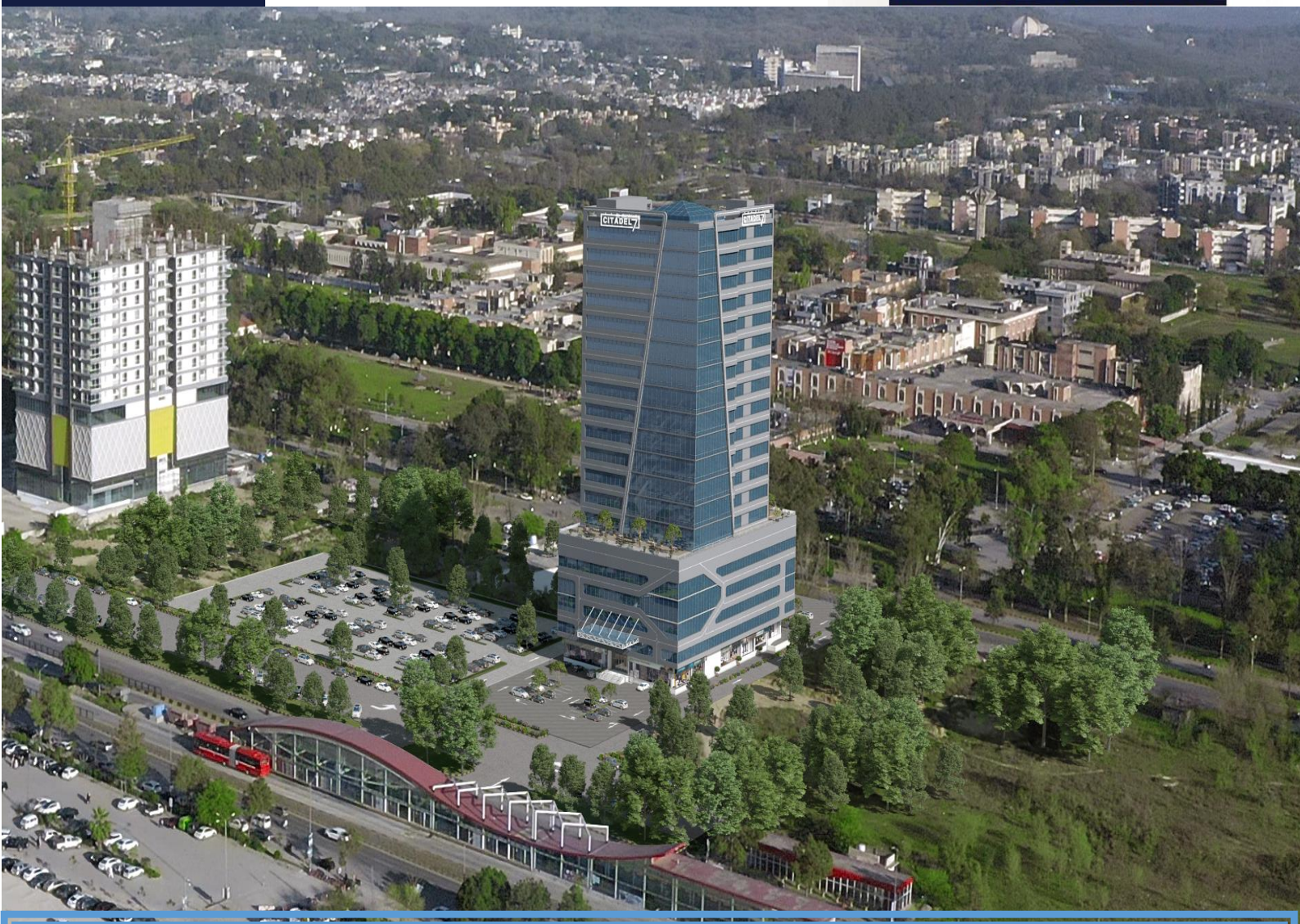
CHAKOR VENTURES

CITADEL 7

BLUE AREA - ISLAMABAD



Environmental Impact Assessment of CITADEL 7 Building Project, Islamabad

Final Report

November 2023

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Executive Summary

Title of the Project

This report presents the findings of "Environmental Impact Assessment (EIA) of Citadel 7 Building Project, Jinnah Avenue, Islamabad".

The EIA study aims at the identification of the possible environmental impacts of the proposed project on its immediate surroundings on both short and long-term basis, suggesting mitigation measures and identifying the responsible agencies to implement those measures.

Location of the Project

The project site is located at Jinnah Avenue, Sector G-8, Blue Area Islamabad on Plot No. 7, adjacent to Elysium Tower and opposite to The Centaurus Mall Islamabad. The proposed site is accessible via Jinnah Avenue through Service Road in the north and Ibn-e-Sina Road in the south.

Name of Proponent and Organization preparing the report

M/s Chakor Ventures is the proponent of the project.

M/s Project Procurement International, an Environmental and Management Consultancy Firm, Islamabad has prepared Environmental Impact Assessment of Citadel 7 Building Project.

Outline of the Project

The objective of the proposed project is to construct a commercial land use development project for the business and corporate sector in the capital city of Islamabad.

The project site is located at the southern side of Blue Area (G-8), Islamabad, on a 120 ft. X 200 ft. plot. Citadel 7 Building will have 19 floors above ground level and four basement levels. The proposed building height is 293'-6''. The shopping mall comprises five floors (including ground floor), with the fifth floor dedicated to housing a food court, while the floor next to 5th floor is designated for the Mechanical Floor and rest of the floors is intended for rent to corporate and business sector.

The Citadel 7 Building Project will be completed in 4 years, and the total estimated cost is **Rs. 2 billion**.

Table 0.1: Overview of the Proposed Project

Project Name	Citadel 7	
Project Location	Plot # 7, Blue Area Sector G-8, Islamabad	
Category of Plot	high rise commercial and office building	
Total Area of Plot	24,000 Sq. ft (4.40 kanal)	
Components of the Project	4 Basements	Car parking
	Ground Floor	16 shops and 3 kiosks
	1st to 3rd Floor	Shopping Mall (18 shops and 3 kiosk per floor)
	4th Floor	Food Court
	5th Floor	Maintenance Floor
	6th to 19th Floor	14 Office Floor

Number of offices	14
Number of Offices	152 Offices
Parking Space	202 + Outdoor Parking
Facilities/Services	Natural lighting, double glazed windows, green roofs, Energy Efficient HVAC system for efficient ventilation and firefighting system.

Environmental Baseline Conditions

In order to assess and evaluate the impacts and related mitigation measures, in the project area, existing conditions of physical, biological and the socio-economic environment were studied as under:

Physical Environment

Topography: Islamabad is located at 33.43°N 73.04°E at the northern edge of the Potohar Plateau and at the foot of the Margalla Hills in Islamabad Capital Territory. The project site is located within Blue Area bounded Jinnah Avenue in North and Ibn-e-Sina Road in the South.

Geology and Soil: 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.

Surface Water: Rawal Lake is a man-made water reservoir, located across Korang River at a distance of about 10 km from Rawalpindi. The Soan and Korang Rivers are the main streams draining in Islamabad area.

There is Nullah passing through Jinnah Avenue at the north-west of the project site.

Land Use: Natural vegetation includes scrub, forest, and plantation which are about 38.15% in Islamabad in the year 2016. Bare soil covers more than 46%. The built-up area covers 15.14% of the total while water is only 0.44%.

Seismic Risk: Islamabad region can be divided into five major zones: Zone I, Zone II, Zone III, Zone IV, & Zone V. Islamabad lies just at the edge of Hazara Fault Zone that consists of an arc of thrusted and folded rocks about 25km wide and 150 km long that is convex to the south and extends west-southward away from the Himalayan syntaxes.

Climate: Islamabad has distinct seasons marked by the wide variation in temperature. The climate remains very salubrious from April to October, but the winters get very cold due to snowfall. 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 ^{0}C to 46 ^{0}C. The coldest month is January when the mean maximum temperature is 18.3 ^{0}C and mean minimum is 3.8 ^{0}C.

From February to May the temperature rises at the rate of 5.0 ^{0}C per month. The highest temperature reached in May when the mean maximum temperature remains 39.1 ^{0}C.

Air Quality: A major anthropogenic source of air pollution in the project area is moderate to high traffic at Jinnah Avenue and Ibn-e-Sina Road.

The ambient air quality monitoring was carried out for 24h from September 20, 2023, 14:10 hrs to September 21, 2023, 13:10 hrs, were observed at the project site of Citadel 7 Building located at G-8, Blue Area Islamabad. The time-averaged (24h) concentrations of SO_2, NO, NO_2, CO, O3, PM 2.5, PM10 and SPM were found to be 8.3 µg/m^3, 12.2 µg/m^3, 12.8 µg/m^3, 0.9 mg/m3, 39.5 µg/m^3, 29.6 µg/m^3, 141 µg/m^3 and 448 µg/m^3 respectively. The ambient air quality for all the parameters monitored at the project site meets the NEQS limits.

Noise and Vibration: There is moderate to high traffic at Jinnah Avenue and Ibn-e-Sina Road. The noise level data at the project site for daytime was 54.95 dB(A) and 48.07 dB (A) at night-time. The average sound level was noted as 51.51 dB for the 24 hours period. However, the daytime average noise level of 67 dB exceeds the recommended limit of 65 dB

Ecological Environment

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 hysterophorous* (Gandi Booti) and *Ocimum bacilicum* (Niazbo) are predominant.

There are no trees at the plot of Citadel 7 Building. In the vicinity of the plot there are a total of 40 trees, with 15 belonging to the Populus species, 8 being Melia Azedarach, 13 belonging to Jacaranda and 4 being Pinus.

Fauna

In its original form, the Dry Subtropical Scrub Forest constituted the habitat of wild fauna consisting of a host of animals and birds. As the disturbance increased to a maximum level with complete inhabitation, wildlife abundance and diversity decreased to a minimum degree. Mammals commonly found in the project area are Rat, Wild boar and Pocupine, birds include Quail, House Sparrow and House Crow and reptiles common in the area are Monitor Lizard, and Spin tailed lizard.

Protected Areas/National Sanctuaries

The project is located in Zone I of Islamabad Capital Territory and there is no protected area and national sanctuaries in the immediate vicinity of the project.

Socio-Economic and Cultural Environment

The socio-cultural and socio-economic conditions of the local community in the project area namely F-8/4, G-7/1, G-8/3 and G-7/2 are described in the report. This area may get direct positive or negative impacts from the construction of Citadel 7 Building Project.

Public Consultation

During the public consultation, meetings were held with the community visiting the Centaurus Mall, PIMS hospitals, local vendors and community living around the project site. The project activities impact the physical, biological, and socio-economic environment of the project area were highlighted to them. Stakeholders concerns regarding various aspect, existing environment, and impacts of the project were noted, and mitigation measures are proposed in the EIA report.

Much of the public consultation process has revolved around concerns for the mitigation of construction stage and operational stage impacts. The information obtained from the community was used to identify concerns and issues that have been subsequently mentioned and addressed in the EIA report.

Major Impacts and Recommended Mitigation Measures

Physical Environment

Impacts: The soil-related issues include soil erosion, slope stability, and soil contamination. The land clearing, levelling and grading, excavation and filling, construction activities and maintenance of equipment/vehicles may cause these issues. The quality of soil would be affected, as soil contamination would occur because of disposal of untreated wastewater or direct disposal of chemical and onsite preparation of materials. Oils, chemical spills and waste from campsites may also deteriorate the quality of the soil.

Dumping of construction wastes/excavated material, in the surrounding area, may limit the use of land in the project area. The solid waste may be generated due to different construction activities, and it will mainly include surplus excavated and construction material.

Land use change is expected during the construction phase, one at the burrow areas and other 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 also 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.

The quality of water may deteriorate in the area due to preparation of construction material on site, leachate may be produced and percolated through the soil. It may then reach the water table and contaminate the water that may be consumed by the local people.

Citadel 7 Building Project is being developed in an area with a commercial setting. There is very limited vegetation on project site, but still, there is a need to maintain much of its existing landscape and vegetation.

Mitigations: Soil erosion can be minimized by appropriate land clearing, levelling and grading. Excavated slopes will not be left untreated/unattended for long durations, and appropriate slope stabilization measures will be taken as per the design.

For the domestic sewage from the contractor's camp, a septic tank with soaking pit will be constructed having adequate capacity. Waste oils will be collected in drums and sold to the recycling contractor.

The recyclable waste from the project site (such as cardboard, drums, broken/used parts, etc.) will be sold to recycling contractors, or where appropriate to reuse/recycle it. The hazardous waste will be kept separate and handled according to the nature of the waste. While storing, hazardous waste will be marked.

Ecological Environment

Impacts: The project area has a limited natural vegetation cover**.** The site preparation and construction activities may necessitate removal of the natural vegetation. 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 lose.

The project site is located in dense urban area of Islamabad, which provides less and minor habitat for wildlife. The loss of natural vegetation and other project activities will potentially have adverse impacts on the local fauna 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. Similarly, natural population of wild boar, also considered a pest, is maximum due to lack of predators in the project area.

Mitigations: Endeavours will be made to compensate for the loss by enhancing the environment, through a plantation of trees and ornamental plants. A plantation plan for Citadel 7 Building Project has been prepared. As the project site has not as much space for the plantation of large number of trees so the plan has a mix of appropriate trees/bushes which will be raised on the site recommended by the CDA. 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 according to the NEQS. A record will be maintained for any tree cutting. The construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuelwood will not be allowed at the contractor camp.

Environmental Management Plan and Proposed Monitoring

The purpose of the Environmental Mitigation Plan (EMP) is to minimize the potential environmental impacts due to the project. The EMP reflects the commitment of Chakor Ventures Private Limited to safeguard the environment as well as the surrounding population.

The EMP provides a delivery mechanism to address the adverse environmental impacts, to enhance the project's benefits and to introduce standards of best practices to be adopted for all phases of the project.

The contractor will prepare a Quarterly Environmental Monitoring Report of project activities carried out during the construction phase of the project. These reports will be submitted to Pakistan Environmental Protection Agency for their review and consideration. The total Environmental Mitigation & Monitoring Cost is **Rs 28.6 million**.

Conclusion and Recommendations

On the basis of the overall impact assessment, more specifically, nature and magnitude of the residual environmental impacts identified during the present EIA, it is concluded that Citadel 7 Building Project is likely to cause environmental impacts during its constructional phase. However, these impacts can be mitigated provided that the proposed project 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 adequate for the environmental and social justification of the project.

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List of Abbreviations

BOD	Biological Oxygen Demand
CO	Carbon Mono Oxide
COD	Chemical Oxygen Demand
CDA	Capital Development Authority
E	East
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPD	Environmental Protection Department
Govt.	Government
GPD	Gallons per Day
HSE	Health, Safety and Environment
IEE	Initial Environmental Examination
N	North
NaCl	Sodium Chloride
NCS	National Conservation Strategy
NE	North-East
NEQS	National Environment Quality Standards
NOC	No Objection Certificate
Nos	Numbers
NO_x	Nitrogen Oxides
Pak-EPA	Pakistan Environmental Protection Agency
PEPA	Pakistan Environmental Protection Act 1997
PEPC	Pakistan Environmental Protection Council
PM	Particulate Matter
PPI	Project Procurement International
Pvt.	Private
STP	Sewage Treatment Plant
SO_x	Sulphur Oxides
Sr. No.	Serial Number
SW	South-West
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
UNEP	United Nations Environment Program
W	West

WAPDA Water and Power Development Authority

WB World Bank

WHO World Health Organization

MCI Metropolitan Corporation Islamabad

List of Units

%	Percent (age)
^{o}C	Degree centigrade
cm	Centimeter
dB (A)	Decibel
ft^2	Square foot
ft^3	Cubic foot
km	Kilo meter
km/h	Kilometer/hour
m	Meter
m^2	Square meter
m^3	Cubic meter
MT	Metric Ton
Rft	Running Feet
Rpm	Revolutions per Minute

1 Introduction

1.1 Project Background and Overview

Urbanization in Pakistan is experiencing significant growth. Research conducted by the Planning Commission of Pakistan indicates that by the year 2030, approximately 50% of the population will reside in urban areas and other urban settlements.[1]

Over time, Islamabad has seen a significant increase in its commercial importance. Many local and international companies are eager to invest in the capital city. The China Pakistan Economic Corridor (CPEC) initiative has further attracted business-focused companies to invest in Pakistan. This growing interest has created a demand for high-quality commercial and office spaces in Islamabad to accommodate more businesses. Currently, there is a shortage of office space in Islamabad, leading to high rental rates.

Increased local and foreign investment in the country can positively impact the economy if it is supported by quality infrastructure and living services. This project holds commercial significance because it is strategically located in Islamabad's prime business hub, known as the Blue Area. According to the Master Plan of Islamabad, the Blue Area has been designated for commercial activities.

The Blue Area's importance has grown substantially in recent years due to a significant amount of foreign direct investment in its buildings. This commercial hub caters to the shopping needs of numerous government and private organization employees, as well as diplomatic personnel and their families. Notable office buildings in the developed Northeast side of the Blue Area (F-7/G-7) include the Saudi Pak Bank Building, NIC Building, OGDCL Building, Green Trust Tower, MCB Building, UBL Building, Islamabad Stock Exchange Building, Telecom Tower, and Habib Bank Building.

Due to urbanization, the land prices are increasing day by day. It not only often requires converting agricultural land into residential, commercial, or industrial zones. This can lead to the loss of fertile farmland, affecting food security and contributing to environmental degradation. Moreover, it can result in deforestation, habitat loss, and destruction of natural ecosystems. This leads to decreased biodiversity, disruption of local ecosystems, and negative impacts on air and water quality. As urban areas expand, the demand for resources such as water, energy, and raw materials increases. This can lead to overexploitation of resources, environmental degradation, and conflicts over resource allocation. Increased urbanization often leads to higher vehicular traffic, air pollution, and congestion. This not only affects the environment but also impacts public health due to respiratory and other pollution-related issues.

In essence, vertical expansion plays a crucial role in addressing the challenges of urbanization by maximizing land use efficiency, promoting sustainable development, and creating dynamic, vibrant, and functional urban spaces.

Vertical expansion enables cities to accommodate a larger population within a limited geographical area. This can help alleviate urban sprawl and reduce the need for excessive transportation infrastructure, contributing to more sustainable development. Building vertically reduces the need for extensive road networks and utilities over large horizontal areas. This can lead to cost savings in infrastructure development and maintenance, as services can be more efficiently delivered to a concentrated area. High-rise buildings located in central areas can reduce the distance between homes, workplaces, and commercial centres. This can promote walking, cycling, and the use of public transportation, reducing traffic congestion and air pollution. Moreover, vertical expansion allows for the preservation

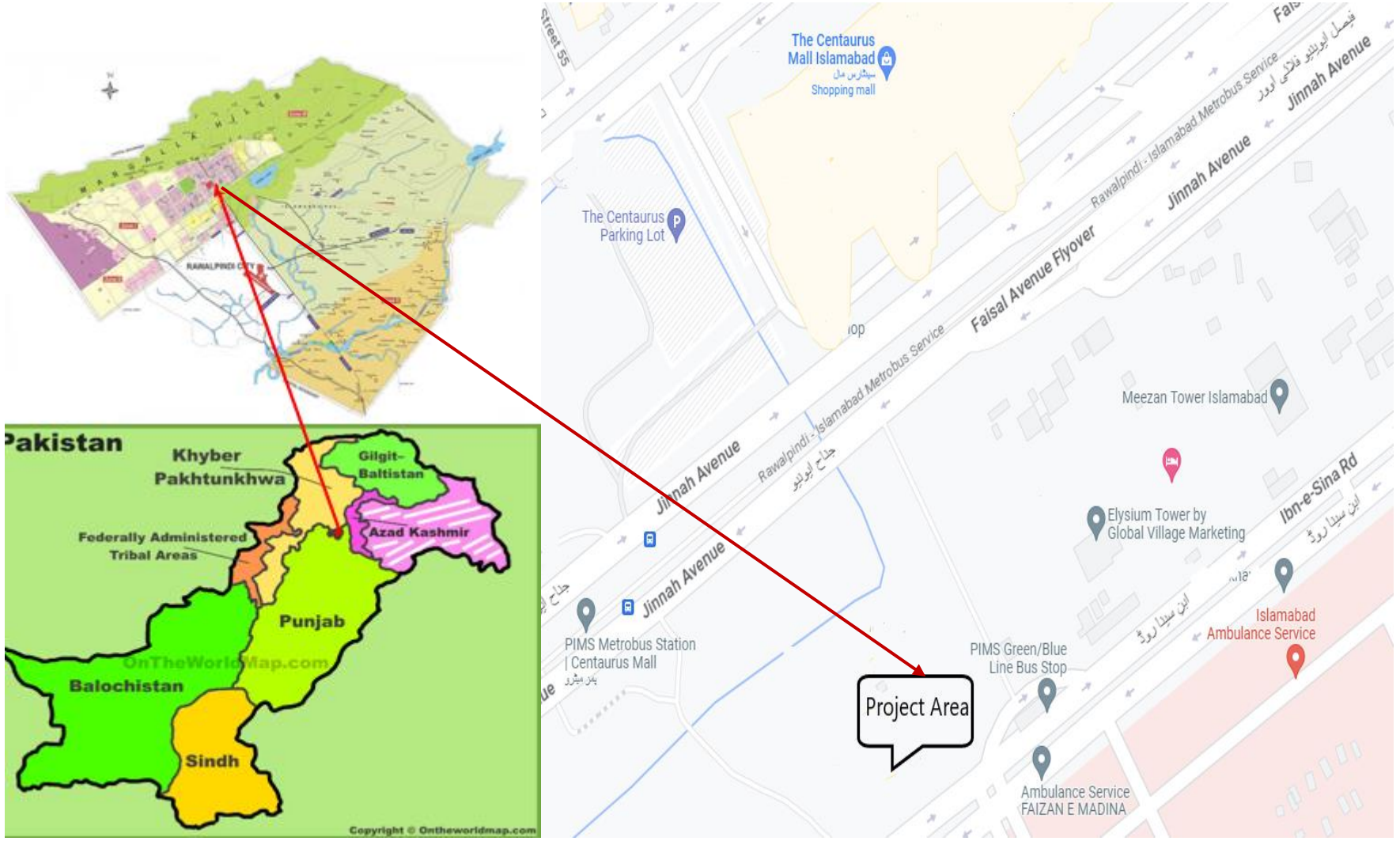
[1] https://www.dawn.com/news/1129681

of parks, green spaces, and natural areas, contributing to improved air quality, recreational opportunities, and overall urban aesthetics.

In this context, Chakor Ventures has commenced a project called Citadel 7 in the Blue Area. The aim is to not only create business opportunities through a shopping mall but also provide space for multiple private offices. In order to comply with the regulatory requirement of Environmental Laws of Pakistan, Citadel 7, Chakor Ventures has acquired the services of M/s Project Procurement International, an Environment and Management Consultancy firm, to conduct an Environmental Impact Assessment (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 location has been shown in **Figure 1.1.**

Figure 1.1: Key Location of the Project Site



1.2 The Proponent

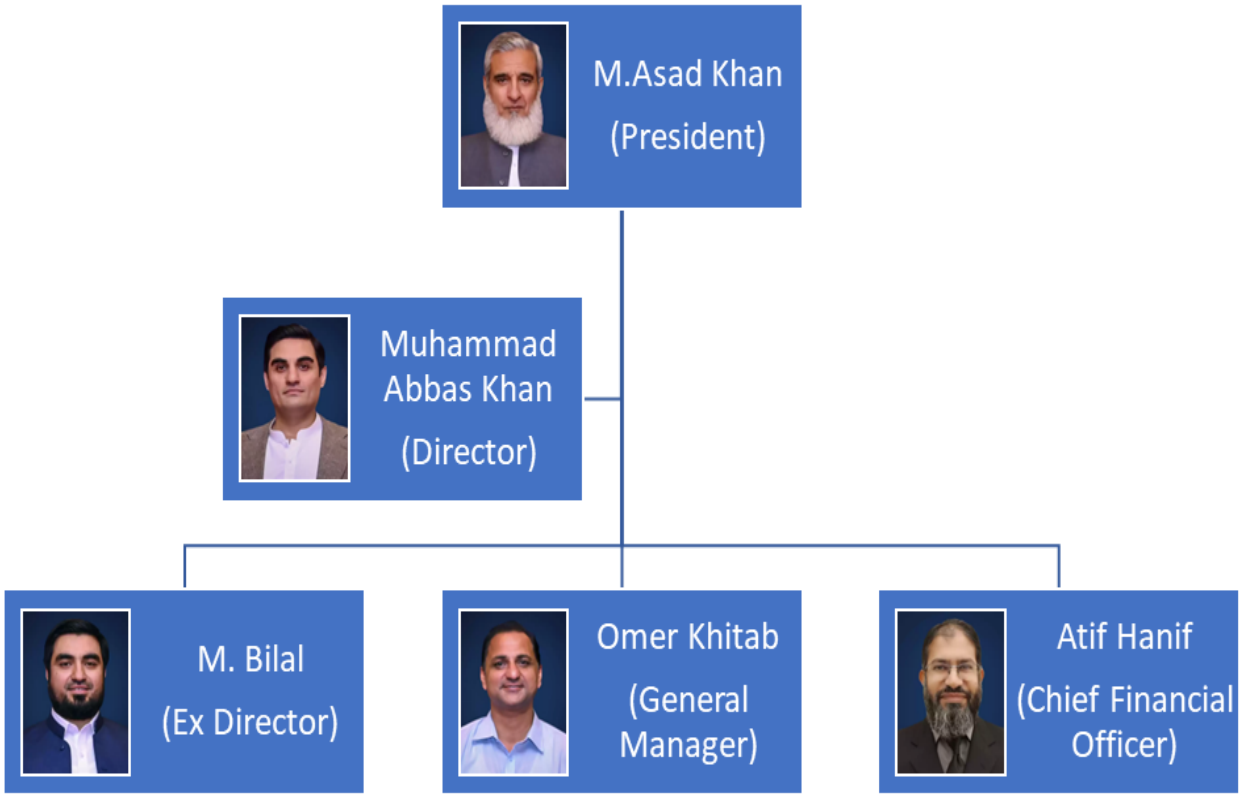
M/s Chakor Ventures is the proponent of the project. Website: https://chakorventures.com/. Chakor Ventures is a rising name in Pakistan's real estate sector, founded with a clear mission to provide excellence through a steadfast commitment to quality. M/s Chakor Ventures represents a hub of creative thinkers dedicated to delivering top-notch development services.

Chakor Ventures provides versatile and practical vertical-construction facilities with their vision of revolutionize the high-rise real estate industry in Pakistan. Now they plan to initiate their latest CDA-approved project, Citadel 7. Immerse into an unparalleled experience with corporate offices, a retail mall, a culinary hub, and entertainment centres. The location of this project is in Blue Area Islamabad- the heart of the capital city.

1.3 The Organization Structure of the Proponent

M/s Chakor Ventures is headed by the President and CEO followed by Executive Director, General Manager and Chief Financial Officer. **Figure 1.2** shows the brief organizational structure of Chakor Ventures.

Figure 1.2: Organizational Structure of Chakor Ventures



1.3.1 Name of the Organisation Preparing the Report

M/s Project Procurement International, an Environmental and Management Consultancy Firm, Islamabad has prepared Environmental Impact Assessment of Citadel 7 Building Project. The list of names, qualification and roles of team members carrying out the EIA has been attached in **Annexure-1**.

1.3.2 Contact Persons

The authorized representative of Chakor Ventures and PPI is the following:

Chakor Ventures	Environmental Consultant
Mr Omer Khitab General Manager Citadel 7 Jinnah Avenue, G-8, Blue Area Islamabad, Pakistan Email: omer.ktb@gmail.com Cell no: +92 331 7852252 Website: https://chakorventures.com/	**Mr. Saadat Ali,** Environmental Engineer Project Procurement International 26, Second Floor, Silver City Plaza, G 11 Markaz, Islamabad Tel: +051 2363624 Cel: 0300 8540195 Email: projectpi@gmail.com Website: www.projectpi.pk

1.4 Environmental Impact Assessment

According to the Pakistan Environmental Protection Agency (Review of IEE/EIA), Regulations 2000.

"No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Federal Agency approval in respect thereof".

1.5 Purpose of Environmental Impact Assessment Report

The Environmental Impact Assessment (EIA) is the assessment of the environmental consequences (positive and negative) of a plan, policy, program, or actual projects prior to the decision to move forward with the proposed action.

The EIA is the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development project prior to major decisions being taken and commitments made. Furthermore, the report will enable Chakor Ventures Private Limited to obtain environmental approval of the construction of Citadel 7 Building Project from Pakistan Environmental Protection Agency (Pak-EPA) Islamabad.

The purpose of the EIA is to ensure that decision-maker consider the environmental impacts when deciding whether or not to proceed with a project.

1.6 Screening of the Project

Citadel 7 Project is a commercial land use development project spread over 4.40 kanal.

EIA is mandatory under section 12 clause (1) of the Pakistan Environmental Protection Act 1997 for all development interventions.

According to Pakistan EPA (Review of IEE and EIA Regulations, 2000), the proposed project falls under **Category H (Urban Development)** of **Schedule II** and, therefore, requires the EIA study.

1.7 Scoping of the Project

A scoping exercise was undertaken with Pakistan Environmental Protection Agency and through Letter No 3(1)/2023-EIA-CITA7-DD(EIA/Mont) it was directed to submit and EIA report of the project. The scoping exercise included the following indispensable tasks:

Spatial and Temporal Boundaries of the Project: The Project is located in Plot 7 of Blue Area, Jinnah Avenue, Sector G - 8, Islamabad. The Project site is located in an urban area. Similarly, the magnitude of impacts will be localized.

The spatial and temporal boundary of the Project during the operational phase will be localized and long-term.

Stakeholder Consultation: Stakeholder consultation sessions were undertaken to document the concerns of the local community and other stakeholders and to identify issues that may require additional assessment in order to address these concerns. Stakeholder consultation was conducted during the initial survey with the following objectives:

- To inform the Stakeholders, Communities and Project Affected Persons about the Project.
- To gather feedback from the primary and secondary stakeholders of the Project
- To identify relevant potential issues, including the socio-economic impacts of the Project and corresponding mitigation measures.

During the stakeholder consultation process for the Project, the following key aspects were highlighted by stakeholders:

- Shadow Analysis
- Effectiveness of Construction Material and Transportation Management Plan
- Energy conservation through latesst HVAC system
- Sufficient Car Parking Space
- Concerns of the residents to be affected by the project (Project Affected Persons, if any)

Magnitude of impact: The magnitude of the impact will be localized as Major Issue.

1.8 Screening of Potential Environmental Impacts

The environmental, and socioeconomic baseline data collected during the Project was used to assess the potential impacts of the proposed activities. The potential sources of environmental impacts identified and analyzed during the impact assessment study include:

- Air Emissions
- Wastewater
- Solid Waste
- Noise Levels

The impact assessment was carried out by siting the Project area and creating an understanding of all the activities during Project siting, construction and operation of Citadel 7 Project.

Checklist of Screening of Potential Environmental Impacts			
Screening Questions	**Yes**	**No**	**Remarks**
Project Siting Impacts			
Densely populated?		✓	The plot is designated for construction of highrise buildings
Heavy with development activities?	✓		The project area has a number of development projects under construction phase
Adjacent to or within any		✓	Not environmentally sensitive areas are

Checklist of Screening of Potential Environmental Impacts			
Environmentally sensitive areas?			located in the microenvironment.
Cultural heritage site		✓	There are no cultural heritage sites nearby.
Protected area		✓	There is no protected area in the microenvironment.
Wetland		✓	No wetland in the microenvironment.
Mangroves		✓	No mangroves are present in the microenvironment.
Estuarine		✓	Not Applicable
Buffer zone of protected area		✓	No such buffer zones exist in the microenvironment
Bay		✓	Not Applicable
Potential environmental impacts will the Project cause			
Dislocation or involuntary resettlement of people?		✓	No dislocation or involuntary resettlement of people?
Traffic congestion		✓	The project site has access from Ibn-e-Sina and Jinnah Avenue
Surface and Groundwater Contamination		✓	CDA drainage and sewerage line pass through the project area
Checklist provides the screening for potential environmental impacts			
Screening Questions	Yes	No	Remarks
Deterioration of environmental conditions surrounding the Project site.		✓	During the construction phase, related environmental impacts may be envisaged; however, they will be curtailed by mitigation measures. During the operation phase, mitigation measures will be implemented to minimize the environmental footprint.
Degradation of land and ecosystems (e.g. loss of wetlands and wildlands, coastal zones, watersheds and forests)?		✓	Not envisaged.
Degradation of cultural property and loss of cultural heritage?		✓	Not envisaged. No such sites are found in the microenvironment.
Disproportionate impacts on the poor, women and children, Indigenous peoples, or other vulnerable groups?		✓	No such impacts are expected as the land is deprived of any such group.
Pollution of receiving drainage waters resulting in residential land, agricultural grounds and land resources?		✓	Loss of land comprising residential, agricultural and grazing land is not envisaged.
Water resources problems (e.g. depletion/ degradation of available water supply, deterioration of surface and groundwater quality and pollution of receiving waters?		✓	A number of water-conserving fixtures will be installed in the Project to reduce water consumption.
Social conflicts between construction workers from other areas and local workers?		✓	Not expected. Reputable and experienced contractors will be hired.

Checklist of Screening of Potential Environmental Impacts			
Road blocking due to soil excavation?		✓	All construction activities will happen inside the project site.
Noise and dust from construction activities?	✓		Likely but will be minimized through better management practices.
Traffic disturbances due to construction material transport?	✓		A proper traffic route will be finalized and shared with ITP for construction material haulage.
Temporary silt runoff due to construction?	✓		If such a situation emerges, it will be mitigated through better management practices and the installation of silt traps.
Contamination of surface and ground waters due to improper waste disposal	✓		Proper solid waste collection and disposal.
Are there any demographic or socio-economic aspects of the Project area that are already vulnerable (e.g. high incidence of marginalized populations, rural-urban migrants, illegal settlements, ethnic minorities, women or children)?		✓	The Project area is not vulnerable with respect to any demographic or socioeconomic aspects.

1.9 Scope of EIA

The project requires the Environmental Impact Assessment to identify environmental impacts of construction and operational phases of the proposed project of M/s Chakor Ventures.

The scope of EIA of Citadel 7 Building Project 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 for 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**.

1.10 Approach and Methodology

1.10.1 Approach for EIA

The approach for conducting EIA of Citadel 7 Building Project is to follow the requirement of Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations, 2000.

1.10.2 Kick off Meeting with the Proponent

Kick off meeting was held between the PPI team and General Manager of Citadel 7 Building Project.

During this meeting, the list of activities for the study relevant to environmental impact assessment of the project was discussed.

1.10.3 Collection of Secondary Data

All available published and unpublished information pertaining to the background environment was obtained and reviewed. All data sources were carefully reviewed to collect the following information:

- Physical Environment: topography, geology, soils, surface and groundwater resources and climate;
- Biological Environment: habitat types, flora and fauna (particularly rare or endangered species), critical habitats, and vegetation communities within the area;
- Socio-Economic Environment: settlements, socio-economic conditions, infrastructure and land use; and
- Heritage Aspects: sites of cultural, archaeological or historical significance.

The list of the references of secondary data consulted during the EIA study is provided in **Annexure-3**. The glossary of terms used in the EIA report has been provided in **Annexure-4.**

1.10.4 Collection of Primary Data and Field Visit

The PPI team visited the project site and adjoining areas for obtaining detailed knowledge of the environmental conditions of the area. During the field visits, the existing environmental conditions were studied.

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. Communities that were in the surrounding 1 km radius investigated during the field survey.

The ambient air quality and noise monitoring at the project site were carried out. The survey team ensured that the mammals, birds and other species were observed without causing any potential disturbance. The sampling locations were randomly selected, ensuring that sufficient locations are represented from each habitat type, and the maximum number of species was recorded.

1.10.5 Analysis of Alternatives

The EIA report gives the details of alternatives considered during planning and design phases of the project**.**

1.10.6 Public Consultation

Public consultations were held with community living in the vicinity of Citadel 7 Building Project site. Different aspects of the proposed project were highlighted to the community regarding their impacts on the physical, biological, and socio-economic environment of the project area and their concerns and suggestions were solicited.

The meetings were held with the General Manager of Chakor Ventures, NUST, Pak EPA, CDA Disaster Management Directorate, Coordinator Elysium Mall, the Centaurus Mall and community living around Project site.

The information obtained from the community was used to identify concerns and issues that have been subsequently mentioned and addressed in the EIA report. The list of the people met during the public consultation is provided in **Annexure-5**.

1.10.7 Review of Legislative Requirements

The information on environmental policies, national and international laws as well as guidelines relevant to the project was reviewed, and a synopsis of all relevant laws has been narrated in the report.

1.10.8 Identification and Evaluation 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 potential impacts were identified with methodical consideration of likely or possible significant impacts on the environment for Installation of the incinerator project. The aim of this task was to assess the associated risks with these impacts.

Each impact identified has been evaluated against its significance in terms of severity and likelihood of its occurrence. The impact evaluation process prioritized each potential impact and screened 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 has formed the basis for the development of Environmental Management Plan.

1.10.9 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 and institutional arrangements for monitoring have been defined and suggested.

1.10.10 Development of Environmental Management Plan (EMP)

An Environmental Management Plan has been developed for effective implementation of the recommended mitigation measures of negative impacts during pre-construction, construction and operation phase. The Environmental Monitoring Plan has been developing to monitor the achievement of Environmental Management Plan during pre-construction, construction and operational phases of the project.

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.

1.11 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 the environment and its implications for 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 *(Project Alternatives)* details the potential alternatives that were considered during the design phase.

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

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

Chapter 7 *(Impact Assessment and Mitigation Measures)* details the potential environmental and social impacts of the 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 the 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.

The last chapter is followed by **Annexures** that provides supporting information.

Table 1.1 shows the summary of methodologies and activities to conduct EIA.

Table 1.1: Summary of Methodologies and Activities to Conduct EIA

Project screening
- Determine the Legal requirements of EIA is necessary

Scoping
- Decide the potential main issues to be addressed

Baseline Data Collecion
- Collecting relevant data on the state of environment

Impact Prediction
- Forecasting the likely changes in the environment as a result of the development

Impact Assessment
- Evaluation of the significance of the identified impacts

Mitigation
- Measures taken to reduce or remedy adverse impacts, or enhance positive impacts

Environmental Management and Monitoring Plan
- Environmental Management and Monitoring Plan (EMMP) develops for effective implementation of the recommended mitigation measures and to monitor the environmental parameters against likely environmental impacts

EIA Report Submission to EPA for approval
- EPA reviews all the nitty gritties of the report to make sure the compliance with environmental guidlines.

Correcpondance with EIA for Final Approval
- EPA reviews the Draft report submitted and communicate comments to address discrepencies, if any.

Public Hearing
- For the purpose of dessimination of information of the Project with stakeholders, a public hearing is held with its 30 days prior advertisement in local/national news papers.

Project Approval/Rejection by EPA
- EPA issues Environmental Approval for the Project development after client/consultant addresses the comments from EPA on Draft report and Public Hearing.

2 Legislative Institutional Framework

2.1 Introduction

Pakistan being a signatory of multilateral international treaties has a comprehensive set of environmental legislation covering multiple environmental issues facing Pakistan like pollution of freshwater bodies and coastal water, air pollution, deforestation, loss of biodiversity, lack of proper waste management and climate changes. The basic policy and legislative framework along with detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation for the protection of the environment and overall biodiversity are in place.

The compliance status of the Citadel 7 Building Project has been reviewed with reference to the legislation and existing legal framework on the environment in Pakistan and International level as described henceforth.

2.2 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.

2.2.1 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 Section12 (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.

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

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 the 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 to 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 preliminary scrutiny and reply within 10 days of submittal of the 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 the 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 a confirmation of compliance within 15 days of receipt of the request and complete documentation.
- The IEE/ EIA approval will be valid for three years from the date of the accord.
- A monitoring report is required to be submitted to the EPA after completion of construction, followed by annual monitoring reports during operations.

The construction of Citadel 7 Building Project falls in schedule-II of the regulations. Hence, this type of project needs an EIA to be conducted.

2.3 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 the concentration of sulphur dioxide in the ambient air,
  - Maximum allowable concentration of nitrogen oxides in ambient air, and

- Maximum allowable emission of nitrogen oxide for steam generators as a 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 website. 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 the 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.

2.3.1 NEQS for Liquid Effluent

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

Table 2.1: NEQS for Liquid Effluent Discharge

Parameters	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

Parameters	Into Inland Waters	Into Sewage Treatment	Into Sea
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
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*

2.3.2 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	Standard
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

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

Source: NEQS Pakistan Environmental Protection Agency

2.3.3 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 (Maximum permissible limits)	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 the gas analyzer.
Noise	85 dB (A)	A sound meter at 7.5 meters from the source

Source: *NEQS Pakistan Environmental Protection Agency*

2.3.4 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	WHO guidelines
Biological		
All water intended for drinking (E. Coli or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample.	Must not be detectable in any 100 ml sample.
Treated water entering the distribution system (E. Coli or Thermo-tolerant Coliform and total Coliform bacteria)	Must not be detectable in any 100 ml sample.	Must not be detectable in any 100 ml sample.
Treated water in the distribution system (E. Coli or Thermo-tolerant Coliform and total Coliform bacteria)	Must not be detectable in any 100 ml sample. In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample. In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.
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
Alminium	≤ 0.2	0.2
Antimony	≤ 0.005	0.02
Arsenic	≤ 0.05	0.01
Barium	0.7	0.7
Boron	0.3	0.3
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

Parameter	Standard values	WHO guidelines
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*

2.3.5 NEQS for Ambient Air and Noise

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)
Sulfur Dioxide (SO_2)	Annual Average* 24 hrs**	80 120
Oxides of Nitrogen gas (NO)	Annual Average* 24 hrs**	40 40
Oxides of Nitrogen gas (NO_2)	Annual Average* 24 hrs**	40 80
Ozone (O_3)	1 hour	130
Suspended Particulate Matter (SPM)	Annual Average* 24 hrs**	360 500
Respirable Particulate Matter (PM_{10})	Annual Average* 24 hrs**	120 150
Respirable Particulate Matter ($PM_{2.5}$)	Annual Average* 24 hrs** 1 hr	15 35 15
Lead (Pb)	Annual Average* 24 hrs**	1 1.5
Carbon monoxide (CO)	8 hrs 1 hr	5 mg/m^3 10 mg/m^3

*** Annual Arithmetic mean of minimum 1040 measurements in a year taken twice a week 24 hourly at a uniform interval*
** 24 hourly /8 hourly values should be met 98 % of the year, 2 % of the time, it may exceed.*
Source: *NEQS, National Environmental Protection Agency*

Table 2.6: NEQS for Noise

Area	Daytime	Night time
Residential area	55	45
Commercial area	65	55
Industrial area	75	65
Silence area	50	45

Source: *NEQS, Pakistan Environmental Protection Agency*

2.21 Environmental Protection Agency's Environmental Guidelines

The Pak 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, Sectorial 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 accordance with the Pakistan Environmental Protection Agency guidelines. The government of Pakistan has also framed guidelines for the preparation of IEE of Projects in various developmental sectors.

2.22 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 on Biological Diversity (CBD) was adopted during the Earth Summit of 1992 in 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. Pakistan signed and ratified on a number of international agreements and Convention and bound to implement them in its territory.

2.23 Implication of Legislations to the Project

The implication of the above-mentioned legislation to the pre-construction, construction and operational phase of the Citadel 7 Building Project would be as follows:

M/s Chakor Ventures, being the proponent of the project will ensure that construction and operational phases of the project be carried out in accordance with the EIA report and Environmental Management Plan is effectively implemented.

The project will be subjected to four basic provisions relating to pollution control under the Pakistan Environmental Protection Act, 1997, as 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 hazardous wastes.
- Section 14, prohibits the handling of hazardous substance except under license or in accordance with the provision of any local law or international agreement.
- Section 15, prohibits the 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 of the project, its salient features, location, components and various phases.

3.2 Type and Category of the Project

The proposed project is the construction of Citadel 7 Building Project, Islamabad which falls in Schedule II of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulation 2000 under category J. Any other project for which filing of an EIA is required by the Federal Agency under sub-regulation (2) of Regulation 5.

3.3 Objective of the Project

The objective of the project is to provide building facility for the shopping mall and offices for the business and corporate community in the city of Islamabad.

3.4 Project Administrative Jurisdiction

The project site lies in the capital city of Islamabad, which comes under the jurisdiction of administration of Islamabad Capital Territory.

3.5 Project Location

The project site is located at Jinnah Avenue, G-8, Blue Area Islamabad. The proposed site is accessible via Jinnah Avenue through Service Road in the north and Ibn-e-Sina Road in the south. The coordinates of the project site are 33°42'20.6"N 73°02'57.9"E.

The exact location of the project site at G-8, Blue Area Islamabad is shown in **Figure 3.1**.

The surrounding areas near the project site of Citadel 7 Building Project are as follows and shown in **Figure 3.1**:

- **East:** Elysium Tower
- **North:** Jinnah Avenue
- **South:** Ibn-e-Sina Road, PIMS Hospital
- **North East:** The Centaurus Mall
- **North West:** ART Hospitality Services Private Limited
- **South West:** Shaheed Zulfiqar Ali Bhutto Medical University PIMS

Figure 3.1: Environmental Receptors near Project Site

3.6 Accessibility

Citadel 7 Building project site is connected to Jinnah Avenue via Service Road in the North and Ibn-e-Sina Road in the South. The project site is accessible via both Jinnah Avenue and Ibn-e-Sina Road.

Accessibility Map of the project site is shown in **Figure 3.2.**

Figure 3.2: Accessibility Map of the Project area

3.7 Description of the Project

The project site is located on plot no. 7 at the southern side of Blue Area (G-8), Islamabad, on a 120 ft. X 200 ft. plot. Citadel 7 Building will have 19 floors above ground level and four basement levels. The proposed building height is 293'-6''. The shopping mall comprises five floors (including ground floor), with the fifth floor dedicated to housing a food court, while the sixth floor is designated for the maintenance office and rest of the floors is intended for rent to corporate and business sector.

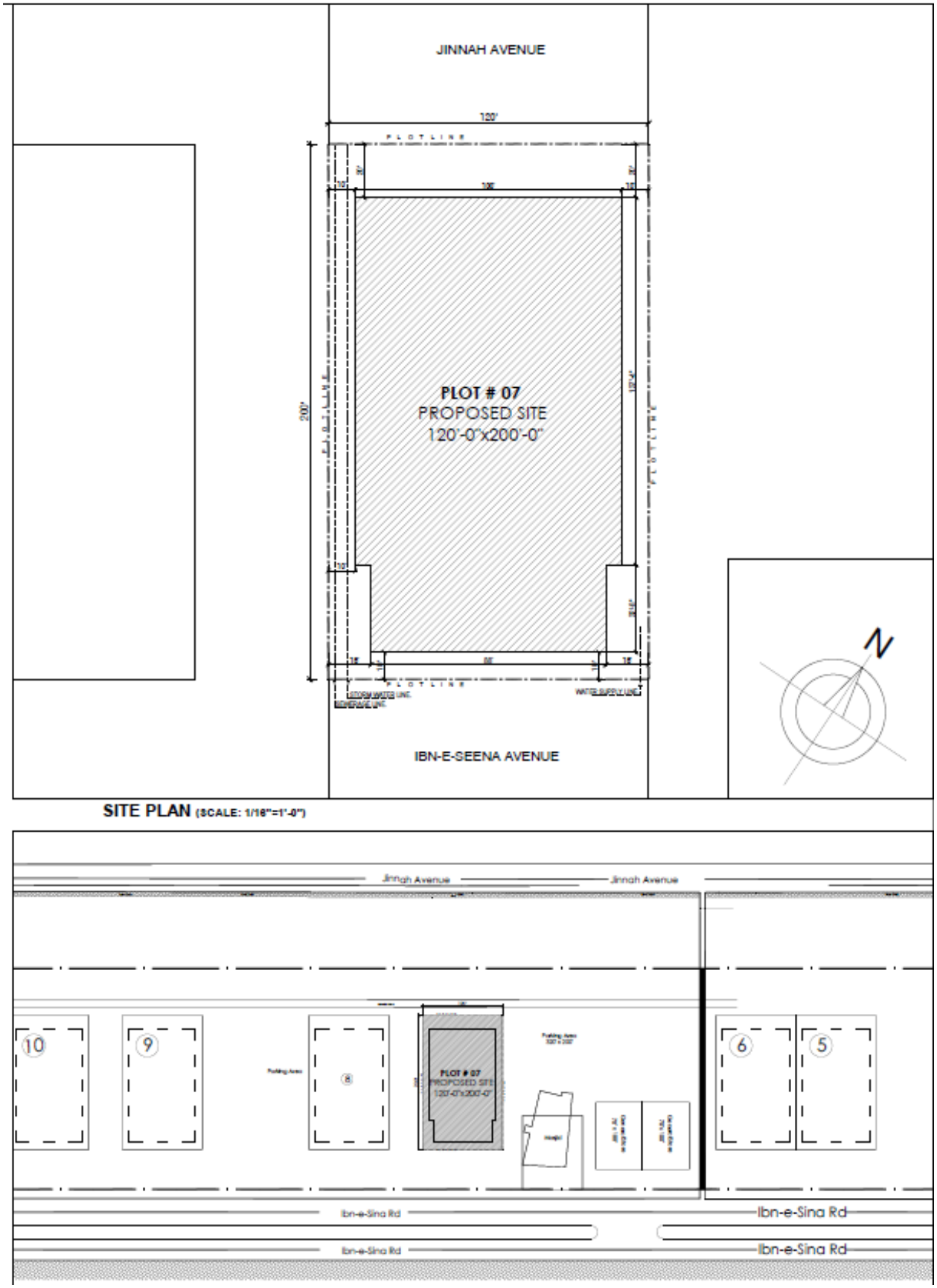
The Citadel 7 Building Project will be completed in 4 years, and the total estimated cost of CITAEL 7 Building Project is Rs. 2 billion.

The site plan of Citadel 7 Building Project is shown in **Figure 3.3**.

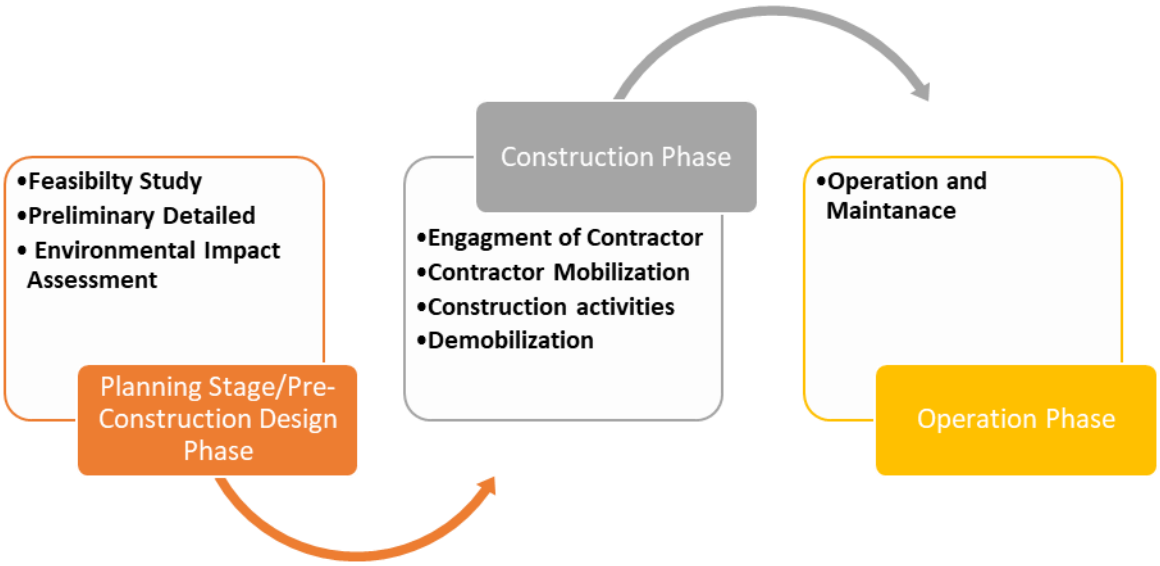
Table 3.1: Overview of the Proposed Project

Project Name	Citadel 7	
Project Location	Plot # 7, Blue Area Sector G-8, Islamabad	
Category of Plot	high rise commercial and office building	
Total Area of Plot	24,000 Sq. ft (4.40 kanal)	
Components of the Project	4 Basements	Car parking
	Ground Floor	16 shops and 3 kiosks
	1st to 3rd Floor	Shopping Mall (18 shops and 3 kiosk per floor)
	4th Floor	Food Court
	5th Floor	Maintenance Floor
	6th to 19th Floor	14 Office Floor
Number of offices	14	
Number of Offices	152 Offices	
Parking Space	202 + Outdoor Parking	
Facilities/Services	Natural lighting, double glazed windows, green roofs, Energy Efficient HVAC system for efficient ventilation and firefighting system.	

Figure 3.3: Site Plan of Citadel 7 Building Project, Islamabad



3.8 Project Process Flow



3.9 Land Use Analysis

The area of the plot number 7 is 120'x200' is allocated for the building construction while the area of 320'x200' is parking area adjacent to building. The land use of Citadel 7 Building Project, Islamabad will be in accordance with the CDA's existing building bye-laws.

Table 3.2: Land Use Analysis of Citadel 7 Building Project

Sr.No.	Description (Footprint)	Area (ft^2)
1	Building Area	24,000
2	CDA Approved Parking area	64,000

3.10 Site Consideration

The site considerations have been kept in mind during the design Citadel 7 Building Project, Islamabad as described hereunder.

Building Location and Orientation: Citadel 7 Building Project, Islamabad is located in Blue Area (G-8). The Jinnah Avenue on the North of the project site and Ibn-e-Sina Road at the South.

Acoustics: There is PIMS Hospital at the south of Citadel 7 Building Project, Islamabad and as such care will be taken with the positioning and noise attenuation of generators. This will not cause any noise problems to the residents of any adjoining premises.

3.11 Occupancy Estimates

The number of occupants of Citadel 7 Building Project, Islamabad has been estimated, and overall occupancy of the building is estimated at 1500 persons.

Floor	No. of Shops	Persons*
Ground Floor	16 Shops, 3 Kiosk	48 + 3
1st Floor	18 Shops, 3 Kiosk	54 + 3

Floor	No. of Shops	Persons*
2nd Floor	18 Shops, 3 Kiosk	54 + 3
3rd Floor	18 Shops, 3 Kiosk	54 + 3
4th Floor (Food Court)	1 Food Court, 2 Restaurant, 2 Food Booths	5 + 60 + 35
Next to 4TH floor	Maintenace floor	5
6TH -19TH floor	14 floor	56x14=784
Visitors	For shopping	390
Total		**1500**

3.12 Facilities to be provided at Citadel 7 Building

Citadel 7 Building Project, Islamabad will have state of the art facilities as follows:

3.12.1 Electrical Systems

The total electricity load of Citadel 7 Building Project, Islamabad is 1400 kWh. The main source of electricity will be Islamabad Electric Supply Corporation (IESCO). MV Bulk supply will be procured from IESCO; there will be11 kV Bulk (with the owner's maintained pre-paid meters for individual offices).

The frequent power failure in the city has made the "Stand-By Power Supply" an essential part of the Power System in building, in view of the nature of this project it has been mutually decided to provide 100 % backup power supply through prime rated Diesel Generators.

Adequate low consumption LED lights are proposed in all areas including Lift lobbies, corridors; entrance to other common services areas.

All the services rooms, lobbies, Corridors, and Circulation areas shall be provided with a sufficient number of general power socket outlets for cleaning and convenience purpose.

3.12.2 Water Demand

The domestic water demand of Citadel 7 Building Project per day is 45,000 Gallons per day.

Table 3.3: Daily Water Requirements

Floor	No. of Shops	Persons*
Ground Floor	16 Shops, 3 Kiosk	48 + 3
1st Floor	18 Shops, 3 Kiosk	54 + 3
2nd Floor	18 Shops, 3 Kiosk	54 + 3
3rd Floor	18 Shops, 3 Kiosk	54 + 3
4th Floor (Food Court)	1 Food Court, 2 Restaurant, 2 Food Booths	5 + 60 + 35
Next to 4TH floor	Maintenace floor	5
6TH -19TH floor	8 offices/Floor	56x14=784
Visitors	For shopping	390
Total		**1501**
Proposed no. of Person		1500
Average water demand g/c/d		20 g/c/d

Floor	No. of Shops	Persons*
Sub Total for Commercial water demand		30,000 g/d
For Peak Hour Water Demand		@ plus 50% on average
Extra 50% of average water demand		15,000
Total Water Demand for Citadel 7		45,000

Provision of water supply for Citadel 7 Building Project, provision has also been provided for water supply through CDA water supply connection and water tankers.

The water storage Capacity for Citadel 7 Building Project is given in the following table:

Table 3.4: Water Storage Capacity

Fire Reserve Tank (B-4)	Gal	33,000
Under Ground Water Tank	Gal	17,000
Water storage tank in 5th floor	Gal	15,000
Overhead water Tank	Gal	10,000
Total Water Storage	**Gal**	**75,000**

3.12.3 Sewerage Disposal System

The sanitary sewerage system is 80% of the water demand and Water demand for the Citadel 7 is 45,000 Gal/Day. So accordingly, the sewage of Citadel 7 Building will be approximately 36,000 Gal/Day.

The sewer system of Citadel 7 Building Project has been designed to drain to CDA sewer.

3.12.4 Soil and Wastewater Drainage System

In all soil/water stacks, tap-off connections at each floor have been provided for future connections of toilets by the office tenant.

The drainage system of Citadel 7 Building Project will be connected with drainage network of CDA.

3.12.5 Solid Waste Management

According to an estimate, the Citadel 7 Building Project Islamabad will produce approximately 1500x 1kg/capita/day=1500 kg of solid waste per day during the operational phase.

The solid waste will have a proper management system. The building should be equipped with Refuse Chute System which will basically, be the collection mechanism from individual units.

A 24” Dia. stainless steel vertical refuse chute is recommended to discharge waste material from upper floors to the basement level.

Disinfectant & sanitizing unit shall be fitted above the topmost entry section of the refuse chute and also exhaust fan at the top of the refuse chute is recommended to use with every chute to overcome strong odours.

Garbage chute comes with automatic cleaning system, which consists of a cylindrical housing with replaceable stiff nylon brushes which automatically lowered and raised by the

geared electric motor. The nylon brushes scrape and clean the internal surface as they move down and up the chute.

A garbage room shall be provided to receive the daily waste material for final dispose-off through garbage vans.

Solid Waste will be handed over to CDA for further disposal.

3.12.6 Fire Suppression

The Fire Suppression Systems includes Fire Sprinkler Pipe, Fire Hose Cabinet Pipe and Fire Hose fire Hose Cabinet With (5kg Dcp+5kg Co_2 Fire Extinguisher).

Fire hose reels shall be compatible to NFPA 14. Inside the building use black seamless schedule 40 pipes. Electric power supply to firefighting pumps shall be given by others. All work shall be carried out according to latest engineering standards and codes. Connection from flow switches to fire alarm system shell be given by others. Connection from flow switches to fire alarm system shell be given by others. Fire pump set shall be in compliance with NFPA-20. The fire water storage for 60 minutes duration at the maximum expected demand shall be maintained at all times. Air release valve should be provided at the highest point.

The fire reserve with the capacity of 33,000 gallons will be present in Basement 4 of the building. Moreover, one fire reserve of 5,000 Gallons will also be constructed on roof top according to the following Fire Protection Diagram.

3.12.7 Car Parking

The car parking is as per the requirement of CDA. The parking requirements will be accommodated within plot line including basements. As per parking requirements basement shall be used for parking only. According to the design of the project, there is a provision of **202 slots** for car parking in the four basements of Citadel 7 Building Project.

4 inhouse basements plus a *CDA approved parking area* shown in site plan (**Figure 3.3**) of proposed site. Parking management system shall be provided to facilitate the vehicle movement in the parking and to reduce traffic load. Parking management systems help people find empty parking bays in a multi-storey parking facility with great convenience.

3.12.8 HVAC System

A smart HVAC (heating, ventilation, and air conditioning) system will be adopted for Waste Heat Recovery from DHC and Thermal Energy Storage (TES). For the calculation of heating and cooling load, different window configurations will be used. It has been observed that the cooling and heating load decreases significantly by using Low-E glass; 22% cooling load and 13% heating load decrease when using Low-E glass in a double-glazed window instead of conventional glass in the double-glazed window.

The Energy Efficiency Measures simulation models were applied. ASHRAE advanced energy design guides climate zone 1, and ASHRAE 1651 – RP Development of Maximum Technically Achievable Energy Targets for Commercial Buildings results for climate zone 1 will be used.

In the Citadel 7 building, the proposed plan is to have a single central HVAC system for the shopping mall, while the offices will use a Variable Refrigerant Flow (VRF) system.

3.12.9 Traffic Management Plan

The Citadel 7 Building Project, Islamabad is located in Blue Area which has various accessibility points. All the incoming traffic will be managed through Jinnah Avenue and Ibn-e-Sina Road.

3.12.10 Vegetation Features of the project site

The project area lies under the humid sub-tropical zone of vegetation and is located against the backdrop of Margalla Hills supporting natural terraces and meadows across the whole area. The area is characterized by a monsoonal climate of hot, rainy summers and cool, dry winters; precipitation is characteristic of the semiarid zone of Pakistan. The area has an abundant diversity of plant species. [2]

At the project site, there are a total of 40 trees, with 15 belonging to the Populus species, 8 being Melia Azedarach, 13 belonging to Jacaranda and 4 being Pinus . Out of which 8 trees (2 Melia Azedarach and 6 Populus trees) may need to be removed during the construction phase of Citadel 7. It's important to note that these two tree species are exclusively found on the project site

3.13 Land acquisition

There is no issue of land acquisition or resettlement due to the project.

3.14 Cost of the Project

The total estimated cost of Citadel 7 Building Project is **Rs. 2 billion.**

3.15 Time Schedule

The construction of the Citadel 7 Building Project will be completed in 4 years.

[2] S.M. Ali, R.N. Malik **Spatial patterns of vegetation with underlying soil properties prevailing along the drain side areas in Islamabad city** Pakistan J. Bot., 42 (2010), pp. 2397-2410

Table 3.5: Time Schedule for Citadel 7 Building Project

Description/Year	**Year**	**1**				**2**				**3**				**4**			
	Months	**01-03**	**04-06**	**07-09**	**10-12**	**13-16**	**14-16**	**17-20**	**21-24**	**25-27**	**28-30**	**31-33**	**34-36**	**37-39**	**40-42**	**43-45**	**46-48**
Foundation works																	
Construction of 4 Basement																	
Construction of ground floor																	
Construction of floors 1- next to 4th floor																	
Construction of floors 5-18 and Roof Floor																	
Handover of Citadel 7 Building																	

3.16 Project Phases

Citadel 7 Building Project would be implemented in three phases, i.e., Pre-construction/ design, Construction and Operation.

3.16.1 Pre-construction/Design Phase

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

Geotechnical/Soil Investigation: An extensive soil investigation of the project site has been carried out.

3.16.2 Construction Phase

Contractor Mobilization: This component involves transportation of construction machinery and equipment to the project site and the establishment of the contractor's camp and office. The contractor will be responsible for the activities being carried out at the project site.

The equipment and machinery will be brought to the project site through Ibn-e-Sina Road via connecting service road. All activities related to transportation of materials will be carried out during nighttime. The campsite facilities of the contractor include site office, a site residence for workers, and areas for equipment and installation materials. The contractor office will be established at the project site.

Site Preparation: Usually, this activity involves the operation of heavy earth-moving machinery and substantial land clearing, levelling and grading, as well as cutting and filling activities.

The first task of this activity is to demarcate the site and other benchmarks, with the help of drawings prepared during the pre-construction and design phase of the project. Once marking is complete; the land will be cleared and prepared for subsequent construction activities. The whole purpose is to maintain the harmony of the area during construction.

Construction Activities: The construction activities will be carried out using the conventional methodology and sequence of work. The activities will include excavation, masonry work, carpentry, wiring, piping and plumbing, flooring, painting and installation of fixtures. Other activities will include the laying of cables, water supply, sewerage and storm drainage systems, junction boxes and providing connections to the individual buildings. Supervision of this whole activity will be carried out by Citadel 7 Building Project management and the consultant.

Staffing: Construction crews will have the responsibility of the civil contractor and its petty contractor. It is estimated that a maximum of 90 personnel will be working at the site at a given time during peak construction period.

These will essentially include masons, carpenter, electricians, painters, plumbers and general labourers. For unskilled employment, preference will be given to local residents of the project area. **Table 3.5** details the staffing requirement during the construction phase of the project.

Table 3.6: Staff for the Construction Phase Citadel 7 Building Project

No	Description	No Posts
1	Skilled workers (Technicians, plumbers, labour)	20
2	Unskilled labour/ helper	70
	Total	**90**

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

- Concrete Mixing Plant
- Excavators
- Dumpers
- Concrete pump and
- Crane
- Dozer
- Well drilling machines
- Concrete Mixing Plant
- Water tanker
- Water pumps
- Diesel generator
- Vehicles for personnel movement
- Compactors

An 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.

Cement Mixing Plant: With the construction and operation of the concrete mixing plant, air quality, noise nuisance, water quality and visual impact induced by the barges transportation minimized significantly. All sensitive receivers around the project site and along the site would benefit from the reduction. Control discharge of highly alkaline wastewater, dust and excess noise.

Concrete mixing plant combines various ingredients to form concrete. Some of these inputs include sand, water, aggregate, fly ash, potash, and cement. The plant has a variety of parts and accessories, including mixers, cement batches, aggregate batches, conveyors, radial stackers, aggregate bins, cement bins, heaters, chillers, cement silos, batch plant controls, and dust collectors (to minimize environmental pollution). The centre of the concrete batching plant is the mixer. Used to mix stiff consistency concrete, semi-stiff consistency concrete, lightweight aggregate concrete and so on.

This machine can be used as a separated mixing machine or used as the supporting machine of the ready-mix concrete plant. When matched with batching plant, they can form a simple mixing plant with more environmental benefits.

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

Traffic Load during Mobilization (and Demobilization) of the Contractor: All of the constructions equipment and vehicles will be transported to the site via Ibn-e-Sina Road. However, the arrival of this equipment and vehicle will be fairly controlled and minimized during weekdays.

Traffic Load for Construction Materials Supplies: It is estimated that on average 3-5 truckloads per day will be supplying different types of materials to the site during peak construction period. The condition of Ibn-e-Sina is satisfactory and as such larger trucks will be used. Other staff will move on small vehicles.

Other Supplies

Water: During the construction phase, maximum of about 30,000 GPD 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 10,000 litres per day. The diesel will be procured from the Rawalpindi to the site.

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

Camp Supplies: Camp supplies can be procured from Islamabad and transported to the site via Ibn-e-Sina.

Camp Site Sanitation Facilities: The sanitation facilities will be provided at the campsite, and the contractor will construct a septic tank with soakage pit for storage, removal, and careful disposal of solids from wastewater in order to minimize environmental pollution and to improve the project site environment. The sewerage from the project site will be connected with the CDA sewerage system.

Site Restoration Plan: The contractor will prepare a site restoration plan for closure of the construction camp which will be submitted to Project Engineer and management of Citadel 7 Building Project.

The main areas to be considered for the site restoration include the construction areas, campsite etc. These areas to be restored to the original condition before construction with maximum efforts. The restoration work comprises removal of all temporary construction works and removal of fence installed, levelling of areas (where required), etc.

3.16.3 Operational Phase

The project manager will be responsible for day-to-day operation and maintenance of Citadel 7 Building Project. It is estimated that a maximum of 30 personnel will be working at Citadel 7 Building Project during its operational phase. **Table 3.11** details the staff requirement during the operational phase of the project.

Table 3.7: Staff for the Operational Phase of the Project

No	Description	No of staff
1	Skilled workers (Technicians, plumbers, labour)	10
2	Unskilled labour/ helper	20
Total		**30**

Figure 3.4: Pictorial View of the Project Site along with Receptors

Exhibit 5.1: A view of proposed project site of Citadel 7 Building Project

Exhibit 5.2: Jinnah Avenue in the North of the project site

Exhibit 5.3: Elysium tower adjacent to the project site

Exhibit 5.4: View of Site Office

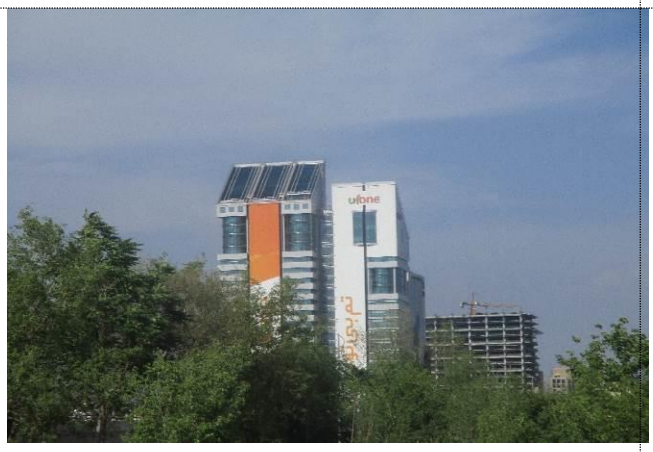


Exhibit 5.5: A view of Ufone Regional Office Building from Project Site

Exhibit 5.6: The Centaurus Mall in the North of Project site

Exhibit 5.7: View of Citadel 7 Office from Jinnah Avenue Islamabad

Exhibit 5.8: Metro Bus Route near the project site

Exhibit 5.9: Ibn-e-Sina Road in the south of the project site

Exhibit 5.10: An exterior view of PIMS hospital adjacent to the project site

4 Project Alternatives

4.1 Background

Regardless of the chosen approach and its adjoining management strategies for project implementation, there are always some alternative ways to implement the project using the same resource base. Therefore, to exercise all available options and also for the selection of suitable Management and technological options it is necessary to exercise the alternatives available.

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

Upon the selection of the "No Project" option the project will lose all positive impacts; for instance, the Citadel 7 Building Project in Islamabad aims to not only offer office spaces for businesses and corporations but also create job opportunities and boost the retail (shopping) industry in the city.

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

4.3 Build-As-Proposed-Option

Due to urbanization, the land prices are increasing day by day. It not only often requires converting agricultural land into residential, commercial, or industrial zones as urban areas expand, the demand for resources such as water, energy, and raw materials increases. This can lead to overexploitation of resources, environmental degradation, and conflicts over resource allocation. So, this 293 ft building resolve the issue of horizontal expansion and create numerous employment opportunities. The problems pertaining office space required for business and corporate community is also being catered in the said project. Vertical expansion enables cities to accommodate a larger population within a limited geographical area.

A detailed impact assessment has also been carried out, and the underlying issues have also been catered for. For instance, positive mitigation measures have been taken up for the constructional and operational phases.

4.4 Site Alternative

According to the master plan of the capital city of Islamabad, Blue Area has been designated for the commercial purposes and for the construction of high-rise buildings. Therefore, the selected project site was the most favourably strong location for the construction of Citadel 7 Building Project, Islamabad hence no other alternative site was considered.

4.5 Conclusion:

Citadel 7 Building Project construction would be a landmark in the high-rise building structures of the federal capital. It would have a definite and an extremely positive impact on the economic market and in the corporate sector. Therefore, best option is to go with the project by mitigating its potential impacts.

5 Description of the Environment

5.1 Introduction

This chapter describes the existing environmental conditions of the project site and area. The project area is the area falling within 3 km radius of the project site.

5.2 Islamabad

Islamabad Capital Territory is the capital and the ninth largest city in the country which is spread over an area of 906 sq. km., and is divided into three segments; namely, (i) Islamabad Urban Area, including institutional and industrial area, covering 220 sq. km. (ii) Islamabad Park is occupying 220 sq. km., and (iii) Islamabad rural area is measuring 446 sq. km.

Islamabad Capital Territory is divided into eight zones: Administrative Zone, Commercial District, Educational Sector, Industrial Sector, Diplomatic Enclave, Residential Areas, Rural Areas and Green Area. Islamabad city is divided into five major zones: Zone I, Zone II, Zone III, Zone IV, and Zone V. The rural area of Islamabad encompasses 132 villages and administratively consists of 12 Union Councils. Islamabad has been planned in parallel belts with Administrative Sector, Diplomatic Enclave, Public Building Area, Residential Sectors, a Commercial area called the Blue Area and Industrial areas.

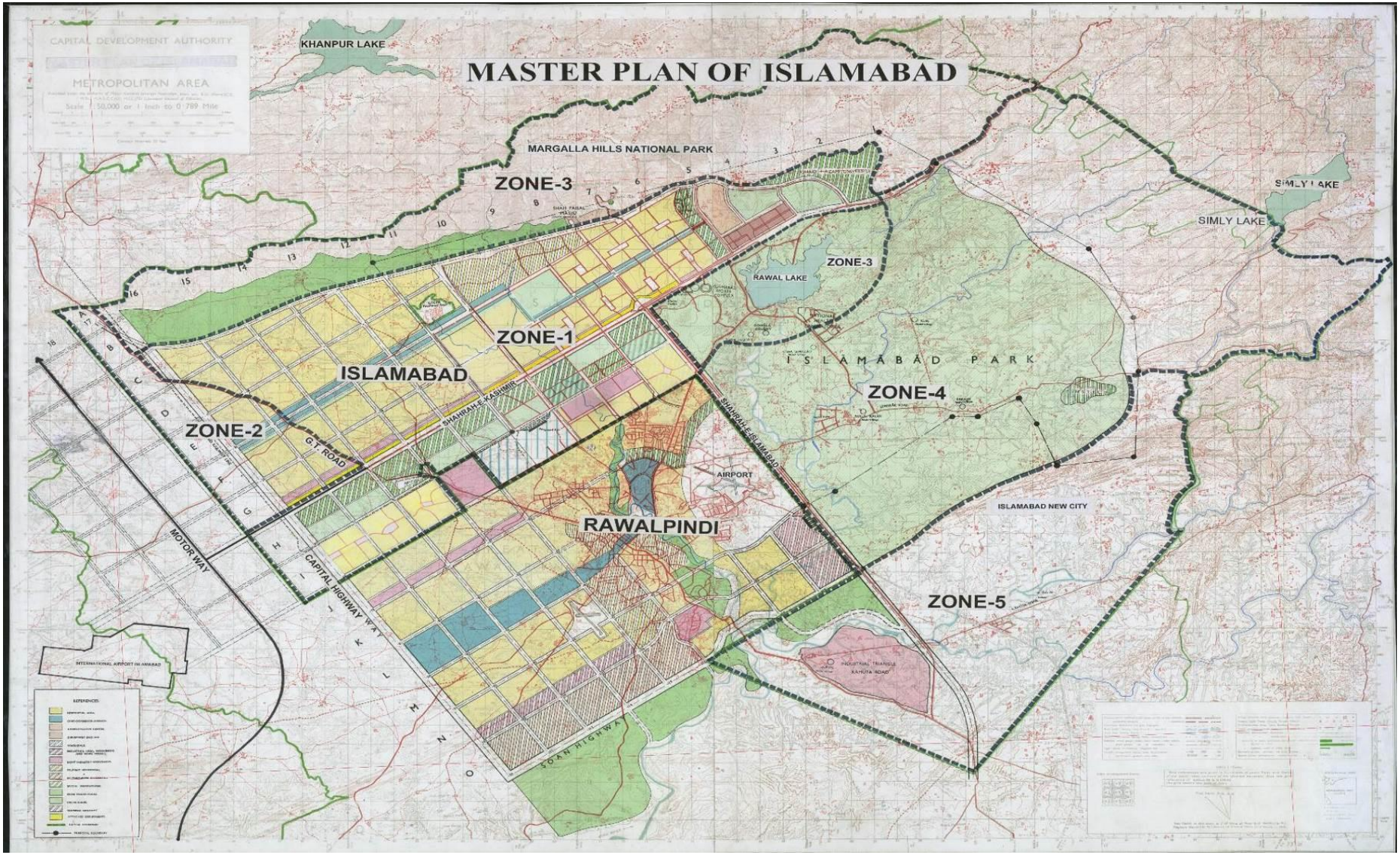
Islamabad is located at 33.43°N 73.04°E at the northern edge of the Potohar Plateau and at the foot of the Margalla Hills in Islamabad Capital Territory. Its elevation is 540 meters (1,770 ft.). The modern capital and the ancient Gakhar city of Rawalpindi stand side by side and are commonly referred to as the Twin Cities, where no exact boundary exists between the two cities.

To the northeast of the city lies the hill station of Murree and to the north lies the Haripur District of Khyber Pakhtunkhwa. Kahuta lies on the southeast, Taxila, Wah Cantt, and Attock District to the northwest, Gujar Khan, Rawat, and Mandrah on the southeast, and the metropolis of Rawalpindi to the south and southwest. Islamabad is located 120 kilometres (75 mi) SSW of Muzaffarabad, 185 kilometres (115 mi) east of Peshawar, 295 kilometres (183 mi) NNE of Lahore, and 300 kilometres (190 mi) WSW of Srinagar, the capital of Indian Kashmir.

The area of Islamabad is 906 square kilometres (350 sq. mi). A further 2,717 square kilometres (1,049 sq. mi) area is known as the Specified Area, with the Margalla Hills in the north and northeast. The southern portion of the city is an undulating plain. It is drained by the Kurang River, on which Rawal Dam is located.

The Blue Area is the commercial and business hub of Islamabad, Pakistan. It is called the "Blue Area" because it was represented in blue colour in the original design (master plan) of the planned city. The map of Islamabad has been provided in **Figure 5.1.**

Figure 5.1: Map of Islamabad



5.3 Physical Environment

5.3.1 Topography

Islamabad is located at the edge of the Potohar Plateau and at the foot of the Margalla Hills in Islamabad Capital Territory.

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 of varying thickness. A large part of the area is undulating, and at various places, it is badly dissected by gullies and ravines. The Korang 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. 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 km^2 area bounded by Kala Chitta and Margalla hills in the North and the Salt Range in the South, Indus River in the West and Jhelum River in the East. The plateau has the level to undulating topography with scattered gullies and gorges created through active water erosion.

The topography of Islamabad consists of plains and mountains. The northern part of the metropolitan area comprises mountains terrain of the Margalla Hills, and Rawal Lake lies in the northeast just below the hills. The southern portion of this city is an undulating plain drained by Korang River followed by its tributaries. Towards east is a relatively flat area with bare soil and settlements.

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 colour, mixed or alternating with its 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 ridges and valleys in the area are formed by alluvial deposits from the hills that that have been buried in the ridges of sandstone and covered by interbedded sandy silt and limestone gravel. Most of the urbanization in the region is primarily focused on the Piedmont bench area dissected more into south side. The southern area which comprises sandstone, mudstone and conglomerate of the Siwalik Group of Neogene to Pleistocene crop out along the many steep-sided stream valleys that dissect the land. The northern edge of which extends southwards is predominantly Piedmont bench. Landforms of the area can be further divided into land formed by erosion and landforms constructed by the deposition of sediments. Different soil types and landforms with a range of slopes and active geological processes may limit the suitability of the land for the various purpose.[3]

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.

[3] *DIGITAL ENVIRONMENTAL ATLAS OF ISLAMABAD:* Establishment of Geometric Centre for Climate Change and Sustainable Development Pakistan environmental Protection Agency Ministry of Climate Change

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.

Natural vegetation includes scrub, forest, and plantation which are about 38.15% in Islamabad in the year 2016. Bare soil covers more than 46%. The built-up area covers 15.14% of the total while water is only 0.44%.

Table 5.1: Temporal Variation of Land use

Sr. No	Class	Area in Percentages (%)			
		1990	2000	2010	2016
1	Permanent Vegetation	24.27	34.35	36.199	38.15
2	Urban Area	03.70	3.84	7.125	15.144
3	Bare Soil	71.42	61.34	56.2	46.26
4	Water	0.60	0.46	0.45	0.44

Source: *DIGITAL ENVIRONMENTAL ATLAS OF ISLAMABAD: Establishment of Geometric Centre for Climate Change and Sustainable Development Pakistan environmental Protection Agency Ministry of Climate Change*

5.3.4 Seismic Risk

Islamabad region can be divided into three major structural zones. The mountainous north including Margalla Hills is complexly folded and thrust along the Hazara Fault Zone. Southwards the mountains are a sloping piedmont bench that is truncated in sandstone and shale. The Soan River flows along the axis of Soan syncline. Islamabad lies just at the edge of Hazara Fault Zone that consists of an arc of thrusted and folded rocks about 25km wide and 150 km long that is convex to the south and extends west-southward away from the Himalayan syntaxis. There are many thrust sheets in Islamabad area, some of these thrust faults are in front of Margalla Hills which extends north of Fatehjang and form Kala Chita Range.

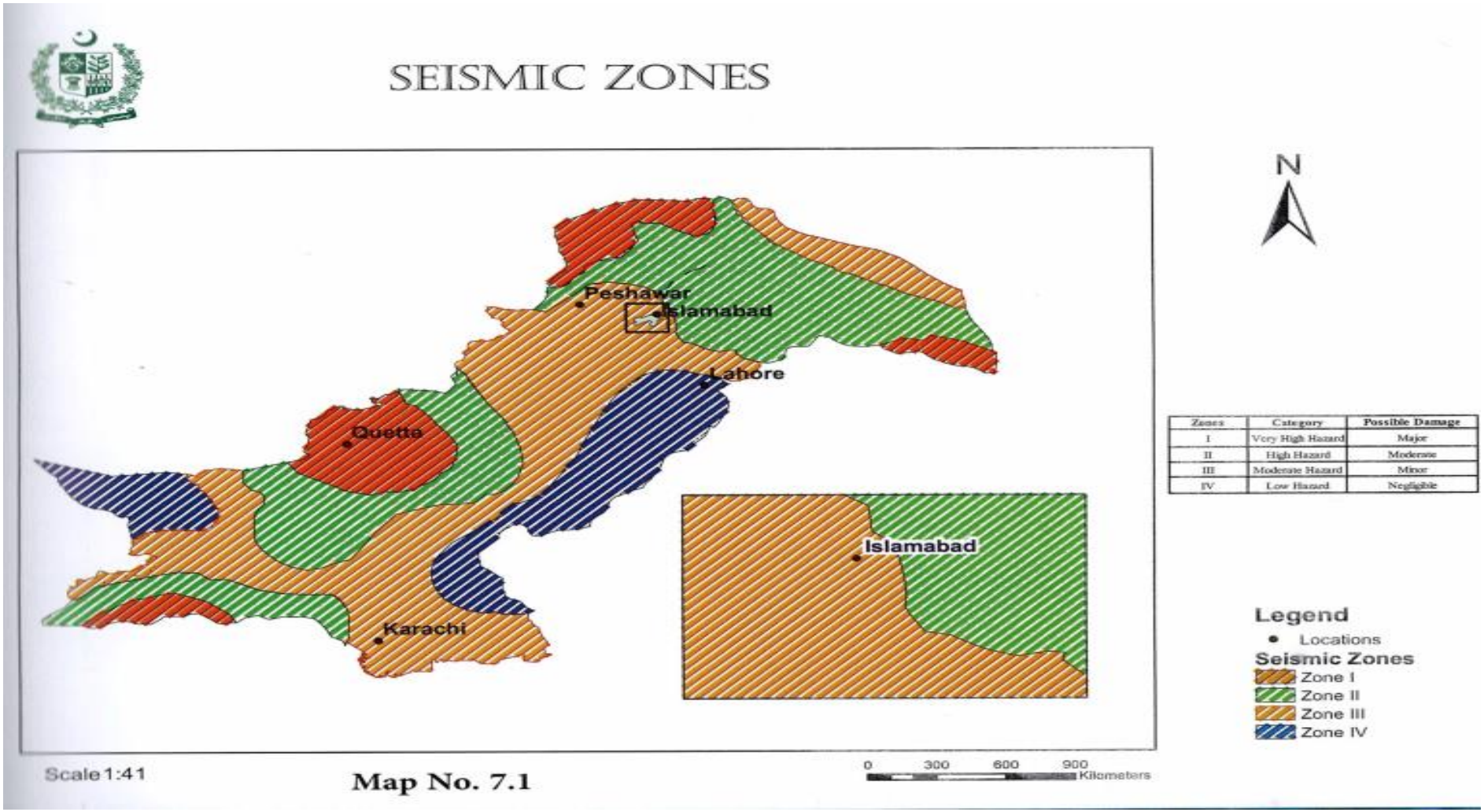
5.3.5 Major Earthquakes

The Islamabad region lies in a tectonically active zone, where earthquakes have been frequenting in the recent geological history due to faulting and folding of the structure. Geological past shows that there were many activities of earthquakes in the past in the region. The Soan syncline is an asymmetric, faulted fold of regional extent, plunging west-southward. Although earthquake shaking is not confined to areas near surface faults, the risk of surface rupture is greater where the surface has been broken previously. Earthquakes in 2005 (7.6 magnitudes) resulted in large area destruction in Islamabad. Repeated earthquakes have been hitting the area almost every year. [4]

The Seismic Map of Islamabad is given in **Figure 5.2**.

[4] *DIGITAL ENVIRONMENTAL ATLAS OF ISLAMABAD:* Establishment of Geometric Centre for Climate Change and Sustainable Development Pakistan environmental Protection Agency Ministry of Climate Change

Figure 5.2: Seismic Map of Islamabad



Source: *DIGITAL ENVIRONMENTAL ATLAS OF ISLAMABAD (2016):* Establishment of Geometric Centre for Climate Change and Sustainable Development Pakistan environmental Protection Agency Ministry of Climate Change

5.3.6 Surface Water

Rawal Lake is a man-made water reservoir, located across Korang River at a distance of about 10 km from Rawalpindi. The Soan and Korang Rivers are the main streams draining in Islamabad area. Their primary tributaries are the Ling River, draining northwestward into the Soan; Gumreh Kas, draining westward into the Korang from the area between the Korang and Soan, and Lei Nullah, draining southward into the Soan from the mountain front and urban areas. The Korang and Soan Rivers are dammed at Rawal and Simly Lakes, respectively, to supply water for the urban area. There is Nullah passing through Jinnah Avenue at the north-west of the project site.

5.3.7 Ground Water

Ground Water quality of the project site is good and used for drinking and other domestic purposes. The commercial area comprises various buildings have Municipal Water supply from CDA. The groundwater level ranges from approximately 65-85 ft. at the project area.

5.3.8 Traffic and Transportation

All major cities and towns are accessible through regular trains and bus services running mostly from the neighbouring city of Rawalpindi. Lahore and Peshawar are linked to Islamabad through a network of motorways which has resulted in a significant reduction in travelling times between these cities. M-2 Motorway is 367 km long and connects Islamabad and Lahore. M-1 Motorway connects Islamabad with Peshawar and is 155 km long. Islamabad is linked to Rawalpindi through the Faizabad Interchange; the cloverleaf interchange has a daily traffic volume of about 48,000 vehicles. Zero Point Interchange was completed in 2012; it is built at the intersection of Islamabad Highway, Kashmir Highway and Khayaban-e-Suharwardy.

5.3.9 Climate

Islamabad has distinct seasons marked by the wide variation in temperature. The climate remains very salubrious from April to October, but the winters get very cold due to snowfall. 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 ^{0}C to 46 ^{0}C. The coldest month is January when the mean maximum temperature is 18.3 ^{0}C and mean minimum is 3.8 ^{0}C.

From February to May the temperature rises at the rate of 5.0 ^{0}C per month. The highest temperature reached in May when the mean maximum temperature remains 39.1 ^{0}C.

The average daily wind speed is 3.78 km/h while average relative humidity remains 60.5%. Islamabad receives 114.57 mm rain on the 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 2012 is provided in **Table 5.2**.

Table 5.2: Mean Monthly Meteorological Data of Islamabad

Months	Rainfall (mm)	Humidity (%)	Mean Temp. (^{0}C)		Wind speed km/h	Wind direction
			Max.	Min.		
January	63.2	70	18.3	3.8	2.7	W
February	25.6	61	25.0	9.7	3.5	W
March	45.5	62	26.2	11.4	4.3	W
April	20.3	37	32.7	15.3	4.9	W

Months	Rainfall (mm)	Humidity (%)	Mean Temp. (^{0}C)		Wind speed km/h	Wind direction
			Max.	Min.		
May	62.9	36	39.1	23.0	4.8	SE
June	61.2	42	37.7	23.0	4.5	SE
July	550.9	70	34.6	24.0	4.5	SE
August	327.2	68	32.9	23.3	3.8	SE
September	13.9	63	33.7	20.5	3.8	Variable
October	55.9	64	31.3	15.9	3.1	SW
November	14.2	75	24.1	6.4	2.7	SW
December	134.1	78	18.3	4.1	2.8	W
Mean	114.57	60.5	29.49	15.03	3.78	Variable

Source: *Pakistan Meteorological Department, NAMC, Islamabad*

5.3.10 Ambient Air Quality and Noise Level Monitoring

The ambient air quality monitoring was conducted for National Environmental Quality Standards (NEQS) for Sulphur dioxide (SO_2), Oxide of Nitrogen (as NO), Oxide of Nitrogen (as NO_2), Ozone (O_3), Suspended Particulate Matter (as SPM), Respirable Particulate Matter (as PM_{10}), Respirable Particulate Matter (as $PM_{2.5}$), and Carbon Monoxide (CO) during 24 hours at the project site.

The noise level monitoring was conducted for 24 hours at the project site. The ambient air quality monitoring was carried out for 24h from September 15, 2023, 14:10 hrs to September 16, 2023, 13:10 hrs, were observed at the project site of Citadel 7 Building located at G-8, Blue Area Islamabad.

The GPS coordinates of ambient air quality and noise level monitoring location are 33°42'20.6"N 73°02'57.9"E. The ambient air quality and noise monitoring were carried out by EPA approved laboratory named Environmental Services Pakistan, ESPAK (www.espak.com.pk).

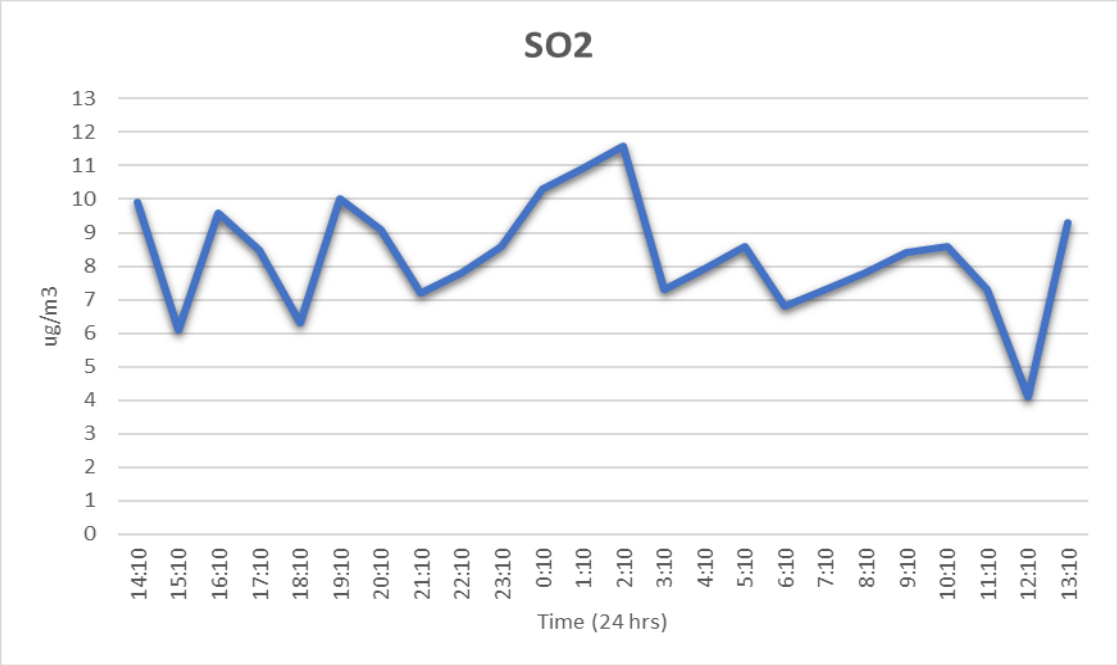
Ambient Air Quality Monitoring

Sulphur dioxide (SO_2): Sulphur dioxide (SO_2) is a colourless, poisonous gas with a strong odour. Coal and petroleum containing Sulphur compounds produce Sulphur dioxide after their combustion. It is one of the main contributors to acid rains because of oxidation of SO_2 in the presence of a catalyst such as NO_2 forms H_2SO_4. It irritates eyes, nose and throat. It may impair lung function and aggravate respiratory diseases.

The 24h average concentration of SO_2 at the monitoring site was 8.3 µg/m^3 which is in compliance with the NEQS (120 µg/m^3) of Pakistan.

The hourly variation graph shows that concentration of SO_2 varies between 11.6 µg/m^3 to 4.1 µg/m^3 during 24 hrs monitoring. This is due to the fact that there is no major industry near the project site.

Figure 5.3: Hourly Variation of Sulfur dioxide (SO_2) at the Project Site



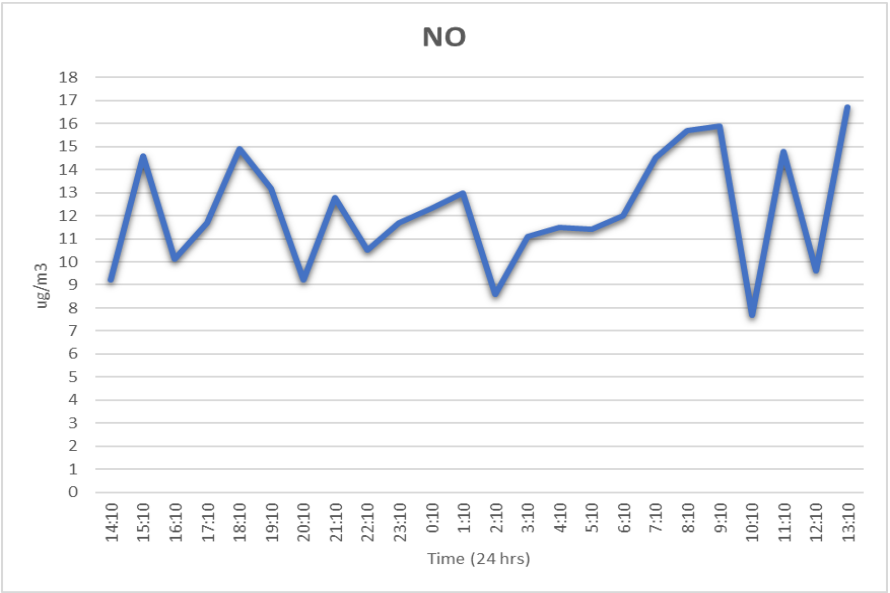
Nitrogen dioxide (NO): Nitric oxide (nitrogen oxide, nitrogen monoxide) is a molecular, chemical compound with a chemical formula of NO. One of several oxides of nitrogen, it is a colourless gas under standard conditions. It is also produced naturally by the extremely high air temperatures produced along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

Nitric oxide should not be confused with nitrous oxide (N_2O), an anaesthetic, or with nitrogen dioxide (NO_2), 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 (12.2 ųg/m^3) remained in compliance with NEQS (40 µg/m^3) at the ambient air quality monitoring site**.**

The highest concentration (16.7 ųg/m^3) of NO was observed from 12:10-13:10 h. The lowest concentration of NO was (7.7 ųg/m^3). The values kept on fluctuating, but all of them were within the NEQs limit (40 µg/m^3) so, the site is safe from NO toxicity.

Figure 5.4: Hourly Variation of Oxide of Nitrogen (as NO) at the Project Site



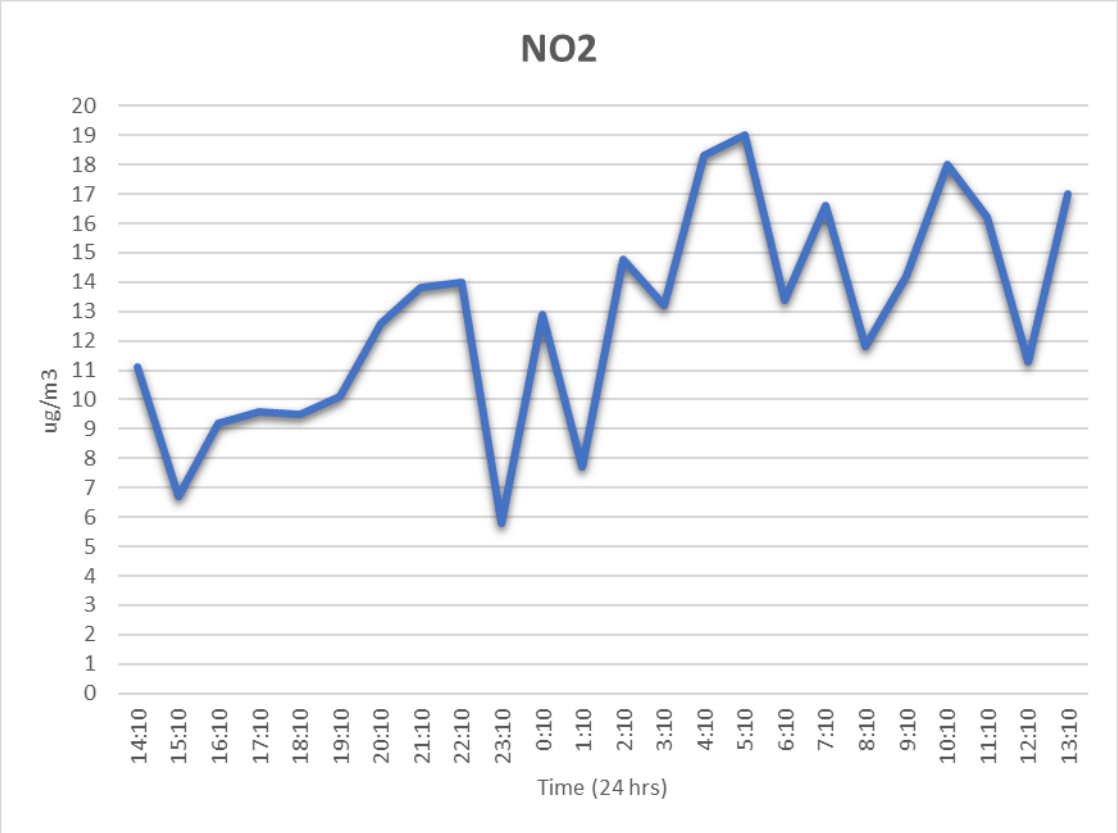
Nitrogen dioxide (NO_2): Nitrogen dioxide (NO_2) is a light brown gas that can become an important component of urban haze. It is likely that oxides of nitrogen are the second most abundant atmospheric contaminants in many cities, ranking next to Sulphur dioxide.

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 NO_2 (12.8 µg/m^3) remained within in compliance with NEQs (80 µg/m^3) at the ambient air quality monitoring site**.**

The highest hourly average concentration of Nitrogen dioxide was 19.0 µg/m^3 and the lowest concentration registered was 5.8 µg/m^3.

Figure 5.5: Hourly Variation of Oxide of Nitrogen (as NO_2) at the Project Site



Ozone (O_3): Ozone or tri-oxygen is an inorganic molecule with the chemical formula O_3. 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 averaged (24h) concentration of O_3 (39.5 µg/m^3) remained well within compliance limits of NEQS (120 µg/m^3) at the project site. Ozone is formed indirectly by the action of sunlight on nitrogen dioxide.

Particulate Matter: Particulate matter (PM) is solid matter from smoke, dust, fly ash, or condensing vapours that can remain suspended in the air for a long period of time. PM_{10} 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.

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 SPM is 448 µg/m^3, PM_{10} is 141 µg/m^3 and $PM_{2.5}$ is 29.6 µg/m^3, were in compliance with the NEQS that are 500 µg/m^3, 150 µg/m^3 , and 35 µg/m^3 respectively.

Figure 5.6: Hourly Variation of Respirable Particulate Matter (as PM_{10}) at Site

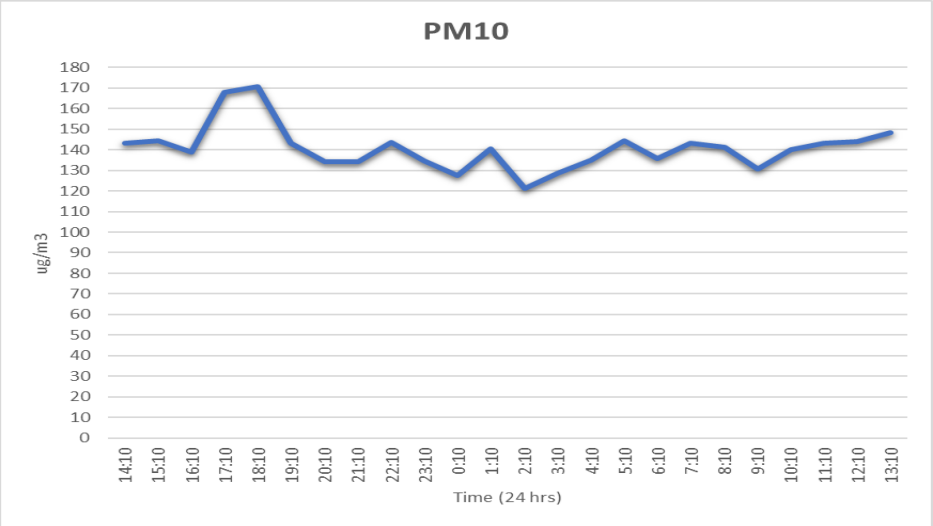


Figure 5.7: Hourly Variation of Respirable Particulate Matter (as $PM_{2.5}$) at the Project Site

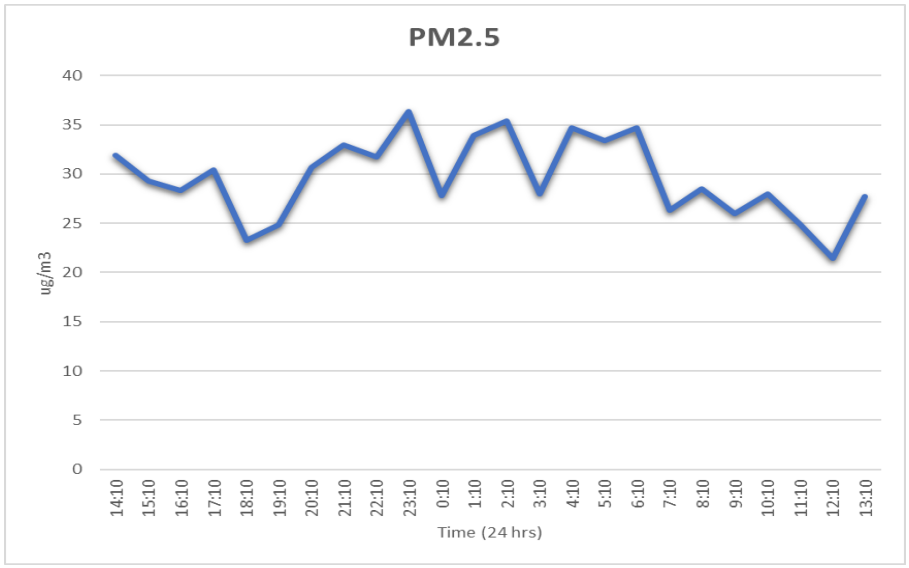
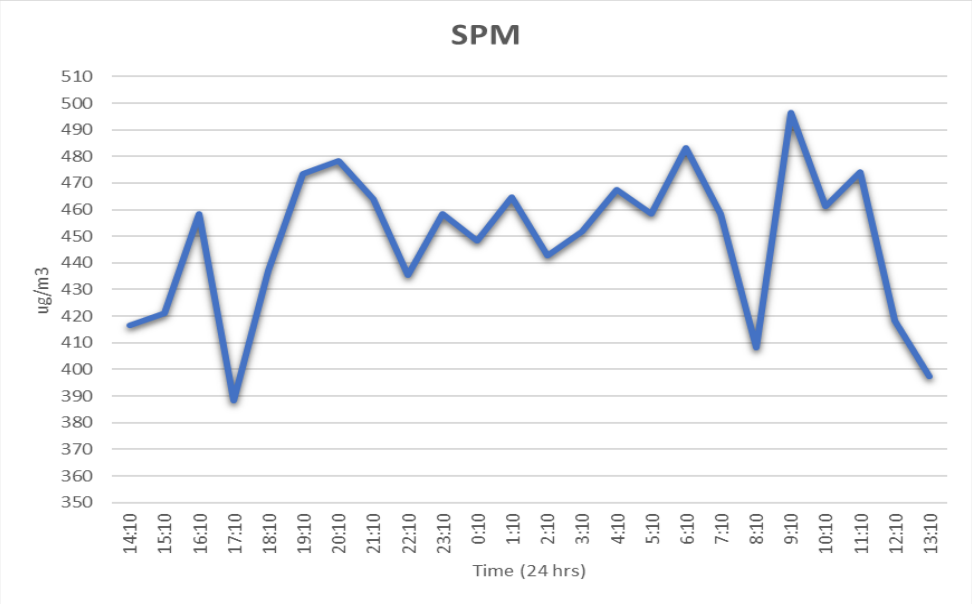


Figure 5.8: Hourly Variation of Suspended Particulate Matter at the Project Site



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 24h at the selected site. The 24h averaged value of CO was compared with NEQS for ambient air. The averaged concentration of CO at the project site was found to be 0.9mg/m^3 which is within the NEQS (i.e. 5mg/m^3) and is presented in

The SO_2, NO, NO_2, O_3, SPM, PM_{10} and $PM_{2.5}$ and CO concentrations meet the NEQS limits.

Therefore, it is concluded that presently there is no air pollution at the project site. Proper plantation around the site will help to maintain the air quality of the area in future.

Noise Level Monitoring

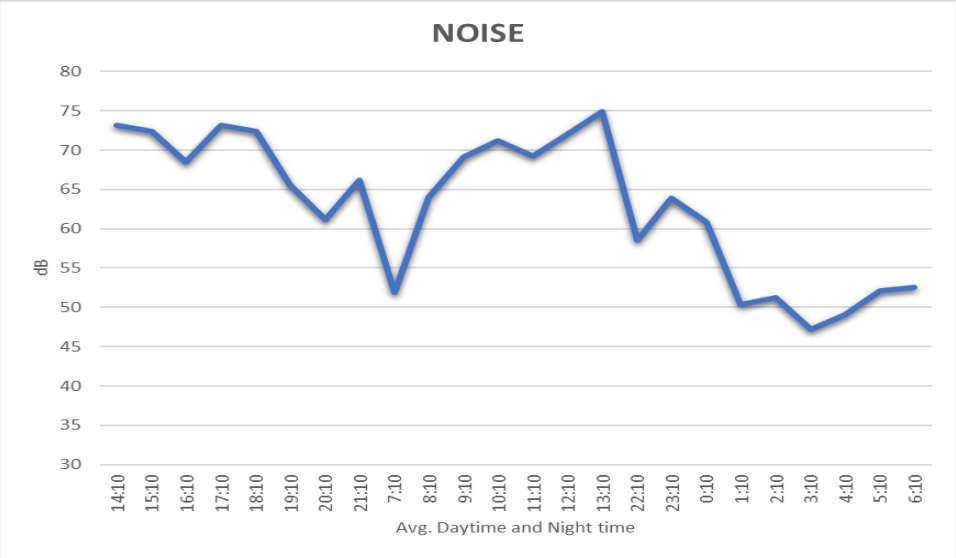
Ambient noise levels were also continuously recorded at the project site of Citadel 7 Building, G-8, Blue Area for 24 hours. The sound pressure level (dB) was frequency weighted on A-curve (dB (A)) and time weighted (dB (A) L_{eq}) on an hourly basis.

The 24-hour monitoring period for noise with a one-hour interval is divided into two periods, i.e., daytime hours and nighttime hours. Since the project site is located in commercial area, therefore, commercial area zone standard of NEQS was followed for comparison, and the commercial area standards are 65 dB (A) and 55 dB (A) for daytime and nighttime respectively.

The noise level data at the project site for daytime was 54.95 dB(A) and 48.07 dB (A) at night time. The average sound level was noted as 51.51 dB for the 24 hours period. Nonetheless, the daytime average noise level of 67 dB exceeds the recommended limit of 65 dB. Effective noise reduction strategies will be detailed in Chapter 7 to ensure that noise levels during the project's pre-construction, construction, and operational phases remain within acceptable boundaries. The Noise level measured at the project site was within commercial zone standards of NEQs.

The hourly noise variation throughout the day reveals that noise levels noise is low at around 22:00h to 06:00h and the maximum noise level is reached around morning at 14:00 to 16:00h. This variations in noise levels show that maximum noise level is due to the rush traffic hours at both Jinnah Avenue and Ibn-e-Sina Road in the morning.

Figure 5.9: Hourly Noise Variations at Project Site



The conclusion of ambient air quality and noise level monitoring

The time-averaged (24h) concentrations of SO_2, NO, NO_2, CO, O_3, PM $_{2.5}$, PM_{10} and SPM were found to be 8.3 µg/m^3, 12.2 µg/m^3, 12.8 µg/m^3, 0.9 mg/m^3, 39.5 µg/m^3, 29.6 µg/m^3, 141 µg/m^3 and 448 µg/m^3 respectively.

The laboratory report detailing the ambient air and noise level monitoring report is attached in **Annexure-6**.

The SO_2, NO, NO_2, O_3, PM_{10}, CO, $PM_{2.5}$, PM_{10}, and SPM concentrations meets the NEQS limits. A summary of ambient air quality and noise levels results are given in **Table 5.3** below:

Table 5.3: Summary of Ambient Air Quality and Noise Results at the Project Site

Parameter	Averaging Time		NEQS	Unit	Average Concentration at the Project Site
Sulphur dioxide (SO_2)	24 h		120	µg/m^3	8.3
Nitric Oxide (NO)	24 h		40	µg/m^3	12.2
Nitrogen dioxide (NO_2)	24 h		80	µg/m^3	12.8
Ozone (O_3)	24 h		120	µg/m^3	39.5
Suspended Particulate Matter (SPM)	24 h		500	µg/m^3	448
Particulate Matter (PM_{10})	24 h		150	µg/m^3	141
Particulate Matter ($PM_{2.5}$)	24 h		35	µg/m^3	29.6
Carbon monoxide (CO)	24 h		5	mg/m^3	0.9
Noise	Day-time (06:00 to 18:00)	12 h	65	dB(A)	67

Parameter	Averaging Time		NEQS	Unit	Average Concentration at the Project Site
	Night-time (19:00 to 05:00)	12 h	55		54

The noise level data at the project site for daytime was 54.95 dB(A) and 48.07 dB (A) at night time. The average sound level was noted as 51.51 dB for the 24 hours period. Nonetheless, the daytime average noise level of 67 dB exceeds the recommended limit of 65 dB

5.3.11 Water Quality Monitoring

A chemical analysis test of the surface water in the project site was conducted. The Ground water samples were collected on 15th September 2023 from electric pump and were received by the Environmental Services Pakistan on 16th September 2023 for analysis. All of the water quality parameters lie within permissible limits of NSDWQ 2016.

Table 5.4: Chemical Analysis of ground water at the project site

S. No	Parameters	Reference values	Concentration	Method/ Equipment Used	Remarks
1	pH*	6.5-8.5	7.2	SMWW 4500H+B	Within Limits
2	Total Dissolved Solids (TDS)*	<1000 mg/L	508 mg/L	SMWW 2540C	Within Limits
3	Chloride (as Cl^-) *	<250 mg/L	15 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	ND	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	ND	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	ND	U.S. EPA-200.7	Within Limits
11	Arsenic (As)	≤ 0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
12	Boron (B)	0.3 mg/L	ND	U.S. EPA-200.7	Within Limits
13	Barium (Ba)	0.7 mg/L	ND	U.S. EPA-200.7	Within Limits
14	Mercury (Hg)	≤ 0.001 mg/L	ND	U.S. EPA-200.7	Within Limits
15	Selenium (Se)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
16	Cyanide (CN^-)	≤ 0.05 mg/L	ND	SMWW 4500 CN^- F	Within Limits
17	Fluoride (F^-)	≤ 1.5 mg/L	0.5 mg/L	U.S. EPA-9214	Within Limits
18	Phenolic Compounds (as	0.1 mg/L	ND	SMWW 5530 C	Within Limits

	Phenols)				
27	Chlorine (Cl)	1.0 mg/L	ND	SMWW 4500 Cl B	Within Limits
28	Odor	Non objectionable/ Acceptable	Acceptable	Organoleptic	Within Limits
29	Lead (Pb)	0.5 mg/L	ND	U.S.EPA-200.7	Within Limits
30	Total Coliforms	----	ND	SMWW 9222 B	-----
31	E.coli	Must not be detectable in any100mL sample	ND	SMWWW 9222 H	Within Limits
32	Color	Less than or equal to 15 TCU	ND	SMWW 2120 C	Within Limits
33	Total Hardness as $CaCO_3$	Less than 500 mg/L	340 mg/L	SMWW 2340 C	Within Limits
34	Turbidity	Less than 5 NTU	ND	SMWW 2130B	Within Limits

5.4 Biological Environment

5.4.1 Flora

According to the Digital Environmental Atlas of Islamabad compiled by Pakistan Environmental Protection Agency, Ministry of Climate Change, for the analysis of vegetation and its variation over the years, Normalized Difference Vegetation Index (NDVI) for the year 1990, 2000, 2010 and 2016 were calculated showing the rise in the vegetation of Islamabad over the years. [5]

The vegetation of project area around 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 hysterophorous* (Gandi Booti) and *Ocimum bacilicum* (Niazbo) are predominant.

The plantation of the following trees, though of fewer incidences, is also found in and around Citadel 7 Building site:

Table 5.5: Flora in the vicinity of the project site

Sr.No	Local Name	Scientific Name	Quantity
1	*Poplar*	*Populus*	*15*
2	Darek	*Dalbergia sissoo*	*8*
3	Jacaranda	*Jacaranda mimosifolia*	*4*
4	Pine	*Pinus*	*13*

[5] *DIGITAL ENVIRONMENTAL ATLAS OF ISLAMABAD* (2016): Establishment of Geometric Centre for Climate Change and Sustainable Development Pakistan environmental Protection Agency Ministry of Climate Change

5.4.2 Fauna

In its original form, the Dry Subtropical Scrub Forest constituted the habitat of wild fauna consisting of a host of animals and birds. As the disturbance increased to a maximum level with complete inhabitation, wildlife abundance and diversity decreased to a minimum degree. Species still found include:

Mammals

Sr. No	Local Name	Scientific Name
1	Rat	*Rattus rattus*
2	Wild boar	*Sus sucrofa cristatus*
3	Porcupine	*Hystrix indica*

Birds

Sr. No	Local Name	Scientific Name
1	Quail	*Coturnix coturnix*
2	House Sparrow	*Passer domesticus*
3	House Crow	*Corvus splendons*

Reptiles

Sr. No	Local Name	Scientific Name
1	Monitor lizard	*Varanus bengalensis*
2	Spin tailed lizard	*Uromastix hardwickii*

The fauna of Islamabad has been provided in **Annexure-8.**

5.4.3 Protected Areas/National Sanctuaries

Located in the north of the Project site, at a distance of about 4 km is the Margalla Hills National Park which is the only *Protected Area*, in the vicinity.

Margalla Hills National Park is located in the foothills of the Himalayan range with numerous valleys and steep slopes in its rugged topography. The drainage area includes the river Korang and its tributaries, which flows into the river Soan. It is a unique wildlife sanctuary, being rich in Sino Himalayan fauna and flora.

Figure 5.1: Shows the pictorial presentation of vegetation at Citadel 7 Building Site in G-8, Blue Area Islamabad.

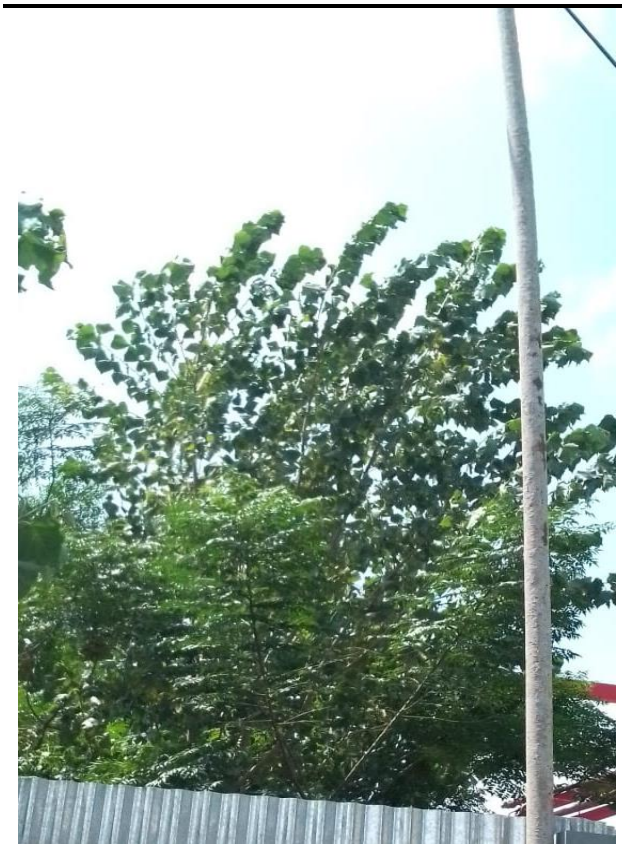


Exhibit 5.1: *Darek*

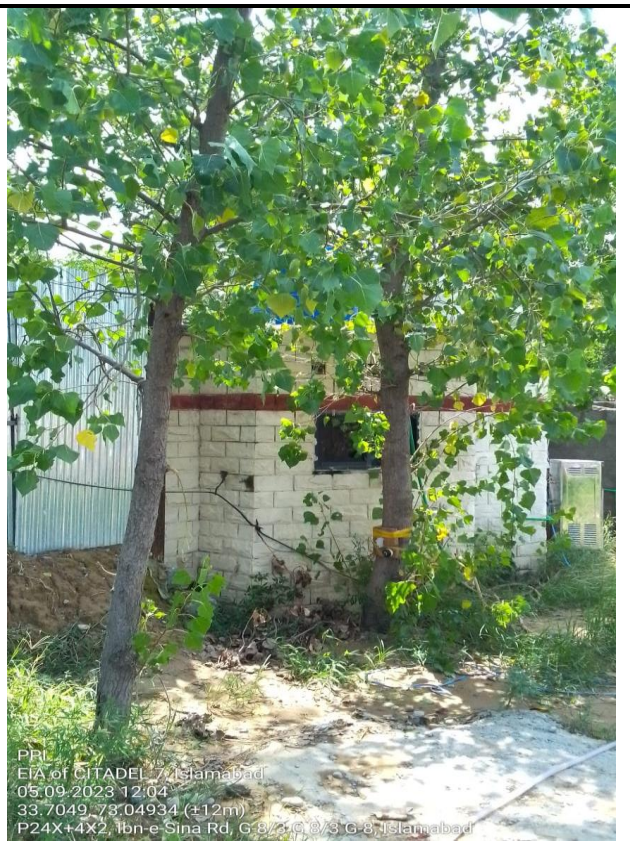


Exhibit 5.2: *Populus*

Exhibit 5.3: *Pine*

Exhibit 5.4: *Jacaranda*

5.5 Socio-Cultural Environment

This section provides a detailed discussion of the socio-economic and socio-cultural environment of the local community in the project area namely F-8/4, G-7/1, G-8/3 and G-7/2. This area may get direct positive or negative impacts from the construction of Citadel 7 Building Project. **Figure 5.12** shows the main environmental receptor within 1 km radius of the project site.

Figure 5.12: Project area Map of Citadel 7 Building Project

5.5.1 Pakistan Institute of Medical Sciences

Pakistan Institute of Medical Sciences (PIMS) is a research-oriented health sciences institute located in Islamabad, Pakistan. It is one of the region's leading tertiary level hospitals which include 22 medical and surgical specialist centres.

Established in 1985 the institute includes three semi-autonomous hospitals including the Islamabad Hospital spread over 3.5 hectares; the 230 Bedded Children's Hospital spread over 1.6 hectares and the 125 bedded Maternal & Child Health Care Centre.

The main objective of PIMS is to provide medical facilities to the community of Rawalpindi/Islamabad as a National Referral Hospital for Northern areas Azad Jammu and Kashmir NWFP and Northern area of Punjab. Also, Children's Hospital is an important component of PIMS. It caters to the need of primary health care for the whole area through preventive and curative approaches.

The Medical colleges and school affiliated with the institute are Quaid-e-Azam Postgraduate Medical College, Federal Medical & Dental College, College of Nursing, and School of Nursing.

PIMS provides medical training through the Quaid-e-Azam Postgraduate Medical College. The establishment of the Quaid-e-Azam Postgraduate Medical College is a milestone for the PIMS. It will help in meeting the deficiency of specialist doctors in the country. The objective of the College of Medical Technology is to train health workers in a properly equipped and adequately staffed residential institution.

The medical care departments of the institute are: Anesthesia, Blood Bank, Burn Center, Cardiology, Critical Care, Dentistry, Dermatology, Medicine, Gastroenterology, Gynecology, Neonatology, Nephrology, Neurology, Neurosurgery, Oncology, Ophthalmology, Pathology, Plastic Surgery, Psychiatry, Pulmonology, Radiology, Rheumatology, General Surgery, and Urology.

5.5.2 Shaheed Zulfiqar Ali Bhutto Medical University

Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU) Islamabad was established on 21st March 2013. The Pakistan Institute of Medical Sciences (PIMS) Islamabad is the constituent Hospital of Shaheed Zulfiqar Ali Bhutto Medical University.

Shaheed Zulfiqar Ali Bhutto Medical University offers structured Residency training programs in 32 disciplines of Medicine, Surgery & Dentistry. M. Phil. & Ph. D. programs in twelve disciplines of Basic Medical Science. The University is offering MBBS at its constituent college, i.e., Federal Medical & Dental College, Islamabad.

The University has College of Nursing, School of Nursing and College of Medical Technology where graduate and postgraduate courses offered viz. BSC(Nursing), MSC(Nursing), BS(MLT), BS Vision Sciences (optometry & orthoptics) etc.

6 Stakeholder Consultation

6.1 Approach to Public Consultation

The public consultation process with various stakeholders has been approached to involve public and other stakeholders from the earliest stages. 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.

Much of the public consultation process has revolved around concerns for the mitigation of construction stage impacts and possible traffic congestion on the Ibn-e-Sina Road and Jinnah Avenue during the operational phase of the project.

The stakeholders involved in the process were the project management of Chakor Ventures Private Limited, Elysium Tower, neighbouring buildings near the project site, Professors from different universities, roadside consultation at PIMS Metro Station and Shopkeepers of Centaurus Mall.

6.2 Objectives of Consultation

The overall objective of the consultation with stakeholders is to verify the environmental and social issues that have been presumed to arise and to identify those which are not known or are unique to the project.

The important general objectives of the consultation process are:

- Providing key project information to the stakeholders, and to solicit their views on the project's potential or perceived impacts,
- Identification of potential problems and needs,
- To devise the way for collaborative problem solving,
- Develop and maintain communication links between the project proponents and stakeholders, providing opportunities to the public to influence the project design in a positive manner, and
- Ensure that views and concerns of the stakeholders are incorporated into the project design and implementation with the objectives of reducing or offsetting negative impacts and enhancing benefits of the proposed project.

6.3 Categories of Stakeholders Contacted

Potential stakeholders for consultation and participation were identified, and discussions were held with the people living in the project area of impact, household women, college/university students, pedestrians, vendors and business/shop owners. Moreover, government and private employees, Public/private University Professors, national organizations, and local public representative were also contacted.

6.4 Major Stakeholders Involved

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 Citadel 7 Building Project site)
3	Government Organizations

4	Environment & Social Experts (Public and Private Institutes/Academia)
5	Grass-root stakeholder discussions

6.5 Scoping Session

During the public consultation process, both primary and secondary stakeholders were consulted. Consultation with the primary stakeholders was in the form of informal meetings and interviews.

The consultation with the secondary stakeholders was formal since most of them are government functionaries or professionals.

During these interviews, simple, non-technical description of the project was given, along with an overview of project's likely impacts on people and environment. Following the project description, a discussion was held so that people could voice their concern.

Generally, the community is aware of the proposed project of establishment of Citadel 7 Building and indicated their support as it will provide employment opportunity and enhance the socio-economic status of the area as well as of the country.

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 and
- Beneficial factors and involvement opportunities for the local people in the set of activities of Project.

6.7 Major Stakeholders and their Apprehensions

Meetings with major stakeholders were organized to discuss project specific issues and its potential impacts on the local and regional environment.

Stakeholders consulted, and their valuable suggestions and comments are described below:

Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
Mr. Omer Khitab, General Manager Chakor Ventures Private Limited	Citadel 7, G-8 Branch Sector G-8/1, Jhelum Road, Islamabad	▪ The plot for construction of Citadel 7 Building has been acquired from CDA under certain terms and conditions. The construction phase of the project will adhere to all health, safety and environment consideration. ▪ The mitigation measures proposed in the EIA Report will be followed to avoid any environmental and social degradation during the construction phase of the project. ▪ Chakor Ventures Private Limited gives importance to sustainable development, and we will adopt green and energy efficient technologies. ▪ The building should be constructed according to the National and International Standards to resist any natural calamity, and it will be sustainable.
Mr Aqeel Shahzad-Coordinator Elysium Tower Project, Oasis Developers, Islamabad Pakistan	Plot # 05, Jinnah Avenue Blue Area, F-8/G-8, Islamabad	▪ As the project site for Citadel 7 Building is adjacent to the Elysium Tower, so most of the scenarios associated with construction, operation and environmental issues are relatable. ▪ Construction materials such as sand, gravel, steel and cement should be transported during night time only. Furthermore, there is no difficulty in transportation of construction material as the project site is accessible through various roads. ▪ The excavated material from the project site should be dumped in consultation with CDA at their designated dumping site. ▪ The life safety signs should be placed in a project site during the construction phase to avoid any undesirable accident; the workers should be given training regarding health and safety and provided with Personal Protective Equipment's (PPEs). ▪ The environmental effects of the project are predicted to be negligible if the mitigation measures are followed. ▪ The water table of the project site is 60-65 ft. A temporary water supply connection has been obtained from CDA during the construction period. However, there is a need for utilization of groundwater as an alternate source of water for Citadel 7 Building. ▪ Prior to departing from the project site, it is essential to ensure that the tires of transportation vehicles are thoroughly cleaned. This precaution is necessary to preserve the visual appeal of Ibn-e-Sina Road, particularly during rainy seasons when mud can accumulate on the vehicle tires and negatively affect the road's aesthetics.
Dr Musharib Ali - Lecturer	National University of Sciences and	▪ Construction of high-rise building is necessary to fulfil the increasing commercial demand in urban areas. This kind of building provides more accommodation by

Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
NUST	Technology	occupying less space. We actually need to shift towards high rise buildings due to the reason that population of the country is dramatically increasing and available space in urban areas is already very less. ▪ Construction period should be short and multiple parallel activities should carried out so that environmental impacts of construction phase are minimized. ▪ Negative impacts during operational phase should be mitigated according to international standards, and new green and energy efficient technologies should be adopted in the Citadel 7 Building. ▪ Rooftop gardening should be part of the design of the building. The roof of the high rise building should be green, and the trend of vertical gardening should be implemented in order to have a more environmentally friendly approach and in this way the natural setting of greenery will be retained. ▪ Water resources in the urban areas are already limited, so wastewater treatment plant should be part of the project. The grey water generated by the building should be reused. Standard piping colour codes should be developed for water and wastewater treatment plants.
Mr Sher Afzal-Deputy Manager (Environment & Social) Islamabad Electric Supply Company Limited	IESCO- Head office, St # 40, G-7/4 Islamabad.	▪ High rise development projects are a part of the positive approach to catering for commercial and office needs of increasing population only if they are cost-effective. ▪ Islamabad's allowable power supply is roughly 1,200 MW. Commencement of this Project will add 2-3 MW of electricity, which will further increase the load on IESCO. To entertain more consumers, the government should increase the electrical supply quota of Islamabad. WAPDA should contribute to making new dams and increase hydropower supply. ▪ There is a shortage of electricity in the Blue Area so the Regional Office Building should not rely on a single source of energy. It is highly recommended to consider the mixed source or alternate energy sources. Even with low production, it will contribute to sharing the extra burden of electric supply shortages ▪ Building structure should be designed to resist maximum earthquake. Installation of private tubewell will further lower the water table in Islamabad. Treatment/ reuse of grey water should be carried out for landscape irrigation. And there should be pipe coding for the sewage and drainage system of the building. ▪ In Building design phase, green technologies should be incorporated. This feature will

Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
		reduce the carbon footprint and moreover, encourage other people to adopt environmentally friendly measures. Activities like rooftop plantation, rainwater harvesting, etc. should be added to the project in order to make it more sustainable. ▪ There should be proper plantation plan in order to compensate for environmental deterioration.
Mr Ahsan Ali- Marketing Manager-The Centaurus Mall, Islamabad	Mezzanine floor-The Centaurus Mall, Jinnah Avenue Islamabad	▪ The projects of the good quality vertical building are highly recommended for the sake of modern and developed Islamabad; it will contribute to the aesthetic beauty of the city and accommodate more people in less space. ▪ The project will accelerate economic activity, will provide quality office space for the business and corporate sector in the long term. ▪ The environmental impacts of the proposed projects are minimal, and there won't be any issue if the proper planning of projects activities can be done. A boundary wall should be constructed in order to avoid any noise and dust pollution in the surrounding area. ▪ There should be proper planning of everything; security measures should be implemented on priority basis. ▪ There will be a burden on the natural resources and supplies in the area such as gas, electricity and water. More occupancy will lead to more consumption of resources. So green and energy efficient technologies should be implemented.
Mr. Anwar Kamal Mr. Zulqarnain	Emergency & Disaster Management Directorate	▪ Emergency and Disaster Risk Management should be an integral part of the operational phase of the Project however; it should also be considered during the construction phase of the Project.
Mr. Waseem Khan	Gandhara Property	▪ The construction of high-rise buildings is a right strategy for solving housing/commercial space shortage in Islamabad. ▪ The maintenance charges by the developer should be reasonable and the building should be kept clean. ▪ There is a need for strong and robust Security System at the building with CCTV camera at important locations including parking area.

6.8 Consultation with the Communities

A series of roadside discussions were carried out with local communities in Ibn-e-Sina Road and Jinnah Avenue and Marketplaces to find out their opinion about the project.

The viewpoints of respondents are as follows:

- The operation of Citadel 7 will generate employment opportunity for local residents and business opportunity in the area. This will enhance the socio-economic uplift of the area.
- This kind of projects are very necessary for the development of the country, this project of Citadel 7 Building will fulfil the office space demand to some extent in the capital city of Islamabad.
- The project of Citadel 7 Building will have both positive and negative impacts, no doubt that the high-rise buildings accommodate more people in a smaller space but at the same time there will be a parking issue, and most importantly such kind of high rise building are more vulnerable to natural disasters such as an earthquake. As a result, there is a chance of more causalities as a result due to the fact that more people live in the same building.
- Pakistan is already facing many security threats such as terrorism and suicide attacks, this could also lead to more causalities, so proper security measures should be ensured in the building to avoid any harsh consequences.
- According to respondents, they are not socially or environmentally threatened by the project.
- The project may cause traffic congestion on Ibn-e-Sina Road, and PIMS hospital staff and patients may suffer during the construction and operational phase of the project.
- Construction activity should be avoided during nighttime.
- The dust suppression measures should be adopted such as water sprinkling of the project site. Similarly, other strategies for dealing with water and noise pollution should also be adopted.
- The project should not disturb the privacy of the local residents.
- People emphasized that proper mitigation measures should be implemented to control the water and solid waste pollution.

Figure 6.1: Pictorial Presentation of Public and Stakeholders Consultation for Citadel 7 Building Project

<table>
<tr><td> 
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<tr><td>Exhibit 6.1: Consultation with ELYSIUM Coordinator</td><td>Exhibit 6.2: Meeting with Site Engineer, Citadel 7, Islamabad</td></tr>
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<tr><td>Exhibit 6.3: Roadside Consultation in the vicinity of project site</td><td>Exhibit 6.4: Inquiring the views of students at near Metro Station.</td></tr>
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<tr><td>Exhibit 6.5: View of Roadside Consultation</td><td>Exhibit 6.6: Consultation with sweeper at Metro Station nearby Citadel 7 Building Project</td></tr>
</table>

Exhibit 6.9: Discussion with Security Guard of Centaurus

Exhibit 6.10: Consultation with shopkeeper at Centaurus Mall near the project site

Exhibit 6.11: Consultation with shopkeeper at Centaurus Mall near the project site

Exhibit 6.12: Consultation with shopkeeper at Centaurus Mall near the project site

6.9 Address of Concerns

Efforts have been made in the preparation of this Environmental Impact Assessment Report to address all the concerns raised by the stakeholders during the consultation meetings.

Proper management plans have been proposed in the relevant sections to deals with all the issues related to biodiversity conservation, management and disposal of solid waste, wastewater disposal and safeguarding interests of the local people.

7 Impact Assessment and Mitigation Measures

7.1 Introduction

This chapter provides screening of potential environmental impacts of the proposed project, discusses the stakeholders' views, assesses the significance of the potential impacts, and recommends mitigation measures to minimize if not eliminate the potentially adverse impacts of the proposed activities.

7.2 Impact Identification with Matrices

A Matrix has been prepared for the identification of different environmental impacts and their associated risks or benefits. The Matrix also presents the mitigation measures or environmental enhancement measures for the identified impacts and the change in risk after the mitigation techniques have been adopted.

7.2.1 Risk Assessment

The risk assessment of the project activities is carried out for all the negative impacts following the basic steps listed below:

- Identify the potential impact
- Assess the risk
- Apply the appropriate measure

Risk is assessed as the likelihood that the activity will have an effect on the environment as well as the consequence of the effect occurring. It is often described like this:

Risk = Likelihood X Consequence

The likelihood is further classified and relatively valued into Certain (5), Likely (4), Possible (3), Unlikely (2), Rare (1).

- Certain: Will undoubtedly happen/recur on a frequent basis.
- Likely: It will probably happen/recur, but it is not a persisting issue/circumstance.
- Possible: Might happen or recur occasionally
- Unlikely: Do not expect it to happen/recur, but it may do so.
- Rare: This will probably never happen/recur.

The consequence is further classified and relatively valued into Remarkable (5), Major (4), Moderate (3), Minor (2), and Insignificant (1).

- Remarkable: Impact on a larger area and highly sensitive receptors.
- Major: Impact on a large area and slightly sensitive receptors.
- Moderate: Impact on a small area with few receptors.
- Minor: Impact on a very small area with almost no receptors.
- Insignificant: Almost no impact.

Based on the classification and values, a risk analysis matrix has been developed and presented in **Table 7.1**.

Table 7.1: Risk Analysis Matrix

Likelihood	Consequence and Value				
	Remarkable (5)	Major (4)	Moderate (3)	Minor (2)	Insignificant (1)
Certain (5)	25	20	15	10	5
Likely (4)	20	16	12	8	4
Possible (3)	15	12	9	6	3
Unlikely (2)	10	8	6	4	2
Rare (1)	5	4	3	2	1

Based on the related values in Table 7.1 following risk impact categories are identified.

- Extreme Risk (score 20-25): require more intensive mitigation measures
- High Risk (score 10-19): Will have a large impact which requires specific mitigations
- Medium Risk (score 5-9): Will have a small impact that can be mitigated easily
- Low Risk (score 1-4): Professional judgment

7.2.2 Positive impacts

Positive impacts are also evaluated in the Matrix using the same methodology; however, a different color scheme is used.

Based on the classification and values, a positive impact analysis matrix has been developed and presented in **Table 7.2**.

Table 7.2: Positive Impact Analysis Matrix

Likelihood	Consequence and Value				
	Remarkable (5)	Major (4)	Moderate (3)	Minor (2)	Insignificant (1)
Certain (5)	25	20	15	10	5
Likely (4)	20	16	12	8	4
Possible (3)	15	12	9	6	3
Unlikely (2)	10	8	6	4	2
Rare (1)	5	4	3	2	1

Based on the related values in **Table 7.2** following positive impact categories are identified:

- Extremely Beneficial (score 20-25): Will add a lot of value to the local environment
- Highly Beneficial (score 10-19): Will have a large positive impact on the environment
- Medium (score 5-9): Will have a small positive impact
- Low (score 1-4): Will does not have any significant impact

Table 7.3: Environmental Screening Matrix of Citadel 7 Building Project

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking Mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
Pre-construction Phase Impacts								
Site Selection	Encroachment on historical/cultural values	1	3	3	Site selection has been made in a way to ensure no historical site in the Project site.	1	2	2
	Waste emissions relating to sitting	2	4	8	The project site comes under the jurisdiction of CDA. CDA will be responsible for the collection of solid waste.	1	3	3
	Resettlement	1	5	5	No resettlement shall be caused by the Project.	1	2	2
	Historical or Archaeological or religious Site	1	3	3	No Historical and Archeological site present at the project site.	1	2	2
	Disruption of Surface Water	2	4	8	There will be little to no impact on surface water in the Project area.	1	3	2
Site Preparation	Noise	5	3	15	Noise barriers around the construction site, along with mufflers (silencers) for vehicles and construction equipment to minimize noise.	4	2	8
	Dust generation	5	3	15	Additional water is to be applied for dust suppression during dry weather. Masks will be provided to all workers to reduce the health impacts caused by the inhalation of dust.	3	2	6
	Damage to natural vegetation	4	3	12	No tree will be cut due to the project.	2	2	4
Positive Impacts	Increase in population density	3	3	9	The proposed project provides commercial space at one location. This will decrease vehicle trip generation and promote population density.	4	4	16

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking Mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
	Increase in green cover	4	3	12	More than 4000 trees shall be planted in the project area.	5	4	20
Construction Phase Impacts								
Construction Works	Land Acquisition	2	3	6	The designated land of the proposed project already belongs to the proponent (M/s Chakor Ventures). Construction camps have been established on site.	2	2	4
	Visual Impact	2	3	6	Dust pollution shall be controlled with water sprinkling. Workers shall be provided with personal protective equipment to minimize the risks of adverse impacts of dust on workers and surrounding areas. These impacts would remain for only two years of the construction period.	2	2	4
	Soil Erosion and degradation	5	3	15	Minimal land clearing, levelling, and grading to reduce soil erosion. Construction of temporary reinforced walls to contain debris. Waste to be categorized and recycled.	3	2	6
	Air Quality Deterioration	5	3	15	Construction equipment to be well maintained to reduce exhaust emissions. Workers are to be provided with Personal Protective gear (e.g., masks). Water to be used for dust suppression.	3	2	8
	Loss of vegetation	5	3	15	Spiling of chemicals and other effluents on the soil shall be avoided. Tree plantation shall also be carried out.	3	2	6
	Damage to Wildlife	5	3	15	Measures to be taken to enhance natural vegetation and minimize impacts on the local bird population	3	2	6

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking Mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
	Noise and Vibration	4	3	12	Barriers to be constructed in sensitive areas. Night-time activities shall not be held unless unavoidable.	3	2	6
	Quarrying Hazards	3	4	12	Exposed soils are to be stabilized with mulch and grass to prevent hazards.	3	2	6
	Safety Hazard, Public Health, and Nuisance	5	3	15	EHS officer shall also monitor the construction crew and ensure the use of PPEs.	3	2	6
	Gender Issues	3	3	9	Campsite for construction shall be decided in consultation with the nearby housing schemes. Strict code of conduct shall be maintained by the construction crew. Local norms shall be respected.	3	2	6
	Child Labour	2	2	4	The provisions of the Child Labour Act shall be made part of the construction contracts to ensure that no child labour is employed at the Project site or campsite	1	1	1
	Traffic Congestion	3	4	12	Construction material shall be transported in the nighttime to avoid traffic congestion during the day.	3	2	6
Waste Disposal	Surface (and Groundwater) quality	4	3	12	Wastewater shall be properly drained into the nearest sewerage line.	3	2	6
	Solid Waste Disposal	4	4	16	Any solid waste generated during construction shall be recycled or disposed of at the nearest waste disposal site after consultation with nearby schemes.	2	3	6
	Waste Effluent Disposal	4	4	16	Waste effluent generated from the septic tank shall be properly drained into the nearest sewerage line on the site.	3	3	9

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking Mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
Positive impact	Job opportunities	4	4	16	Training shall be arranged to hire a local crew for the Project.	5	4	20
Operational Phase Impacts								
Operation of the Citadel	Air Quality	3	5	15	Vehicular Traffic will emit pollutants that will be reduced by scheduled testing of vehicles.	2	4	8
	Safety Hazard, Public Health & Nuisance	4	4	16	To ensure safe operations at Citadel 7 Building, Signboards will be placed at important locations.	3	3	9
	Noise	4	3	12	Dense canopy trees shall be planted to provide shade and absorb the generated noise.	3	3	9
	Wastewater	4	3	12	Wastewater shall be properly treated in a CDA sewerage line.	3	2	6
	Traffic congestion	3	3	9	Defensive and best driving practices shall be inculcated.	2	2	4
	Monitoring	5	3	15	Monthly/Quarterly monitoring reports shall be submitted to the Pak EPA after obtaining conditional environmental approval.	3	2	6
	Solid waste disposal	4	4	16	Solid waste shall be handed over to CDA for disposal.	3	3	9
Positive impact	Employment	4	4	16	The project will generate a large number of local jobs and provide various services to the local people.	5	4	20

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking Mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
	Safety and Security	4	4	16	Smart building management measures shall be adopted to improve safety and security.	5	4	20
	Reduction of waste	4	4	16	Proper waste management practices shall reduce the amount of waste.	4	5	20
	Business opportunities	4	3	12	Citadel 7 shall give rise to small, medium to large scale businesses.	4	4	16

7.3 Community and Stakeholders' View

As discussed in chapter 6, a public consultation was held with the community and stakeholders regarding their comments and suggestion on the construction of Citadel 7 Building, G-8 Islamabad. The views of the stakeholders are listed below:

- Mitigation measures should be adopted to control dust and noise pollution that may arise during the construction phase of the proposed project, and Environmental Management Plan should be strictly followed.
- People emphasized that proper mitigation measures should be implemented to control the water and solid waste pollution.
- The project will create jobs for many people. There are many jobless people nowadays. The need for any kind of developmental projects to cope with this situation is evident.

An attempt has been made to address the above issues as much as possible in the EIA of Citadel 7 Building Project.

7.4 Environmental Impact Characterization

During the environmental impact assessment process of Citadel 7 Building project, 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 7.4: Impact Characterization of Citadel 7 Building Project

Categories	Characteristics
Nature	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes as a result of a 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 the clearing of the campsite, contamination of soil or water by fuels or oil. Long-term: Lasting for a period much greater than medium-term impact before naturally reverting to the original condition such as loss of soil due to soil erosion.
Geographical extent	Local, regional (spatial dimension)

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

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:

7.5 Pre-Construction/Design Phase Impacts

7.5.1 Project Siting Impacts

The impacts associated with the project sitting are those which relate to its location at (G-8) Blue Area, Islamabad 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

- The project site, land use and design
- Visual Impacts

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

Project Site, Land Use, and Design

The project site of Citadel 7 Building Project should be in line with the Master Plan of Islamabad for commercial buildings. The land use and design should be in accordance with the building codes and bye-laws of CDA for the construction of high-rise buildings in Islamabad.

The design of Citadel 7 Building Project should be able to withstand the risks due to seismic activity, and necessary arrangements are in place for health and safety of the occupants. The project will increase the energy consumption and will put the burden on the already existing energy crisis in the country.

The unmitigated impact associated with not following the Master Plan of Islamabad or its design does not meet the minimum requirement of CDA for construction of high rise building 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: According to Master Plan of Islamabad, Blue Area is reserved for construction of high-rise commercial area. Therefore, the project site is located in the designated commercial area of Islamabad.

Land Use: The land use of Citadel 7 Building Project will be in accordance with the CDA Building bye-laws. The land use plan of Citadel 7 Building Project will be approved by CDA.

Design: The proposed structure of Citadel 7 Building Project will be in accordance with existing building bylaws, and its design will be approved by CDA. The following mitigation measures are proposed for earthquake and firefighting:

- The Building Bye-Laws and Codes of CDA will be strictly adopted.
- Complete equipment control system, fire escape stairs and secured access system supplemented with close circuit surveillance equipment/alarms will be included in the design of the building.
- Adequate internal and external water distribution system will be designed, with standby system for sufficient water, which could also supply adequate quantity for firefighting.
- Adequate space will be provided for parking firefighting vehicle at the front and back side of the Citadel 7 Building. The designated space will be able to withstand the load of firefighting vehicle which is 30-40 tons.
- Sufficient access points should be provided for access of firefighting staff to enter into Citadel 7 Building.

- Provision for pumping out water from the basement will be kept, to meet any emergency in case of water flooding the basement.
- Adequate water storage for firefighting will be provided in the building. The pumps for firefighting will maintain a constant pressure in the system.
- Standpipes, connected with fire pumps, will be provided in the building with fire hose cabinets on each floor. Each cabinet will house one 1.5 diameter hose of 100 ft. the length and attached to a gate valve of the same diameter.
- Orifice plates will be provided at the hose cabinets to control pressure at required level as per manufacturer's requirements.

Visual Impacts

The Citadel 7 Building Project 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 has been minimized at different levels, as described below:

- First of all, the design of the sector should be adopted in a manner that minimizes the changes in the topography, landscape and damage to the natural vegetation.
- A plantation plan has been proposed for Citadel 7 Project which should be followed.
- Certain areas must be marked and left untouched to preserve natural vegetation.

Residual Impacts

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

7.5.2 Shadow Analysis

Need for the Shadow Analysis: The proposed project would result in a new building reaching approximately 293 feet in height including rooftop in the blue area which is dedicated to the construction of large/multi-story buildings. Shadow Studies illustrate the impact of development in terms of sun and daylight access to the surrounding context including surrounding buildings, the public realm, public and private open space.

Shadow Studies may be required in support of development applications to demonstrate that the location and height of a proposed building if greater than 10.7m,[6] will not cause undue shade on the subject lands, and on surrounding context including building facades, private and public outdoor amenity and open spaces, public parkland, sidewalks and other components of the public realm. The proposed building is planned to be 18 stories above ground level.

[6] Standards for shadow studies

Therefore, it's intended to examine whether the proposed building would cast shadows on any publicly accessible sunlight-sensitive resources and assesses the potential effects of any such shadows.

Sun Light Sensitive Resources: Sunlight-sensitive resources are those resources that depend on sunlight or for which direct sunlight is necessary to maintain the resource's usability or architectural integrity. Following are the general classes of the shadow sensitive areas:

- Public open space (e.g. parks, beaches, playgrounds, plazas, schoolyards, greenways, landscaped medians with seating).
- Features of architectural resources that depend on sunlight for their enjoyment by the public. Only the sunlight-sensitive features need be considered, as opposed to the entire resource. Such sunlight-sensitive features might include: design elements that depend on the contrast between light and dark (e.g. recessed balconies, arcades, deep window reveals); elaborate, highly carved ornamentation; stained glass windows; historic landscapes and scenic landmarks; and features for which the effect of direct sunlight is described as playing a significant role in the structure's importance as a historic landmark.
- Natural resources where the introduction of shadows could alter the resource's condition or microclimate. Such resources could include surface water bodies, wetlands, or designated resources such as coastal fish and wildlife habitats. There is no such resource located within the proximity of the buildings leading to adverse impacts of the shadow on these resources.

Non-Sunlight-Sensitive Resources: Non-sunlight-sensitive resources include:

- Sector streets and sidewalks (except green belts located around side the roads as well as buildings);
- Private open space (e.g. front and back yards, stoops, vacant lots, and any private, non- publicly accessible open space);
- Project-generated open space cannot experience a significant adverse shadow impact from the project because without the project the open space would not exist.

Significant Adverse Shadow Impact: Any building puts adverse shadow impacts on its surroundings when its shadow falls on sunlight sensitive resources and reduces/ eliminates the provision of direct sunlight, thereby significantly changing the public use of the resources or threatening the flora or other resources. For the proposed development each case will be thoroughly investigated based on the extent of the incremental shadow and the analysis of the resource sensitivity.

Shadow impacts from proposed developments should not exceed one hour in duration on the roofs, front, rear and exterior side walls of adjacent low rise (one to four stories) residential buildings including townhouses, detached and semi-detached dwellings. The line of impact assessment shall be a line at grade, 3m from the front, rear and exterior side wall of the adjacent low rise residential building. This criterion is met if there is shadow impact for no more than two consecutive hourly test times in the "No Impact Zone," i.e. the space between the front, rear and exterior side walls of the adjacent low-rise residential buildings and the respective lines of impact assessment.

Figure 7.1: Sun angle for Summer Solstice, 21st June 2023

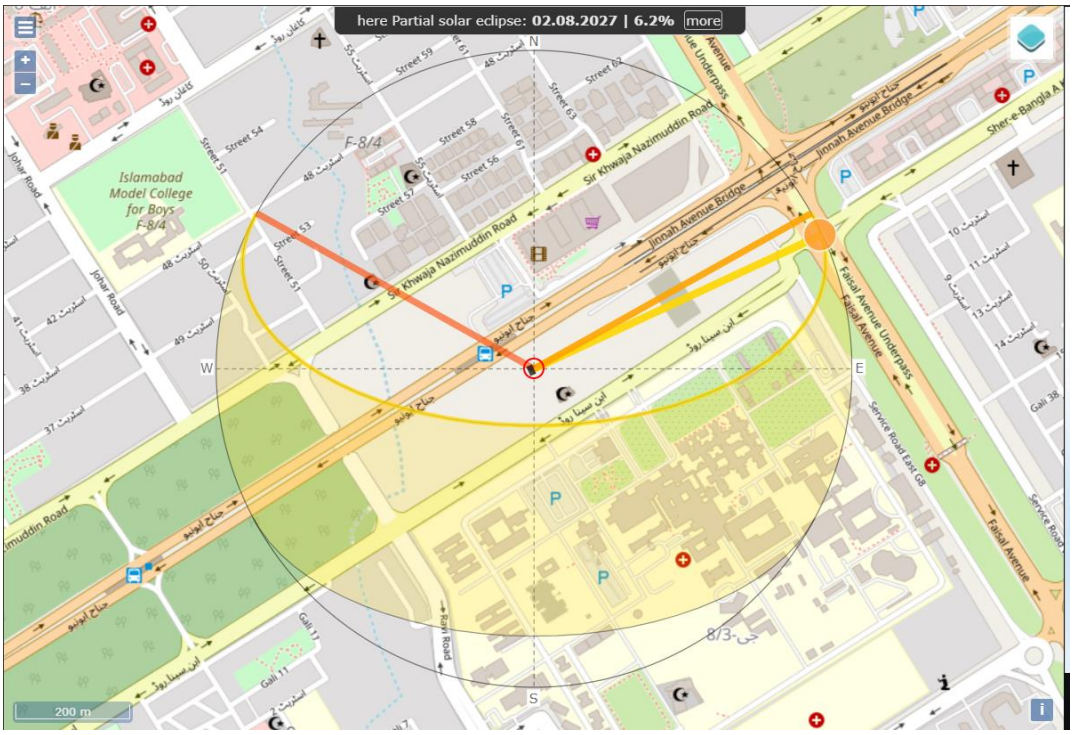
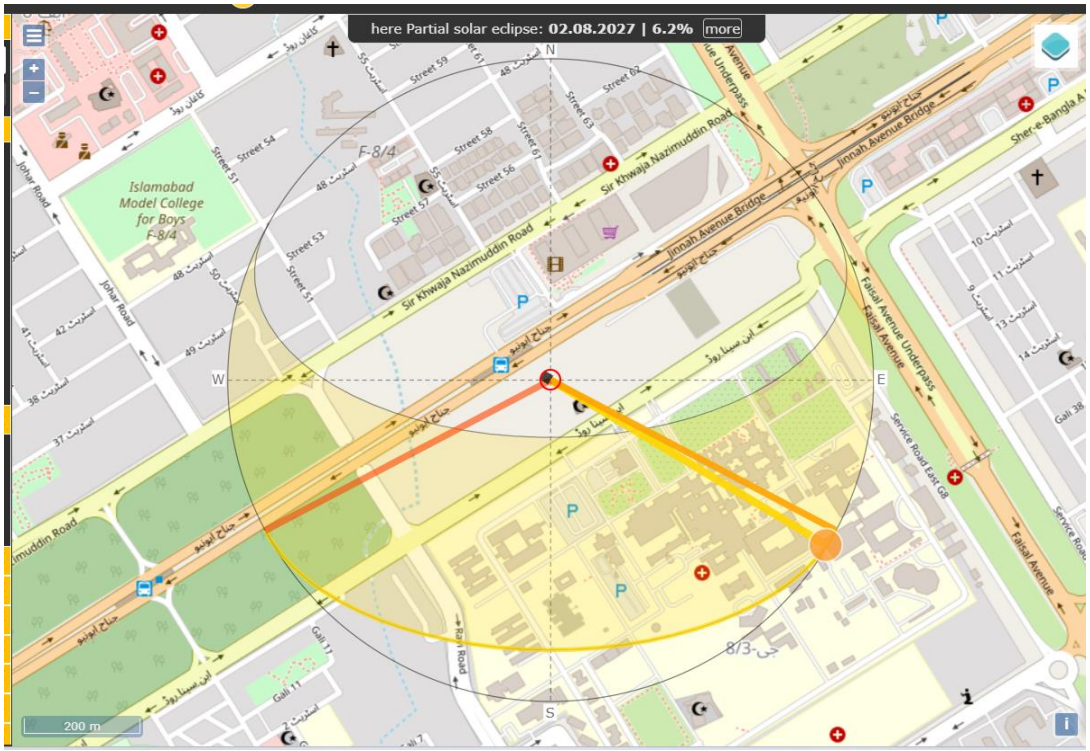


Figure 7.2: Sun angle for Winter Solstice, 21st December 2023



Shadow Length

Using sun angle, a degree from the north and altitude, the SLF is calculated and is as follows:

Table 7.5: Liner Shadow length-June 21, 2023

Local Time (GMT +5.0)	Azimuth (deg. from N)	Altitude (deg.)	Shadow Length(m)
6:00	69.00°	10.99°	458.36
6:30	72.66°	16.85°	293.82
7:00	76.22°	22.85°	211.25
7:30	79.76°	28.94°	160.98
8:00	83.35°	35.10°	126.63
8:30	87.10°	41.31°	101.27
9:00	91.18°	47.54°	81.43
9:30	95.81°	53.77°	65.22
10:00	101.40°	59.93°	51.53
10:30	108.75°	65.95°	39.71
11:00	119.49°	71.66°	29.51
11:30	137.31°	76.58°	21.24
12:00	167.90°	79.53°	16.45
12:30	204.92°	78.80°	17.62
13:00	230.38°	74.92°	23.98
13:30	245.00°	69.63°	33.05
14:00	254.22°	63.78°	43.83
14:30	260.79°	57.69°	56.28
15:00	265.97°	51.50°	70.8
15:30	270.36°	45.27°	88.18
16:00	274.30°	39.04°	109.75
16:30	277.98°	32.84°	137.88
17:00	281.54°	26.70°	176.93
17:30	285.08°	20.64°	236.23
18:00	288.67°	14.69°	339.41
18:30	292.38°	8.89°	569.01

Figure 7.3: Shadow length over different times of day for June 21

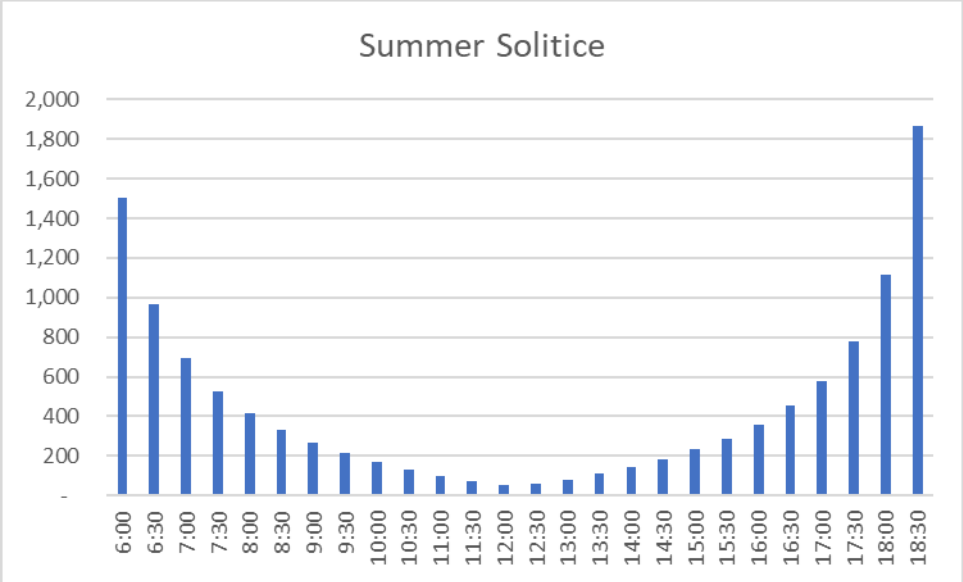
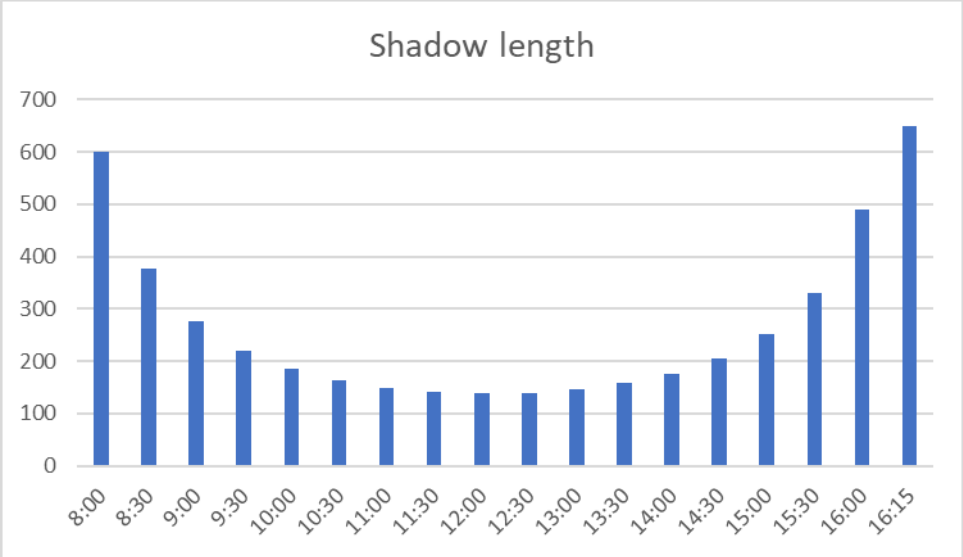


Table 7.6: Liner Shadow length-December 21

Local Time (GMT +5.0)	Azimuth (deg. from N)	Altitude(Deg)	Shadow Length (m)
08:00	125.51°	8.43°	600.63
08:30	130.40°	13.31°	376.19
09:00	135.75°	17.85°	276.38
09:30	141.61°	21.96°	220.73
10:00	148.02°	25.55°	186.18
10:30	154.98°	28.52°	163.75
11:00	162.45°	30.79°	149.37
11:30	170.33°	32.26°	141.03
12:00	178.46°	32.86°	137.76
12:30	186.63°	32.59°	139.23
13:00	194.63°	31.44°	145.60
13:30	202.27°	29.46°	157.55
14:00	209.43°	26.74°	176.62
14:30	216.05°	23.37°	205.92
15:00	222.11°	19.45°	252.04
15:30	227.64°	15.06°	330.75
16:00	232.70°	10.30°	489.88
16:15	235.07°	7.80°	649.47

Figure 7.4: Shadow length over different times of day for December 21



Assessment Findings and Mitigation Measures for Shadow

Assessment Findings: Shadows are resulting from Citadel 7 Project to be considered because of its height. The project is 18 story above the ground level including ground floor so, the sun rises during the morning will cast low shadows on the west, but with time, the shadow of the proposed building would increase and will fall on the buildings towards northwest and east.

Following inferences might be drawn from the Shadow Analysis.

- In June, at 6:00 "O" Clock in the morning, the shadow of the proposed building will be in a **North-West** direction extending to **458 m** long. However, on performing screening assessment, it was found that there is no light-sensitive area. Beside this, it's early morning and sunlight is not required. The length of the shadow falls on Jinnah Avenue from 9:00 am to 3:00 am.
- The Building will see caste longest shadows in December in **North-East** side. The shadow length will be **649 m** at 16:15 hr and will fall on the Jinnah Avenue and car parking area of Centaurus Mall for half an hour. However, No light-sensitive body has been found on screening assessment under the range of the building shadow. The shadow will fall on roads for the rest of the day.

7.6 Construction Phase Impacts

The 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 community. Such impacts include the following:

Physical Environment

- Soil degradation and contamination
- Air quality deterioration
- Surface and groundwater contamination

- Solid Waste Management

Biological Environment

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

Social Environment

- Compensation for 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:

7.6.1 Soil Degradation and Contamination

The soil-related issues include soil erosion, slope stability, and soil contamination. These may be caused by the land clearing, levelling 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.

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, levelling and grading be minimized and carried out in a manner to minimize soil erosion.
- Good management of topsoil should be done to prevent the loss of soil fertility.
- Excavated slopes will not be left untreated/unattended for long durations. 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 Islamabad.
- Vehicles and equipment will not be repaired at the project site. If 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 (if any) 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.) will 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 will be marked.
- Domestic solid waste will be disposed of in a manner that does not cause soil contamination/water contamination.

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'.

7.6.2 Air Quality Deterioration

Construction machinery and project vehicles will release exhaust emissions, containing Carbon Monoxide (CO), Oxides of Sulfur (SOx), Oxides of Nitrogen (NO_x) and Particulate Matter (PM).

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.

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 emission 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.

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.

7.6.3 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.
- Noise monitoring will be done at the project site, and if found more than 55 dBA, appropriate sound reduction mechanism (such as a noise barrier) will be put in place.
- 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.

7.6.4 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
- Campsite 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

The mitigation measures recommended to forestall 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.

7.6.5 Loss of Vegetation

The project area has limited vegetation cover. Construction crew can also indulge in tree/shrub cutting to obtain fuelwood 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 follows mitigation measures will further minimize any negative impacts on the floral resources of the area:

- Endeavours will be made to compensate for the loss by enhancing the environment, through a plantation of trees and ornamental plants.
- A plantation plan for Citadel 7 Building Project has been prepared. The plan has a mix of appropriate trees/bushes which will be raised within the available open spaces within the premises of Citadel 7 Building Project.
- 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.
- 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.
- The construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuelwood will not be allowed at the contractor camp.

Residual Impact

The trees planted under the plantation plan will take some time to grow and mature. Therefore, there will be some reduction of vegetation cover in the area. However, no vegetation will be possible in 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 be more than compensate for any vegetation loss.

7.6.6 Damage to Wildlife

The project site is located in a commercial area of Islamabad, which provides less and minor 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. Similarly, natural population of wild boar, also considered a pest, is maximum due to lack of predators in the project area.

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.
- Special measures will be adopted to minimize impacts on birds, such as avoiding noise-generating activities.
- Solid waste from the contractor's camp and construction waste will not be left in the open and be disposed of properly.
- The measures to restore natural vegetation loss in the area will benefit the area's fauna as well.
- The project staff will not be allowed to indulge in any hunting or trapping activities.
- Illumination levels at the site will 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.
- 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 boon to maintain ecological balance.
- Developmental activities and establishment of the project site would be a positive step to keep down the number of this undesirable species at the desirable level from the 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.

7.6.7 Disposal of Construction Waste/Excavated Material

Dumping of construction wastes/excavated material, in the surrounding area, may limit the use of land in the project area. The solid waste may be generated due to different construction activities, and it will mainly include surplus excavated and construction material. It may also be generated from the construction camp.

The indiscriminate disposal of solid waste may cause dust emissions due to the wind blowing thereby affecting the health of the workers working or passing in the immediate vicinity of solid waste heaps. The impacts of solid waste would be temporary and minor negative in nature.

The unmitigated impacts of the proposed activities 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:	Moderate

Mitigation Measures

- Management of construction activities will be done in a way to ensure minimal degradation to the soil around the project site
- Dumping of excavated waste and waste generated from the construction camp will be done at a designated site approved by CDA.
- The contractors will be bound by contractual obligations to take care of the waste generated from the construction activities.

7.6.8 Traffic Management

During the construction phase, the movement of heavy machinery and transportation of construction material and equipment may cause traffic problems. As a result, the daily activities of the people of nearby localities as well as the traffic on Ibn- e-Sina Road may be disturbed, which will require proper mitigation measures. This impact is temporary and minor negative in nature.

Mitigation Measures

- A traffic management plan has been prepared to avoid traffic jams/public inconvenience.
- Movement of vehicles carrying construction materials will be restricted during the night time to reduce traffic load and inconvenience to the local residents.
- The management is required to maintain liaison between the Traffic Police, local residents/ travellers and the contractor to facilitate traffic movement during the construction stage.

7.6.9 Safety Hazards, Public Health and Nuisance

The project is located close to the PIMS hospital may pose some safety hazards to the local population and pose a varying degree of a safety hazard.

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:

Dust and Pollen Allergy: One of the main problem people are facing here is of dust and pollen allergy.

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 community may be affected due to disturbances created by the project activities. Mitigation measures for workers include the devotion to standards regarding working conditions.

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

The unmitigated impacts related to the safety hazards; public health and nuisance are characterized as 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 training, posters and other similar measures.
- Vehicle speeds of 5 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.
- A traffic management plan will be prepared and implemented during the construction phase to control the accidents.
- The contractor will ensure better working conditions for its employees.
- Regular routine health screening of the staff should be carried out.
- Firefighting equipment will be made available at the camp.
- The camp staff will be provided firefighting training.
- The construction camps and site offices will have first-aid kits.
- The construction crew will be provided with awareness of the transmissible diseases (such as HIV/AIDS, hepatitis B and C).

- All safety precautions will be taken to transport, handle and store hazardous substances such as fuel.
- Road signage will be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic.

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.

7.6.10 Sites of Archaeological or Historical Significance

There are no reported sites of archaeological or historical significance at the land acquired for the project. However, in case an artifact of such significance is found during the construction activities, the Archaeology Department, Government of Pakistan will be informed.

7.6.11 Operational Phase Impacts

The operation of Citadel 7 Building Project will interact with different components of the environment. This interaction may result in the following adverse impacts:

- Soil contamination
- Contamination of Surface and Groundwater
- Safety hazards, public health and nuisance

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

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

- Landscaping and plantation
- Noise and another public nuisance abatement.

The potential environmental impacts of Citadel 7 Building Project during an operational phase are discussed below:

7.6.12 Solid Waste Management

Solid waste generated during construction activities will be safely disposed at an approved waste disposal site in Islamabad. The management will prepare a solid waste management plan which details municipal waste collection and disposal as well as promotes recycling. The hazardous waste will be collected in a separate vehicle and transported to the designated dumping site in Islamabad in consultation with CDA.

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: Medium

Mitigation Measures

Solid Waste Management will also be an important issue during the operational phase of Citadel 7 Building Project.

- Solid waste segregation facility shall be established that should separate the recyclable and non-recyclable waste. For this purpose, residents can be provided with different colour waste bins for different waste materials.
- All the solid waste from the building will be collected at one location and will be transported by the contractor for disposal and the designed dumping site at Islamabad.

Residual Impact

The residual impacts of the implementation of the above measures will be low if Solid Waste is collected and disposed of properly.

7.6.13 Contamination of Surface and Groundwater

The nature of the impact of the project's operation activities on the surface and groundwater quality is expected to be quite similar to those predicted for the construction phase, except that the magnitude is likely to be lesser.

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 operation activities will forestall any possible water contamination as well.

Residual Impact

After the effective implementation of the above measures, the residual impacts of the operation of the Citadel 7 Project on the water resources of the area will be negligible.

7.6.14 Safety Hazard, Public Health and Nuisance

The nature impacts of the project's operation activities relating to safety hazards, public health and nuisance are expected to be quite similar to those predicted for the construction phase.

These unmitigated impacts are characterized below:

Nature: Direct and indirect

Duration: Short-term

Geo extent: Local

Reversibility: Reversible

Likelihood: Likely/possible

Consequence: Moderate

Impact significance: High to medium.

Mitigation Measures

The following mitigation measures will forestall any possible impact during the operation phase:

- The mitigation measures discussed under air quality deterioration, soil and water contamination will address the public health concerns as well.
- Appropriate solid waste disposal mechanisms will be implemented, as described earlier.
- Appropriate light diffusers and reflectors will be used where required to minimize the public nuisance caused by light pollution.
- Provision of firefighting arrangements in each floor of the Citadel 7 Building Project.
- Provision of emergency health facilities.

7.6.15 Residual Impact

After the effective implementation of the above-mentioned measures, the residual impacts of the estate operation activities relating to safety hazards, public health and nuisance will be negligible. Positive impacts of the Project

The positive impacts of the Citadel 7 Building Project are as follows:

7.6.15.1 Employment and Business Opportunity

First five floors including ground floor of the Citadel 7 Building Project will be allocated for the shopping mall and rest of the building will be rented out to the corporate and business community except mechanical floor, so the project has a great scope towards business.

The project will also provide employment opportunities, both direct (workers and employees) and indirect by accelerating the business activities in Islamabad.

In addition, the local industry would get benefit from the construction activity of Citadel 7 Building Project since most of the construction material would be procured locally.

8 Environmental Management Plan

8.1 Introduction

The EIA report has identified the potential impacts that are likely to arise during the project. The EIA report has identified both positive and negative impacts at each stage of the project.

To minimize the effects of adverse impacts, the EIA has recommended the mitigation measures. These mitigation measures include the use of alternative technologies, management and physical control or compensation in monetary terms. The proposed mitigation measures have been based on the understanding of the sensitivity and behaviour of environmental receptors in the project area. The legislation controls that apply to the project and a review of good industry practices while operating in sensitive environments.

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

For the effective implementation and management of mitigation measures, an environmental management plan (EMP) has been prepared. The EMP satisfies the requirement of the Pakistan Environmental Protection Act, 1997.

This chapter outlines the implementation mechanism for the 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

An Environmental Management Plan (EMP) provides a delivery mechanism to address the adverse environmental impacts of a project during its execution, 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 identified mitigation measures.
- Develop a proper monitoring mechanism and identify requisite monitoring parameters to confirm the effectiveness of the proposed mitigation measures.
- Define the responsibilities of the project proponent, design & supervision consultant and contractor, and provide a means of effectively communicating environmental issues among themselves.

8.3 Management Approach

8.3.1 Pre-Construction and Construction Phase

The organizational roles and responsibilities are summarized below:

a) Project Proponent

The overall responsibility for compliance with the Environmental Management Plan of Citadel 7 Building Project rests with the project proponent, Chakor Ventures Private Limited

b) Engineers, Contractors/Sub Contractors

The contractors will carry out field activities as part of their contract agreement. The contractors will be responsible for implementing various mitigation actions prescribed in the EIA report. The contractors will also be subject to certain liabilities under the environmental laws of Pakistan, and under their contracts with the Chakor Ventures Private Limited.

Furthermore, the Project Manager of the contractor will implement Environmental Monitoring Plan which has been prepared for the construction phase.

The Project Engineer, will monitor the contractors and ensure implementation of the EMP and the EIA.

8.3.2 Operational Phase

During the operational phase of the project, environmental management will become a routine function. The institutional set up for the operational phase should include Chakor Ventures. staff involved with the main responsibility for the environmental performance of the Citadel 7 Building Project.

8.4 Organizational Structure and Responsibilities

8.4.1 Construction Phase

The organisational structure for the construction phase EMP is described as follows:

Primary Responsibilities: The primary responsibilities for the environmental performance of the project proponent, design and consultant and the contractor will be assumed by their respective highest-ranking officers during the project.

The Project Manager, Citadel 7 Building Project, will be responsible for the compliance with the EMP of the project.

Project Engineer, Design & Supervision Consultant will be responsible for monitoring and ensuring the implementation of the EMP and EIA of the project.

Site Engineer of the Contractor will be responsible for the implementation of the EMP and EIA on the ground.

Field Management and Quality Control: The construction activities will be carried out in an environmentally sound manner during the construction phase of the project and will be the responsibility of the Site Engineer of the contractor. He will be responsible for implementing EMP and EIA recommendations.
The Project Engineer, Design & Supervision Consultant will be responsible for ensuring the overall environmental soundness of all construction activities. He will ensure the implementation of EMP and EIA.

Environmental Monitoring: M/S Chakor Ventures Private Limited/Capital Development Authority Islamabad will make necessary arrangements to monitor the key environmental data during the construction phase.

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

8.4.2 Operational Phase

The Chakor Ventures Private Limited management staff will assume the main responsibility for the environmental performance of the building during the operational phase.

An environmental monitoring plan has been developed as part of Citadel 7 management system. The key environmental parameters, such as water consumption, waste disposal, water quality, traffic count, noise, 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 Pak-EPA and Chakor Ventures Private Limited management.

The Project Manager of Citadel 7 Building will be the focal point for all environmental matters associated with the operation of the facility. He will coordinate with the Pak-EPA, for any monitoring and/or reporting requirement.

8.4.3 Legislation and Guidelines

The EIA of Citadel 7 Building Project 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.

8.4.4 Environmental Improvement Cell and Responsibilities

Citadel 7 Building Project 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 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

8.4.5 Approvals

The management and project contractor will obtain all the relevant clearances and necessary environmental approvals required by the Pakistan Environmental Protection Agency, Islamabad.

8.4.6 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 management of Chakor Ventures Private Limited.

The contractor shall be responsible for implementing the mitigation measures and monitoring of various environmental parameters. The management shall monitor the contractor's performance with respect to EMP implementation.

8.4.7 Environmental Mitigation Matrix

For Citadel 7 Building Project, an Environmental Management Matrix has been developed which is given in **Table 8.1**.

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 8.1: Environmental Matrix of Citadel 7 Building Project

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
Pre-construction/Design Stage									
Drainage	Environmental	Aesthetic, water pond, a breeding ground for mosquitoes	At Citadel 7 Building	During and after rains	Major	Properly designed drains along the roads so as to avoid the formation of water ponds. Roper design and maintenance.	Engineering Consultant	Chakor Ventures Private Limited	Stormwater runoff
Cultural Properties	Impact on Mosque, Graveyard and archaeological sites	Social Impacts	To be checked at the project site	At planning stage	-	Construction activities avoid any interference with cultural heritage sites.	Design & Supervision Consultant	CDA	Social issues
Location in an area with seismic background	Seismic activities may damage structures, environment, health, and lives	Health, food quality, jobs, safety	At Citadel 7 Building	After earthquake with intensity higher than design.	Can be serious at times	Citadel 7 Building Project will be designed in accordance with the revised seismic code for Islamabad.	Engineering Consultant	Chakor Ventures Private Limited	Land
Construction Phase									
Campsite and construction work									

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
Site selection of construction camp, materials storage, human activities on site, travel to and from the construction camp	Socio-cultural, environmental,	Sanitary waste disposal, solid (kitchen) waste disposal, fuel leakage, noise and additional traffic, water usage and pollution	Contractor's Camp Site for Construction	Throughout construction period	Minor if Recommendations are followed	Camp Site construction to be supervised. Proper storage and fencing, locking of storage rooms containing hazardous material. Construction camp will be located in a stable and flat area, requiring minimal removal of vegetation and levelling. Camp Site construction to be supervised. Proper storage and fencing, locking of storage rooms containing hazardous material.	Contractor	Engineering Consultant	Land Analysis

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
Sanitation and waste disposal facilities at the campsite	Sanitation and waste disposal problems	Worker's health may impair which may result in slow progress	At all solid and liquid waste collection areas, latrine sites of camp	Throughout construction period	Moderate	Contractor to provide a proper waste management plan for campsite waste. Sewerage system at the camp to be properly designed (septic tank with soakage pit) to receive all sanitary wastewater.	Contractor	Engineering Consultant	Waste Management
Movement of vehicles in a construction site and along haulage routes	Environmental impact, impacts from temporary haul and access roads	Soil compaction and alteration of percolation and vegetation pattern, Dust emissions	At the project site	During construction period	Low	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 regularly monitored as in EMP Existing road will be used to the extent possible for hauling materials	Contractor	Engineering Consultant	Air and Soil Quality
Movement, maintenance, and fuelling of construction vehicles	Environmental pollution and contamination	Contamination of soil, surface and groundwater from fuel and lubricants, air pollution due to dust and exhaust from vehicles movement	Fuelling and maintenance sites near construction camp, seasonal waterways present near the project site	During construction period	Low	Slopes of the embankment to be designed so that pollutants do not enter water bodies. Construction vehicles and equipment 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	Contractor	Engineering Consultant	Air, Soil and Water Quality

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
						drainage channels. Oil and grease traps to be provided at fuelling locations to prevent contamination of water Unusable debris shall be dumped at the designated site in Islamabad.			
Creation and burning of waste at/or near the campsite	Solid waste generation and air pollution associated with burning	Eyes irritation for workers and public, nuisance, deteriorated air quality, smell from organic wastes	Around Campsite	Throughout construction period	Moderate	Devise a plan for safe handling, storage, and disposal of harmful materials Waste burning not allowed Introduce re-use and/or recycle Discourage use of disposables	Contractor	Engineering Consultant	Solid Waste Management
Health and safety at the workplace	Health risks for workers if unfavourable working conditions prevail	Worker's progress may impair which will result in slow progress of the project	Throughout construction area and construction campsite	Throughout construction period	High	Obligatory insurance against work accidents for labourers Provide basic medical service and supplies to workers. Layout plan for a campsite is indicating safety measures taken by the contractor (e.g., firefighting equipment, safe storage of hazardous materials, first aid, security, fencing, and contingency measures in case of	Contractor	Engineering Consultant	Workers Health

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
						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.			
Soil and Burrow Material, Blasting and Cutting, Cut and Fill									
Disposal of Surplus material, storing material for reuse	Physical environment	Water pollution from runoff of discarded asphalt, loss of productive land due to dust	Along the full length of the service roads around Citadel 7 Building Project	At the start of construction	Low	Construction waste to be collected for reuse. Waste disposed of in existing Dump Site. Water spraying to reduce dust.	Contractor via bid documents	Engineering Consultant	Water
Excavation for the foundation of the building	Changes of topographic characteristic, loss of topsoil, soil erosion, loss of vegetation, loss of habitat	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	Remove topsoil and reintroduce for returning to nature. In areas with the strong flash flow, high embankments are provided to minimize soil erosion. Concrete retaining walls at high embankments in critical areas.	Contractor	Engineering Consultant	Soil erosion and Water

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
Acquisition of construction materials	Landscape degradation by use of quarries and borrow areas in the immediate vicinity of the Project site.	Accelerate erosion at the site	Quarries and borrow areas	Long-term effects	Low	No use of any quarries for construction material from inside Islamabad.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Soil erosion
Storage, handling, and transport of hazardous construction materials	Work safety and human health risk	Health risk for workers, impair their progress	At all construction sites at Citadel 7 Building	Throughout construction period	Low	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.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Construction material storage
Creation of construction waste material and spoil management	Contamination of soil and water from waste and/or quarry materials, and impact on landscape value	Air, water, and solid waste generation	All construction site.	During construction	High	All spoils to be disposed of in environmentally friendly manner and sites to be restored to original conditions.	Contractor	Engineering Consultant Chakor Ventures Private Limited	Water and Soil analysis
Transporting materials to the site	Physical environment	Creation of noise, fumes, and dust	Throughout the Project	During construction	Medium	All vehicles are carrying loose, friable material to be properly covered.	Contractor	Engineering Consultant & Chakor Ventures Private	Noise and Air Quality

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
								Limited	
Planting trees	Ecological	Introduction of Indigenous trees species	In green areas and green belts	After construction	Medium	Implement Plantation Plan.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Site restoration
	Social	Trees create safety hazards	Where trees are planted	Once trees have matured	Medium	Proper monitoring of the matured trees.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	
Closure Plan									
Clearing site	Damage not restored on departure	Air, soil and water pollutions in future, a nuisance for the residents	where construction took place	After completion of construction activities	Low	Construction and campsites should be restored according to proper Site Restoration Plan. Compliance monitoring of the restoration.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Site restoration
Utility Disruption									
No utility except electricity is available	Affected utilities create disruption of public services and economics	Disruption in utilities may create problems for adjoining buildings	To be checked	Construction period	None, if organized in a timely manner and implemented; otherwise, Intermediate.	Timely notifications and consultations with respective departments especially with IESCO.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Electricity supply management

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
Water Issues									
Use of water for construction and consumption for human use	Conflict with local water demand under very limited supply	Water shortage	In the immediate vicinity of the project site	During construction	Low	The contractor will arrange required water for construction in such a way that water availability and supply nearby to community remain unaffected.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Water management
Spillage of liquid waste	Environmental and Social Impacts	Risk of polluting surface and groundwater from spillage, drainage, and runoff from construction sites.	Citadel 7 Building Project site	During construction	Low	Regular water quantity monitoring according to determined sampling schedule. Contractor shall ensure that construction debris does not find its way into the drainage.	Contractor	Engineering Consultant	Water quality
Earthwork, stonework, and, other construction activities	Environmental and Social Impacts	Contamination of water due to construction waste, health risks for public	Citadel 7 Building Project site	During construction	Low	Construction works close to water bodies to be avoided, especially during the monsoon period. Waste must be collected, stored, and taken to the existing Dump Site.	Contractor	Engineering Consultant	Social Issues
Air Pollution Control									
Vehicular movement and operation of machinery	Environmental and Social Impacts	Emission from construction vehicles and machinery, causing a public health risk, nuisance, and	Workshops of contractor campsite, Construction sites	Throughout construction period	Low	All temporary service and access roads to be regular water sprayed be carried out to minimize the dust generation. All vehicles, equipment and machinery used for	Contractor	Engineering Consultant	Air Quality

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
		other impacts on the biophysical environment				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.			
Operation of Concrete Batching Plant etc	Environmental and Social Impacts	Dust generation from construction machines causing a health risk to operating workers and impacts on the biophysical environment	At sites of plants, crushers	Throughout construction period	High	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 with 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. Proper training for operators/ workers by HSE staff.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Air Quality and workers health
Transportation of materials, and other construction	Environmental and Social Impacts	Dust and emissions from machines causing a health risk to	Jinnah Avenue & Ibn-e-Sina Road	During construction	Low	Vehicles are delivering loose and fine materials, like sand and fine aggregates, shall be covered to reduce spills on	Contractor	Engineering Consultant & Chakor Ventures	Air quality and workers health

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
activities that create dust and emissions		operators; Impacts on the biophysical environment				the existing road. Ambient air quality monitoring will be carried out in accordance with the EMP. If monitored parameters are above prescribed NEQS limits, suitable control measures must be taken.		Private Limited	
Noise Pollution									
Operation of construction machinery,	Noise from vehicles, asphalt plants, and equipment;	A nuisance for workers and public	At mix plant, batching plants, and construction sites; built-up areas;	During construction	Medium	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 the effectiveness of mitigation measures.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Noise
Fauna and Flora: Wildlife and adjacent Ecological Sensitive Areas									
No sensitive area is present	Ecological Impacts	Disturbance to Local flora and fauna	Throughout the proposed project	Throughout construction period	Low	Use of firewood for cooking and execution of work to be prohibited. No open fire is allowed.	Contractor	Engineering Consultant & Chakor Ventures Private	Ecological sensitive area

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
						Restoration of damaged vegetated areas. Strict instructions to contractors' staffs (particularly the cooks) with respect to poaching wildlife Assist in public awareness program.		Limited	
Road Safety and Community Life									
The risk associated with construction activities	Accident and health risks, Social Impacts	Road accidents may occur to general public and workers; social problems may arise; the progress of the project may impair	Project Site	Throughout construction period	Low	Ensure safely 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 a construction site.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Health and safety of workers
Archaeological Sites									

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
Encountering archaeological sites during earthworks and construction	Impacts of historically important sites and damage to fossils, artifacts, tombs, structure, and others, as defined in Antiquity Act of 1975	If sites of special interest not identified and flagged, contractors may inadvertently cause damage	Near Project site	Throughout construction period	Low	In case of finding any archaeological artifact structure, tomb, etc., the contractor must immediately halt all works and contact the Archaeological Department. In the event of such finding, the contractor has the duty to secure the site against any intrusion until an archaeological expert decides for further action.	Contractor	Engineering Consultant & Chakor Ventures Private Limited	Sensitive area
Operation Phase									
Water and Soil									
Drainage of runoff from roads into water bodies	Physical and Environmental Impacts	Physical congestion of drainage structures, Localized flooding, water and soil contamination	At natural drainage points in and around the Project site.	When road operates and in the rainy season, as required	Medium	Adopt performance specified maintenance contracts. Ensure proper cleaning scheme for keeping drainage structure clear of debris and blockage.	Citadel 7 Building Project Management	Chakor Ventures Private Limited	Stormwater runoff
Vehicular movement	Environmental Impacts	Contamination from spills due to traffic and accidents	Project Site	As incidents occur	Medium	Accidental spillage to be cleared and disposed of immediately and properly.	Citadel 7 Building Project Management	Chakor Ventures Private Limited	
Ambient Air Quality									
Induced vehicular traffic	Environmental and Social Impacts	Adverse effects on PIMS and public health risk,	Project area	At operation	Medium traffic generation will be for short	Roadside tree plantation as applicable and feasible under harsh climatic condition;	Citadel 7 Building Project Management	Chakor Ventures Private	Air Quality

Project Activities	Type(s) of Impact	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		Parameters for Monitoring
							Implementation	Supervision	
movement		nuisance, and other impacts on the biophysical environment			duration	plants should be selected according to their abilities to absorb emissions. Regular road maintenance to ensure the good surface condition Regular vehicle checks to control and ensure compliance with NEQS.		Limited	
Noise Level and Vibrations									
Induced vehicular traffic movement	Environmental and Social Impacts	Traffic-related noise pollution and vibrations from engines, tires, and use of(pressure) horns	Project area	At operation stage	Medium traffic generation will be for short duration	Noise measurements to be carried out to ensure the effectiveness of mitigation measures, (e.g., speed limits at the Project site).	Citadel 7 Building Project Management	Chakor Ventures Private Limited	Noise
Flora and Fauna									
Roadside right-of-way plantation	Environmental and Social Impacts	Soil erosion if site not vegetated acts as a sound barrier against noise and dust, aesthetically valuable,	Along with service roads along Citadel 7 Building Project	Operation stage	Low	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.	Citadel 7 Building Project Management	Chakor Ventures Private Limited	Plantation
Road Safety									

Project Activities	**Type(s) of Impact**	**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**		**Parameters for Monitoring**
							Implementation	**Supervision**	
Vehicular movement	Social Impacts	Road accidents may occur, life risk of the general public	Near populated areas	Operation stage	Low	Traffic management plan to be developed. Traffic control measures, including speed limit, to be enforced. Mass awareness regarding traffic rules.	Citadel 7 Building Project Management	Chakor Ventures Private Limited	Social Issues

8.1. Solid Waste Management Plan

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

Chakor Ventures Private Limited will contract MCI for collection, transportation and disposal of solid waste generated by Citadel 7 Building Project.

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

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

8.2. 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, Masks etc.).
- 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 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 Sign board will be installed at the project site for an emergency response.
- Rest area & smoking zones will be established at the site.
- Regular First Aid Centre along with all required medicines 24/7 will be available at the project site.
- Paramedic (dispensers) will be deployed at 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 at the project site.

The contractor will develop his HSE policy, roles and responsibilities of HSE Manager and staff. It also provides 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 plast, healing balms, pyodine, spirit, painkiller, etc.

- Dispensaries: Medical facilities will be established by the contractor. 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 PPE to all workers.
- Safety Signs: Relevant safety sign boards will be displayed on the work sites 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: The contractor will put up barricade tape at all the active work sites. 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 HSE Manager to achieve its objectives. Training will be conducted for capacity building of employees/workers/labour/sub-contractors to make them well effective to respond to any kind of emergency situation.

The breakup cost for the safety of workers is described in **Table 8.2.**

Table 8.2: Estimated Cost for the Implementation of Environmental Monitoring Plan for Citadel 7 Building Project

Sr No	Item	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
Personal Protective Equipment (A)				
1	Dust Masks	17,280	10	172,800
2	Safety Shoes	720	3000	2,160,000
3	Gloves	4,320	400	1,728,000
4	First Aid Box	2	3000	5,400
5	Ear Plugs	4,320	200	864,000
6	Safety Helmets	360	1000	360,000
7	Safety Jackets (Hi-Vis)	720	500	360,000
Others (B)				
8	Provision of Dust Bins	5	1000	5,000
9	Warning Tape	3	500	1,500
10	Safety Cones	5	1000	5,000
11	Safety Sign Boards	5	1500	7,500
12	Rain Coat	90	1000	90,000

Total (A + B)	**5,759,200**

Time Required for Construction Period = 48 Months
Number of Labor Required for Construction = 90
Personal Protective Equipment PPEs
Dust Musk: 1 Dust Mask to be used in a week by each labourer
Safety Shoes: 1 Safety shoe for twelve months for each labourer
Gloves: A pair of gloves for each labourer for a month
First Aid Box 1 first aid box for every 50 labourers
Ear Plug 1 set of the earplug to be used for 2 months for each labourer
Safety Helmet 1 safety helmet for each labourer for 12 months
Safety Jackets 1 safety Jacket (Hi-Vis) for each labourer for 12 months
Dust Bin: Rough estimate
Water Sprinkling the whole construction period
Rain Cost: 1 Rain Coat for each labourer
(The calculations are made by considering the average number of workers working at a time)

8.3. Traffic Management and Construction Material Transportation Plan

- All the contractor's construction material will be transported to the project site via Ibn-e-Sina Road.
- 5 km speed limited is being maintained at the project site.
- All the light vehicles cars, jeep etc. are being parked in a designated area.
- Speed breakers will be followed properly.
- All the 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 sign boards have been 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.

8.4. Emergency Preparedness, Response and Site Evacuation Plan

- The Contractor 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 in Rescue 15 in the case of any serious injury/accident.
- Close coordination will be carried out by 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 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 HSE Manager regarding the required awareness towards the hazardous and risky situation and control.
- The entire workforce will be provided with all mandatory PPEs for the risk-free environment.
- Special in-house training (TBT) will be conducted by HSE Manager regarding the awareness towards any emergency condition and control.
- Proper water sprinkling will be carried out on service road along with the project site for dust control to avoid any hazardous and risky situation which can be a cause of transport emergency.

8.5 Fire Fighting Plan

The campsite will be equipped with fire extinguishers as well as communication equipment for contacting the appropriate emergency response teams.

At all 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 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 severe 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.

8.6 Plantation Plan

The plantation plan recommends planting 1,000 mature plants having 4-5 feet in height and 1.0 to 1.5 inches stem diameter at suitable place in consultation with CDA Environment Wing.

The management of the proposed Project will ensure the provision of staff and a budget for the implementation of the plantation plan.

The practice of plantation of mature plants will be an effective compensation against the expected damages to the existing vegetation.

The Chakor Ventures Private Limited will ensure the provision of staff and budget for the implementation of plantation plan.

The following species of Trees, Shrubs and Indoor Plants are recommended for green areas, parking and gardens at the entrance of Citadel 7 Building Project:

Table 8.3: Recommended Plants for Citadel 7 Building Project

No.	Scientific Name	Common Name	Description
1	*Pinus rxburghii*	Cheer	Highly recommended for Islamabad

			regions, grows very well in
2	*Cedrus deodora*	Deodar/Diyar	-do-
3	*Platanus orientalis*	Chinaar	-do-
4	*Pongamia glabra*	Sukh Chain	Evergreen and historical shade tree
5	*Ficus spp.*	Ficus Spp.	Different varieties all evergreen for shade as well as beautification
6	*Cupressus sempervirens*	Saroo	Tall, hardy tree
7	*Cassia fistula*	Amaltas	The beautiful flowering tree grew in this region
8	*Cassia gulaca*	Small amaltas	Beautiful yellow flowers almost all the year
9	*Thevetia peruviana*	Peeli Kanair	Thick foliage shrub with yellow leaves
10	*Juniper Spp.*	Junipers	Different varieties, do very well in high landscape areas
11	*Vinca difformis*	Periwinkle	An evergreen, flowering subshrub
12	*Lavandula spica*	Lavenderle ft)shrubs	ornamental plants for garden and landscape use
13	*Gulphinum*	Gulphinium	Nice small shrub with a lot of flowers in season
14	*Epipremnum aureum*	Jade plant or money plant	An evergreen flowering vine
15	*Asparagus aethiopicus*	Asparagus Fern	A indoor ornamental plant
16	*Saintpaulia*	African violet	Indoor plant for decorative purposes
17	*Ficus elastica*	Rubber tree	An ornamental indoor plant
18	*Spathiphyllum*	Spath/ peace lilies	Evergreen herbaceous perennial plants with large leaves
19	*Aglaonema hybrids*	Chinese evergreen plant	An adaptable plant, and grow in low light and dry air
20	*Phoenix roebelenii*	Pygmy Date Palm	Medium size, slow-growing shady plant
21	*Aphelandra squarrosa*	Zebra Plant	Exotic, emerald green leaves with dramatic white veins

8.7 Plantation Plan Cost

A total number of 1000 trees will be planted. The cost of plantation includes the cost of equipment, initial planting (including restocking during the first 3 years) and maintenance cost for the first four years of plantation. The total estimated cost of implementation of the plantation plan is Rs. 1.583 million. The cost of raising one plant and its maintenance for 4 years is Rs. 1583.

The tentative cost of equipment is given below in **Table 8.4**

Table 8.4: Tentative Cost of Equipment

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

The total cost of equipment	**100,000**

The cost break-up of plantation and maintenance for a period of four years is mentioned in **Table 8.5** to **Table 8.9.**

Table 8.5: Estimated Cost of Unit Plantation (1,000 Plants) for 1st Year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
1	Clearance of Site	1000	5/plant	5,000
2	Layout/ unit	1000	2/plant	2000
3	Digging of Pits	1000	50/pit	50,000
4	Average cost per unit plant	1000 plants	215/plant	215,000
5	Carriage/unit of plants from Nursery to Site, including loading/unloading	1000 plants	10/plant	10000
6	Plantation of plants with a ball of earth/unit	1000	30/plant	30,000
7	Addition of Manure 1 cft. / Pit	1000 cft.	Lump Sum	50,000
8	Hand watering 100 times Approx. x1000=100,000	100,000	1/watering	100,000
9	Weeding 4 times 1000x4=4000	4000	5/plant	20,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	50,000
Total				**532,000**
Say				**530,000**

Table 8.6: Estimated Unit Cost of Plantation of (200 Plants) & Maintenance for 2nd Year in case of 20% Mortality

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	45000
5	Carriage/unit of plants from Nursery to Site, including loading/unloading	200 plants	10/plant	2000
6	Plantation of plants with a ball of earth/unit	200	30/plant	6000
7	Addition of Manure 1 cft. / Pit	200 cft.	Lump Sum	20,000
8	Hand watering 100 times Approx. x1000=1000,000	100,000	1/watering	100,000
9	Weeding 4 times 1000x4=4000	4000	5/plant	20,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	40,000
Total				**243,000**

Table 8.7: Estimated Cost of Plantation Unit (100 Plants) & Maintenance for 3rd Year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
3	Re-Digging of Pits	100	50/pit	5,000
4	Average cost per unit plant	100 plants	215/plant	21500

5	Carriage/unit of plants from Nursery to Site, including loading/unloading	100 plants	15/plant	1500
6	Plantation of plants with a ball of earth/unit	100	30/plant	3,000
7	Addition of Manure 1 cft. / Pit	1,000 cft.	Lump Sum	20,000
8	Hand watering 50 times Approx. x1,000=500,000	500,000	1/watering	500,000
9	Weeding 3 times 1,000x3=3,000	3,000	5/plant	15,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	50,000
Total				**616,000**
Say				**610,000**

Table 8.8: Estimated cost of Maintaining 1000 plants for the 4th year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
1	Hand watering 50 times 1,000x50=50,000	50,000	1/time	50,000
2	Weeding	1,000	5/unit	5,000
3	Trimming/pruning of plants	1,000	5/unit	5,000
4	Miscellaneous			40,000
			Total	**100,000**

Table 8.9: Total Cost of Plantation Plan for Four years

Activity	Amount (PKR)
Estimated Cost of Unit Plantation (1,000 Plants) for 1st Year	530,000
Estimated Unit Cost of Plantation of (200 Plants) & Maintenance for 2nd Year in case of 20% Mortality	243,000
Estimated Cost of Plantation Unit (100 Plants) & Maintenance for 3rd Year	610,000
Estimated Cost of Maintaining 1,000 plants for 4th Year	100,000
Total	**1,483,000**

Table 8.10: Final Cost per Tree Planted

Activity	Amount (PKR)
Cost for maintenance of cultivated plants for 4 years	1,483,000
Cost of equipment	100,000
Total cost	1,583,000
Cost of raising one plant and its maintenance for 4 years	**1583**

8.8 Restoration and Rehabilitation Plan

Restoration of the project site and associated facilities including access tracks and contractor's camp after construction activities is of utmost importance. Improper disposal of

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 handed over to MCI for reuse or disposal.
- All the un-necessary pits at the project site will be backfilled.

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

The proposed mechanism will be based on a simple grievance redress committee—Members included in the committee will be from high officials of Citadel 7 Building 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 the Citadel 7 Building.

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.

8.10 Project Monitoring

Chakor Ventures Private Limited will make necessary arrangements to monitor the key environmental data during the construction and operational phases. These will include the number of trees cut as part of the project work, the quantity of water used, a record of waste produced, a record of waste disposal, and project-related vehicular traffic.

The Project Director of Citadel 7 Building Project shall monitor project activities while working in the project area. He will keep a record of all non-conformance observed and report these along with actions to Chakor Ventures Private Limited for further action. He will also have to report any impacts anticipated along with his recommendations for further action.

8.11 Environmental Monitoring Plan

Environmental Monitoring is normally undertaken during both the construction and operational phases of the project 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 management and environmental controls based on the monitoring data. Pak-EPA is entrusted with the overall responsibilities of monitoring the environment in Islamabad.

An Environmental Monitoring Plan for Citadel 7 Building Project has been provided in **Table 8.11**. 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 8.11: Environmental Monitoring Plan for Citadel 7 Building Project

Environmental Component	Project Phase	Parameters	Locations	Frequency	Standards	Implementing	Supervision
Ambient air quality	Construction	SO_2, NO_x, CO PM_{10}	At the project site	PM_{10}, for continuous 8 hours, on a monthly schedule	WHO/USEPA guidelines, NEQS	Contractor	Engineering Consultant
Ground Water Quality	Construction	pH, TDS, TSS, DO, coliforms, hardness, nitrate, chloride, sulphate	At the project site	Quarterly	WHO and NEQS	Contractor	Engineering Consultant
Noise Levels	Construction	dB (A)	At the project site	Twice in 8 hours at a selected site on a quarterly basis	EPA Ambient Noise standards	Contractor	Engineering Consultant
Roadside Plantation	Construction	Visual inspection of plant species survival rate and status of maintenance	At sites where plantation was carried out on service roads and inside of the Citadel 7 Building Project.	(1) One month after plantation (2) One year after plantation 1 month, 3 months, 6 months, and 12 months after planting	75 % survival rate	Contractor	Engineering Consultant
Indoor Plantation+	Operation	Visual inspection of plant species survival rate and status of maintenance	At sites where plantation was carried out	(1) 2.5 years after plantation	75% survival rate	Citadel 7 Building Management	Chakor Ventures Private Limited
Safety 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 4 years	To be determined	Citadel 7 Building Management	Chakor Ventures Private Limited

Key:

dBA = decibels (measured in the audible range)
NEQS = National Environmental Quality Standards
ROW = Right-of-Way
TSS = Total Suspended Solids
EPA = Environmental Protection Authority,
PM10 = Particulate Matter smaller than about 10 micrometres,
SPM = Suspended Particulate Matter
USEPA = United States Environmental Protection Agency

Table 8.12 shows the estimated cost for the EMP**.**

Table 8.12: Cost Estimates for Environmental Monitoring during the construction phase

Environmental Monitoring Activities	No. of Samples	Unit Cost specification	Cost (Rs)
Construction phase			
Ambient air quality monitoring Quarterly basis	16	@ 50,000 per sample for 24 hr monitoring.	800,000
Ambient water quality monitoring Quarterly basis	16	@ 20,000 per sample	320,000
Noise levels monitoring on Quarterly basis	16	@ 5,000 per sample	80,000
	Total (a–c)		**1,200,000**
Environment, Health & Safety Officer (Environmental Scientist/ Environmental Engineer)	16 months	@ 100,000	1,600,000
G Total			**2,800,000**

Source: *PPI Estimates, 2023*

8.12 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 contractor's 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 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

Engineering Consultants 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 **Figure 8.13.**

Table 8.13: Framework for Environmental & Social Training Program of Citadel 7 Building Project

Type of Training	Training Description	Period	Duration	Training By	Trainee
Occupational Health and Safety 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 with 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 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

8.13 Environmental Monitoring & 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 8.14**.

Table 8.14: Summary of Environmental Mitigation & Monitoring Cost

Activity	Basis	Cost (Rs)
Environmental Monitoring Cost	Ambient Air, Noise and Water Quality Monitoring & Cost of Hiring Environmental Engineer for 48 Months	2,800,000
Plantation Plan	Implementation of plantation plan	1,583,000
Health & Safety of Workers	For 90 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi-Vis) And Provision of dustbins, warning tap, safety cones, safety sign boards and water sprinkling	5,759,200
Estimated Cost of energy efficiency	water faucet, energy-efficient LEDs.	17,500,000
Cost of Environmental Training	For the whole construction period	1,000,000
Grand Total		**28,642,200**

8.14 Communication and Documentation

An effective program for storing and communicating environment 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 effects 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 proponent site representatives.

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 proponent site representative and the contractors will also prepare a weekly environmental report. Copies of the proponent will be provided to the proponent and contractor's higher management.

8.15 Change Management

An environmental assessment of the proposed project has been made on the basis of project description available at the time the EIA was conducted. However, it is possible that changes in the project design will be required when the project is implemented. This section provides the mechanism that will be put in place to manage changes that might affect the project's environmental impact.

Changes to the Operation: The changes in the project design have been categorized as first-order, second-order and third-order. These are defined below:

First-Order Change: A First order change is one that leads to a significant departure from the project described in the EIA and consequently requires a reassessment of the environmental impact associated with the change. In such an instance, Chakor Ventures Private Limited will be required to reassess the environmental impact of the proposed change, the results of which will then be sent to the Pak-EPA approval.

Second-Order Change: A second order change is the one that may entail the project activities not significantly different from those described in the EIA, which may result in project effects whose overall magnitude would be similar to the assessment made in this report. In case of such changes, Chakor Ventures Private Limited will be required to reassess the impact of the activity on the environment, specify additional mitigation measures, if necessary and report the changes to the Pak-EPA.

The Pak-EPA will review the change management statement and communicate if any concerns. If EPA agrees with the assessment of Chakor Ventures Private Limited, it does not have to send a formal approval. Seven days after submission of the change management statement, the change will be implemented unless a communication to the contrary has been received from Pak-EPA.

Third-Order Change: A third-order change is the one that is of little consequence to EIA findings. This type of change doesn't result in effects beyond those already assessed in the EIA; rather it may be made onsite to minimize the impact of an activity such as realigning a particular section is to avoid cutting a tree, relocating construction campsites to minimize clearing vegetation, etc. The only action required for such changes would be to record the change in the Change Record Register.

8.16 Change Management Plan

The EIA for Citadel 7 Building Project site recognizes that changes in the EMP may be required and therefore provides a Change Management Plan to manage such changes.

The overall responsibility for the preparation of change management statements will lay with Project Manager, Citadel 7 Building Project who upon approval from Chakor Ventures Private Limited will implement the Change Management Plan. However, if major changes are envisaged, then the environmental consultant will review the entire process and formulate the Change Management Plan to be implemented by the Project Manager, Citadel 7 Building Project.

8.17 Quarterly Environmental Monitoring Report

The contractor will prepare a Quarterly Environmental Monitoring Report of project activities carried out during the specified period to Citadel 7 Building Project via Design and Supervision Consultant.

The Chakor Ventures Private Limited will submit the Quarterly Environmental Monitoring Report of the project to Pakistan Environmental Protection Agency. A format of the Quarterly Environmental Monitoring Report has been provided at **Annexure-9.**

8.18 Post Project Monitoring

The Project Director of the Citadel 7 Building Project or his representative 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.

9 Conclusion and Recommendations

9.1 Introduction

This chapter presents the assessment of the possible environmental impact of Citadel 7 Building Project at Jinnah Avenue and Ibn-e-Sina Road, 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 a building facility for the regional office of the Chakor Ventures Private Limited, and it will also provide office facilities for the business and corporate sector in the capital city of Islamabad.
- The project site is located on plot no. 7 at the southern side of Blue Area (G-8), Islamabad, on a 120 ft. X 200 ft. plot. Citadel 7 Building will have 19 floors above ground level and 4 basement levels. The proposed building height is 293 ft. shopping mall will be developed in five stories (Ground + four levels) for its regional office, and rest of the floors is intended for rent to corporate and business sector except mechanical floor (6th floor).
- The Citadel 7 Building Project will be completed in 4 years, and the total estimated cost of Citadel 7 Building Project is Rs. 2 billion.
- 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 project siting is likely to result in some aesthetic issues, which can be reduced with the help of astute planning.
- The potential impacts during construction phase includes loss of natural vegetation, increased threat to wildlife, increased traffic load on Jinnah Avenue and Ibn-e-Sina Road, soil erosion and contamination, water 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 community.
- The significant environmental management issues during operation phase include solid waste and vehicular traffic and water consumption.
- The mitigation measures have been identified in chapter 6 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

- A plantation plan has been proposed in the EIA report, which must be developed and implemented for Citadel 7 Building Project.

- The provision for rainwater harvesting has been proposed, and it should be implemented, which will adequately replenish the local aquifer. Hence, no further measures are needed other than proper and regular maintenance of such facilities.
- There is very less space for plantation, so the vertical gardening approach should be adopted.

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 Citadel 7 Building Project 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.

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

Annexure-1: List of Names, Qualification and Roles of EIA Team Members

Name	Project Position	Qualification and Experience	Nationality	Tasks assigned / TORs of individual Specialist
Mr. Saadat Ali	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	Pakistani	▪ 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	M. Sc. Environmental Engineering, Newcastle University (2016) B. Sc. Civil Engineering, The University of Lahore, Lahore (2010-1014) A Levels, The City School (2008-2010)	Pakistani	▪ Suggest mitigation measures for impacts that impact the environment. ▪ Identification of site for baseline data collection for water, wastewater, noise, soil, traffic and ambient air quality.
Ms. Amna Saeed	Environmental Engineer	B. Sc. Environmental Engineering, UET Lahore (2018-2022)	Pakistani	▪ Identifying any rare, endemic, protected or endangered species in the Project area
Ms. Ayesha	Environmental Scientist	B. Sc. Environmental Sciences, International Islamic University, Islamabad (2018-2022)	Pakistani	▪ Secondary data collection for desk review ▪ Field work for baseline data collection in the area under study
Mr. M. Ali Qureshi	Environmental Engineer	M. Sc. Environmental Engineering, NUST Islamabad (2022-ongoing) B. Sc. Environmental Engineering, UET Taxila (2018-2022)	Pakistani	▪ Preparation of draft report ▪ Field work for baseline data collection in the area under study ▪ Secondary data collection for desk review ▪ Field work for baseline data collection in the area under study ▪ Draft Environmental management plan for successful management of expected environmental impacts from the Project.

Annexure-2: Terms of Reference

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 Installation of the Incinerator Project and respond to queries generated by Pak-EPA until issuance of the NOC.

Annexure-3: References

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Pak-EPA. *DIGITAL ENVIRONMENTAL ATLAS OF ISLAMABAD (2016)*: Establishment of Geometric Centre for Climate Change and Sustainable Development Pakistan environmental Protection Agency Ministry of Climate Change.

Annexure-4: Glossary

Air pollution	Air is made up of a number of gases, mostly nitrogen and oxygen and, in smaller amounts, water vapour, 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 (CO_2)	A colourless gas that is naturally produced by animals and people in the exhaled air and the decay of plants.
Carbon monoxide	A highly poisonous, odourless, tasteless and colourless 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 Pakistan Environmental Quality Standards (NEQS) are quality standards to regulate the air emissions and effluents of industry and other big polluters.
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 People Met During the EIA

No.		Name of Person	Designation
1		Mr. Omer Khitab	General Manager, Chakor Ventures Private Limited
2	Stakeholders	Mr. Aqeel Shehzad	Coordinator, Elysium Tower
3		Dr. Musharib Ali	Lecturer, NUST
4		Mr Sher Afzal	Deputy Manager (Environment & Social) Islamabad Electric Supply Company Limited
5		Mr. Sami Naeem Khan	Director, ERS Limited
6		Mr. Anwar Kamal	Emergency and Disaster Management Directorate, CDA

No.		Name	Age	Gender	Education	Designation
6	Public Consultation	Mr. Anjum Hafeez	32	Male	Civil Engineer	Site Engineer
7		Mr. Rustum Ali Khan	26	Male	Civil Engineer	Site Engineer
8		Mr. Irfan	35	Male	Illiterate	Folder Shuttering
9		Mr. Habib	37	Male	Primary	Vendor
10		Mr. M.Imran	28	Male	Illiterate	Security Guard
11		Ms. Shazia	20	Female	Bachelors	Nurse
12		Ms. Imrosha	21	Female	Bachelors	Nurse
13		Ms. Shakila Ajmal	33	Female	Middle	House Wife
14		Mr. Sulaiman Khan	25	Male	Matric	Own Business
15		Mr. Shahidullah	24	Male	Primary	Indrive Rider
16		Mr. Safdar	40	Male	Illiterate	House keeper
17		Ms. Isra Hafeez	22	Female	Masters	Student
18		Ms. Mahnoor Khan	24	Female	Masters	Student
19		Mr. Safdar Pervaiz	18	Male	Inter	Student
20		Mr. M.Azad	44	Male	Illiterate	Security Guard
21		Mr. Farhad	38	Male	Primary	Own Business
22		Ms. Urooj	27	Female	Matric	Shopkeeper

No.		Name of Person	Designation			
23		Ms. Hira	21	Female	Middle	Shopkeeper
24		Mr. Amanullah	22	Male	Intermediate	Student
25		Mr. Haris Khan	45	Male	Intermediate	Own Business

Annexure-6: Lab Reports of Ambient Air Quality and Noise Monitoring

ESPAK

ENVIRONMENTAL SERVICES PAKISTAN
PAK EPA & PUNJAB EPD CERTIFIED

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: ESPAK/0195I/23/GW/5569/01237 **Date:** 22/09/2023
Name of Industry / Client: Citadel 7
Address: Plot No 7, Main Jinnah Avenue Blue Area G-8 Islamabad
Telephone No.: ---
Nature of Sample: Ground Water from Electric Pump
Date Sample Received: 16/09/2023 **Grab / Composite:** Grab
Date of Sample Collection: 15/09/2023
Sample Collected / Sent By: Farhan Ali, Analyst (Field), ESPAK
Date of Completion of Analysis: 22/09/2023

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
1	Total Coliforms	----	ND	SMWW 9222 B	----
2	E. Coli	Must not be detectable in any 100mL Sample	ND	SMWW 9222 H	Within Limits
3	Color	≤15 TCU	ND	SMWW 2120 C	Within Limits
4	Taste	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
5	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
6	Turbidity	<5 NTU	ND	SMWW 2130B	Within Limits
7	Total Hardness as $CaCO_3$*	<500 mg/L	340 mg/L	SMWW 2340C	Within Limits
8	Total Dissolved Solids (TDS)*	<1000 mg/L	508 mg/L	SMWW 2540C	Within Limits
9	pH*	6.5-8.5	7.2	SMWW 4500H+B	Within Limits
10	Chloride (as Cl^-)*	<250 mg/L	15 mg/L	SMWW 4500Cl^-B	Within Limits
11	Cyanide (CN^-)	≤0.05 mg/L	ND	SMWW 4500 CN^- F	Within Limits
12	Nitrate (NO_3^-)	≤50 mg/L	ND	SMWW 4500NO_3^-B	Within Limits
13	Nitrite (NO_2^-)	≤3 mg/L	ND	SMWW 4500NO_2^-B	Within Limits
14	Residual Chlorine	0.2-0.5 mg/L	ND	SMWW 4500-Cl B	----
15	Phenolic Compounds (as Phenols)	NGVS	ND	SMWW 5530 C	----
16	Fluoride (F^-)*	≤1.5 mg/L	0.5 mg/L	U.S. EPA 9214	Within Limits
17	Aluminum (Al)	≤0.2 mg/L	ND	U.S. EPA-200.7	Within Limits
18	Chromium (Cr)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
19	Copper (Cu)	2.0 mg/L	ND	U.S. EPA-200.7	Within Limits
20	Antimony (Sb)	≤0.005 mg/L	ND	U.S. EPA-200.7	Within Limits
21	Lead (Pb)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
22	Manganese (Mn)	≤0.5 mg/L	ND	U.S. EPA-200.7	Within Limits
23	Mercury (Hg)	≤0.001 mg/L	ND	U.S. EPA-200.7	Within Limits

Page 1 of 2

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CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: ESPAK/0195I/23/GW/5569/01237 **Date:** 22/09/2023

Name of Industry / Client: Citadel 7

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
24	Nickel (Ni)	≤0.02 mg/L	ND	U.S. EPA-200.7	Within Limits
25	Arsenic (As)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
26	Barium (Ba)	0.7 mg/L	ND	U.S. EPA-200.7	Within Limits
27	Cadmium (Cd)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
28	Selenium (Se)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
29	Boron (B)	0.3 mg/L	ND	U.S. EPA-200.7	Within Limits
30	Zinc (Zn)	5.0 mg/L	ND	U.S. EPA-200.7	Within Limits

NEQS: National Environmental Quality Standards for Drinking Water, 2016
SMWW: Standard Methods for the Examination of Water and Waste Water 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
USEPA: United States Environmental Protection Agency
ND: Not Detected
NGVS: No Guideline Value Set

- Laboratory tests and measurements were carried out at 25 ± 5 °C and 50 ± 20 % Relative Humidity conditions unless required otherwise.
- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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- **The report data is not intended to be used legally by the client.**
- **Only parameters marked with asterisk (*) are ISO 17025:2017 accredited.**

1. **Sample Analyzed By:** Waqas Ahmad (Analyst (ICP-AES)); Abdul Aziz (Analyst (Chemical)); Muhammad Shahid (Analyst (Chemical)); Khizra Bano (Analyst(Microbiology)); Ghulam Mustafa (Analyst (Chemical))
2. **Name of Chief Analyst with Seal:** Muhammad Arfan
3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 22/09/2023

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

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Report Reference	ESPAK/0195I/23/AA/5568/00574
Client Name	Citadel 7
Address	Plot#7, Main Jinnah Avenue Blue Area G-8 Islamabad
Monitoring Location	Mid of point
GPS Coordinates	(33.705684° 73.049253°)
Monitoring Date	15/9/23 to 16/9/23
Date-Time	Noise
	dB (A) Leq
15/09/2023 14:10	73.2
15/09/2023 15:10	72.4
15/09/2023 16:10	68.5
15/09/2023 17:10	73.2
15/09/2023 18:10	72.4
15/09/2023 19:10	65.5
15/09/2023 20:10	61.2
15/09/2023 21:10	66.2
16/09/2023 7:10	51.9
16/09/2023 8:10	64.0
16/09/2023 9:10	69.1
16/09/2023 10:10	71.2
16/09/2023 11:10	69.2
16/09/2023 12:10	72.1
16/09/2023 13:10	74.9
Average Day Time	**67.1**

15/09/2023 22:10	58.5
15/09/2023 23:10	63.9
16/09/2023 0:10	60.8
16/09/2023 1:10	50.4
16/09/2023 2:10	51.2
16/09/2023 3:10	47.2
16/09/2023 4:10	49.0
16/09/2023 5:10	52.1
16/09/2023 6:10	52.5
Average Night Time	**54.0**

Monitored By:	Farhan Ali

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NOISE MONITORING REPORT

Reference Number: ESPAK/0195I/23/N/5568/00574 **Date:** 20/09/2023
Name of Industry/Client: Citadel 7
Address: Plot No 7, Main Jinnah Avenue Blue Area G-8 Islamabad
Telephone No.: ---
Nature of Sample: Noise
Date of Sample Collection: 15/09/2023 **Grab / Composite:** Continuous-24 Hours
Sample Collected/Sent By: Farhan Ali, Analyst (Field), ESPAK
Date of Completion of Analysis: 16/09/2023
Method/Equipment Used: Sound Level Meter

S. No	Measurement Point	Limit Values (NEQS)	Noise Level in dB(A) Leq	Remarks
1	Mid point of Blue Area G-8 Islamabad (GPS: 33.705684°N, 73.049253°E) - Day time	65 dB(A)	67 dB(A)	Exceeding Prescribed Limits
2	Mid point of Blue Area G-8 Islamabad (GPS: 33.705684°N, 73.049253°E) - Night time	55 dB(A)	54 dB(A)	Within Prescribed Limits

NEQS: National Environmental Quality Standards for Noise in Commercial 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, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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1. **Sample Analyzed By:** Farhan Ali, Analyst (Field)
2. **Name of Chief Analyst with Seal:** Muhammad Arfan
3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 20/09/2023

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

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Report Reference	ESPAK/0195I/23/AA/5567/00489
Name of Industry/ Client	Citadel 7
Address	Plot#7, Main Jinnah Avenue Blue Area G-8 Islamabad
Monitriong Location	Mid of point
GPS Coordinates	(33.705684° 73.049253°)
Monitoring Date	15/9/23 to 16/9/23

Date - Time	CO	SO_2	O_3	NO	NO_2	$PM_{2.5}$	PM_{10}	TSP
	mg/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3	ug/m^3
15/09/2023 14:10	0.9	9.9	39.5	9.2	11.1	31.9	143.2	416.7
15/09/2023 15:10	0.5	6.1		14.6	6.7	29.3	144.4	421.0
15/09/2023 16:10	1.1	9.6		10.1	9.2	28.3	138.8	458.3
15/09/2023 17:10	1.0	8.5		11.7	9.6	30.4	168.1	388.3
15/09/2023 18:10	0.6	6.3		14.9	9.5	23.3	170.7	437.3
15/09/2023 19:10	0.9	10.0		13.2	10.1	24.8	143.1	473.3
15/09/2023 20:10	1.0	9.1		9.2	12.6	30.7	134.3	478.3
15/09/2023 21:10	1.2	7.2		12.8	13.8	33.0	134.3	464.0
15/09/2023 22:10		7.8		10.5	14.0	31.7	143.7	435.3
15/09/2023 23:10		8.6		11.7	5.8	36.4	134.4	458.5
16/09/2023 0:10		10.3		12.3	12.9	27.8	127.7	448.5
16/09/2023 1:10		10.9		13.0	7.7	33.9	140.3	464.9
16/09/2023 2:10		11.6		8.6	14.8	35.4	121.3	442.8
16/09/2023 3:10		7.3		11.1	13.2	28.0	128.7	451.7
16/09/2023 4:10		7.9		11.5	18.3	34.7	135.1	467.5
16/09/2023 5:10		8.6		11.4	19.0	33.4	144.2	458.5
16/09/2023 6:10		6.8		12.0	13.4	34.7	135.6	483.4
16/09/2023 7:10		7.3		14.5	16.6	26.3	143.3	458.3
16/09/2023 8:10		7.8		15.7	11.8	28.5	141.3	408.3
16/09/2023 9:10		8.4		15.9	14.2	26.0	130.8	496.5
16/09/2023 10:10		8.6		7.7	18.0	28.0	140.0	461.3
16/09/2023 11:10		7.3		14.8	16.2	24.9	143.3	474.3
16/09/2023 12:10		4.1		9.6	11.3	21.4	144.1	418.3
16/09/2023 13:10		9.3		16.7	17.0	27.7	148.3	397.2
Average	0.9	8.3	39.5	12.2	12.8	29.6	140.8	448.4
Maximum	1.2	11.6	39.5	16.7	19.0	36.4	170.7	496.5
Minimum	0.5	4.1	39.5	7.7	5.8	21.4	121.3	388.3

Monitred By:	Farhan Ali

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CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: ESPAK/0195I/23/AA/5567/00489 **Date:** 20/09/2023
Name of Industry/Client: Citadel 7
Address: Plot No 7, Main Jinnah Avenue Blue Area G-8 Islamabad
Telephone No.: ---
Nature of Sample: Ambient Air **Monitoring Location:** Mid Point of site (GPS: 33.705684°N, 73.049253°E)
Date of Sample Collection: 15/09/2023 **Grab / Composite:** Continuous-24 Hours
Sample Collected/Sent By: Farhan Ali, Analyst (Field), ESPAK
Date of Completion of Analysis: 16/09/2023

S. No	Parameters	Limit Values (NEQS-24 Hours)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	5 mg/m³ (8 Hours)	0.9 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Sulfur Dioxide (SO_2)	120 µg/m³	8.3 µg/m³	UV Fluorescence (UVF)	Within Prescribed Limits
3	Ozone (O_3)	130 µg/m³ (1 Hour)	39.5 µg/m³	Non Dispersive UV Absorption	Within Prescribed Limits
4	Oxides of Nitrogen as NO	40 µg/m³	12.2 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
5	Oxides of Nitrogen as NO_2	80 µg/m³	12.8 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
6	Particulate Matter $PM_{2.5}$	35 µg/m³	29.6 µg/m³	Particulate Sensor	Within Prescribed Limits
7	Particulate Matter PM_{10}	150 µg/m³	141 µg/m³	Particulate Sensor	Within Prescribed Limits
8	Suspended Particulate Matter (SPM)	500 µg/m³	448 µg/m³	Particulate Sensor	Within Prescribed Limits

NEQS: National Environmental Quality Standards for Ambient Air, 2010

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2. **Name of Chief Analyst with Seal:** Muhammad Arfan
3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 20/09/2023

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