the spill-over of chemicals and other effluents on the ground to protect soil fauna and ensure microbial activity in accordance with NEQS promulgated under Environmental Protection Act 1997.
- Cutting of trees and other natural vegetation will be minimized as far as possible through astute planning.
- A record will be maintained for any tree cutting.
- If cutting of trees is unavoidable, tree plantation of local species will be undertaken at appropriate location.

- The construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuel wood will not be allowed.
- For every tree cut, as many as 10 trees should be raised/planted.
- Some grass species should also be introduced in the project area due to their soil binding capacity.

Residual Impact

The proposed tree plantation will take some time to grow and mature, there will therefore be some reduction of trees and natural vegetation in the area. However, no vegetation will be possible on the built-up area. This impact cannot be fully mitigated and the residual impact would be medium; at least in the medium term. In the longer run, however, the planted trees and vegetation will more than compensate for any vegetation loss.

7.5.5 Damage to Wildlife

The project site is adjacent to housing societies such as Park Enclave Housing Society, Phase – I, Park Enclave Housing Society, Phase – II, and PHA housing society, which provides limited habitat for wildlife. The loss of natural vegetation discussed above and other project activities will potentially have adverse impacts on the faunal resources and habitats of the area as well

Smoke, chemicals, dust particles, and noise generated by heavy machinery are a scaring factor for wildlife. Rodents, hedgehogs, porcupines would lose their abode.

The unmitigated impacts of the proposed activities on the faunal resources of the area are characterized below:

- Nature: Direct
- Duration: Medium to long term
- Geo extent: Local
- Reversibility: Irreversible (reversible in medium to long term)
- Likelihood: Certain
- Consequence: Severe
- Impact significance: High

Mitigation Measures

- The measures to prevent soil and water contamination will forestall any adverse impact on the faunal resources of the area.
- The measures to restore natural vegetation loss in the area will benefit the area's fauna as well.
- The project staff should not be allowed to indulge in any hunting or trapping activities.
- Night time construction works should not be undertaken.
- Illumination levels at the site should be minimized, as far as possible.
- Appropriate diffusers should be used to restrict the illumination within the project site.

- Blasting should not be undertaken at the site for excavation purposes.
- Developmental activities and colonization of project site would be a positive step to keep down the number of this undesirable species at the desirable level from human point of view.

Residual Impact

Despite the above mitigation measures, there will be some residual impacts of the project on the faunal resources of the area. The significance of these residual impacts is expected to be medium.

7.5.6 Land Acquisition

The affected people of land falling in Park Enclave Phase – III Project, Islamabad will be compensated for land as well as built up property. The PC-1 for the development of Park Enclave Phase – III Project, Islamabad has been prepared and the land has been acquired.

The unmitigated impacts related to land acquisition and resettlement are characterized below.

- Nature: Direct
- Duration: Medium term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Certain
- Consequence: Severe
- Impact significance: High

Mitigation Measures:

- CDA should implement the award of land sharing to the affectees.as per the relevant legislations.

Residual Impact

With the implementation of above mitigation measures, the residual land acquisition and resettlement impact will be “low”.

7.5.7 Noise and Vibration

Noise and vibration will be generated by the construction machinery and vehicles during construction activities.

The unmitigated impacts related to the noise and vibrations caused by the project are characterized as follows:

- Nature: Direct
- Duration: Short term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Certain

- Consequence: Moderate
- Impact significance: High

Mitigation Measures

- Construction equipment and vehicles will have exhaust mufflers (silencers) to minimize noise generation.
- Construction activities will not be carried out during the night.
- Blasting will not be allowed as part of the proposed construction activities.

Residual Impact

With the implementation of above mitigation measures, the residual noise impact will be low to medium.

7.5.8 Safety Hazards, Public Health and Nuisance

The public health issues related to the project location are the possibility of contamination of local drinking water resources and dust emissions during the construction phase. The anticipated health impacts are classified into the following categories:

Eye and Respiratory Diseases: Construction workers may be susceptible to eye and respiratory diseases due to their routine exposure to dust and exhaust emissions on site. These effects could possibly be mitigated by routine health screening and training of contractor's employees.

Physical Injuries: Injuries could happen primarily by occupational-related accidents, animal bites, etc. Activities such as land clearing, tree felling, earthworks, and construction of facilities present various occupational hazards to the workers on site. These risks can be mitigated through the provision of appropriate training and emergency response procedures.

Psychological Disorders: Some workers may suffer from depression and anxiety disorders due to working and accommodation conditions, and their relationship with fellow workers. The psychological wellbeing of some members of the communities may be affected due to disturbances created by the project activities. Mitigation measures for workers include the devotion to standards regarding working conditions.

Accidents: During the operational phase, as the traffic will increase, it may cause accidents and become a safety problem.

Excessive illumination at the construction site may potentially cause light pollution, creating public nuisance.

The unmitigated impacts related to the safety hazards; public health and nuisance are characterized follows:

- Nature: Direct and indirect
- Duration: Short to medium term
- Geo extent: Local
- Reversibility: Reversible

- Likelihood: Likely
- Consequence: Major
- Impact significance: High.

Mitigation Measures

- Protected fencing will be fixed around the construction site. Unauthorized access within the construction area will not be allowed.
- The local community will be educated regarding the safety hazards at the site.
- The mitigation measures discussed under air quality deterioration, soil and water contamination will address the public health concerns as well.
- Defensive driving practices will be inculcated in the project drivers through trainings, posters and other similar measures.
- Vehicle speeds of 50 km/hr at the project site will be implemented.
- Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance caused by light pollution.
- Proper traffic plan will be prepared and implemented during the operational phase.

Residual Impacts

There will be a moderate level of residual impact of safety hazard associated with the vehicular traffic and construction activities.

The residual public health and nuisance issues will be quite negligible after the effective implementation of the mitigation measures.

7.5.9 Sites of Archaeological or Historical Significance

A kachi abadi having approximately 50 households are living in the project site. There are two graveyards that will be relocated to another site.

There are no other reported sites of archeological or historical significance at the land being acquired for the project at Park Enclave Phase – III Project, Islamabad. However, in case any artifact of such significance is found during the construction activities, the Archeology Department, Government of Pakistan will be informed.

Mitigation Measures

- The community living in the kachi abadis will be compensated as per relevant law.
- Shifting of graveyards will be done to Islamabad graveyard according to the laws.
- Compensation will be provided to the people living at the project site.

Residual Impacts

There will be a moderate level of residual impact associated with the archaeological sites and construction activities.

7.6 Operational Phase Impacts

The operation of Development of Park Enclave Phase – III Project, Islamabad activities will interact with different components of the environment as shown in **Table 6.1**. This interaction may result into the following adverse impacts:

- Damage to flora and fauna
- Soil contamination
- Contamination of Surface and Ground water
- Safety hazards, public health and nuisance

However, the magnitude of some of the above impacts is likely to be higher as compared to the construction phase impacts.

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

- Landscaping and plantation
- Noise and other public nuisance abatement.
- Air quality management

The potential environmental impacts of Development of Park Enclave Phase – III Project, Islamabad during operational phase are characterized in **Table.7.2** and discussed below:

7.6.1 Damage to Flora and Fauna

The impacts of Development of Park Enclave Phase – III Project, Islamabad on the natural vegetation of the area are likely to be comparatively less than those which would be encountered during the construction phase. Human wildlife conflicts are likely to arise during the operational phase of the project.

Most of the potential impacts of Development of Park Enclave Phase – III Project, Islamabad operation phase on the faunal resources are associated with the damage to the natural vegetation and habitat. In addition, the wildlife may be disturbed by noise, illumination, and mere presence of the people.

The unmitigated impacts of the Park Enclave Phase – III Project, Islamabad operation on the biological resources of the area are characterized as follows.

- Nature: Direct and indirect
- Duration: Medium to long term
- Geo extent: Local
- Reversibility: Mostly irreversible (at least in the short term)
- Likelihood: Likely
- Consequence: Severe
- Impact significance: High.

Mitigation Measures

Most of the mitigation measures for protecting the biological resources during the construction phase and the project sitting would be applicable during the operation phase as well. The additional mitigation measures are:

Residual Impact

With the help of the mitigation measures listed above, the impact of Development of Park Enclave Phase – III Project, Islamabad operation on the biological resources of the project area will be greatly reduced and the residual impacts are expected to be low to medium.

7.6.2 Soil Contamination

The soil may be contaminated as a consequence of inappropriate waste (solid as well as liquid) disposal at the sectors.

These impacts are characterized as follows:

- Nature: Indirect
- Duration: Short term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Like
- Consequence: Major
- Impact significance: High

Mitigation Measures

The mitigation measures recommended under above-mentioned sections are also applicable to the operation phase of the project.

7.6.3 Solid Waste Management

Solid waste generated during construction activities shall be safely disposed at an approved waste disposal site in Islamabad. CDA shall prepare a solid waste management plan which details municipal waste collection and disposal as well as promotes recycling.

The unmitigated impacts related to the solid waste management caused by the project are characterized as follows:

- Nature: Direct to indirect
- Duration: Medium term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Certain
- Consequence: Moderate
- Impact significance: High

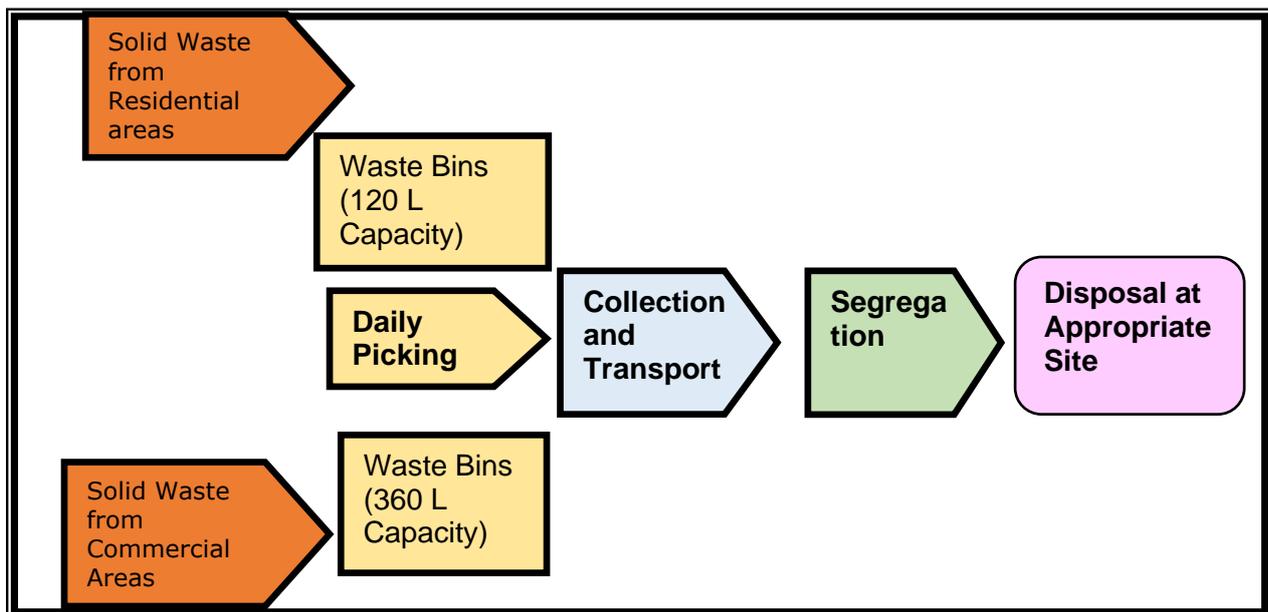
Mitigation Measures

- Solid Waste Management will also be an important issue in the operation of Development of Park Enclave Phase – III Project, Islamabad. For solid waste management, CDA shall make an Integrated Solid Waste Management Plan. The solid waste management flow diagram is shown in **figure 7.1**.
- The implementation of composting programme is also recommended. This will provide on-site recycling of the biodegradable waste and grass clippings. It will also provide natural fertilizer or green manure, to be used in the Park Enclave Phase – III Project, Islamabad landscapes.
- The integrated Solid Waste Management Plan of Islamabad should incorporate a Solid waste segregation facility. Where Solid Waste should separated into recyclable and non-recyclable waste. For this purpose residents can be provided with different color waste bins for different waste materials.
- Solid waste generated by the residents of Park Enclave Phase – III Project, Islamabad shall be collected in the waste bins, placed at all houses and containers will be placed at various locations keeping in view the design criteria. The solid waste in the containers will be collected through the CDA vehicles and finally will be disposed of in the proposed sanitary landfill site of Islamabad.

Residual Impact

The residual impacts after the implementation of the above measures will be low if the CDA construct and operate Sewerage Treatment Plant and Solid Waste is collected and disposed of properly.

Figure 7.1: Flow Diagram of Solid Waste Management System



7.6.4 Contamination of Surface and Groundwater

The nature of impact of the project's operation activities on the surface and ground water quality is expected to be quite similar to those predicated for the construction phase, except that the magnitude is likely to be larger, owing to the living of population at Park Enclave Phase – III Project, Islamabad.

The unmitigated impacts on the surface and groundwater resources of the area are characterized below:

- Nature: Direct
- Duration: Short term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Likely
- Consequence: Major
- Impact significance: High

Mitigation Measures

The mitigation measures against soil contamination discussed above for the construction activities will forestall any possible water contamination at operation stage as well.

Residual Impact

After the effective implementation of the above measures, the residual impacts of the operation of the Park Enclave Phase – III Project, Islamabad on the water resources of the area will be negligible.

7.7 Positive Impacts of the Project

7.7.1 Provides Residential plots

Development of Park Enclave Phase – III Project, Islamabad will provide residential plots for upper and medium income groups, including federal government employees.

7.7.2 Reduce Dependency on private schemes to provide housing

There is a considerable shortage of housing in Islamabad and Rawalpindi. The private sector is fulfilling this demand through building schemes in the outskirts of Islamabad and Rawalpindi where the land is primarily for agriculture. By going ahead with the proposed project, people will have options to buy houses to buy in government funded scheme which are in synchronization with the master plan of the city.

7.7.3 Provides Infrastructure

This project will provide basic infrastructure facilities in the area like Roads, Drainage, Water Supply and Sanitary Sewerage System.

7.7.4 Reduce housing problem in Islamabad/Rawalpindi

This project will facilitate in reducing the pressure on already overcrowded housing in Pakistan particularly in Rawalpindi & Islamabad.

7.7.5 Provide Employment Opportunities

This project will provide employment opportunities both direct (workers and employees) and indirect by accelerating the business activities in the project area especially to the locals.

7.7.6 Improve Living Standards and Strengthen the Economy

Indirectly the project will improve the living standards of the people by strengthening the economy.

7.8 Environmental Mitigation Matrix

For the Development of Park Enclave Phase – III Project, Islamabad, an Environmental Management Matrix has been developed which is given as **Table 7.3**.

This mitigation matrix provides details about the type of activity of the project, type of impact, potential of the impact, location or extent of the impact, duration of the impact, its magnitude, and possible mitigation measures for the impact, and the institutional responsibilities for the implementation and supervision for each of the activity of the project.

Table 7.3: Environmental Mitigation Plan for Development of Park Enclave Phase – III Project, Islamabad

Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
Drainage	Aesthetic, water pond, breeding ground for mosquitoes	At Park Enclave Phase – III Project, Islamabad and specially along roads	During and after rains	Major	<ul style="list-style-type: none"> ▶ Properly designed drains along the roads so as to avoid formation of water ponds. ▶ Roper design and maintenance 	CDA Directorate	CDA Design
Cultural properties	Social Impacts	To be checked at localities	At planning stage		<ul style="list-style-type: none"> ▶ Construction activities avoid any interference with cultural heritage sites. 	CDA Directorate	CDA Design
Location in area with seismic background	Air, water, health, food quality, jobs, safety	Throughout Directorate of Sector Development	After earthquake with intensity higher than designs	Can be serious at times.	<ul style="list-style-type: none"> ▶ Seismic loads for bridges, culverts, residential and commercial buildings to be computed in accordance with revised seismic code for Islamabad 	CDA Directorate	CDA Design
Site selection of construction camp, materials storage, human activities on site, travel to and from construction camp	Sanitary waste disposal, solid (kitchen) waste disposal, fuel leakage, noise and additional traffic, water usage and pollution	Camp Site for construction	Throughout construction period	Minor if Recommendations are followed.	<ul style="list-style-type: none"> ▶ Prior consultation with the contractor for establishing work camps and workshops at the designated site at Park Enclave Phase – III Project, Islamabad. ▶ Camp Site construction to be supervised ▶ Proper storage and fencing, locking of storage rooms containing hazardous material 	CDA	CDA
Sanitation and waste disposal facilities at camp site	Workers health may impair which may result in slow progress	At all solid and liquid waste collection areas, latrine sites of camps	Throughout construction period	Moderate	<ul style="list-style-type: none"> ▶ Contactor to provide proper waste management plan for comp site waste. ▶ Sewerage system at such camps to be properly designed (pit latrines or required septic tanks) to receive all sanitary wastewaters. 	CDA	CDA

Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
					<ul style="list-style-type: none"> ▶ Provide adequate sanitation, washing, cooking, and dormitory facilities. 		
Movement of vehicles in construction site and along haulage routes	Soil compaction and alteration of percolation and vegetation pattern, damage to properties and utilities	Throughout Park Enclave Phase – III Project, Islamabad	During construction period	Low	<ul style="list-style-type: none"> ▶ Construction vehicles, machinery, and equipment shall move, or be stationed in the designed right-of-way to avoid unnecessary soil compaction. ▶ Air, water, and soil quality to be monitored regularly as in EMP ▶ Existing road will be used to the extent possible for hauling materials 	CDA	CDA
Movement, maintenance, and fuelling of construction vehicles	Contamination of soil, surface and ground water from fuel and lubricants, air pollution due to dust and exhaust from vehicles movement	Fuelling and maintenance sites near construction camp, seasonal water ways present at Park Enclave Phase – III Project, Islamabad	During construction period	Low	<ul style="list-style-type: none"> ▶ Slopes of embankment to be designed so that pollutants do not enter water bodies. ▶ Construction vehicles and equipment's to be properly maintained and fuelled so that oil and diesel spillage do not contaminate soil. ▶ Fuel storage and refuelling sites to be kept away from drainage channels. ▶ Oil and grease traps to be provided at fuelling locations to prevent contamination of water ▶ Unusable debris shall be dumped in Designated Dump sites 	CDA	CDA
Creation and burning of waste at/or near camp site	Eyes irritation for workers and public, nuisance, deteriorated air	Around Camp site	Throughout construction period	Moderate	<ul style="list-style-type: none"> ▶ Incorporate technical design features for refuse collection containers and sites that would minimize burning impacts. ▶ Devise plan for safe handling, storage, and disposal of harmful materials 	CDA	CDA

Project Activities	Potential Impacts on Environment	Where the impact likely happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
	quality, smell from organic wastes				<ul style="list-style-type: none"> ▶ Discourage waste burning ▶ Introduce re-use and/or recycle ▶ Discourage use of disposables 		
Health and safety at work place	Workers progress may impair which will result in slow progress of the project	Throughout construction area and construction camp site	Throughout construction period	High	<ul style="list-style-type: none"> ▶ Obligatory insurance against work accidents for labourers ▶ Provide basic medical service and supplies to workers. ▶ Layout plan for camp site indicating safety measures taken by CDA (e.g., firefighting equipment, safe storage of hazardous materials, first aid, security, fencing, and contingency measures in case of accidents). ▶ Work safety measures and good workmanship practices to ensure no health risk for labourers ▶ Proper maintenance of facilities for workers ▶ Regular pest control measures in the site camp 	CDA	CDA
Disposal of Surplus material, storing material for reuse	Water pollution from runoff of discarded asphalt, loss of productive land due to dust	Along the full length of the roads in Park Enclave Phase – III Project, Islamabad	At start of construction	Low	<ul style="list-style-type: none"> ▶ Asphalt to be collected for reuse ▶ Waste disposed in designated Dump Site ▶ Water spraying to reduce dust 	CDA	CDA



Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
Digging borrow pit areas	Burrow pits collect water; malarial mosquitoes	Some areas in Park Enclave Phase – III Project, Islamabad might require fill to raise its level	Early in construction	Low	► Use approved borrows area in consultation with the Environment Directorate, CDA	CDA	CDA
Excavation of earth from borrow areas, embankment works, cutting operations, embanking, clearing of vegetation	Aesthetic, water storage, seepage, soil erosion, water contamination, vegetation clearing, loss of habitat for various faunal species	Designated Borrow areas, and at all sites where high embankments are required	Long lasting	Medium	<ul style="list-style-type: none"> ► Remove top soil and reintroduce for returning to nature. ► In areas with strong flash flow, high embankments are provided to minimize soil erosion. ► Stone pitching and/or retaining walls at high embankments in critical areas 	CDA	CDA
Acquisition of sub-base material, procurement of construction materials	Accelerate erosion at site	Quarries and borrow areas	Long term effects	Low	<ul style="list-style-type: none"> ► No use of any quarries for construction material from inside the Park Enclave Phase – III Project, Islamabad ► Sub-base material to be brought from CDA approved quarries. 	CDA	CDA
Storage, handling, and transport of hazardous construction materials	Health risk for workers, impair their progress	At all construction sites at Park Enclave Phase – III Project, Islamabad	Throughout construction period	Low	<ul style="list-style-type: none"> ► Provision of protective items for labourers handling hazardous materials (e.g. helmets, adequate footwear for bituminous pavement works, protective goggles, gloves, etc.) ► Proper training for workers by HSE staff 	CDA	CDA

Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
Creation of construction waste material and spoil management	Air, water, and solid waste generation	All construction sites and entire length of Park Enclave Phase – III Project, Islamabad	During construction	High	<ul style="list-style-type: none"> ▶ All spoils to be disposed of in environmental friendly manner and sites to be restored to original conditions. ▶ Non-bituminous and bituminous waste should first be recycled if not then be disposed of at designated Dump Site 	CDA	CDA
Transporting materials to the site	Creation of noise, fumes, and dust	All of the Park Enclave Phase – III Project, Islamabad	During construction	Medium	<ul style="list-style-type: none"> ▶ All vehicles carrying loose friable material to be properly covered. 	CDA	CDA
Crushing rock for pavement	Dust emissions from crusher and screening plant, Noise pollution	Crusher will be established at strategic location at Park Enclave Phase – III Project, Islamabad to avoid populated areas.	During crushing operations	Medium	<ul style="list-style-type: none"> ▶ Crushers to be fitted with dust Suppression equipment. 	CDA	CDA
Constructing pavement, laying base course, cleaning surplus	Noise, dust, and water contaminations	Complete Park Enclave Phase – III Project, Islamabad	During construction	Low, adequate precautions taken.	<ul style="list-style-type: none"> ▶ Supervision of construction to ensure proper techniques ▶ Lay asphalt only during dry period 	CDA	CDA



Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
Laying of asphalt	Emission of dust and fumes from asphalt plant, noise pollution Runoff of hydrocarbons during "curing" period	In asphalt batching plant area	In latter stages of Construction	Low	<ul style="list-style-type: none"> ▶ Appropriate protection for workers ▶ Proper training of workers by the HSE staff 	CDA	CDA
Planting trees	Introduction of Indigenous trees species, Increasing Oxygen concentration Increasing aesthetic value	In green areas and green belts	After construction	Medium	<ul style="list-style-type: none"> ▶ Environment Directorate, CDA to select appropriate and indigenous plants 	CDA	CDA
Clearing site	Air, soil and water pollutions in future, nuisance for the residents	Complete Park Enclave Phase – III Project, Islamabad	After completion of construction activities	Low	<ul style="list-style-type: none"> ▶ Construction and camp sites should be restored according to proper Site Restoration Plan ▶ Compliance monitoring of the restoration 	CDA	CDA
Use of water for construction and consumption for human use	Water shortage	Throughout project area of Park Enclave Phase – III Project, Islamabad	During construction	low	<ul style="list-style-type: none"> ▶ Contractor will arrange required water for construction in such a way that water availability and supply nearby to communities remain unaffected. 	CDA	CDA
Spillage of liquid waste	Risk of polluting surface and groundwater from spillage, drainage, and runoff from construction sites,	Park Enclave Phase – III Project, Islamabad	During construction	Low	<ul style="list-style-type: none"> ▶ Regular water quantity monitoring according to determined sampling schedule ▶ Contractor shall ensure that construction debris does not find its way into the drainage 	CDA	CDA

Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
	Social problems regarding water in future, health risks						
Earthwork, stonework, and other construction activities	Contamination of water due to construction waste, health risks for public	Throughout Park Enclave Phase – III Project, Islamabad	During construction	Low	<ul style="list-style-type: none"> ▶ Construction work close to water bodies to be avoided, especially during monsoon period. ▶ Waste must be collected, stored, and taken to the existing Dump Site. 	CDA	CDA
Vehicular movement and operation of machinery	Emission from construction vehicles and machinery, causing public health risk, nuisance, and other impacts on biophysical environment	Workshops of contractor camp site, Construction sites at Park Enclave Phase – III Project, Islamabad	Throughout construction period	Low	<ul style="list-style-type: none"> ▶ All temporary service and access roads to be regularly water sprayed to minimize the dust generation. ▶ All vehicles, equipment and machinery used for construction to be regularly maintained to ensure that pollution emission levels conform to National Environmental Quality Standards (NEQS) of Pakistan ▶ Air quality parameters to be monitored, as determined. 	CDA	CDA
Operation of asphalt, mix plants, crushers, etc	Dust generation from construction machines causing health risk to operating workers and impacts on biophysical environment	At sites of plants, crushers at Park Enclave Phase – III Project, Islamabad	Throughout construction period	High	<ul style="list-style-type: none"> ▶ Ensure precautions to reduce dust emissions from mixers, plants, crushers, and batching plants (e.g., providing with dust extraction units). Crushers to be fitted with dust suspension equipment. ▶ Water will be sprayed in lime, cement, and earth mixing sites. ▶ Work safety measures, such as dust masks and appropriate clothing, to be used to ensure no health risk for operators 	CDA	CDA

Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
					<ul style="list-style-type: none"> ▶ Proper training for operators/ workers by HSE staff 		
Transportation of materials, and other construction activities that create dust and emissions	Dust and emissions from machines causing health risk to operators; Impacts on biophysical environment	Throughout Park Enclave Phase – III Project, Islamabad	During construction	Low	<ul style="list-style-type: none"> ▶ Vehicles delivering loose and fine materials, like sand and fine aggregates, shall be covered to reduce spills on existing road. ▶ Ambient air quality monitoring should be carried out in accordance with the EMP. ▶ If monitored parameters are above prescribed NEQS limits, suitable control measures must be taken. 	CDA	CDA
Operation of construction machinery,	Nuisance for workers and public	At mix plant, batching plants, and construction sites; built-up areas;	During construction	Medium	<ul style="list-style-type: none"> ▶ Plants, vehicles, and equipment to strictly conform to NEQS specified noise standards ▶ Vehicles and equipment used will be fitted, as applicable, with silencers and properly maintained. ▶ In accordance with EMP, noise measurements to be carried out at locations and schedules specified to ensure effectiveness of mitigation measures. 	CDA	CDA
No sensitive area is present	Disturbance to Local flora and fauna	Throughout Park Enclave Phase – III Project, Islamabad	Throughout construction period	Low	<ul style="list-style-type: none"> ▶ Use of firewood for cooking and execution of work to be prohibited. ▶ No open fires allowed. ▶ Restoration of damaged vegetated areas. 	CDA	CDA

Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
					<ul style="list-style-type: none"> ▶ Strict instructions to contractors' staffs (particularly the cooks) with respect to poaching wildlife ▶ Assist in public awareness program. 		
Risk associated with construction activities	Road accidents may occur to general public and workers, social problems may arise, progress of the project may impair	Throughout Park Enclave Phase – III Project, Islamabad	Throughout construction period	Low	<ul style="list-style-type: none"> ▶ Ensure safety code for work staff is observed, including provision and wearing of safety equipment required for specific works (e.g. helmets, dust masks, ear muffs, safety goggles, etc.). ▶ At the construction site, a readily available and fully equipped first aid unit to be provided. ▶ Elaboration of contingency planning in case of major accidents ▶ Adequate signage, lighting devices, barriers, persons with flags during construction to manage traffic at construction site 	CDA	CDA
Drainage of runoff from roads into water bodies	Physical congestion of drainage structures, Localized flooding, water and soil contamination	At natural drainage points in built-up areas of Park Enclave Phase – III Project, Islamabad	When road operates and in rainy season, as required	Medium	<ul style="list-style-type: none"> ▶ Adopt performance specified maintenance contracts ▶ Ensure proper cleaning scheme for keeping drainage structure clear of debris and blockage. 	CDA	CDA

Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
Vehicular movement	Contamination from spills due to traffic and accidents	Throughout the Park Enclave Phase – III Project, Islamabad	As incidents occur	Medium	▶ Accidental spillage to be cleared and disposed of immediately and properly	CDA	CDA
Induced vehicular traffic movement	Adverse effects on residents of Park Enclave Phase – III Project, Islamabad	Park Enclave Phase – III Project, Islamabad	At operation	Medium as traffic generation will be for short duration	<ul style="list-style-type: none"> ▶ Roadside tree plantation as applicable and feasible under harsh climatic condition; plants should be selected according to their abilities to absorb emissions. ▶ Regular road maintenance to ensure good surface condition ▶ Regular vehicle check to control and ensure compliance with NEQS 	CDA	CDA
Induced vehicular traffic movement	Traffic-related noise pollution and vibrations from engines, tires, and use of (pressure) horns	Throughout Park Enclave Phase – III Project, Islamabad	At operation stage	Medium as traffic generation will be for short duration	<ul style="list-style-type: none"> ▶ Noise measurements to be carried to ensure the effectiveness of mitigation measures, (e.g., speed limits and noise control plantations in the Park Enclave Phase – III Project, Islamabad ▶ Ban on pressure horns ▶ Traffic Rules should be followed 	CDA	CDA

Project Activities	Potential Impacts on Environment	Where the impact is likely to happen	When the impact is likely to occur	Magnitude of impacts	Mitigation Measures	Institutional Responsibility	
						Implementation	Supervision
Roadside right-of-way plantation	Soil erosion if site not vegetated, acts as sound barrier against noise and dust, aesthetically valuable,	Along roads and avenues in Park Enclave Phase – III Project, Islamabad	Operation stage	Low	<ul style="list-style-type: none"> ▶ Plantation/Vegetative barriers to lessen visual and other impacts. ▶ Monitoring of survival of trees at the specified rate and suitable measures should be taken to protect trees. ▶ Indigenous flora should be preferred 	CDA	CDA
Vehicular movement	Road accidents may occur, life risk of the general public	Near populated areas	Operation stage	Low	<ul style="list-style-type: none"> ▶ Traffic management plan to be developed ▶ Traffic control measures, including speed limit, to be enforced. ▶ Mass awareness regarding traffic rules 	CDA	CDA

8 Environmental Management Plan

8.1 Introduction

This section outlines the implementation mechanism for Environmental Management Plan (EMP) and defines the institutional arrangements required for the implementation of the plan. The EMP provides the implementation mechanism for the mitigation measures identified during the EIA.

8.2 Purpose and Objectives of EMP

The Environmental Management Plan (EMP) will provide a delivery mechanism to address the adverse environmental impacts of the Project, Development of Park Enclave Phase – III Project, Islamabad during its execution and operation, to enhance project benefits and to introduce standards of best practices to be adopted for all phases of the project.

The primary objectives of the EMP are to:

- Facilitate the implementation of the earlier identified mitigation measures.
- Develop a proper monitoring mechanism and identify requisite monitoring parameters to confirm effectiveness of the proposed mitigation measures.
- Define the responsibilities of the project proponent CDA, engineers and contractors, and provide means of effectively communicating environmental issues among them.

8.3 Management Approach

8.3.1 Pre-Construction and Construction Phase

The organizational roles and responsibilities are summarized below:

8.3.2 Capital Development Authority

The overall responsibility for compliance with the Environmental Management Plan of the project, Development of Park Enclave Phase – III Project, Islamabad.

The CDA will also be responsible to implement various mitigation actions prescribed in the EIA report. The CDA will also be subject to certain liabilities under the environmental laws of Pakistan, and under their contracts with the CDA. Furthermore, the CDA will implement Environmental Monitoring Plan which has been prepared for the construction phase.

8.4 Operational Phase

The magnitude of environmental impacts during the operational phase will significant therefore, the CDA will have to implement various mitigation actions as described in the operation phase. Furthermore, keeping in view of magnitude of environmental impact, an Environmental Monitoring Plan has been proposed.

8.5 Organizational Structure and Responsibilities

7.5.2. Construction Phase

Primary Responsibility:

- The Capital Development Authority will have an overall responsibility to ensure the proper implementation of EMP throughout the project.

- The CDA will be responsible to supervise/ monitor and ensure the implementation of the EMP and the EIA.

Field Management and Quality Control

Carrying out construction activities in an environmentally sound manner during the construction phase will be the responsibility of the CDA for implementing the EIA and EMP recommendations.

Environmental Monitoring: CDA will make necessary arrangements to monitor the key environmental data during the construction phase.

These will include the quantity of water used, record of waste produced, a record of waste disposal and project-related vehicular traffic.

7.5.3 Operational Phase

CDA will assume the main responsibility for the environmental performance of the Park Enclave Phase – III Project, Islamabad during the operational phase.

An environmental monitoring plan has been developed as part of the Park Enclave Phase – III Project, Islamabad. The key environmental parameters, such as water consumption, waste disposal, water quality, traffic count, and noise, the performance of sewerage treatment plant and status of implementation of plantation plan will be monitored on a regular basis. The environmental monitoring reports will be produced and shared with the concerned authorities if required.

8.6 Legislation and Guidelines

The EIA of Park Enclave Phase – III Project, Islamabad has discussed national and international legislation and guidelines that are relevant. The proponent will ensure that his staff and all its assigned design & supervision consultant and contractor are aware of this legislation and guidelines prior to the start of the project activities.

The Pakistan Environmental Protection Act, 1997 is the basic environmental legislation. The act also requires that no person shall emit pollutants or noise in amount, concentration or level that exceeds the National Environmental Quality Standards (NEQS). The NEQS will be followed throughout the construction and operational phases of the project.

8.7 Environmental Improvement Cell and Responsibilities

Park Enclave Phase – III Project, Islamabad will form up an Environmental Improvement Cell, which will be responsible for the environmental management and supervisory affairs during the construction and operational phases of the proposed Project.

The responsibilities of the Environmental Improvement Cell are as follows:

- To ensure implementation of all the proposed mitigation measures during and after the proposed project.
- Capacity building of the staff regarding environmental improvement and awareness.
- To develop operational guidelines and implementation schedule.
- Receiving complaints from the local community and other people and assisting the local environmental authority.

- To ensure that the proposed project is implemented in an environmentally friendly manner, causing the least harm to the existing environment including flora and fauna.
- To make sure that the business and affecters of the proposed project are relocated or compensated in the most judicious manner

Project Monitoring

CDA will make necessary arrangements to monitor the key environmental data during the construction and operation phases. These will include the number of trees cut as part of the project works, quantity of water used, record of waste produced, record of waste disposal, and project-related vehicular traffic. CDA shall monitor project activities during the work in progress in the project area. CDA shall keep a record of all non-conformance observed and report these along with actions to the CDA management for further action. CDA will also have to report any impacts anticipated along with his recommendations for further action.

Approvals

CDA will have to obtain all the relevant clearances and necessary environmental approvals required by the Pakistan Environmental Protection Agency, Islamabad.

Contractual Provisions

Adherence to the requirements of the EIA and EMP in terms of environmental mitigation will be required from all project contractors and thus EMP will form part of their contracts with the CDA. The contractor shall be responsible for implementing the mitigation measures and monitoring of various environmental parameters. The CDA shall monitor the contractor's performance with respect to EMP implementation.

8.8 Solid Waste Management Plan

Construction Phase: Several solid waste bins will be placed at the site camp for the collection of solid waste.

CDA will make arrangements for collection, transportation and disposal of solid waste generated by Park Enclave Phase – III Project, Islamabad.

Empty chemical drums, iron cuttings, etc. will be collected separately at the project site within an area marked as "Scrap Yard". After a suitable timeframe, scrap will be sold to a recycling contractor.

The construction waste generated will be recycled to the extent possible. Open burning of solid waste will not be allowed.

Operational Phase: CDA will make arrangements for collection, transportation and disposal of solid waste generated.

The waste will be collected daily and stored at a designated site where the collection crew will take the waste. The solid waste will be temporarily stored in a designated skips / containers before disposal into the designated landfill site.

8.9 HSE Management Plan

- Health Safety and Environment (HSE) induction/orientation will be provided to all workforce at the project site.
- Assembly point will be established for the gathering of workforce regarding daily HSE Toolbox Talk at the project site.

- HSE Toolbox Meeting will be held by HSE Manager on a weekly basis.
- Special education sessions will be conducted properly at the site.
- The daily walkthrough will be conducted at the project site.
- All the Mandatory PPE's (Safety Helmet, Safety Jacket, Safety Shoes, Coverall, Full body Harness, Safety Goggles, Earplug, Earmuff, Dust mask/Special Safety Gloves, etc.) will be provided.
- Proper and safe scaffolding will be provided at the site for safe work at height.
- All the heavy machinery will be inspected properly at the site.
- All Cranes and lifting gears will be inspected/checked on a regular basis.
- Inspection tagging system will be maintained at the project site.
- Safety signage will be provided at the project site.
- Fire posts will be established at the project site at easy approach location.
- Waste will be maintained properly.
- HSE Signboard will be installed at the project site for an Emergency response.
- Rest area smoking zones will be established at the site.
- Regular First Aid Center, along with all required medicines 24/7, will be available at the project site.
- Paramedic (dispensers) will be deployed at the first-aid post for day-night shift
- Fully equipped Ambulance will be made available at the site for 24/7
- In-house training will be conducted on the project site.

CDA will develop its HSE policy, roles and responsibilities of HSE Manager and staff. It will also provide information about HSE objectives, Personal Protective Equipment (PPE's) to be used at the site, first aid training and communication and documentation regarding HSE.

- **First Aid Boxes:** First aid boxes will be provided at all active construction sites to cope up the emergency situations. Usually, a typical first aid box mainly contains antibiotics, basic medicines, cotton, bandages, sunny plasts, healing balms, pyodine, spirit, pain killer, etc.
- **Dispensaries:** Medical facilities will be established on-site. A dedicated room will be established as a dispensary and first aid services at the campsite.
- **PPEs:** Site Engineer and HSE Manager will be responsible for providing PPEs to all workers.
- **Safety Signs:** Relevant safety signboards will be displayed on the worksites and labour camps to make aware / train workers about safety rules. Mainly safety signs include signs of speed limits, electric spark, etc.
- **TBTs:** Tool Box Talks (TBTs) will be delivered on a regular basis and when a new team of workers start a new activity like shuttering, steel fixing, steel cutting, steel bending, scaffolding, concrete pouring, mechanical works, electrical works, etc. at sites to promote safety culture.
- **Water Sprinkling:** Dust pollution will be controlled with water sprinkling and minimizes the risk of adverse impacts of dust on workers and surrounding areas.

Water sprinkling will be carried out regularly to minimize dust pollution and avoiding creating slush.

- Barricading: Barricade tape at all the active work sites will be put. Hard barricading (scaffolding pipes) will be used to cover exposed areas where excavation is more than 10 feet.
- Training: Safety training will be delivered by the HSE Manager to achieve its objectives. Trainings will be conducted for capacity building of employees / workers /labor/ sub-contractors to make them well effective to respond in any kind of emergency situation.
- The breakup cost for the safety of workers is described in **Table 8.1**.

Table 8.1: Estimated Cost for the Implementation of Environmental Monitoring Plan for Park Enclave Phase – III Project , Islamabad

Sr No	Item	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
Personal Protective Equipment (A)				
1	Dust Masks	4,800	10	48,000
2	Safety Shoes	100	2000	200,000
3	Gloves	2,400	150	360,000
4	First Aid Box	2	3,000	6,000
5	Ear Plugs	200	50	10,000
6	Safety Helmets	100	1000	100,000
7	Safety Jackets (Hi Vis)	200	350	70,000
Others (B)				
8	Provision of Dust Bins	20	1000	20,000
9	Warning Tape	10	500	5000
10	Safety Cones	40	1000	40,000
11	Safety Sign Boards	40	2500	100,000
12	Raincoat	100	500	50,000
Total (A + B)				1,009,000

- Time Required for Construction Period = 12 months
- Number of Labor Required during peak Construction = 100
- Personal Protective Equipment PPEs
- Dust Musk: 1 Dust Mask to be used in a week by each laborer
- Safety Shoes: 1 Safety shoe for 1 year for each labourer
- Gloves 2 pair of gloves for each labourer for each month
- First Aid Box 1 first aid box for every 50 laborer
- Ear Plug 1 set of the earplug to be used for 6 months for each laborer
- Safety Helmet 1 safety helmet for each labourer for 12 months
- Safety Jackets 2 safety Jackets (Hi-Vis) for each labourer for 12 months
- Dust Bin: Rough estimate
- Water Sprinkling the whole construction period
- Rain Cost: 1 Raincoat for each labourer

8.10 Traffic Management and Construction Material Transportation Plan

- All the construction material will be transported to the project site via Park Road through multiple connecting major roads such as Srinagar Highway and Islamabad Expressway.

- 20 km per hour speed limited will be being maintained at the project site.
- All the light vehicles cars, jeep etc. will be parked in a designated area.
- All traffic signals will be followed properly.
- Experienced and license holders (drivers/operators) will be hired for transportation.
- All the heavy machinery will be checked properly and inspected on a regular basis.
- Speed limit signboards will be installed at the project site.
- All the (headlights, backlights, Indicator, etc.) will be checked and maintained regularly.
- All the warning light, reverse back alarms will be maintained properly.
- All the routes within the project site will be marked and designated properly.

8.11 Emergency Preparedness, Response and Site Evacuation Plan

- The management will always be ready for response in any kind of emergency at the project site.
- Special assembly points will be established at the project site (offices site).
- The emergency siren will be installed at assembly points.
- Contact numbers of emergency response team will be circulated at the project site.
- Close coordination will be carried out with 1122 in the case of any serious injury/accident.
- Close coordination will be carried out with all law enforcement agencies (police) in case of an aggressive mob of people in the shape of any kind of protest.
- Emergency response drill will be carried out once in a month for provision of awareness to the workforce at the project site.
- First Aid Boxes will be available at the project site around the clock.
- Experienced and qualified paramedic staff will be available at First Aid Post at the site under the command of HSE Manager.
- Fully equipped Ambulance will be available at the project site along with all mandatory items (Oxygen cylinder, Statures First Aid Box)
- All the new entrants will be oriented by the HSE Manager regarding the required awareness towards the hazardous and risky situation and control.
- The entire workforce will be provided with the all mandatory PPEs for the risk-free environment.
- Special in-house training (TBT) will be conducted by the HSE Manager regarding the awareness towards any emergency condition and control.
- Proper water sprinkling will be carried out at service road along within the project site for dust control to avoid any hazardous and risky situation which can be a cause of transport emergency.

8.12 Fire Fighting Plan

- The campsite will be equipped with fire extinguishers as well as communication equipment for contacting the appropriate emergency response teams.
- At the campsite, emergency alarms will be installed. Persons will be nominated to ring the emergency alarm in case of an emergency situation or any emergency risk.
- All the camp residents will be trained and well communicated how to respond to the emergency alarm and reach at assembly point immediately. Workers will be trained to respond to an emergency alarm, as discussed below:
- If the alarm rings for 20 seconds, only once, then it is a less severe emergency;
- If it rings for 20 seconds thrice after intervals, then it is medium to a severe high emergency, but it can be much severe; and
- If it rings for 60 seconds or more continuously, then the emergency situation is most difficult so, everyone should respond to it immediately, evacuate the workplace and move towards the assembly point.
- Proper evacuation routes will be designated, nominated and well communicated to all. All the workers will be trained to follow the particular evacuation routes and reach the assembly point in case of an emergency situation

8.13 Plantation Plan

Trees and shrubs play major role in improving the urban landscape and help protect the city environment. Trees and shrubs meet different needs for food, shelter, energy and aesthetic in the city. Urban woodlands and forest areas beyond the city offer respite if only for a while, from the pressure of the daily life. The skillful choice of trees and shrubs together with manipulation and design of space in urban development and land management for people or wildlife leads to the creation of stimulus environment.

Trees growing in their natural environment survive without our help but trees grown near building or roads need skillful selection of species and good care to make them worth and safe for the life and property. The selection of trees and shrubs species for suburban (Margalla Hills) and Urban (Islamabad city) Areas essentially depend on the objectives of tree and shrub plantation plan as under:

The following are the best choice of species for different green sites in Islamabad.

- **Greenbelts** - Trees: Siris (*Albizia lebbek*), Jacaranda (*Jacaranda mimosifolia*), *Sapium chinensis*, Kachna (*Buahinia variegata*), Amatas (*Casia fistula*), Gul Nishter (*Erithrina indica*), Silver Oak (*Grevilea robusta*) Arjun, Ficus Pelicon (*Ficus pelican*), Sukh Chain, Dhak (*Butea frondosa*), and Pear (*Pyrus pasha*), and Plum Peaches (*Prunus padus*) Shrubs: *Tecoma stans*, *Holmskiodia*.
- **Median Strips - Trees:** -Gab, *Alstonia*, Amaltas, Kachnar, *Largestromia*, *Stercolia*, *Brochicotton*, Citrus, *Washingtonia* Palms
- **Shrubs:** - *Ficus hawi*, *Bougainvillea*, *Casia glauca*, *Plambago*, *Hypericum*, *Hamelia pattens*, *Jatropha*, *Erithrina blacki*, *Hibiscus*, *Psuedonia*, *Silvery*, *Duranta*, *Roses*.
- **Avenues** - Chir pine, *Jacoranda*, *Almltas*, Kachnar, Fiddle wood, Kanak champa
- **Streets** - *Celtis*, Arjun, Silver Oaks, *Ficus Pelicon*

- **Parks/Playfields** - Ficus pelican, Sukh chain, Michelia, Hibisucs, Fics Green, Ficus hawi
- **Parking Areas** - Bakain, Sukh Chain, Ficus Retusa, Bischofia
- **Nullahs** - Salix, Poplar, Jaman, Arjun
- **House Fronts** - Alstonia, Plumaria Obtusa, Magnolia, Ponsitea, Ashok, Peaches, Moraya, Palms
- **Grills/Walls** - Chlorodendron, Bougainvillea, Honey Suckle, Rangoon creeper, Bomentia, Tecoma grandi flora.
- **Rockeries** - Phoenix, Yucca, Agave, Asparagus, Cactus, Begonia, Juniper, Ruselia, Duranta, Iresine.
- **Indoor** - Aglaonema, Aucuba, Beaucarnea, Cladium, Coleus, Cycas, Dracaena, Dieffenbachia, Ficus benjmina, Pilea, Schefflera.

Table 8.2: Proposed Floral Species for Plantation in the Project Site

Sr. #	Local Name of Plant	Scientific Name	Family
1	Shisham	<i>Dalbergia sissoo</i>	Fabaceae
2	Chir Pine	<i>Pinus roxburghii</i>	Pinaceae
3	Alstonia	<i>Alstonia scholaris</i>	Apocynaceae
4	<i>Phoenix dactylifera</i>	Khajoor	Palmae
5	<i>Phulai</i>	<i>Acacia modesta</i>	Fabaceae
6	Kachnar	<i>Bauhinia variegata</i>	Caesalpiniaceae
7	Toot / mulberry	<i>Morus alba</i>	Moraceae
8	Silver Oak (Arjun)	<i>Grevilea robusta</i>	Proteaceae
9	Sukhchain	<i>Pongamia pinnata</i>	Fabaceae
10	Bakain/ China Berry	<i>Melia azedarach</i>	Maliaceae
11	Siris / Sharee	<i>Albizia lebbek</i>	Mimosaceae
12	Salix (Poplar)	<i>Populus deltoidi</i>	Salicaceae
13	Yucca	<i>Yucca filamentosa</i>	Asparagaceae
14	Rubber Plant	<i>Ficus elastica</i>	Moraceae
15	Bischofia/ bishop wood	<i>Bischofia javanica</i>	Phyllanthaceae
16	Kanger	<i>Pistacia intergerrima</i>	Anacardiaceae
17	Amaltas	<i>Casia fistula</i>	Caesalpiniaceae
18	Seemal	<i>Bombax ceiba</i>	Malvaceae
19	Bher	<i>Zizyphus spp.</i>	Rhamnaceae
20	Kikar	<i>Acacia nilotica</i>	Fabaceae
21	Anar	<i>Punica granatum</i>	Punicaceae

8.13.1 Estimated Cost & Budgeting for Plantation

A total number of 2,000 trees will be planted. The cost of plantation includes the cost of equipment, initial planting (including restocking during first 2 years) and maintenance cost for first four years of plantation. The total estimated cost of implementation of plantation plan is Rs. 1.743 million. The Cost of raising one plant and its maintenance for 4 years is Rs. 870.

The tentative cost of equipment for is given below in **Table 8.3**.

8.13.2 Estimated Cost & Budgeting for Plantation

A total number of 2,000 trees will be planted. The cost of plantation includes the cost of equipment, initial planting (including restocking during first 2 years) and maintenance cost for first four years of plantation. The total estimated cost of implementation of plantation plan is Rs. 1.743 million. The Cost of raising one plant and its maintenance for 4 years is Rs. 870.

The tentative cost of equipment for is given below in **Table 8.3**.

Table 8.3: Tentative Cost of Equipment

Sr.	Equipment	Numbers	Cost in PKR
1	Grub hoe (earth digging tool) and others	Lump sum	100,000
Total cost of equipment			100,000

The cost break-up of plantation and maintenance for a period of four years is mentioned in **Table 8.4** to **Table 8.8**.

Table 8.4: Estimated Cost of Unit Plantation (2,000 Plants) for 1st Year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
1	Clearance of Site (2,000 plants)	2,000	5/plant	10,000
2	Layout/ unit	2,000	2/plant	4,000
3	Digging of Pits	2,000	50/pit	100,000
4	Average cost per unit plant	2,000 plants	215/plant	430,000
5	Carriage/unit of plants from Nursery to Site including loading/unloading	2,000 plants	10/plant	20,000
6	Plantation of plants with ball of earth/unit	2,000	30/plant	60,000
7	Addition of Manure 1 cft. / pit	2,000 cft.	Lump Sum	50,000
8	Hand watering 100 times Approx. x2,000=200,000	200,000	1/watering	200,000
9	Weeding 4 times 2,000x4=8,000	8,000	5/plant	40,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	50,000
Total Say				964,000
Say				964,000

Table 8.5: Estimated Unit Cost of Plantation of (400 Plants) & Maintenance for 2nd Year in case of 20% Mortality

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
3	Re-Digging of Pits	400	50/pit	20,000
4	Average cost per unit plant	400 plants	215/plant	86,000
5	Carriage/unit of plants from Nursery to Site including loading/unloading	400 plants	10/plant	4,000
6	Plantation of plants with ball of earth/unit	400	30/plant	12,000
7	Addition of Manure 1 cft. / pit	1,000 cft.	Lump Sum	25,000
8	Hand watering 100 times Approx. x2,000=200,000	200,000	1/watering	200,000
9	Weeding 4 times 2,000x4=16,000	8,000	5/plant	40,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	50,000
Total				412,000
Say				412,000

Table 8.6: Estimated Cost of Plantation Unit (200 Plants) & Maintenance for 3rd Year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
3	Re-Digging of Pits	200	50/pit	10,000
4	Average cost per unit plant	200 plants	215/plant	43,000
5	Carriage/unit of plants from Nursery to Site including loading/unloading	200 plants	15/plant	3,000
6	Plantation of plants with ball of earth/unit	200	30/plant	6,000
7	Addition of Manure 1 cft. / pit	1,000 cft.	Lump Sum	25,000
8	Hand watering 50 times Approx. x2,000=100,000	100,000	1/watering	100,000
9	Weeding 3 times 2,000x3=6,000	6,000	5/plant	30,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	50,000
Total				267,000
Say				267,000

Table 8.7: Estimated Cost of Maintaining 2,000 plants for 4th Year

Activity	Amount (PKR)
Estimated Cost of Unit Plantation (2,000 Plants) for 1 st Year	964,000
Estimated Unit Cost of Plantation of (400 Plants) & Maintenance for 2 nd Year in case of 20% Mortality	412,000
Estimated Cost of Plantation Unit (200 Plants) & Maintenance for 3 rd Year	267,000
Total	1,643,000

Table 8.8: Final Cost per Tree Planted

Activity	Amount (PKR)
Cost for maintenance of cultivated plants for 4 years	1,643,000
Cost of equipment	100,000
Total cost	1,743,000
Cost for raising one plant and its maintenance for 4 years	870

8.14 Restoration and Rehabilitation Plan

Restoration of the project site and associated facilities including access tracks and campsite after construction activities is of utmost importance. Improper disposal of the waste left at the end of the construction activities would lead to extensive disturbance to the environment.

Following measures will be adopted for site restoration and rehabilitation:

- All equipment and machinery at the project site will be de-mobilized.
- All waste at the project site will be disposed of according to the requirement of EIA.
- Septic tank with soakage pit will be properly dismantled.
- All temporary concrete structures at the project site will be dismantled, and construction and demolition material will be properly disposed of.
- All the un-necessary pits at the project site will be backfilled.

8.15 Grievance Redressal Mechanism

An attempt has been made during the present EIA to identify all potential impacts of the proposed project, to provide mitigation measures to address the potential impacts, and to chart out a mechanism to implement these mitigation measures.

Although this project does not involve any voluntary land acquisition, some social and environmental issues/grievances/disputes are likely to arise during the construction and operational phase of the project.

There will be a complain box to address any complaints or conflict arise during construction, and operational phase of the project and the quarrels will be sorted out by the project manager of the project as a part of the redressal committee. If the issue could not be resolved at a lower level, then it will be addressed by the higher officials of CDA.

The proposed GRM will help to achieve the objectives of sustainability by dealing with the environmental and social issues of the Project in a timely manner.

8.16 Environmental Monitoring Plan

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

The various purposes of the environmental monitoring plan are:

- To evaluate, the effectiveness of mitigation measures.
- To respond to the unanticipated environmental impacts when the project is under implementation.

To make regulations and improve traffic management and environmental controls based on the monitoring data. The Pak-EPA is entrusted with the overall responsibilities of monitoring the environment in Pakistan and especially in Islamabad.

An Environmental Management Plan is provided in **Table 8.9**. The plan will be used as a management and monitoring tool for the implementation of the mitigation measures required by the EIA. The plan entails the required mitigation measures recommended in the EIA.

Table 8.9: Environmental Management Plan for Development of Park Enclave Phase – III Project, Islamabad

Environmental Component	Project Phase	Parameters	Locations	Frequency	Standards	Implementing	Supervision
Construction Phase							
Air Quality	Construction	SO ₂ , NO _x , CO PM ₁₀ ,	At the Center of Park Enclave Phase – III Project, Islamabad	PM ₁₀ , for continuous 8 hours, on monthly schedule	WHO/USEPA guidelines, NEQS	CDA	CDA
Ground Water Quality	Construction	pH, TDS, TSS, DO, coliforms, hardness, nitrate, chloride, sulphate	At location near contractor's camps	Quarterly	WHO and NEQS	CDA	CDA
Noise Levels	Construction	dB (A)	At the Center of Park Enclave Phase – III Project, Islamabad	Twice in 8 hours at selected site on quarterly basis	EPA Ambient Noise standards	CDA	CDA
Operational Phase							
Sewerage generated by the sectors	Operation	NEQS parameters for liquid effluents	At Sewerage Treatment Plant	Once in a month	NEQS	Maintenance Division	Maintenance Directorate of CDA
Roadside Plantation	Construction	Visual inspection of plant species survival rate and status of maintenance	At sites where plantation was carried out	(1) One month after plantation (2) One year after plantation 1 month, 3 months, 6 months, and 12 months after planting	75 % survival rate	Maintenance Division	Maintenance Directorate of CDA

Environmental Component	Project Phase	Parameters	Locations	Frequency	Standards	Implementing	Supervision
	Operation	Visual inspection of plant species survival rate and status of maintenance	At sites where plantation was carried out	(3) 2.5 years after plantation	75% survival rate	Maintenance Division	Maintenance Directorate of CDA
Safety and Traffic Rules Compliance	Operation	(1) Faulty, overloaded and speeding vehicles (2) Inspection of signage	All along the estate, with spot check at accident-prone black spots	Quarterly basis, for 3 years	To be determined	Maintenance Division	Maintenance Directorate of CDA

Key:

dBA = decibels (measured in the audible range)

EPA = Environmental Protection Authority, **NEQS** = National Environmental Quality Standards

PM10 = Particulate Matter smaller than about 10 micrometers, **ROW** = Right-of-Way

CDA = Capital Development Authority

SPM = Suspended Particulate Matter

TSS = Total Suspended Solids

USEPA = United States Environmental Protection Agency

WHO = World Health Organization



Table 8.10: Summary of Cost Estimates for Environmental Monitoring during construction phase

Environmental Monitoring Activities	Units/ months/No. of Samples	Unit Cost specification	Cost (PKR)
Construction phase			
a) Ambient air quality monitoring quarterly basis for 1 years	3	@ 50,000 per sample for 24 hr monitoring.	150,000
b) Ambient water quality monitoring quarterly basis at one location for 1 years	3	@ 20,000 per sample	60,000
c) Noise levels monitoring on quarterly basis for 1 years	3	@ 10,000 per sample	30,000
Total (a–c)			240,000
Hiring of Environment Health & Safety Consultant (Quarterly Visits)	3 Quarterly Visits 100,000	@	300,000
G Total			540,000

8.17 Training Program

Training programs are a necessary agenda that has to be implemented to implement Environmental Management Monitoring Plan effectively. The Environment, Health Safety Officer, will impart training to the staff. The key objective of the training program is to ensure that the requirement of EMP is clearly understood and followed throughout the project. The training shall cover the following areas:

- Environmental sensitivity of the project area.
- EMP communication and documentation requirement.
- Vegetation and community issues and their mitigation measures.
- Safe construction practices
- Use of personal protective equipment's (PPEs)
- Environmentally sound construction practices
- Vehicular safety.
- Site restoration requirement.
- Solid Waste Disposal

CDA will be primarily responsible for providing training to all project personnel. A lump sum fee of Rs. 1,000,000/= should be kept for the training management plan. Framework for the environmental and social training program is being provided in **Table 8.11**.

Table 8.11: Framework for Environmental Social Training Program for the Proposed Project

Type of Training	Training Description	Period	Duration	Training By	Trainee
Occupational Health and Safety for staff	Training should be provided to aware staff to conform to safety codes	Before Commencement of Project Activities	Full day	External Sources	EHS Manager
Environment Social Laws, Regulations, procedure and guidelines of the government	The training should detail the laws and regulation concerning the environment, labour laws and compliance to government regulation.	Before Commencement of Project Activities	Full day	External Sources	EHS Staff, Site Supervisors, Site Engineers.
Occupational Health Safety for workers	Health, Safety and Hygiene. Proper usage of Personal Protective Equipment (PPE's), Precautions to be taken for working in confined areas.	Before Construction Activities	Full Day	EHS Manager	Workers
Solid Waste Management	Waste Segregation, identification of hazardous waste, Use of PPEs and waste handling	Before Commencement of Project Activities	Full Day	External Sources	Relevant workers and staff
Vehicular safety	Safe operation and maintenance of all vehicles, insurance in accordance with the applicable local and federal laws	Before Commencement of Project Activities	Full Day	EHS Manager	Relevant workers and staff
Vegetation and community issues and their mitigation measures	To analyze the community problems and how to cater to serious issues relevant to vegetation and agricultural land of the community	Before Commencement of Project Activities	Full Day	EHS Manager	Relevant workers and staff
Safe construction practices	To upgrade local craftsmen's skill in quality construction and develop skilful working human resources in hazard-resistant construction	Before Commencement of Project Activities	Full Day	EHS Manager	Relevant workers and staff
Health Safety and Environmental Auditing	Health Safety and Environmental Audits, Reporting Requirements	Before Commencement of Project Activities	Full Day	External Sources	Relevant Department
Implementation of environmental management and monitoring plan	Explanation of Environment Management and Monitoring Program	Quarterly. As soon as the project activities start	Full Day	External Sources	EHS Staff

8.18 Environmental Monitoring and Mitigation Cost

The cost required to implement the mitigation measures effectively is important for the sustainability of the project both in the construction and operational phases of the Project.

The summary of the cost of monitoring environment and mitigation cost is shown in **Table 8.12**.

Table 8.12: Cost of Monitoring Environment and Mitigation

Activity	Basis	Cost (Rs)
Environmental Monitoring Cost	Ambient air, Noise and Water Quality Monitoring & Cost of hiring Environmental Engineer	540,000
Health and Safety of Workers	For 100 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi-Vis)	1,009,000
Cost of Environmental Training	For the whole construction period	1,000,000
Cost for Environment and Beautification	Plantation Plan	1,743,000
Soft and Hard Landscaping	Improvement of aesthetics value of the project site	127,000,000
Sewerage Treatment Plant	Collection and treatment of wastewater	375,000,000
Total		506,292,000

8.19 Communication and Documentation

An effective program for storing and communicating environmental information during the project is an essential requirement of an EMP. This activity will be done by an independent monitoring consultant. The key features of such a mechanism are:

- Precise recording and maintenance of all information generated during the monitoring in a predetermined format.
- Communicating the information to a central location
- Storing the raw information in a central database
- Processing the information to produce periodic reports

Data recording and maintenance: All forms will be numbered, and a tracking system will be developed for each. Whenever a form is released for use in the field, its number will be recorded. The monitors will be required to account for each form after completion. In this manner, it will be ensured that all forms are returned to the office, be they filled, unused or discarded.

Storage of information: A database for information collected during the project will be prepared. The database may include information on training programs, staff deployment, non-compliance, corrective actions, water resources, results of effecting monitoring.

Meeting: For effective monitoring, management and documentation, of the environmental performance during the operation, environmental matters will be

discussed during a daily meeting held on-site. Environmental concerns raised during the meetings will be mitigated after discussions with the higher management.

Reporting: Monitoring body will produce daily, weekly, monthly and another periodic report, as well as a final report of the project based on the information collected. The site representative will prepare a weekly environmental report.

8.20 Quarterly Environmental Monitoring Report

CDA will prepare a Quarterly Environmental Monitoring Report of project activities carried out during the specified period of development of Park Enclave Phase – III Project, Islamabad.

CDA will submit the Quarterly Environmental Monitoring Report of the project to Pakistan Environmental Protection Agency.

8.21 Change Management Plan

The EIA of Development of Park Enclave Phase – III Project, Islamabad recognizes that changes in the EMP may be required and therefore provides a Change Management Plan to manage such changes. Overall responsibility for the preparation of change management statements will lay with the CDA.

8.22 Post Project Monitoring

The CDA shall prepare a brief post project report describing the conduct of the actual operation, any changes from the operation for which approval was obtained, the degree to which the recommendations of the EIA were adhered to, any damages to the environment and the mitigation or compensation provided, and monitoring information of scientific or environmental interest that is not propriety in nature. This report should be submitted to Pakistan Environmental Protection Agency, Islamabad.

9 Conclusion and Recommendations

9.1 Introduction

This Chapter presents the assessment of the possible environmental impact of Development of Park Enclave Phase – III Project, Islamabad.

The study presents the purpose of the EIA as to the description of the site, the impact of the project during and after implementation, the mitigation measures and residual impacts.

The EIA also includes the justification and detailed description of the project, with an evaluation of the potential impacts and effects on the environment including economic and social consequences. This Chapter describes the conclusion and recommendation of the EIA study of the project.

9.2 Conclusions

The major conclusions of the EIA are:

- The objective of the project is to provide residential plots for high, middle and low-income groups in the city. Islamabad is facing an acute shortage of housing and the proposed project will improve housing situation considerably.
- The development of Park Enclave Phase – III Project, Islamabad has been proposed on a piece of land measuring 112.80 acres (902 kanals) located adjacent to the Park Enclave Housing Society, Phase – I.
- The Project includes a total of 1,047 residential plots, which will be built on an area of 453 Kanal. The residential plots are of different size such as, there will be 271 plots of 25'X50', 588 plots of 35'X70', 124 plots of 40'X80', 64 plots of 50'X90'.
- The commercial plots will be built on an area of 41 Kanal out of the total 902 Kanal. The Project will also incorporate open spaces, parks, educational institutes, graveyards, and Roads.
- For the development of Park Enclave Phase – III Project, Islamabad the essential infrastructure works include Roads, storm drainage system, water supply, sanitary sewerage system, solid waste management system, electrification, streetlights, security, sui gas works, sanitation and external electrification by IESCO. CDA will also provide soft and hard landscaping, parks, playground and other facilities in the sector.
- CDA has allocated 18.40% (166 kanals) of land for the provision of parks and open spaces.
- The total estimated cost of the development of Park Enclave Phase – III Project, Islamabad is Rs 3,084.49 Million. The time schedule for completion of the project is 12 months.
- The project construction and operation activity can potentially affect the natural resources of the area. These adverse impacts can be largely reduced by implementing the appropriate mitigation measures, which has been discussed in this report.
- The potential impacts during construction phase includes loss of natural vegetation, increased threat to wildlife, increased traffic load on Park Road and

Kuri Road, soil erosion and contamination, deterioration of ambient air quality caused by the exhaust emission and kicked up dust, noise pollution, damaged infrastructure, safety hazards and public health concerns for the nearby communities.

- The significant environmental management issues during operation phase include sewerage disposal, solid waste and noise pollutions, vehicular traffic and water consumption.
- The mitigation measures have been identified in the Chapter 7 for impacts expected during the different phases of the project.
- Based on the recommended mitigation measures in Chapter 7, the impacts identified will be reduced with residual impacts having insignificant levels. **Table 9.1** presents the assessment of the residual impacts (mitigated).

9.3 Recommendations

- CDA should procure tree transplantation equipment / tree spade to transport trees that fall in the ROW of roads.
- The Wastewater Treatment Plant (WWTP) to be installed at the Park Enclave Phase I should treat wastewater generated from Park Enclave Phase – III Project
- CDA should develop and implement an Integrated Solid Waste Management Plan for the proposed project.
- CDA should implement the Plantation Plan as described in the EIA Report. Furthermore, CDA should dedicate one of the open spaces for the development of Miyawaki Forest
- CDA should implement Integrated Solid Waste Management Plan, which should include;
 - Collection of solid waste from residential and commercial buildings
 - Segregation of solid waste into recyclable, biodegradable and non-biodegradable wastes. The recyclable wastes will be given away to recycling contractors: the biodegradable waste will be composted at the site to produce green manure; and the remaining waste will be transported to the waste disposal site.
- The implementation of Environmental Monitoring Plan should be ensured by the contractor and proponent during construction phase.
- Recruitment of Environmental Engineer/HSE officer for construction phase of the Project.

On the basis of the overall impact assessment, more specifically, nature and magnitude of the residual environmental impacts identified during present EIA, it is concluded that Development of Park Enclave Phase – III Project, Islamabad is likely to cause environmental impacts mainly during its construction phase and low to medium impact during operational phase. However, these impacts can be mitigated provided the proposed activities are carried out as mentioned in the report, and the mitigation measures included in this report are completely and effectively implemented.

There are no remaining issues that warrant further investigation. This EIA is considered as adequate for the environmental and social justification of the project.

Table 9.1: Impact Matrix – Residual Impacts (Mitigated)

	Soil	Air Quality	Surface and Ground Water	Flora	Fauna	Noise and Vibration	Land Acquisition and Compensation Issues	Safety Hazard, Public Health and Nuisance	Employment	Historical or Archeological Sites
Project Sitting										
Project Site, Land Use and Design	N	N	N	N	N	N	N	N	N	N
Visual Impacts	N	N	N	N	N	N	N	N	N	N
Construction Phase										
Land Acquisition	N	N	N	N	N	N	N	N	N	N
Work Force Mobilization	0	0	0	N	N	-1	N	0	0	N
Construction Camp Establishment	-1	0	0	-1	-1	0	N	0	+1	N
Construction Camp Operation	0	0	0	0	-1	0	N	0	+1	N
Site Preparation	-1	0	0	-1	-1	-1	N	0	+1	N
Construction of Road	0	0	0	0	0	-1	N	-1	+1	N
Laying of Services	0	0	0	0	0	-1	N	-1	+1	N
Construction of Buildings	0	0	0	0	0	-1	N	-1	+1	N
Construction Materials Supply	0	0	N	0	-1	-1	N	-1	+1	N
Construction Crew Transportation	0	0	N	0	-1	-1	N	-1	+1	N
Solid Waste Disposal	-1	0	-1	-1	-1	N	N	0	0	N
Sewage Disposal	0	0	-1	0	0	N	N	0	0	N
Demobilization of Work Force	0	0	0	0	0	-1	N	0	0	N
Operational Phase										

	Soil	Air Quality	Surface and Ground Water	Flora	Fauna	Noise and Vibration	Land Acquisition and Compensation Issues	Safety Hazard, Public Health and Nuisance	Employment	Historical or Archeological Sites
Operation of Park Enclave Phase – III	N	0	0	0	-1	0	N	0	+1	N
Solid Waste Disposal	-1	0	-1	-1	-1	N	N	0	N	N
Sewerage Disposal	-1	0	-1	-1	-1	N	N	0	0	N

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

Annexure-1: List of EIA Study Team Members

Name and Designation	Project Position	Qualification and Experience	Tasks Assigned
Mr Saadat Ali, Team Leader	Team Leader/ Environmental Engineer	Postgraduate Diploma in Sanitary Engineering, International Institute for Hydraulic and Environmental Engineering, 1984 B. Sc. Civil Engineering, Engineering College, University of Peshawar, 1978	<ul style="list-style-type: none"> ▪ Overall management of the project (Supervision, site visits, guidance, inputs and suggestion, recommendation and discussion and report presentations). ▪ To review overall environmental issues and mitigation measures. ▪ To prepare the draft and final study reports.
Mr Ali Abdullah, Environmental Engineer	Enviro-Civil Engineer	M. Sc. Environmental Engineering, Newcastle University (2016) B. Sc. Civil Engineering, The University of Lahore, (2010-1014)	<ul style="list-style-type: none"> ▪ Suggest mitigation measures for impacts that affect the environment. ▪ Identification of site for baseline data collection for water, wastewater, noise, soil, traffic and ambient air quality.
Mr Amir Saeed, Ecological Expert	Biodiversity Specialist	Pakistan Forest Institute (PFI), University of Peshawar 1991-1993 M.Sc. Forestry Govt. Post Graduate College for Boys, Kohat, University of Peshawar, KP province 1988- 1990 B.Sc. Organic Chemistry	<ul style="list-style-type: none"> ▪ Identifying flora and fauna of the area. ▪ Identifying any rare, endemic, protected or endangered species in the project area.
Mr. Ehsan Mustafa Hashmi, Environmental Engineer	Environmental Engineer	Bachelor's in Environmental Engineering, National University of Sciences and Technology (NUST) Islamabad, 2017 Master's in Water Resources Engineering & Management, National University of Sciences and Technology (NUST) H-12, 2020-2022	<ul style="list-style-type: none"> ▪ Secondary data collection for a desk review. ▪ Research tools preparation for field study. ▪ Fieldwork for baseline data collection in the area under study.
Ms. Fehmida Rafi, Environmental Scientist	Environmental Scientist	Bachelor's in Environmental Science, International Islamic University, Islamabad (2014-2018) MS in Integrated Water Resources Management, Mehran University of Engineering and Technology, Jamshoro (2018- 2021)	<ul style="list-style-type: none"> ▪ Fieldwork for baseline data collection in the area under study. ▪ Draft Environmental Management Plan for successful management of expected environmental impacts from the project. ▪ Fieldwork for baseline data collection in the area under study.

Annexure-2: Terms of References

An EIA will be carried out for all stages of the projects, i.e. preconstruction, construction, and post construction with the following objectives:

- Establishing the environmental baseline in the study area and identifying any significant environmental issue.
- Assessing these impacts and providing for the requisite avoidance, mitigation, and compensation measures.
- Integrating the identified environmental issues in the project planning and design.
- Developing appropriate management plans for implementing, monitoring and reporting of the environmental mitigation and enhancement measures suggested.
- Give presentation during a public hearing of the EIA of the Development of Park Enclave Phase – III Project, Islamabad and respond to queries generated by Pakistan EPA until issuance of the NOC.

Annexure-3: References

- Nasir, E. & Ali, S. I. 1973. Mimosaceae Flora of Pakistan no.1-210, Department of Botany, University of Karachi.
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- Pak-EPA, 1997 Guidelines for Public Consultation, Pakistan Environmental Protection Agency, Government of Pakistan.
- Roberts, T.J. 1997. Mammals of Pakistan, Oxford University Press, Oxford
- Islamabad District Census Report, Government of Pakistan
- PC I , Development of Park Enclave Phase-III Project, Islamabad.

Annexure-4: Glossary

Air pollution	Air is made up of a number of gases, mostly nitrogen and oxygen and, in smaller amounts, water vapor, carbon dioxide and argon and other trace gases. Air pollution occurs when harmful chemicals and particles are emitted to the air – due to human activity or natural forces – at a concentration that interferes with human health or welfare or that harms the environment in other ways.
Ambient air quality	Ambient air quality refers to the quality of outdoor air in our surrounding environment. It is typically measured near ground level, away from direct sources of pollution.
Archaeology	The study of human history and prehistory through the excavation of sites and the analysis of artefacts and other physical remains.
Biodiversity	The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.
Bye-law	A rule made by a local authority to govern activities within the area it controls. Examples include bye-laws covering waste disposal, traffic or public events or signs.
Carbon dioxide (CO₂)	A colorless gas that is naturally produced by animals and people in the exhaled air and the decay of plants.
Carbon monoxide	A highly poisonous, odorless, tasteless and colorless gas that is formed when carbon material burns without enough oxygen.
Climate	The pattern of weather in a particular region over a set period of time, usually 30 years.
Compost	A rich soil-like material produced from decayed plants and other organic matter, such as food and animal waste, that decomposes (breaks down) naturally.
Composting	The process of deliberately allowing food, garden and other suitable organic wastes to break down naturally over time to produce compost.
Conservation	Preserving or protecting animals and resources such as minerals, water and plants through planned action (such as breeding endangered species) or non-action (such as not letting taps run unnecessarily).
Deforestation	The reduction of trees in a wood or forest due to natural forces or human activity such as burning or logging.
Effluent	Liquid wastes such as sewage and liquid waste from industries.
Energy efficiency	Actions to save fuels, for example, better building design, changing production processes, developing better transport policies, using better road vehicles and using insulation and double glazing in homes.
EIA	An environmental impact assessment (EIA) is an analytical process that systematically examines the possible environmental consequences of the implementation of projects, programs and policies.

EMP	An environmental management plan (EMP) is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.
Fauna	The animals of a particular region, habitat, or geological period.
Flora	The plants of a particular region, habitat, or geological period.
Habitat	The area occupied by a community or species (a group of animals or plants), such as a forest floor, desert or seashore.
Initial Environmental Examination	Initial environmental examinations describe the environmental condition of a project, including potential impact, formulation of mitigation measures, and preparation of institutional requirements and environmental monitoring.
Landfill	A site that is specially designed to dispose of waste and operates with a license granted by the Environmental Protection Agency (EPA).
NEQS	The National Environmental Quality Standards (NEQS) are quality standards to regulate the air emissions and effluents of industry and other big polluters.
Miyawaki Forest	The Miyawaki forestation method is a unique way to create an urban forest and is pioneered by Japanese botanist Akira Miyawaki. ... In the Miyawaki technique, various native species of plants are planted close to each other so that the greens receive sunlight only from the top and grow upwards than sideways.
Noise Pollution	Noises that disturb the environment and people's ability to enjoy it, for example continually sounding house alarms, loud music, air conditioning or other electrical units and aircraft or motor engines.
Seismology	The branch of science concerned with earthquakes and related phenomena.
Topography	The arrangement of the natural and artificial physical features of an area.

Annexure-5: List of the People Met During the EIA Study

No.	Name of Person	Designation
1	Mr. Muhammad Kashif	Deputy Director, Capital Development Authority (CDA)
2	Mr. Asif Majeed	Director Environmental Protection Cell, CDA Islamabad
3	Mrs. Rizwana	Assistant Director Wildlife Officer, Punjab Wildlife and Parks Department, Lohi Bher Wildlife Park
4	Sher Afzal	Assistant Director, Environmental Social and safeguard section, IESCO, Islamabad
5	Mr Mukhtiar Shakir,	Fire Audit Supervisor, Directorate of Municipal Administration Islamabad
6	Mr. Umar Farooq	Principal Scientific Officer, Agroforestry Rangeland Research Institute, NARC, Islamabad
7	Muhammad Rais	Assistant Professor, Department of Wildlife Management, PMAS Arid Agriculture University Rawalpindi
8	Mr. Mozaam Abbas and Mr. Muhammad Tanveer,	Real Estate Agent, Fazal Builders, G-11, Islamabad

No.	Area	Name	Age	Village	Occupation	Gender
1	Park Enclave Phase – III Project	Javeed	32	Chathi Bukhtawar	Digital Marketing	Male
2		Kalim Bakhtar	50	Chathi Bukhtawar	Housewife	Female
3		Faizan	18	Chahi Bukhtawar	Tailor	Male
4		Adnan	25	Chahi Bukhtawar	Shopkeeper	Male
5		Zaibul Nisa	30	Chahi Bukhtawar	Housewife	Female
6		Tanveer	38	Chahi Bukhtawar	Shopkeeper	Male
7		Nida	30	Chahi Bukhtawar	Housewife	Female
8		Muhammad Zubair	62	Chahi Bukhtawar	Shopkeeper	Male
9		Zarnab Tariq	29	Chahi Bukhtawar	Housewife	Female

No.	Area	Name	Age	Village	Occupation	Gender
10		Ghazanfar	52	Chahi Bukhtawar	Retired Army	Male
11		Asghar	62	PHA	Retired Army	Male
12		Muhammad Manzoor	40	PHA	Tailor	Male
13		Hafiz Muhammad Asif	37	PHA	Business	Male
14		Shoukat Chaudhary	32	PHA	Accountant	Male
15		Muhammad Amir	22	PHA	Student	Male
16		Zeeshan	21	PHA	Student	Male
17		Zahoor Quraishi	50	PHA	Driver	Male
18		Imran Khan	40	PHA	Manager	Male
19		Tariq	29	PHA	Documentator	Male
20		Iftiqhar Hussain	35	PHA	Office Boy	Male
21		Jamshed	24	Newmal Bazaar	Data Entry Operator	Male
22		Yasir	38	Newmal Bazaar	Shop Owner	Male
23		Amir Iqbal	30	Newmal Bazaar	Loader	Male
24		Atif Hussain	27	Newmal Bazaar	Helper in a shop	Male
25		Zafar Iqbal	54	Newmal Bazaar	Driver	Male
26		Muhammad Asif	32	Newmal Bazaar	Shopkeeper	Male
27		Raja Jamshid	62	Newmal Bazaar	Retired Army	Male
28		Kosar	45	Project site	Housewife	Female
29		Khan Wali	62	Project site	Water Supplier	Male
30		Haji Mehrban	70	Project site	Labor	male

Annexure-6: List of Flora of Islamabad

Sr. #	Local Name of Plant	Scientific Name	Family
23.	Shisham	<i>Dalbergia sissoo</i>	Fabaceae
24.	Phulai	<i>Acacia modesta</i>	Fabaceae
25.	Kachnar	<i>Bauhinia variegata</i>	Caesalpiniaceae
26.	Toot / mulberry	<i>Morus alba</i>	Moraceae
27.	Paper mulberry	<i>Broussonetia papyrifera</i>	Moraceae
28.	Sukhchain	<i>Pongamia pinnata</i>	Fabaceae
29.	Bakain/ China Berry	<i>Melia azedarach</i>	Maliaceae
30.	Siris / Sharee	<i>Albizia lebbek</i>	Mimosaceae
31.	Salix (Poplar)	<i>Populus deltoidi</i>	Salicaceae
32.	Yucca	<i>Yucca filamentosa</i>	Asparagaceae
33.	Rubber Plant	<i>Ficus elastica</i>	Moraceae
34.	Bischofia/ bishop wood	<i>Bischofia javanica</i>	Phyllanthaceae
35.	Apricot	<i>Prunus spp.</i>	
36.	Ailanthus/ tree of heaven	<i>Ailanthus altissima</i>	
37.	Arand/ Caster oil	<i>Ricinus communis</i>	Ricinus
38.	Palak/ Spinach	<i>Spinacia oleracea</i>	
39.	Kanger	<i>Pistacia intergerrima</i>	Anacardiaceae
40.	Black plum	<i>Syzygium cuminii</i>	
41.	Wild pear	<i>Pyrus pashia</i>	
42.	Wild fig	<i>Ficus canica</i>	Moraceae
43.	Amaltas	<i>Casia fistula</i>	Caesalpiniaceae
44.	Semal	<i>Bombax ceiba</i>	Malvaceae
45.	Bher	<i>Zizyphus spp.</i>	Rhamnaceae
46.	Kikar	<i>Acacia nilotica</i>	Fabaceae
47.	Kana	<i>Saccharum munja</i>	Poaceae
48.	Bhekarh	<i>Adhatoda vasica</i>	Acanthaceae
49.	Ack	<i>Calotropis procera</i>	Apocynaceae
50.	Narra	<i>Phragmites karka</i>	Poaceae
51.	Barru	<i>Sorghum helepense</i>	Poaceae
52.	<i>Pennisetum orientale,</i>	Oriental fountain grass	Poaceae
53.	kana	<i>Saccharum spontaneum</i>	Poaceae
54.	Dhab	<i>Desmostachya bipinnata</i>	Poaceae

Annexure-7: List of Fauna of Islamabad

Sr. #	Name of the Bird	Scientific Name	Conservation Status
1.	Pied kingfisher	<i>Ceryle rudis</i>	Least concern
2.	Quail	Coturnix	Least concern
3.	Hoopoe	<i>Upupa epops</i>	Least concern
4.	Lesser golden-backed woodpecker	<i>Dinopium benghalense</i>	Least concern
5.	Common koel,	<i>Eudynamys scolopacea</i>	Least concern
6.	Crested lark	<i>Galerida cristata</i>	Least concern
7.	Large pied wagtail	<i>Motacilla maderaspatensis</i>	Least concern
8.	Grey wagtail	<i>Motacilla cinerea</i>	Least concern
9.	House crow	<i>Corvus splendens</i>	Least concern
10.	Common myna	<i>Acridotheres tristis</i>	Least concern
11.	House sparrow	<i>Passer domesticus</i>	Least concern
12.	Black drongo	<i>Dicrurus macrocercus</i>	Least concern
13.	Black kite	<i>Milvus migrans</i>	Least concern
14.	Shikra,	<i>Accipiter badius</i>	Least concern
15.	Grey wagtail,	<i>Motacilla cinerea</i>	Least concern
16.	White wagtail,	<i>Motacilla alba</i>	Least concern
17.	Little egret	<i>Egretta garzetta</i>	Least concern
18.	Grey heron	<i>Ardea cinerea</i>	Least concern
19.	Black Kite	<i>Milvus migrans</i>	Least concern

Mammals & Reptiles

Sr. #	Name of the Reptile	Scientific Name	Conservation Status
1.	Porcupine	<i>Erethizon dorsatum</i>	Least concern
2.	Rhesus macaque	<i>Macaca mulatta</i>	Least concern
3.	yellow-throated marten	<i>Martes flavigula</i>	Least concern
4.	Wild boar	<i>Sus scrofa</i>	Least concern
5.	Common Jackal	<i>Canis aureus</i>	Least concern
6.	Red fox	<i>Vulpes</i>	Least concern
7.	Cape hare	<i>Lepus capensis</i>	Least concern
8.	Pangolin	Pholidota	Least concern
9.	Black rat	<i>Rattus</i>	Least concern
10.	Squirrel		Least concern

Annexure-8: Ambient Air and Noise Monitoring Results



CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)



Reference Number: **ESPAK/243/21/AA/1559/00150** Date: **10/06/2021**
 Name of Industry/Client: **Project Procurement International**
 Address: **Office #26, 2nd Floor, Silver City Plaza, G11 Markaz, Islamabad**
 Telephone No.: **---**
 Nature of Sample: **Ambient Air** Monitoring Location: **Park Enclave phase 3, Chatta Bakhtawar, Islamabad.**
 Date of Sample Collection: **02/06/2021** Grab / Composite: **Continuous - 24 Hours**
 Sample Collected/Sent By: **Shahzaib Ali, Field Officer, ESPAK**
 Date of Completion of Analysis: **03/06/2021**

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	10 mg/m ³ (1 Hour)	0.4-1.2 mg/m ³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Carbon Monoxide (CO)	5 mg/m ³ (8 Hours)	0.6-1.1 mg/m ³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
3	Sulfur Dioxide (SO ₂)	120 µg/m ³	10.7 µg/m ³	UV Fluorescence (UVF)	Within Prescribed Limits
4	Ozone (O ₃)	130 µg/m ³ (1 Hour)	1.3-34.1 µg/m ³	Non Dispersive UV Absorption	Within Prescribed Limits
5	Oxides of Nitrogen as NO	40 µg/m ³	11.4 µg/m ³	Chemiluminescence Detection	Within Prescribed Limits
6	Oxides of Nitrogen as NO ₂	80 µg/m ³	15.7 µg/m ³	Chemiluminescence Detection	Within Prescribed Limits
7	Particulate Matter PM _{2.5}	35 µg/m ³	30.3 µg/m ³	Particulate Sensor	Within Prescribed Limits
8	Particulate Matter PM ₁₀	150 µg/m ³	129 µg/m ³	Particulate Sensor	Within Prescribed Limits
9	Suspended Particulate Matter (SPM)	500 µg/m ³	588 µg/m ³	High Volume Sampler (HVS)	Exceeding Prescribed Limits

NEQS: Pakistan National Environmental Quality Standards for Ambient Air, 2010
 • Uncertainty of Measurement (UoM) data will be provided on request, if applicable.

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Signature

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CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: ESPAK/243/21/AA/1559/00150 Date: 10/06/2021
Name of Industry/Client: Project Procurement International



1. Sample Analyzed By: Shahzaib Ali
Field Officer

2. Name of Chief Analyst with Seal: Muhammad Arfan 

3. Signature of Incharge of the Environmental Laboratory:


Name: Imran Malik
General Manager
Date: 10/06/2021



----- End of Report -----

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NOISE MONITORING REPORT



Reference Number: ESPAK/243/21/N/1562/00131 Date: 10/06/2021
 Name of Industry/Client: Project Procurement International
 Address: Office #26, 2nd Floor, Silver City Plaza, G-11 Markaz, Islamabad
 Telephone No.: ---
 Nature of Sample: Noise
 Date of Sample Collection: 02/06/2021 Oral / Composite: CONTINUOUS - 24 HOURS
 Sample Collected/Sent By: Shahzaib Ali, Field Officer, ESPAK
 Date of Completion of Analysis: 03/06/2021
 Method/Equipment Used: Sound Level Meter

S. No	Measurement Point	Limit Values (NEQS)	Noise Level in dB(A) Leq	Remarks
1	Park Enclave phase 3, Chatta Bakhtawar, Islamabad - Day Time	55 dB(A)	58 dB(A)	Exceeding Limits
2	Park Enclave phase 3, Chatta Bakhtawar, Islamabad - Night Time	45 dB(A)	57 dB(A)	Exceeding Limits

NEQS: Pakistan National Environmental Quality Standards for Noise in Residential Area, 2010 Day Time Hours (6:00 am to 10:00 pm) Night Time Hours (10:00 pm to 6:00 am)

• Uncertainty of Measurement (UoM) data will be provided on request, if applicable.

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1. Sample Analyzed By: Shahzaib Ali
Field Officer

2. Name of Chief Analyst with Seal: Muhammad Arfan

3. Signature of Incharge of the Environmental Laboratory:

Name: Imran Malik

General Manager

Date: 10/06/2021

----- End of Report -----



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Annexure-9: Groundwater Results



ENVIRONMENTAL SERVICES PAKISTAN

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CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: **ESPAK/243/21/GW/1562/00495** Date: **10/06/2021**

Name of Industry / Client: **Project Procurement International**

Address: **Office #26, 2nd Floor, Silver City Plaza, G11 Markaz, Islamabad**

Telephone No.: **---**

Nature of Sample: **Boring Water at Park Enclave phase 3, Chatta Bakhtawar, Islamabad**

Date Sample Received: **04/06/2021** Grab / Composite: **Grab**

Date of Sample Collection: **04/06/2021**

Sample Collected / Sent By: **Shahzaib Ali, Field Officer, ESPAK**

Date of Completion of Analysis: **08/06/2021**



S. No	Parameters	Limit Values (NSDWQ)	Concentration	Method / Equipment Used	Remarks
1	pH*	6.5-8.5	7.3	SMWW 4500H*B	Within Limits
2	Total Dissolved Solids (TDS)*	<1000 mg/L	420 mg/L	SMWW 2540C	Within Limits
3	Chloride (as Cl ⁻)*	<250 mg/L	20.0 mg/L	SMWW 4500Cl*B	Within Limits
4	Cadmium (Cd)*	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
5	Chromium (Cr)*	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
6	Copper (Cu)*	2.0 mg/L	0.007 mg/L	U.S. EPA-200.7	Within Limits
7	Lead (Pb)*	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
8	Manganese (Mn)*	≤0.5 mg/L	0.012 mg/L	U.S. EPA-200.7	Within Limits
9	Nickel (Ni)*	≤0.02 mg/L	ND	U.S. EPA-200.7	Within Limits
10	Zinc (Zn)*	5.0 mg/L	0.068 mg/L	U.S. EPA-200.7	Within Limits
11	Antimony (Sb)	≤0.005 mg/L	ND	U.S. EPA-200.7	Within Limits
12	Aluminum (Al)	≤0.2 mg/L	0.038 mg/L	U.S. EPA-200.7	Within Limits
13	Arsenic (As)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
14	Boron (B)	0.3 mg/L	0.101 mg/L	U.S. EPA-200.7	Within Limits
15	Barium (Ba)	0.7 mg/L	0.303 mg/L	U.S. EPA-200.7	Within Limits
16	Mercury (Hg)	≤0.001 mg/L	ND	U.S. EPA-200.7	Within Limits
17	Selenium (Se)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
18	Total Coliforms	---	>8.0 MPN/100mL	SMWW 9221 B	---
19	Fecal Coliform Bacteria	Must not be detectable in any 100mL sample	2.6 MPN/100mL	SMWW 9221 F	Exceeding Limits
20	E. Coli	Must not be detectable in any 100mL Sample	ND	SMWW 9221 F	Within Limits
21	Color	≤15 TCU	Nil	SMWW 2120 C	Within Limits
22	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
23	Turbidity	<5 NTU	0.74 NTU	SMWW 2130B	Within Limits

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CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: ESPAK/243/21/GW/1562/00495 Date: 10/06/2021
Name of Industry / Client: Project Procurement International



S. No	Parameters	Limit Values (NSDWQ)	Concentration	Method / Equipment Used	Remarks
24	Total Hardness as CaCO ₃	<500 mg/L	408 mg/L	SMWW 2340C	Within Limits
25	Cyanide (CN ⁻)	≤0.05 mg/L	0.007 mg/L	SMWW 4500 CN ⁻ F	Within Limits
26	Fluoride (F ⁻)	≤1.5 mg/L	0.4 mg/L	U.S. EPA 9214	Within Limits
27	Nitrate (NO ₃ ⁻)	≤50 mg/L	9.6 mg/L	SMWW 4500NO ₃ ⁻ D	Within Limits
28	Nitrite (NO ₂ ⁻)	≤3 mg/L	0.03 mg/L	SMWW 4500NO ₂ ⁻ B	Within Limits
29	Residual Chlorine	0.2-0.5 mg/L	ND	SMWW 4500-Cl B	---
30	Phenolic Compounds (as Phenols)	NGVS	0.075 mg/L	SMWW 5530 C	---

NSDWQ: Pakistan National Standards for Drinking Water Quality, 2010
SMWW: Standard Methods for the Examination of Water and Wastewater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
USEPA: United States Environmental Protection Agency
NGVS: No Guideline Value Set
ND: Not Detected
• Laboratory tests and measurements were carried out at 25 ± 2 °C and 50 ± 10 % Relative Humidity conditions unless stated otherwise.
• Uncertainty of Measurement (UoM) data will be provided on request, if applicable.

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1. Sample Analyzed By: Waqas Ahmad (Analyst), Javeris Abid (Asst Microbiologist), Ameer Usama (Asst Analyst), Sana Ashraf (Asst Analyst)

2. Name of Chief Analyst with Seal: Muhammad Arfan

3. Signature of Incharge of the Environmental Laboratory:
Name: Imran Malik, General Manager
Date: 10/06/2021
End of Report



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