BOARD OF REVENUE, GOVERNMENT OF PUNJAB

ENVIRONMENTAL IMPACT ASSESSMENT OF CONSTRUCTION OF RAWALPINDI CIRCUIT HOUSE, RAWAL DAM IRRIGATION COLONY, ISLAMABAD

Final Report

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Executive Summary

Title of Project

This report presents the Environmental Impact Assessment of the project "Construction of Rawalpindi Circuit House", in Rawal Dam Irrigation Colony, Islamabad.

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

Location of Project

Rawalpindi Circuit House is proposed in Rawal Dam Irrigation Colony, Islamabad. The project site is accessible from Park Road, which connects to Murree Road, Jinnah Road and Rawal Road.

The GPS coordinates of the project site are 33°41'21.84" N 73° 7'25.99" E. The project site is located approximately 0.5 km from Rawal Dam spillway.

Name of Proponent and Organization preparing Report

The Board of Revenue, Government of Punjab is the proponent of the proposed project. In order to comply with the regulatory requirement of federal environmental laws, Board of Revenue has acquired the services of Infrastructure Development Authority Punjab (IDAP), to execute the project.

Infrastructure Development Authority Punjab (IDAP), an autonomous body established under the Infrastructure Development Authority of the Punjab Act 2016 for planning, designing, construction and maintenance of public sector infrastructure projects in the province. IDAP has prepared an Environmental Impact Assessment of Rawalpindi Circuit House, Rawal Dam Irrigation Colony, Islamabad.

Outline of the Project

The Government of Punjab intends to develop a circuit house near Rawal Dam, Islamabad. The project will comprise buildings having a total covered area of 76,918 square feet. The proposed Rawalpindi Circuit House is spread over an area of 24 Kanal.

The project will comprise of 5 buildings (4 Blocks + Servant Quarter). There will be the provision of residences for government officers to carry out official assignments.

Rawalpindi Circuit House will have a total of 24 Officers' Suites and 16 Servant Rooms.

The project is to provide residential facilities to government officers as well as other officials who travel from a provincial headquarter to attend the court cases in Rawalpindi/Islamabad and other official meetings in the district Rawalpindi, as there is no circuit house currently available in District Rawalpindi.

The estimated cost of the Project is Rs. 1,980.95 million. The project will be completed in 16 months (1.25 years) time.

Environmental Baseline Conditions

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

Physical Environment

Topography: Islamabad is located on the Northern edge of the track known as Potohar Plateau. The Potohar Plateau has an uneven table and land is gradually rising in elevation from 500 to 600 meters above sea level, and the highest point is 1,600 meters above mean sea level. The project site is a plain land.

Geology and Soil: The project site strata mainly consist of silty clay underlain by sand and boulders/rock beds. The geotechnical investigation has revealed that the soil at the project site is very loose to dense over burden soil (Silty Clayey Sand with Gravel / Clayey Sand / Well Graded Gravel with Silty Clay and Sand / Silty Gravel with Sand / Silty Sand with Gravel / Silty Gravel with Sand).

Land Use: The project site comprises of empty fishponds and barren land.

Surface Water: Rawal Dam Lake and Korang River are the main surface water bodies located 0.5 km from the project site.

Testing of surface water at the project site was conducted. The samples of surface water was collected on 18th May 2023 and were received by a Pak EPA certified Laboratory 19th May 2023 for analysis.

The parameters that were analyzed include pH, Total Dissolved Solids, Chloride, Cadmium, Chromium, Copper, Lead, Manganese, Nickel, Zinc, Antimony, Aluminum, Arsenic, Boron, Barium, Mercury, Selenium, Total Coliforms, Fecal Coliforms Bacteria, E.coli, Color, Taste, Odor, Turbidity, Total Hardness as $CaCO_3$, Cyanide, Fluoride, Nitrate, Nitrite, Residual Chlorine and Phenolic Compounds (as Phenols) whose concentrations were all within acceptable limits.

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

Ground Water: There is groundwater available at shallow depths, however, the local population uses the water supply from CDA for daily use.

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 in surrounding areas (especially in Murree). 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 ºC to 46 ºC. The coldest month is January when the mean maximum temperature is 18.3 ºC, and the mean minimum is 3.8 ºC.

From February to May the temperature rises at the rate of 5.0 ºC per month. The highest temperature was reached in May when the mean maximum temperature remains 39.1 ºC.

Air Quality: The ambient air and noise level monitoring was conducted on 24th May to 25th May 2023 for 24 hours at the project site of Rawalpindi Circuit House Project, Rawal Lake, Zone III, Islamabad.

The ambient air quality and noise monitoring was carried out by Pak - EPA Certified laboratory. The average 24-hour CO, SO_2, O_3, NO, NO_2, $PM_{2.5}$, PM_{10}, and SPM were recorded as 2 mg/m^3, 21.6 ug/m^3, 15.8 ug/m^3, 13.9 ug/m^3, 23.2 ug/m^3, 28.3 ug/m^3, 133 ug/m^3, 254 ug/m^3 respectively.

The ambient air quality monitoring results indicate that the parameters for ambient air quality are within the NEQS limits.

Noise and Vibration: The 24-hour monitoring period for noise level was carried out at the project site. At daytime noise level was 65 dB, at nighttime it was 54 dB. These values are within the compliance limits of NEQS (i.e., 65 dB (day time), 55 dB (night time). During the construction of the project, special care will be taken for noise and vibration.

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.

The dominant flora at the project site comprises of Paper Mulberry Trees.

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 Porcupine, birds include Quail, House Sparrow, and House Crow and reptiles common in the area are Monitor Lizard, and Spin tailed lizard.

Socio-Economic and Cultural Environment

The socio-cultural and socio-economic conditions of the project area, namely Rawal Dam Irrigation Colony, is described in the report. These are the localities, which may get direct positive or negative impacts from the development of Rawalpindi Circuit House.

Public Consultation

During the public consultation, meetings were held with the Proponent's Team, CDA, SDO Irrigation Colony, Office of the Deputy Director (Development), Rawalpindi, IESCO, Islamabad Traffic Police, environmental experts 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.

Generally, the people of the project area are in favour of the project and stated that this project would create employment opportunities and uplift the area in the project area.

Impacts and Mitigation Measures

Physical Environment

Impacts: 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 the 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.

The solid waste may be generated due to different construction activities, and it will mainly include surplus excavated and construction material.

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 affect 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.

Rawalpindi circuit house is being developed in an area with a semi-urban setting. There is a need to maintain much of its natural landscape and vegetation as it is the most asset of the project site.

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.

Appropriate sewage treatment mechanisms such as septic tanks of adequate sizes will be incorporated into the design for treating sanitation water where municipal sewage system is not available or does not exist.

Water quality analysis will be carried out at the project site and campsite quarterly during the construction phase.

Ecological Environment

Impacts: The project site has a cover of vegetation which mainly consists of 40 Paper Mulberry, 3 Sheesham (Dalbergia sissoo) trees, 2 Amaltas (cassia fistula), 1 Sumbal (bombax ceiba) and 1 Shatoot (Morus alba). The site preparation and construction activities may necessitate the removal of the natural vegetation from the areas where roads and Rawalpindi Circuit House will be constructed.

Mitigations: Majority of the trees to be cut are Paper Mulberry which is an invasive specie that causes pollen allergy to residents of Islamabad and Rawalpindi. Through astute planning, the cutting of remaining trees will be avoided. Moreover, to maintain plantation cover, a robust plantation plan has been devised to improve the aesthetic beauty of the area.

A plantation plan will be prepared to plant mature plants to strengthen the ecological environment of the project area.

Socio-Economic Environment

Impacts: The land for the Rawalpindi Circuit House has been acquired by the Board of Revenue Government of Punjab. Hence, there is no issue of resettlement of the community due to the proposed project. The project is located in close vicinity of Rawal Dam Irrigation Colony housing which may pose some safety hazards to the local population during the construction phase of the project.

Construction workers may be susceptible to eye and respiratory diseases due to their routine exposure to dust and exhaust emissions on site. Injuries could happen primarily by occupational-related accidents, animal bites, etc. Activities such as land clearing, earthworks,

and construction of facilities present various occupational hazards to the workers on the project site.

There are no reported sites of archaeological or historical significance at the project site. However, in case an artefact of such significance is found during the construction activities, the Archeology Department, Government of Pakistan will be informed.

Mitigations: Any physical injury will be mitigated through the provision of appropriate training and emergency response procedures. Protected fencing will be fixed around the construction site.

Provision of Personal Protective Equipment (PPE) to the workers will be ensured. Unauthorized access to the construction area will not be allowed. Vehicle speeds of 20 km/hour at the project site will be implemented. Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance caused by light pollution.

Environmental Management Plan (EMP) and Proposed Monitoring

For effective implementation and management of mitigation measures, an Environmental Management Plan has been proposed. The EMP reflects the commitment of Rawalpindi Circuit House to safeguard the environment as well as the surrounding population.

The EMP provides a delivery mechanism to address potential impacts of project activities, to enhance project benefits and to introduce standards of good practice in all project activities.

An Environmental Monitoring Plan has been proposed for the construction and operational phase of the project, which will be adopted by Rawalpindi Circuit House.

The cost proposed for the proposed estimated Environmental Monitoring Plan is Rs. 14,317,500***/-.***

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 construction of Rawalpindi Circuit House Project is likely to cause minor environmental impacts during its constructional and operational 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

EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ERS	Electrical Resistivity Survey
EPA	Environmental Protection Agency
GPD	Gallons per Day
HSE	Health, Safety and Environment
IESCO	Islamabad Electric Supply Company
IEE	Initial Environmental Examination
NCS	National Conservation Strategy
NEQS	National Environmental Quality Standards
PEQS	Punjab Environment Quality Standards
NOC	No Objection Certificate
PEPA	Pakistan Environmental Protection Act 1997
PEPC	Pakistan Environmental Protection Council
Sr. No.	Serial Number
TMA	Tehsil Municipal Authority

List of Units

%	Percent (age)
^{o}C	Degree centigrade
cm	Centimeter
dB (A)	Decibel
ft^2	square foot
ft^3	Cubic foot
Km	Kilometre
Km/h	Kilometer/hour
m	Meter
m^2	square meter
m^3	Cubic meter
MT	Metric Ton
Rft	Running Feet

1 Introduction

1.1 Project Background and Overview

Government officers and other officials often have to travel inter-city for attending court cases, meetings or other office-related work, and currently there is no circuit house available for officers to stay in Rawalpindi and Islamabad.

The project is to provide residential accomodation to government officers as well as other officials who travel from a provincial headquarters to attend the court cases in Rawalpindi/Islamabad and other official meetings in the District Rawalpindi and Islamabad Capital Territory.

The project will be completed in 16-month (1.25 years) time.

The project is required as a platform to facilitate the coordination of the work of all the offices and public facilities in the region, and will ensure integrated development, efficient use of public resources and effective service delivery.

1.2 Brief description of the nature size and location of the project

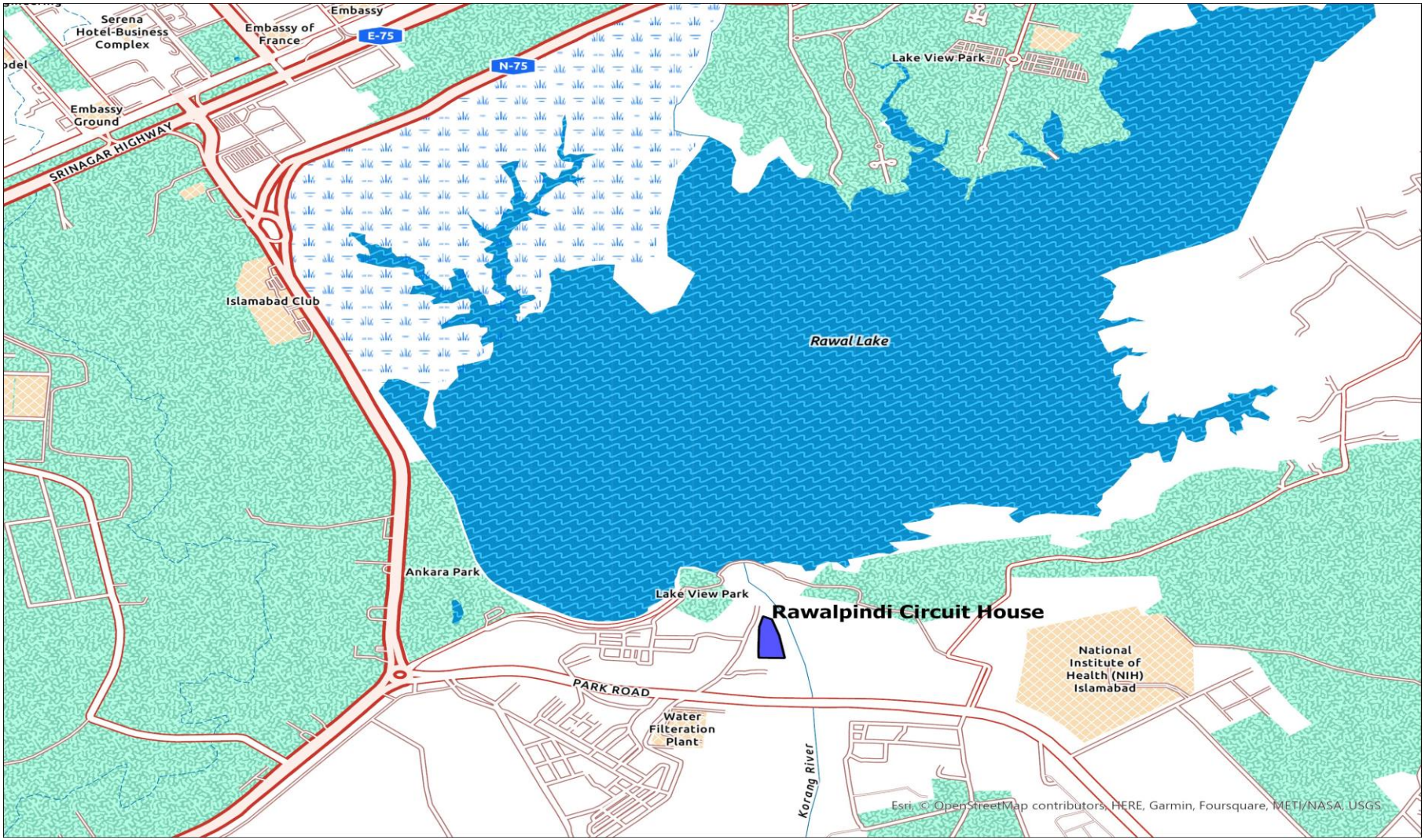
Nature: This project is the Establishment of Rawalpindi Circuit House, near Rawal Dam Lake, Islamabad.

Size: Government of Punjab intends to develop a Circuit House in Islamabad as there is currently no circuit house in Islamabad or Rawalpindi. The project will comprise 5 buildings (4 blocks + servants quarter) having a total covered area of 76,918 square feet and the total site area is 24 Kanal. The site is approximately 0.5 km away from the Rawal Lake . There will be the provision of 24 officers' suites and 16 servant quarters in the project.

Location: The project site is located along Park Road which is further connected to Murree Road, Jinnah Road and Rawal Road. The GPS coordinates of the project site are 33°41'21.84" N 73° 7'25.99" E.

The project site is located approximately half km from Rawal Dam. The keymap of the project location has been shown in **Figure 1.1.**

Figure 1.1: Key Map of Project Location



1.3 The Proponent

Board of Revenue, Government of Punjab is the sponsor and proponent of the project. The functions of:

- Administration of land laws and maintenance of record of rights in land
- Management of state land
- Changes in administrative units/creation of new division, districts and tehsils
- Land acquisition of land for public proposes and for companies
- Consolidation of holdings

1.4 The Consultant

Infrastructure Development Authority Punjab (IDAP) is an autonomous body established under the Infrastructure Development Authority of the Punjab Act 2016 for planning, designing, construction and maintenance of public sector infrastructure in the province, has prepared Initial Environmental Examination of Construction of Rawalpindi Circuit House, Near Rawal Dam Lake, Islamabad.

IDAP is committed to providing world-class education, research, and healthcare delivery for the benefit of patients & society, healthcare practitioners and educationists nationally and internationally to meet the needs of the 21st Century. The college intends to be recognized at home and abroad as a leading and trend-setter institute of medical education and research.

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

1.5 Contact Persons

Proponent	Environmental Consultant
Muhammad Mazhar Nadeem Deputy Director (Development) Rawalpindi Office of the Deputy Commissioner Rawalpindi Tel: +92 51 9292534 Email: doprwp@gmail.com	**Engr. Saadat Ali,** Environmental Consultant Office Number 26, Second Floor, Silver City Plaza, G-11 Markaz, Islamabad Tel: +92 51 2363624 Cell: +92-300-8540195 Email: projectpi@gmail.com

1.6 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 Federal 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".

1.7 Aims and Objectives of EIA Report

The aim and objectives of the EIA of the project are as follow:

- Identification and assessment of all major and minor impacts during construction and operational stages of the project.
- Identification of all significant impacts that may require detailed assessment.

- Propose mitigation measures to minimize, eliminate or to compensate the potential adverse impacts identified.
- Preparation of Environmental Management Plan.
- Preparation of an Environmental Impact Assessment report for submission to the Federal Environmental Protection Agency, Islamabad.

1.8 Screening of the Project

The Rawalpindi Circuit House Project will be a residential land-use development spread over an area of 24 Kanals.

EIA is mandatory under **section 12 clause (2)** 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 J** (Any other project) of Schedule II and, therefore, requires the EIA study.

1.9 Scoping of the Project

A scoping exercise was undertaken with Pakistan Environmental Protection Agency on 09-06-2023 to identify the potential issues that are to be considered in the Initial Environmental Examination. The scoping exercise included the following indispensable tasks:

Spatial and Temporal Boundaries of the Project: The Project is located near Rawal Lake in Zone III, Islamabad. The Project site is located in a semi-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:

- The EMP cost should be proportionate to the total cost of the project
- Shadow Analysis
- Seasonal ambient air data of project area
- Effectiveness of Construction Material and Transportation Management Plan
- Water arrangement and measures to recharge groundwater
- Wastewater Treatment Plant
- Solid Waste Management Treatment and Disposal Plan

- 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.

1.10 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 The Rawalpindi Circuit House Project.

Checklist of Screening of Potential Environmental Impacts			
Screening Questions	**Yes**	**No**	**Remarks**
Project Siting Impacts			
Densely populated?		✓	The Project site is located near Rawal Dam Lake. There is no residential area in the immediate vicinity of the project site
Heavy with development activities?		✓	There is no other major construction or development activity going on in the area.
Adjacent to or within any Environmentally sensitive areas?	✓		Although Rawal Lake is an environmentally sensitive area and is classified inside the Margalla Hills National Park, the project site is located within the premises of Rawal Dam Irrigation Colony which has been established since 1962.
Cultural heritage site		✓	There are no cultural heritage sites nearby.
Protected area	✓		Protected area i.e Rawal Lake is located in vicinity of the project area.
Wetland	✓		The project is located close to the Rawal Dam Lake.
Mangroves		✓	No mangroves are present in the microenvironment.
Estuarine		✓	Not Applicable
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		✓	Park Road is already being upgraded to 3 lanes which will ensure smooth flow of traffic

Checklist of Screening of Potential Environmental Impacts			
Surface and Groundwater Contamination		✓	The wastewater will be disposed of in sewerage network of Islamabad.
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.
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.
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		✓	The Project area is not vulnerable with respect to any demographic or socioeconomic aspects.

Checklist of Screening of Potential Environmental Impacts
settlements, ethnic minorities, women or children)?

1.11 Approach and Methodology

1.11.1 Approach For EIA

The approach for conducting Environmental Impact Assessment of the Construction of Rawalpindi Circuit House is to follow the requirement of Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations, 2000.

1.11.2 Kick-off Meeting with the Proponent:

The consultant team held a kick-off meeting with the Deputy Director (Development) Rawalpindi, IDAP's Team, and Executive Engineer, Irrigation Department at the beginning of the EIA study. During the kick-off meeting, all technical data, and the layout plan of the project "Construction of Rawalpindi Circuit House" was provided.

1.11.3 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, geomorphology, 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.

1.11.4 Collection of Primary Data and Field Visit

The Infrastructure Development Authority (IDAP) team visited the project site and adjoining areas in coordination with Rawalpindi Circuit House officials, for obtaining detailed knowledge of the environmental conditions of the area. During the field visits, the existing environmental conditions were studied. In addition, consultation/meetings were held with the community.

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.

1.11.5 Analysis of Alternatives

The EIA report gives the details of alternatives considered during the EIA of the project**.**

1.11.6 Stakeholder & Public Consultation

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 public consultation is provided in **Annexure-2**.

1.11.7 Review of Legislative Requirements

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

1.11.8 Identification of Impacts

The identification of impacts is a key activity in the environmental assessment process, which is based on the professional judgment of our experienced team supported by national and international guidelines. The potential impacts were identified with methodical consideration of likely or possible significant impacts on the environment for the project "Construction of Rawalpindi Circuit House". The aim of this task was to assess the associated risks with these impacts.

Evaluation of Impacts: Each impact identified has been evaluated against its significance in terms of 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 the Environmental Management Plan.

1.11.9 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.

1.11.10 Development of Environmental Management Plan (EMP)

An EMP has been developed for effective implementation of the recommended mitigation measures. The EMP includes a control to minimize the identified impacts, and monitoring program to monitor residual impacts, if any, during the construction and operational phases of the project.

The EMP also lays down procedures to be followed during the operational phase of the project. The EMP also identifies the roles and responsibilities of all concerned personnel during the project's construction and operational phases.

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

Chapter 5 *(Impact Assessment and Mitigation Measures)* details the potential environmental and social impacts of the project on the different features of the micro and macro-environment using the matrix method.

Chapter 6 *(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 7 *(Conclusion)* summarizes the report and presents its conclusions.

The last chapter is followed by the references and **Annexures** that provide supporting information. **Annexure-3** is the glossary of the report where technical words have been briefly described. **Annexure-4** describes the Terms of Reference of the EIA Report.

2 Legislative and 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 Rawalpindi Circuit House 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 National Conservation Strategy

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

2.3 National Environmental Policy, 2005

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

2.4 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.

2.4.1 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 Environmental Impact Assessment (EIA) or an Initial Environmental Examination (IEE) 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.

2.4.2 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 *IEE and EIA*.
- 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 the confirmation of completeness.
- EPAs accord their approval subject to the 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 EIA/ 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 EIA/ 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 the Rawalpindi Circuit House Project falls in Schedule-II of the regulations. Hence, this type of project needs an EIA to be conducted.

2.5 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 sets 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.

2.5.1 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
Tempereture	=<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

Parameters	Into Inland Waters	Into Sewage Treatment	Into Sea
Total Suspended Solids (TSS)	200	400	200
Total Dissolved Solids (TDS)	3500	3500	3500
Grease & Oil	10	10	10
Phenolic Compounds (as phenol)	0.1	0.3	0.3
Chlorides (as Cl')	1000	1000	SC
Fluoride (as F')	10	10	10
Cyanide (CN') total	1.0	1.0	1.0
An-ionic Detergents (as MBAs)	2.0	20	20
Sulphate (SO'')	600	1000	SC
Sulphide (S')	1.0	1.0	1.0
Ammonia (NH^3)	40	40	40
Pesticides	0.15	0.15	0.15
Cadmium	0.1	0.1	0.1
Chromium (trivalent & hexavalent)	1.0	1.0	1.0
Copper	1.0	1.0	1.0
Lead	0.5	0.5	0.5
Mercury	0.01	0.01	0.01
Selenium	0.5	0.5	0.5
Nickel	1.0	1.0	1.0
Silver	1.0	1.0	1.0
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*

2.5.2 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, Coal-Fired, Cement Kilns	300
	Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500
		300
		500
Hydrogen Chloride	Any	400
Chlorine	Any	150
Hydrogen Fluoride	Any	150
Hydrogen Sulphide	Any	10
Sulphur Oxides	Sulfuric Acid/sulphonic Acid Plants	5000
	Other Plants except power plants operating 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*

2.5.3 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*

2.5.4 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 the 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 the 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

Parameter	Standard values	WHO guidelines
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
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*

2.5.5 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	Nighttime
Residential area	55	45
Commercial area	65	55
Industrial area	75	65
Silence area	50	45

Source: NEQS, National Environmental Protection Agency

2.6 The Capital Development Authority Ordinance 1960

The objective of Ordinance, Firstly, planning and development of Capital (Islamabad), secondly completing or authorizing Capital Development Authority to perform functions of a Municipal Committee and to provide for cleanliness, health, education of inhabitants, the supply of goods, articles of food and mild, to promote the interest of different sections of the public. All provisions are for advancing interest and the public good. Such statues are not repugnant to Sharia (PLD 1985 FSC 221).

Capital Development Authority is a statutory body is expected to deal with citizens fairly, and honestly and conduct it's all actions transparently (2003 CLC1684).

Whereas it is expedient to establish a Capital Development Authority for making all arrangements for the planning and development of Islamabad within the framework of a regional development plan.

This Ordinance may be called the Capital Development Authority Ordinance, 1960. The Ordinance has 8 chapters.

2.7 National Drinking Water Supply 2009

In September 2009, the government approved the National Drinking Water Policy that provides a framework for addressing the key issues and challenges facing Pakistan in the provision of safe drinking water to the people by 2025.

Drinking water is the constitutional responsibility of the provincial governments, and the specific provision function has been devolved to specially created agencies in cities and Towns and Tehsil Municipal Administrations under the Local Government Ordinance 2001.

Therefore, this policy framework is intending to guide and support the provincial and district governments in discharging their responsibility in this regard. The overall goal of the national drinking water policy is the following:

- To ensure safe drinking water to the entire population at an affordable cost in an equitable, efficient and sustainable manner.
- To ensure a reduction in the incidence of mortality and morbidity caused by water-borne diseases.

The policy is expected to be reviewed and updated every five years to examine its implementation and efficacy and to adapt it to the changing situation in the country.

2.8 Building Code of Pakistan- Fire Safety Provisions – 2016

The Building Code of Pakistan-Fire Safety Provisions-2016 provide rules for fire prevention, life safety in relation to fire and fire protection of building and structures as prescribed. Building Code of Pakistan-Fire Safety Provisions-2016 shall be adopted by the federal vi and provincial governments, organizations, authorities, both public and private, as notified.

- This Byelaw shall apply to both new and existing buildings.
- Any person who fails to comply with this Byelaw or fails to carry out an order made pursuant to these provisions, or violates any condition attached to a permit, approval, or certificate shall be subject to the penalties in accordance with the regulations

2.9 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 IEE or EIA 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.

2.10 Implication of Legislations to the Project

The implication of the above-mentioned legislation to the pre-construction, construction and operational phase of the Rawalpindi Circuit House Project would be as follows:

- Board of Revenue, Government of the Punjab 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 a 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 of the established ambient standard.

3 Project Description

3.1 Introduction

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

3.2 Objective of the Project

The objective of the project is to provide suitable housing to government officers as well as other officials who travel from a provincial headquarter to attend the court cases in Rawalpindi/Islamabad and other official meetings in the district Rawalpindi.

3.3 Project Location and Accessibility

The project is located on Park Road, which connects to Murree Road, Jinnah Road and Rawal Road.

The GPS coordinate of the project site is 33°41'21.84" N 73° 7'25.99" E. The surrounding areas near the project site of Rawalpindi Circuit House are as follows:

North: Rawal Lake

South: Park Road

East: Korang River

West: Rawal Dam Irrigation Colony, Office of the Executive Engineer Small Dams

The location of the project is shown in **Figure 3.1.**

Figure 3.1: Project Location and Accessibility Map of Rawalpindi Circuit House

3.4 Description of the Project

The project will comprise 5 buildings (4 blocks + servants quarter) having a total covered area of 76,918 square feet and the total site area is 24 Kanal. The site is approximately 0.5 km away from Rawal Lake. There will be the provision of 24 officers' suites and 16 servant quarters in the project.

3.5 Land Use of the Project Site

The land use distribution of Rawalpindi Circuit House is provided in **Table 3.1.**

Table 3.1: Details of Facilities at Rawalpindi Circuit House

AREA SCHEDULE					
Sr. No	**Buildings**	**No. of Floors**	**Building Blocks**	**Total Covered Area One Building**	**Total Covered Area All Buildings**
	Description	**(Nos).**	**(Nos).**	**Area (Sft.)**	**Area (Sft.)**
A	Officers' Suites	G+02	4	15,995	63,980
B	Servant Quarter	G+01	1	12,418	12,418
E	Pump Room			100	100
F	UGWT			240	240
G	Metering Room			896	896
H	Guard Rooms (1&2)			180	180
Total			**5**	**76,918**	**76,918**

***Source**: PC-1 Rawalpindi Circuit House*

The project is significant as it will facilitate the government officers from all over the Punjab province.

3.6 Land acquisition

The land for the proposed project is in possession and there is no issue of land acquisition and resettlement.

3.7 Occupancy of Rawalpindi Circuit House

The estimated population of Rawalpindi Circuit House is approximately 80. The estimated population is calculated based on an average of 2 people in one suite and 2 people in one quarter. The expected occupancy of Rawalpindi Circuit House is shown in **Table 3.2.**

Table 3.2: Expected occupancy of Rawalpindi Circuit House

Occupancy of Rawalpindi Circuit House				
Sr.No	**Buildings**	**No. of Floors**	**Building Blocks**	**Expected Population**
	Description	**(Nos).**	**(Nos).**	**(Nos).**
A	Officers Suites	G+02	4	48
B	Servant Quarters	G+01	1	32
Total			**5**	**80**

***Source:** Consultant Estimates, 2023*

Figure 3.2 shows the master plan of Rawalpindi Circuit House.

Figure 3.2: Master Plan of Rawalpindi Circuit House

AREA STATEMENT	
AREA WITHIN BOUNDARY LIMITS	24 KANAL
TOTAL N0: OF BLOCKS	04
UNITS IN ONE BLOCK	06
TOTAL UNITS OF ALL BLOCKS	24
COVERED AREA OF ONE BLOCK	15,771 SFT.
TOTAL COVERED AREA OF ALL BLOCKS	63,084 SFT.
COVERED AREA OF SERVANT QUARTER BUILDING	7,499 SFT.
COVERED AREA OF O.H.W.T	546 SFT.
COVERED AREA OF METERING ROOM & MV ROOM	896 SFT.
GUARD ROOMS (1&2)	314 SFT.
FILTRATION PLANT ROOM	332 SFT.
TUBE WELL ROOM	178 SFT.
I.T ROOM	120 SFT.
TOTAL COVERED AREA	69,049 SFT.

3.7.1 Water Demand of Rawalpindi Circuit House

Based upon the estimated occupancy of Rawalpindi Circuit House, the average water demand for the Project will be **4,480** gallons per day for the full phase.

Table 3.3 Water Balance of Rawalpindi Circuit House

No	Description	Occupancy	Recommended Daily Water Requirement	Daily Water Consumption	Daily Water Requirement
		Number	Gal/Day/Person	Gal/day	Gal/day
1	Offices and Residencies	80	56	4,480 GPD	4,480 GPD
Total Water Requirement					**4,480 GPD**

3.7.2 Sewerage and Drainage System of Rawalpindi Circuit House

The total wastewater generation is estimated to be 80 per cent of the average water demand of the proposed Project. The average water demand of the proposed project is **4,480 g/d,** so the wastewater generation will be **3,584 g/d** for the fully operational phase.

For the wastewater generated in Rawalpindi Circuit House, separate septic tanks for each residency will be constructed. The wastewater generated in the fully operational phase will be disposed of in the existing sewerage line of Islamabad.

3.7.3 Solid Waste Management

The Rawalpindi Circuit House will have a proper solid waste management plan. A garbage room shall be provided to receive the daily waste material for final dispose-off through garbage vans.

The total estimated solid waste generation load during operational phase is as follows:

No	Description	Occupancy	Waste Generation Rate	Quantity of solid waste generation
		Number	Kg/c/day	Kg/day
1	Offices and Residencies	80	1	80

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

3.8 Project Components

The details of development work to be carried out at Rawalpindi Circuit House are as follow:

Officers' Suites: Residential suites of officers of are G+02 buildings having 4 blocks. The total covered area of these residences is 63,980 sft.

Servant Quarters: The quarters are G+01 storey building having 1 blocks. 01 bed quarter will be constructed for workers. The total covered area of these quarters is 12,418 Sft. The estimated population of these residences would be approximately 32 people based upon the estimation of 2 people per quarter.

Solid waste generation: Rawalpindi Circuit House is a project with an estimated occupancy of 80 persons. It is estimated that solid waste generated will be 80 kg/day. This Solid Waste will be collected, transported, and dumped at a transfer station. At the transfer station, further segregation will take place where recyclables and non-recyclables are be segregated. The recyclable content of waste will be sold to contractors, and the non-recyclable is disposed at designated dumping site.

Electricity Supply: Rawalpindi Circuit House will acquire electricity from Islamabad Electric Supply Company (IESCO).

Sui Gas and Telephone Arrangements: At present, there is gas connection availability, in nearby areas if provided by the government it will be supplied to the residents of Rawalpindi Circuit House, it will be obtained from Sui Northern Gas Pipeline Limited (SNGPL). Similarly, telephone facilities will be also available in the project area.

Fire Fighting: Rawalpindi Circuit House management will be in contact with the local firefighting unit in Islamabad city and will act swiftly in case of any emergency. The management will make sure that there are fire extinguishers present.

Traffic Plan and Transportation: As Park Road is also used by the residents of Rawal Dam Irrigation Colony and the residents of other nearby areas as well as the commuters coming to and from NARC, NIH, COMSATS University etc, therefore, a traffic plan is prepared for Rawalpindi Circuit House as follows:

- Traffic at the main gate will be controlled with the help of security guards. Traffic cones will be placed to direct the traffic in the desired direction.
- To control the speed of traffic on the road speed breakers will be constructed including at exits.
- To avoid over speeding in the streets, speed breakers will be constructed.
- Traffic signs will be installed on all roads as per the requirement of smooth and safe traffic within the vicinity of Rawalpindi Circuit House.

3.9 Cost and Magnitude of the Project

The estimated cost of Construction of Rawalpindi Circuit House is Rs. 1,980.95 million.

The cost distributions of the Rawalpindi Circuit House are shows in **Table 3.4**.

Table 3.4 Cost of Rawalpindi Circuit House

S.No	Description	Phase I Cost (millions)
A	**Buildings & External Works**	
i	Building & External Works (Local Items)	1,483.027
ii	Building (Imported Items-Foreign Exchange Component)	$0.080
	Imported Items - PKR Equivalent @ 01 USD=PKR 283.8366	22.707
	Sub Total (A)	**1,505.73**
B	Punjab Revenue Authority (PRA) Sales Tax on Construction Services @ 5%	75.29
	Sub Total (B)	**1,581.02**
C	Revenue Component	222.258
	Sub Total (C)	**222.26**
	Sub Total (A+B+C)	**1,803.28**
D	IDAP fee (Design & Execution Phase) on man month basis	72.131
E	Consultancy supervision 2% Excluding PRA	34.560
F	Environmental Impact Assessment, Traffic Assessment, topographic and Geo Tech Investigation, Structural/ MEP Design Vetting, etc. 0.5 % on Sub Total A	7.529
G	PST (16% on D+E+F)	18.275
H	Contingencies @3% on Subtotal **A**	45.172
	TOTAL:	**1,980.95**

3.10 Government Approvals

Only the NOC from Pak EPA is required, all other requirements have been fulfilled.

3.11 Schedule of Implementation

The project will be completed in 16-month time.

Table 3.5: Time Schedule/Flow Chart for Construction of Rawalpindi Circuit House

Activity/Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Construction works Commencement Date																
Mobilization of Contractor																
Sub/Super Structural Works																
Architectural Finishing and MEP Works																
Testing and Commissioning																
Snag list																
Handing/Taking over																

3.12 Restoration and rehabilitation plans

The proposed project will be comprised of the following components to be considered in the design:

3.12.1 Traffic Plan and Transportation

A proper traffic management plan will be prepared to ensure safety, which will be then implemented by the Rawalpindi Circuit House Management. The traffic plan should include the following:

- The traffic at the main gate will be controlled with the help of security guards. Traffic cones will be placed to direct the traffic in the desired direction, and speed breakers will control the speed of traffic.
- At least two security guards will be deputed to allow smooth flow of the traffic and to check traffic violators, i.e., speeding, adopting the wrong route and not wearing a helmet etc.
- To avoid over speeding in the streets, speed breakers will be constructed.
- Signboards will be displayed at different locations on the roads to direct the traffic in their desired direction.

3.12.2 Electricity System

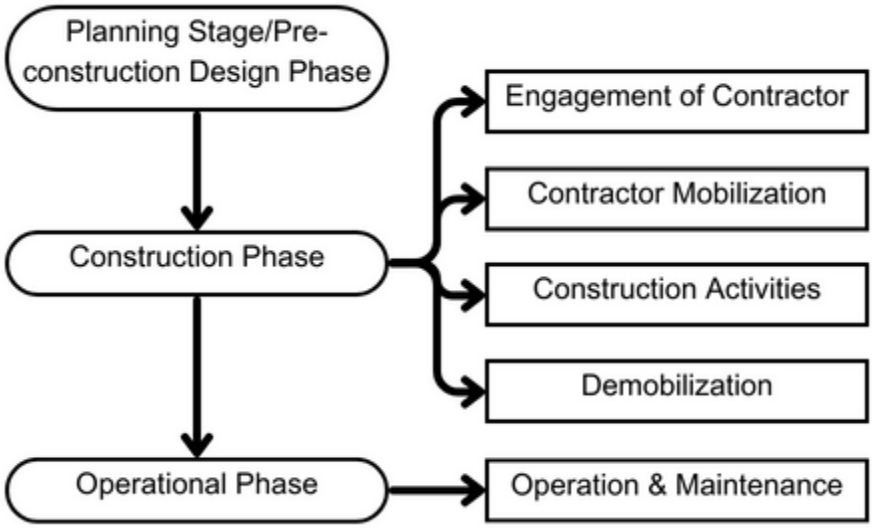
The electricity facility for the proposed Project will be provided by the Islamabad Electricity Supply Company (IESCO).

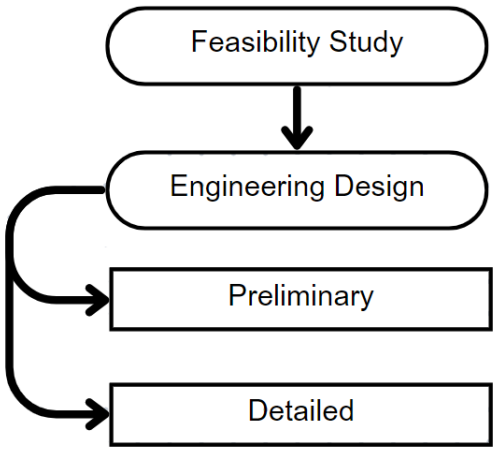
The lights proposed for the buildings will be Surface Mounted Devices, LED, CFL, Spotlight, Fluorescent lights, Decorative Lights, Mirror Lights, etc., and for daylight saving, open lights have been provided for optimum lighting levels and energy saving.

The general principles that underpin the lighting scheme for the proposed Project are listed below:

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

3.13 Project Process Flow





3.14 Environmentally Friendly Features of the Project

The following sustainable features have been provided in this project:

- The planning & design of the Rawalpindi Circuit House has been carried out keeping in mind the natural topography, sun and wind direction.
- The Plantation plan for the Rawalpindi Circuit House is already in place. Total of 5000 trees will be planted.
- Rawalpindi Circuit House has allocated open spaces in the master plan.

3.15 Project Phases

Infrastructure Development Authority Punjab is responsible for design and execution phase of the construction of Rawalpindi Circuit House. The construction of Rawalpindi Circuit House would be implemented in three phases, i.e. Pre-construction/ design, construction and operation.

3.15.1 Pre-construction/ Design Phase

Site Investigation**:** A geotechnical investigation and hydrological study of the project site is carried out for determining the suitability of a site to support the structures, roads, and other development works.

3.15.2 Construction Phase

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

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 construction works will be carried out as per design/profile prepared by the consultant.

The first task during this activity is to demarcate the road alignment and other benchmarks, with the help of drawings prepared during the pre-construction and design phase of the project. On the spot changes will be employed to avoid, to the extent possible, cutting of trees. Once markings are complete; the land will be cleared and prepared for subsequent construction activities. The whole purpose is to develop the area as per Layout of Rawalpindi Circuit House.

Construction Activities**:** The construction activities will be carried out using the conventional methodology and sequence of work. The activities will include excavation, roads, water supply system, separate septic tanks for each residency and other things proposed in the master plan. Other activities will include the laying of cables, construction of drains and footpaths and providing connections to the individual buildings.

Staffing: Construction crews will be the responsibility of the contractor. It is estimated that 100 personnel will be working at the project site at a given time during the peak construction period.

These will essentially include masons, heavy machinery operators, drivers, electricians, plumbers, and general labours. For unskilled employment, preference will be given to residents close to the project area.

Table 3.6: Staff Engaged during the Construction Phases of the Project

No.	Description	For construction
1	Technical staff	20
2	Skilled workers (heavy machinery operators, plumbers, labour)	40
3	Unskilled labour/ helper	40
	Total	**100**

Source: *IDAP Estimates, 2023*

Following steps will be taken for effective management of construction crew:

- A complaint cell for workforce will be established, where they can register their reservations related to work.
- The contractor will develop an effective system of communication/consultation and will ensure that the staff concerns are addressed.
- Employees will be discouraged from working excessive hours and/or missing break periods (this may involve a detailed job evaluation).

- Child labour will be avoided.
- Incidents of bullying, sexual and racial harassment will be monitored and, where necessary disciplinary actions will be taken.
- Clear job descriptions will be developed for the workforce, and it will be ensured that the individual is matched to them.

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

- Dozer
- Loader/Excavators/Jack Hammer
- Concrete Mixers
- Tractor Trolley
- Water tanker
- Water pump
- Diesel generator
- Vehicle for personnel movement
- Road rollers

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, the piping material, and electrical material. Most materials will be procured from Lahore, Rawalpindi or Islamabad depending upon the prices. The Bills of Quantities of the material will depend upon the construction activities.

Disposal of Excavated/ Construction Waste**:** Construction waste will be recycled by the contractor. Construction debris will be used in the cut/fill process.

Electricity**:** Currently there is no electricity connection at the project site. However, the contractor will get proper electricity connection from IESCO for the construction activities and camp.

Camp Supplies**:** Camp supplies can be procured from Islamabad city and transported to the project site from Park Road.

Camp Site Sanitation Facilities**:** The contractor will construct a septic tank with a soakage pit to treat sewerage generated at the campsite.

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

Traffic Load for Construction Materials Supplies: It is estimated that on average, 2-5 truckloads per day during the peak construction period will be supplying different types of construction materials to the project site during the peak construction period.

Other Supplies Water: During the construction phase, a maximum of about 6,000 gallons per day of water will be required for 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 vehicles will get diesel from the nearest petrol pump.

3.15.3 Operational Phase

The office of IDAP will be responsible for operation and maintenance of the Rawalpindi Circuit House during the operational phase.

Figure 3.3: Pictorial Presentation of Project Site

Exhibit 1: View of the project site

Exhibit 3: View of the Rawal Dam Spillways located nearby

Exhibit 4: Irrigation department offices located near the project site

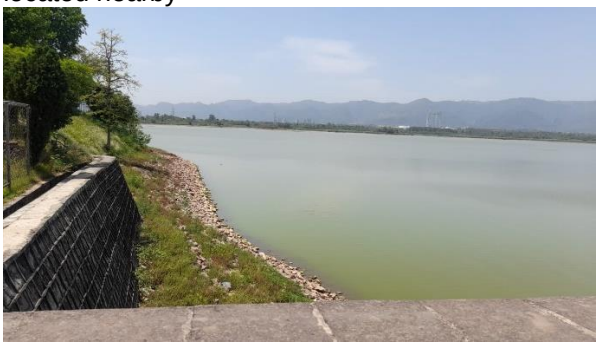


Exhibit 5: Rawal Dam Lake located near the project site

Exhibit 6: Office of deputy director fisheries located close to the project site

4 Project Alternatives

4.1 Background

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

4.2 Management Option

The three significant alternative management option is the 'no project option', 'site alternative option' and 'build as proposed option'.

4.3 No Project Option

If the "No Project" option is triggered; then Project will lose all positive impacts; like providing facilities to the travelling officials as there is no other circuit house in Islamabad or Rawalpindi. A suitable platform for the effective functioning and coordination of the government officials who have to travel due to work will be lost. It will also not create any employment opportunities for the locals, and no development of the area will happen. There will be unplanned and mushroom growth of population and may lead to unplanned construction of slums.

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

4.4 Build-As-Proposed-Option

The proposed project is located within the premises of Rawal Dam Irrigation Colony that is established since the construction of Rawal Dam. The area allocated is lying vacant and the possession is with Government of Punjab. The project is only the development of 76,918 sq.ft. and can be categorized as small scale development.

However, the negative impacts due to the project's construction and operational phases can be minimized, controlled, or eliminated, if the mitigation measures, as suggested in the EIA report, are implemented.

4.5 Site Alternatives

The infrastructure development in the area is rapidly improving in the area due to the expansion of Park Road and establishment of various housing societies near the project site.

The land for the project site is also already in the possession of Government of Punjab, so no alternative site was considered for the project.

4.6 Conclusion

No alternative site has been identified. If the project is not implemented, then all positive impacts related to the project will be lost. The project will address the development of the area by providing employment opportunities to the local population. The positive contribution of the project will be providing efficient services to the public sector officials. So, the 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 environment of the project area. In order to assess the impacts and related mitigation measures, existing environmental conditions of physical, biological and the socio-economic environment of the project area were studied.

5.2 Project Area Location

The project area is located in the premises Rawal Dam Irrigation Housing Colony, Park Road, Islamabad Capital Territory.

5.3 Baseline 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.

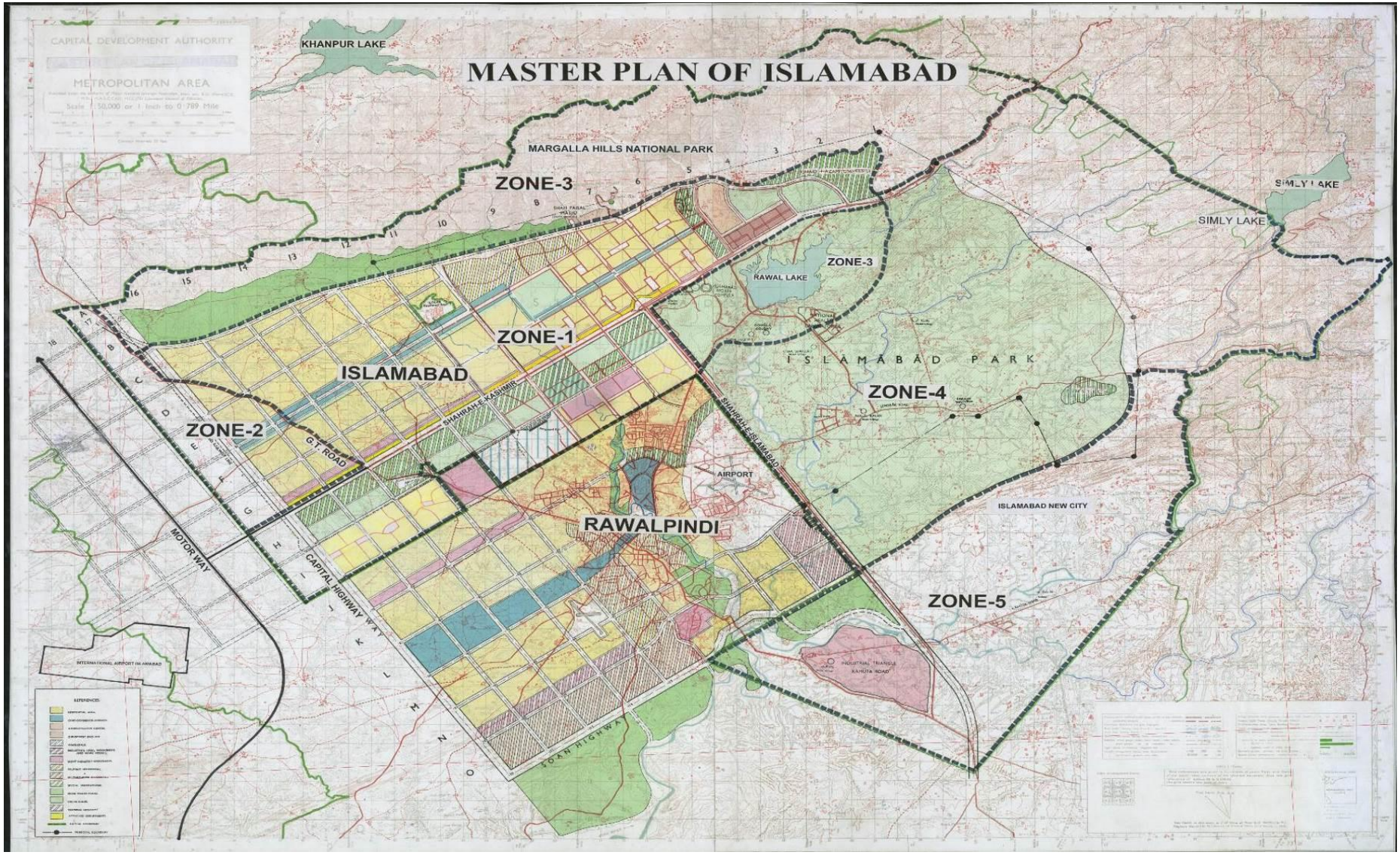
The Potohar Plateau has an uneven table and land is gradually rising in elevation from 500 to 600 meters above the sea level, and the highest point is 1,600 meters above mean sea level. The land gradually slopes towards the South. The land is composed either of alluvium (clay or silt) or of gravel caps. 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 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 the east is a relatively flat area with bare soil and settlements. The map of Islamabad has been provided in **Figure 5.1**.

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.

Figure 5.1: Map of Islamabad



5.3.3 Land Use

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

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 thrust 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 Fateh Jang and form Kala Chita Range.

The Islamabad region lies in a tectonically active zone, where earthquakes have been frequent 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.

Earthquake in 2005 (7.6 magnitudes) resulted in large area destruction in Islamabad.

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

5.3.5 Major Earthquakes

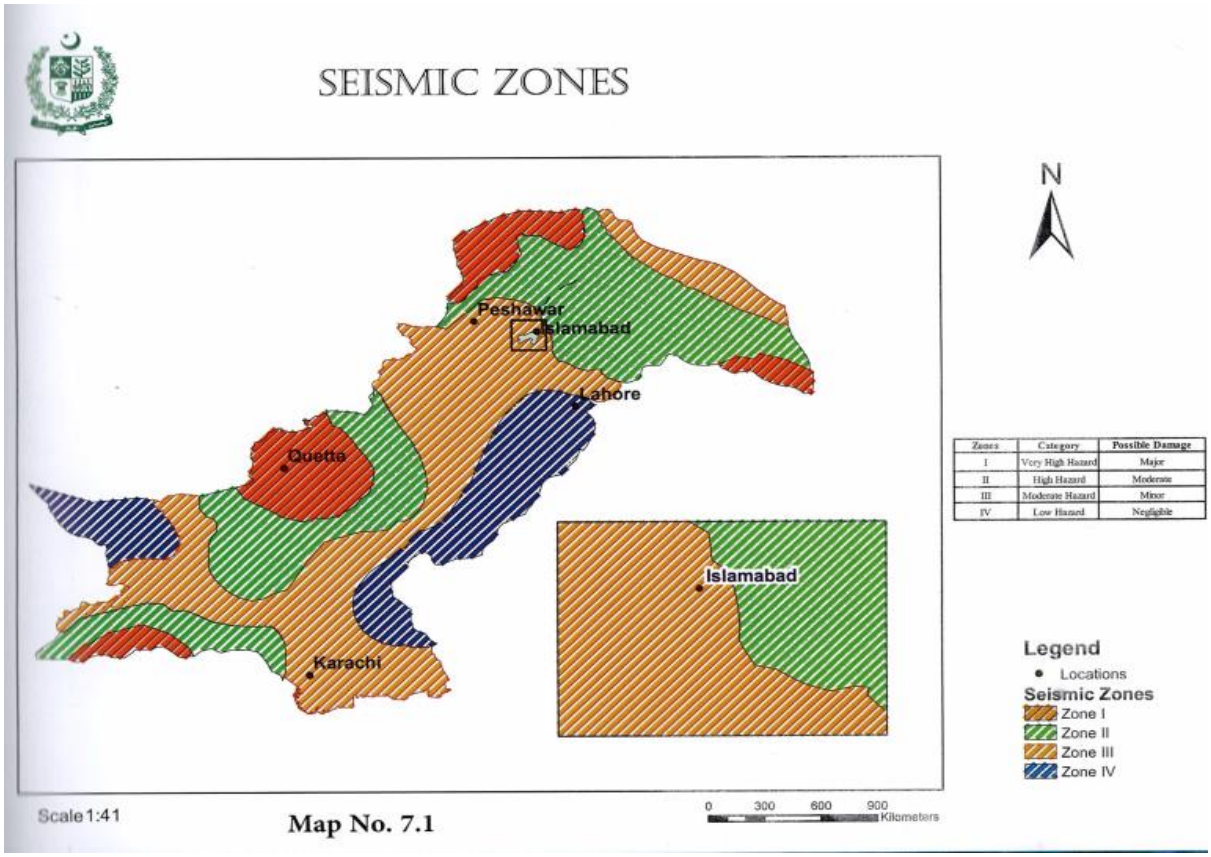
The Islamabad region lies in a tectonically active zone, where earthquakes have been frequent in the recent geological history due to faulting and folding of the structure. Geological past shows that there were many activities of earthquakes in the past in the region.

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.

Earthquake in 2005 (7.6 magnitudes) resulted in large area destruction in Islamabad. Repeated earthquakes have been hitting the area almost every year. [1]

[1] *DIGITAL ENVIRONMENTAL ATLAS OF ISLAMABAD:* Establishment of Geometric Center 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 Center for Climate Change and Sustainable Development Pakistan Environmental Protection Agency Ministry of Climate Change

5.3.6 Surface Water

The Soan and Kurang Rivers are the main streams draining the area. Their primary tributaries are the Ling River, draining north-westward into the Soan; Gumreh Kas, draining westward into the Kurang from the area between the Kurang and Soan; and Leh Nala, draining southward into the Soan from the mountain front and urban areas. The Kurang and Soan Rivers are dammed at Rawal and Simly Lakes, respectively, to supply water for the urban area. Extensive forest reserves in the Kurang and Soan Rivers' headwaters benefit the quality and quantity of water supply.

The Rawal Dam Lake and Korang River are the main surface water resource in the vicinity of the project site.

A chemical analysis test of the surface water in the project site was conducted. The samples of surface water were collected on 18th May 2023 from the nearby Rawal Dam Lake, and were received by the Environmental Services Pakistan on 19th May 2023 for analysis.

Table 5.1: Chemical Analysis of surface water at the project site

S. No	Parameters	Reference values	Concentration	Method/ Equipment Used	Remarks
1	pH*	6.5-8.5	7.6	SMWW 4500H$^+$B	Within Limits
2	Total Dissolved Solids (TDS)*	<1000 mg/L	293 mg/L	SMWW 2540C	Within Limits

3	Chloride (as Cl^-) *	<250 mg/L	18 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	0.1 mg/L	U.S. EPA-200.7	Within Limits
9	Nickel (Ni) *	≤ 0.02 mg/L	ND	U.S. EPA-200.7	Within Limits
10	Zinc (Zn) *	5.0 mg/L	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	0.1 mg/L	U.S. EPA-200.7	Within Limits
13	Barium (Ba)	0.7 mg/L	0.4 mg/L	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	0.1 mg/L	U.S. EPA-9214	Within Limits
18	Phenolic Compounds (as Phenols)	0.1 mg/L	ND	SMWW 5530 C	Within Limits
19	Biochemical Oxygen Demand (BOD) at 20 C	80 mg/L	10 mg/L	SMWW 5210 B	Within Limits
20	Chemical Oxygen Demand (COD)	150 mg/L	21 mg/L	SMWW 5220 D	Within Limits
21	Total Suspended Solids (TSS)	200 mg/L	7 mg/L	SMWW 2540 D	Within Limits
22	Grease and Oil (as n-HEM)	10 mg/L	ND	U.S.EPA 1664 B	Within Limits
23	An-Ionic Detergents (as MBAS)	20 mg/L	ND	SMWW 5540 C	Within Limits
24	Sulfate (SO_4^{2-})	600 mg/L	46 mg/L	SMWW 4500 SO_4^{2-} C	Within Limits
25	Sulfide (S^{2-})	1.0 mg/L	ND	SMWW 4500 S^{2-} F	Within Limits
26	Ammonia (NH_3)	40 mg/L	ND	SMWW 4500 NH_3 D	Within Limits
27	Chlorine (Cl)	1.0 mg/L	ND	SMWW 4500 Cl B	Within Limits
28	Iron (Fe)	8.0 mg/L	0.2 mg/L	U.S.EPA-200.7	Within Limits

29	Lead (Pb)	0.5 mg/L	ND	U.S.EPA-200.7	Within Limits
30	Silver (Ag)	1.0 mg/L	ND	U.S.EPA-200.7	Within Limits
31	Total Toxic Metals	2.0 mg/L	0.5 mg/L	Calculated Value	Within Limits

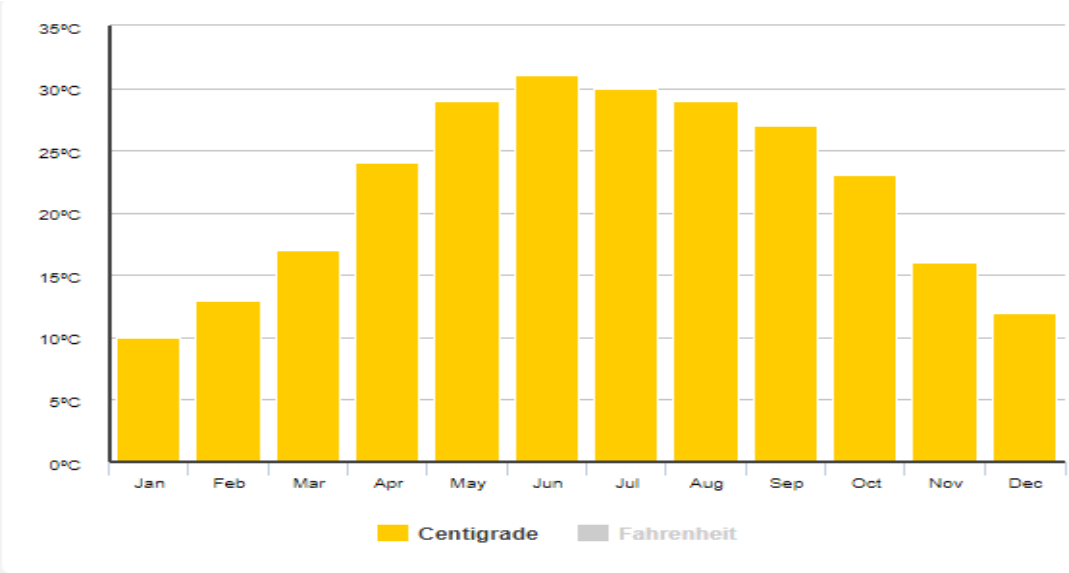
5.3.7 Climate

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 (in Murree). 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 the 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. Humidity varies greatly in Islamabad.

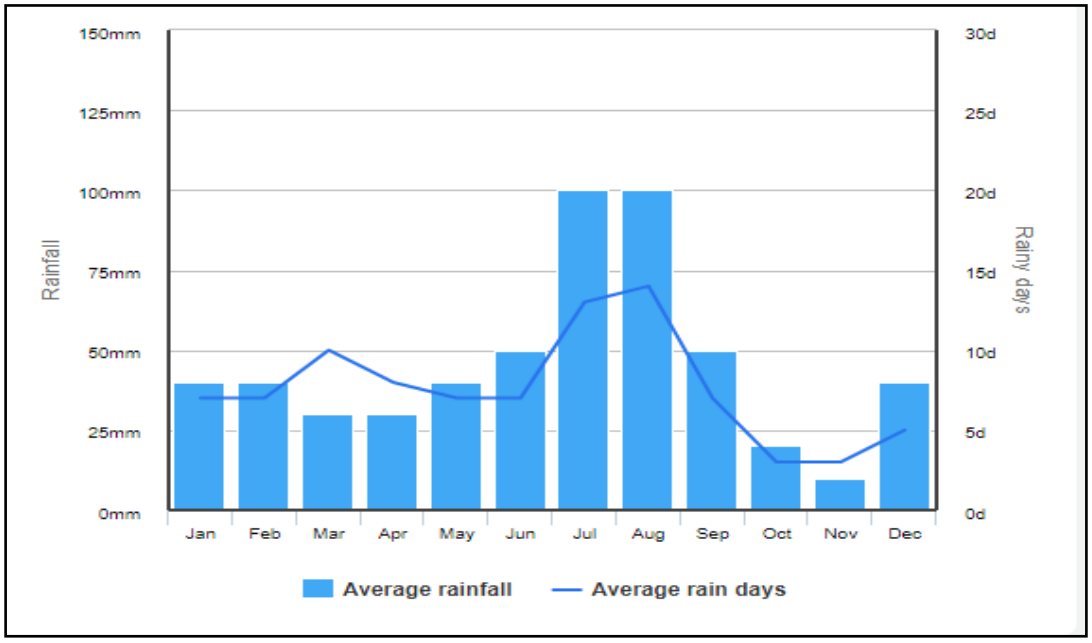
Metrological Data of Islamabad, including rainfall and mean minimum and the maximum temperature is shown in **Figure 5.3**.

Figure 5.3: Mean Monthly Meteorological Data of Islamabad[2]



[2] https://www.worldweatheronline.com/lang/en-pk/islamabad-weather-averages/islamabad/pk.aspx

Figure 5.4: Mean Monthly Precipitation Data of Islamabad[6]



5.3.8 Air Quality and Noise Level Monitoring

The ambient air quality and noise level monitoring was conducted and compared against the 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 ambient air and noise level monitoring was conducted on 24th May to 25th May 2023 for 24 hours at the project site of Rawalpindi Circuit House, Islamabad.

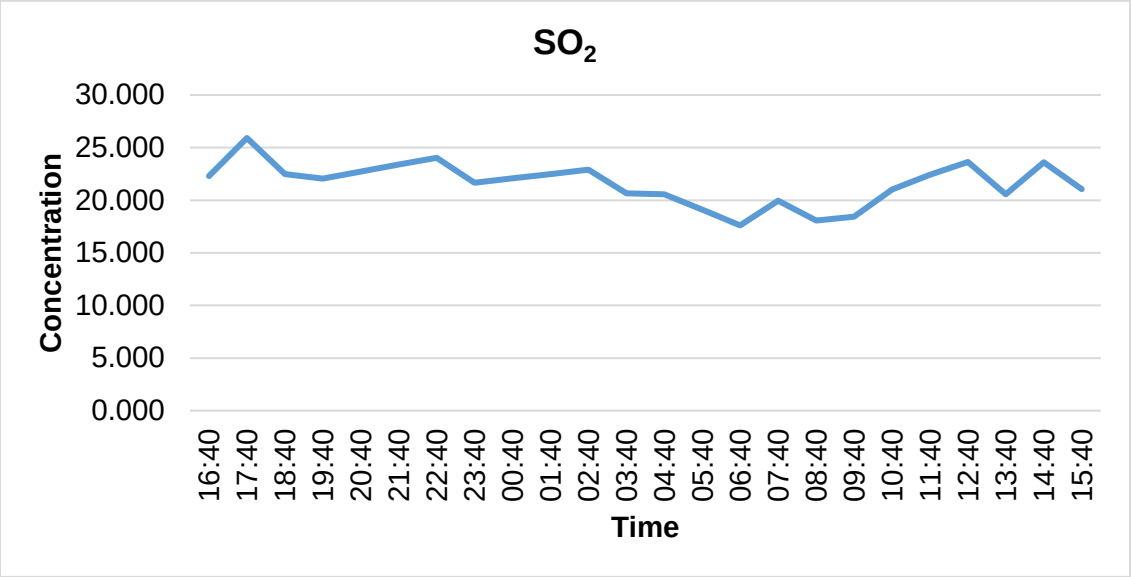
The ambient air quality and noise monitoring was carried out by Pak-EPA Certified laboratory, Environmental Services Pakistan (ESPAK).

5.3.9 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 of 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 21.6 µg/m^{3,} which is in compliance with the NEQS (120 µg/m^3) of Pakistan.

Figure 5.5: Hourly variation of Sulphur dioxide (SO_2) at the project site

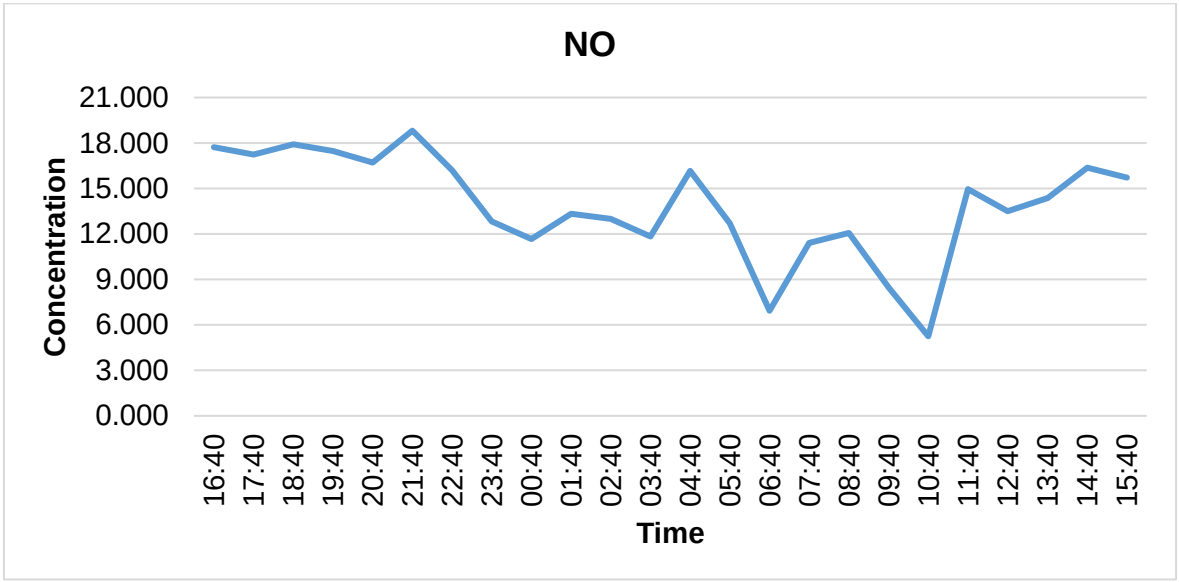


Nitrogen Monoxide (NO): Nitric oxide (nitrogen oxide, nitrogen monoxide) is a molecular, chemical compound with a chemical formula of NO. One of several oxides of nitrogen, it is a colourless gas under standard conditions. It is also produced naturally by the extremely high air temperatures produced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

Nitric oxide should not be confused with nitrous oxide (N_2O), an anesthetic, or with nitrogen dioxide (NO_2), a brown toxic gas and a major air pollutant, the latter being a product to which nitric oxide is rapidly oxidized in air.

The averaged (24h) concentration of NO (13.9 µg/m^3) remained within compliance with NEQS (40 µg/m^3) at the ambient air quality monitoring site.

Figure 5.6: Hourly variation of Oxide of Nitrogen (as NO) at the project site

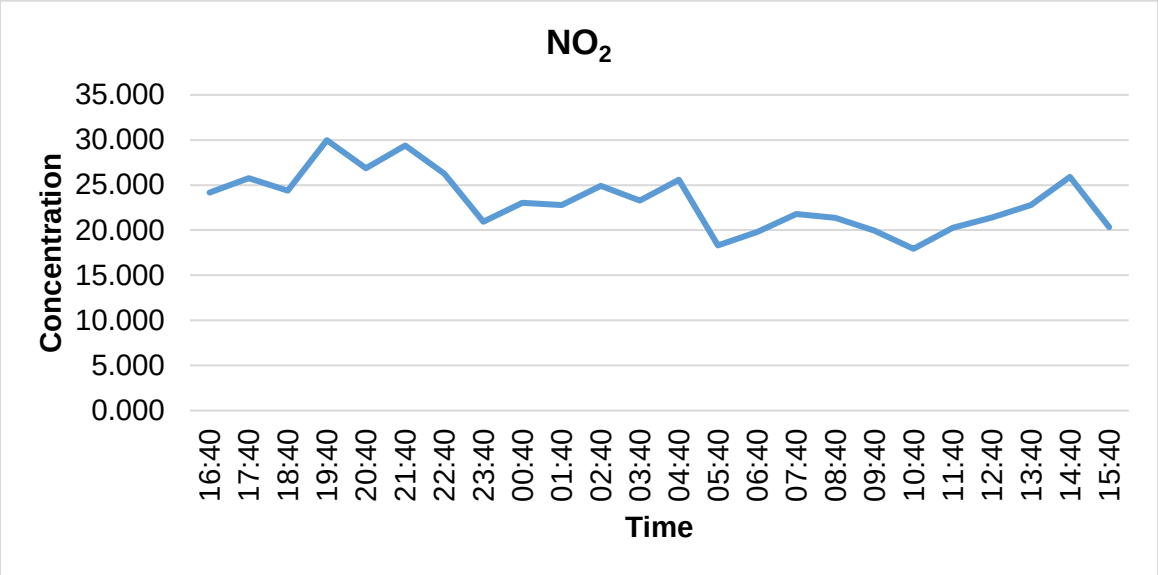


Nitrogen dioxide (NO_2): Nitrogen dioxide (NO_2) is a light brown gas that can become an important component of urban haze. It is likely that oxides of nitrogen are the second most abundant atmospheric contaminants in many cities, ranking next to Sulphur dioxide.

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 (23.2 µg/m^3) remained within compliance with NEQS (80 µg/m^3) at the project site.

Figure 5.7: Hourly variation of oxide of Nitrogen (as NO_2) at the project site

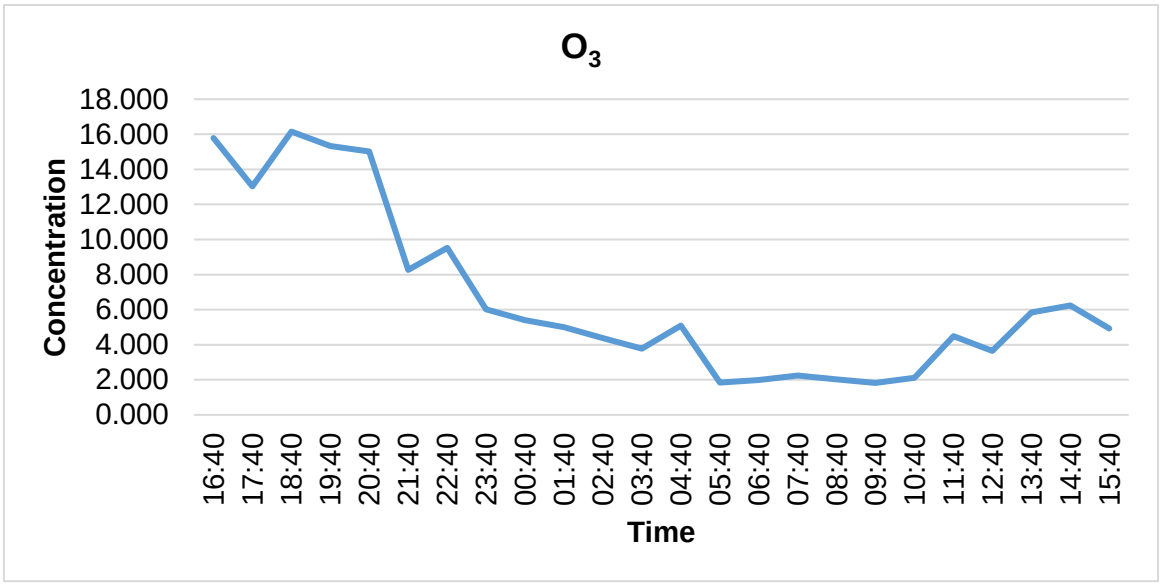


Ozone (O_3)

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 O_2, breaking down in the lower atmosphere to normal oxygen.

The 24 hr average concentration of Ozone was 15.8 µg/m^3 at the project site which remained within compliance limits of NEQS.

Figure 5.8: Hourly variation of Ozone (O_3) at the project site



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

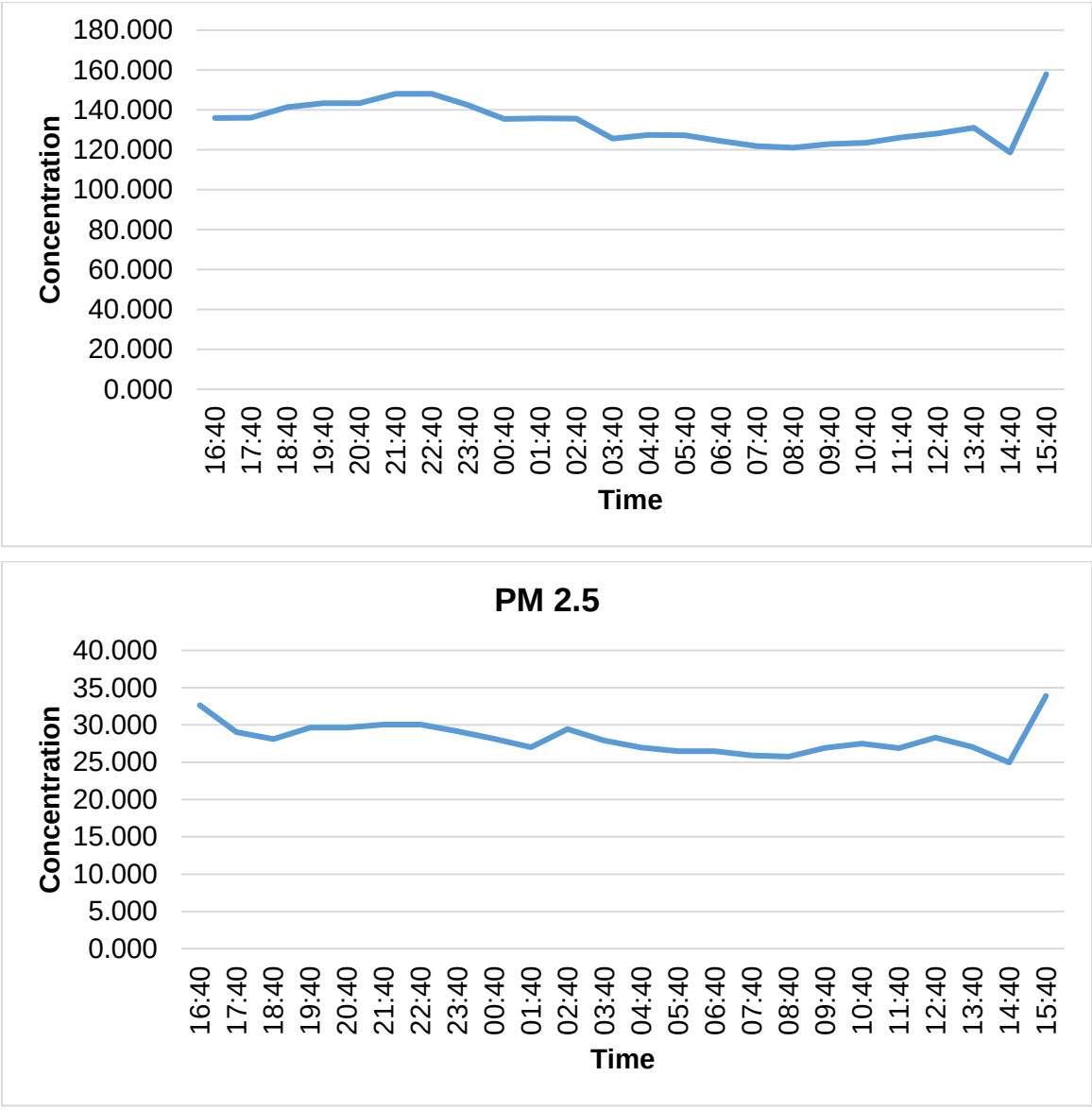
The fine PM can be sulfates, nitrates, organic matter (organic carbon compounds), elemental carbon (soot), and soil dust (crustal materials).

The time-averaged (24h) concentration of PM_{10} is 133 µg/m^3 which is within limits and for $PM_{2.5}$ is 28.3 µg/m^3 which is also within the permissible limit of NEQs.

The concentration of PM_{10} were within limits during the 24h monitoring at the project site.

The PM_{10} and $PM_{2.5}$ hourly variation in concentrations are shown in **Figure 5.9**.

Figure 5.9: Hourly variation of Respirable Particulate Matter (PM_{10} and PM $_{2.5}$) at the Project Site

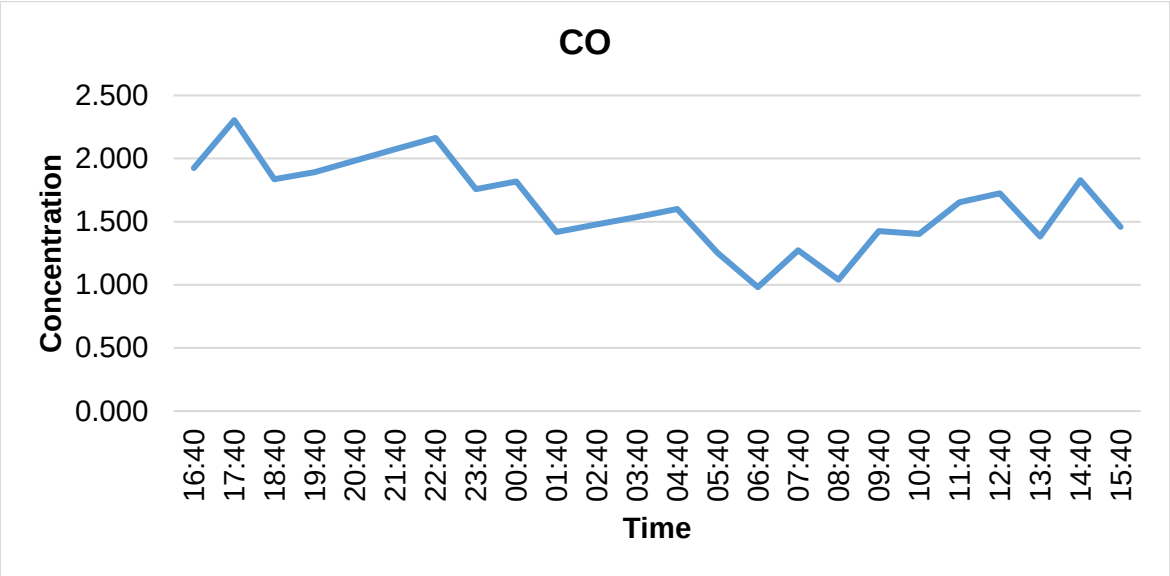


Carbon monoxide (CO): Carbon monoxide is an odourless, colourless and highly poisonous gas that has its major origin in the incomplete combustion of carbonaceous materials. Although industrial processes contribute to CO pollution levels, however, the principal source of CO is automobiles.

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

The Carbon monoxide (CO) concentration was monitored for 8h intervals at the selected site. The average 8h concentration of CO at the project site was found to be 2 mg/m^3 which is within the compliance limit of NEQS (i.e., 5 mg/m^3).

Figure 5.10: Hourly variation of Carbon Monoxide (CO) at the Project Site



5.3.10 Noise Level Monitoring

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

The 24-hour monitoring period for noise level was carried out at the project site. The low noise level data was 49.364 dB, and the highest was 68.713 dB which corresponds to nearby commercial activities. The average sound level was noted as 61.0617 dB for the 24 hours period.

The hourly noise variation throughout the day reveals that noise levels are minimal and within the compliance limit of NEQS (i.e., 65 dB) at the project site. The average noise level during the daytime was observed to be 65 dB whereas the noise level at night was 54 dB respectively.

5.3.11 Conclusion of Ambient Air and Noise Level Monitoring

The ambient air and noise level monitoring was conducted on 24th May to 25th May 2023 for 24 hours at the project site of Rawalpindi Circuit House, near Rawal Dam Irrigation Colony, Islamabad. All values were observed to be within range.

Proper plantation on open spaces of the project site will be promoted to help enhance and maintain the air quality of the area in future.

The laboratory report detailing the ambient air and noise level monitoring report is attached in **Annexure-5.**

The SO_2, NO, NO_2, O_3, CO concentrations meets the NEQS limits. A summary of ambient air quality and noise levels results are given in **Table 4.2** below:

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

Parameters	Limit Values (NEQS-24 hrs)	Project Site	Method/Equipment Used	Remarks
Carbon Monoxide	5 mg/m^3 (8 Hours)	**2 mg/m^3**	Non-Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
Sulfur Dioxide (SO_2)	120 µg/m^3	**21.6 µg/m^3**	UV Fluorescence (UVF)	Within Prescribed Limits
Ozone (O_3)	130 µg/m^3 (1 Hour)	**15.8 µg/m^3**	Non-Dispersive UV Absorption	Within Prescribed Limits
Oxides of Nitrogen (NO)	40 µg/m^3	**13.9 µg/m^3**	Chemiluminescence Detection	Within Prescribed Limits
Oxides of Nitrogen (NO_2)	80 µg/m^3	**23.2 µg/m^3**	Chemiluminescence Detection	Within Prescribed Limits
Particulate Matter $PM_{2.5}$	35 µg/m^3	**28.3 µg/m^3**	Particulate Sensor	Within Prescribed Limits
Particulate Matter PM_{10}	150 µg/m^3	**133 µg/m^3**	Particulate Sensor	Within Prescribed Limits
Suspended Particulate matter (SPM)	500 µg/m^3	**254 µg/m^3**	High Volume Sensor (HVS)	Within Prescribed Limits
Noise Level Day Time	65 dB(A)	**65 dB(A)**	Bentech Noise Meter	Within Prescribed Limits
Noise Level Night Time	55 dB(A)	**54 dB(A)**	Bentech Noise Meter	Within Prescribed Limits

5.4 Biological Environment

5.4.1 Flora

According to the natural vegetation of Pakistan, ecologically Islamabad lies under the thorny zone of vegetation. The vegetation is a representative of Dry Subtropical Scrub Forest which is dominated by *Acacia Modesta* (Phulai), *Ziziphus mauritiana* (Ber), etc.

The most common trees in Islamabad are of Amal Tas (*Casia fistulla*), Chinar (*Platanus orientalis*), Phulai (*Acacia modesta*), Dharek (*Melia zardorachita*), Jangali ber (*Zizyphus maurantiana*), Kiker (*Acacia nilotica*), Mulberry-Shahtoot (*Morus alba*), Safaida (*Eucalyptus camaldulensis*), Shisham (*Dalbergia sissoo*), Coconut (*Cocos nucifera*), Papeta (*Manilkara zapota*), Jaman (*Syzygium cumini*),Peli Kaner (*Thevetia peruviana*), Shireen (*Albizia lebbek*), Bamboo (*Bambusa*), Semal (*Bombax ceiba*), Palm (*Arecaceae*), Mango (*Mangifera indica*), etc. In the undergrowth *Cannabis sativa* (Bhang), *Calotropis procera* (Desi Ak), *Parthenium hysterophorous* (Gandi Booti) and *Ocimum bacilicum* (Niazbo) are predominant.

The project site has a cover of vegetation which mainly consists of 40 Paper Mulberry, 3 Sheesham (Dalbergia sissoo) trees, 2 Amaltas (cassia fistula), 1 Sumbal (bombax ceiba) and 1 Shatoot (Morus alba).

5.4.2 Fauna

The major wildlife of the area is porcupine, hare, wild boar, and grey partridges. The species found in the Islamabad are:

Mammals

- *Canis aureus* (Asian Jackal)
- *Rattus rattus* (Rat)
- *Herpestes javanicus* (Grey Mangoos)
- *Felis chaus* (Jungle Cat)
- *Lepus negricollis* (Indian Hare)
- *Hystrix indica* (Porcupine)
- *Sus scrofa* (Wild Boar)

Reptiles

- *Calotes Versicolor* (Garden Lizard)
- *Eschis carinatus* (Saw scaled viper)
- *Passer domesticus* (House Sparrow)
- *Spalerosophis diadema* (Diadem Snake),
- *Uromastix hardwicki* (Spiny Tailed Lizard),

Birds

- *Coturnix coturnix* (Quail)
- *Centropus sinensis* (Common Crow)
- *Alcedo atthis* (Kingfisher)
- *Passer domesticus* (House Sparrow)
- *Corvus splendons* (House Crow)

5.5 Socio-Economic and Cultural Environment

This section describes the socio-economic and cultural environment of the project area.

5.5.1 Methodology for Socio-economic and Cultural Environment analysis

A random sampling survey was carried out within the project area and its surroundings to collect firsthand, reliable, and authentic information that could lead to a sound socio-economic analysis of the people living in the area.

Rawal Dam Irrigation Colony

Location: The Rawal Dam Irrigation Colony is located in the vicinity of the project site. The colony is adjacent to the Project site.

Demographics: Rawal Dam Irrigation Colony comprises of an estimated household size of 6 with an estimated population of 300 inhabitants. Averagely, 50 houses are present in the Rawal Dam Irrigation Colony.

Transport/Communications: The Rawal Dam Irrigation Colony is connected Park Road which is further connected to Rawal Road, Murree Road and Jinnah Road. There is public transport available in the locality. Mainly the mode of travel is through motorcycles and by private vehicles.

Education: There are multiple government and private schools, colleges and universities present near the project site.

Health Care: The National Institute of Health, which is Pakistan's largest clinical institute dedicated to clinical research, is located 2 km from the project site.

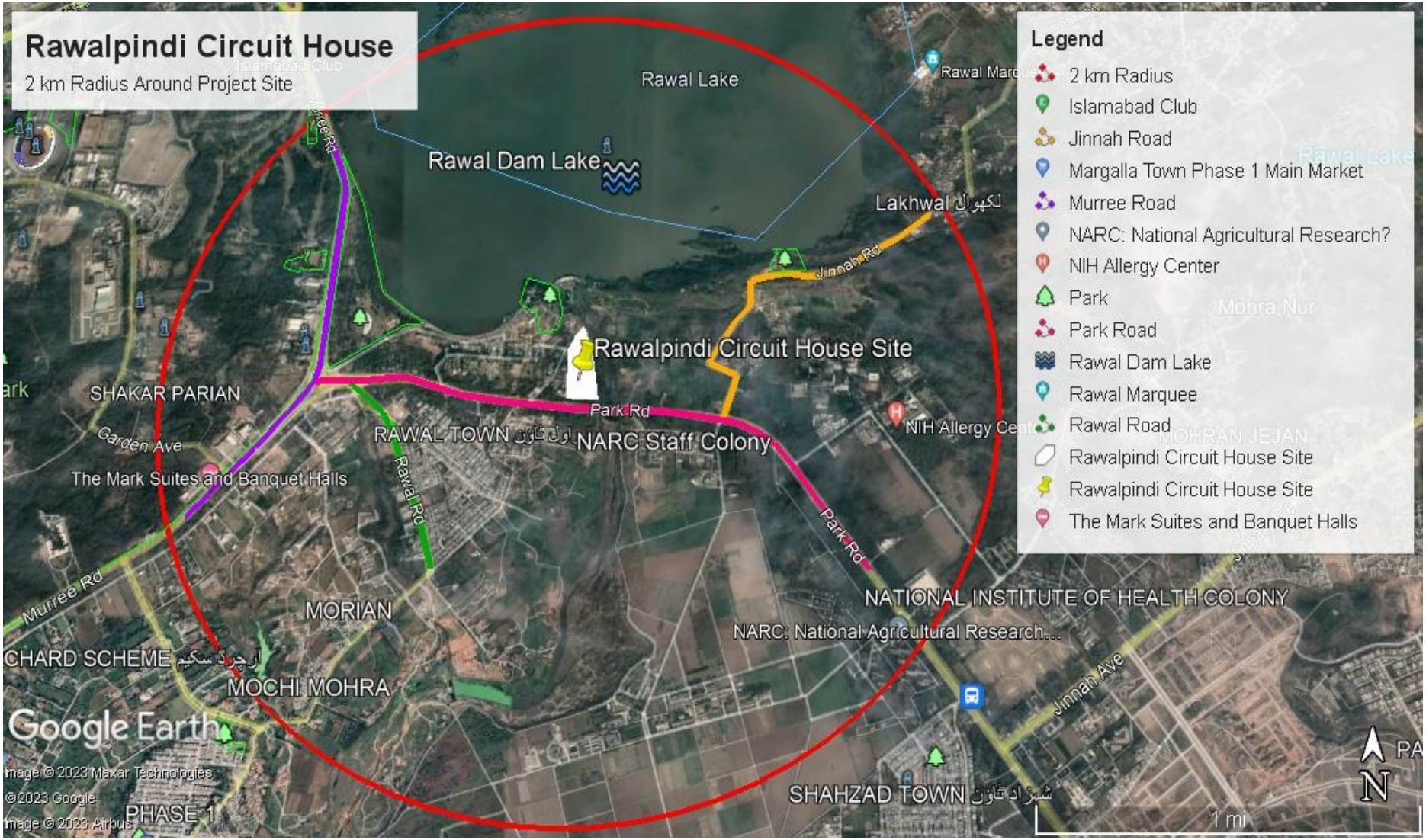
Drinking-Water Supply: There is a Government-installed drinking water supply scheme. People also use groundwater for drinking.

Employment: The Rawal Dam Irrigation Colony is specifically allotted to the employees at various designations of Irrigation Department, Government of Punjab.

Cultural Heritage and Archeology: No archaeologically significant site was found in the area.

Other Facilities: Inhabitants of Rawal Dam Irrigation Colony have the facility of electricity and mobile services in the area. There is no significant market within the Rawal Dam Irrigation Colony except for a few small shops. There are police stations and post offices in the vicinity of the project area.

Figure 5.11: Project Area Map (Environmental Receptors) within 2 KM radius of the Rawalpindi Circuit House Project



6 Stakeholder and Public Consultation

6.1 Introduction

During the EIA processing, the stakeholders were involved in the public consultation to know their opinions, concerns, issues, and suggestions regarding the project.

This chapter provides details of public consultations carried out with the community and stakeholders at different levels.

6.2 Approach to Public Consultation

The public consultation process has been approached to involve the community and 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 community living adjacent to the Rawalpindi Circuit House Project, Islamabad, as well as staff, patients and visitors who may be affected by the project.

The viewpoint of the stakeholders has been considered, 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 and operational phase impacts.

Meetings were held with the Proponent's Team, Deputy Director (Development) Rawalpindi, Office of Irrigation Department, Government of Punjab, Islamabad Traffic Police, IESCO, CDA and community living around the project site. Their point of concern and suggestions regarding the project was solicited.

6.3 Objectives of Consultation

The overall objective of the consultation with the 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 objectives of the public consultation process are:

- Provide key project information to the stakeholders, and 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 the benefits of the proposed project.

6.4 Categories of Stakeholders Contacted

Potential stakeholders for consultation and participation were identified, and discussions were held with the community living in the project area of impact.

6.5 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	Project Proponent (the Proponents Environmental Management Team)
2	Project Consultant
3	Government Organizations
4	Community living adjacent to the project site

6.6 Issues Discussed

Following issues were discussed during the stakeholder consultation:

- Overall activities of the project and their possible impacts;
- Possible impacts on water bodies and natural vegetation, flora and fauna;
- Possible mitigation measures and
- Beneficial factors and involvement opportunities of the local people in the set of activities of the Project.

6.7 Major Stakeholders and their Apprehensions

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

6.8 Stakeholders consulted, and their valuable suggestions and comments are described here under:

Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
Mr. Wajid, Project Director, IDAP	IDAP Project Office, Islamabad	▪ As the execution agency of the project, we will try our utmost to construct the project in an environmentally friendly manner. ▪ We will avoid construction activities during nighttime due to proximity to Rawal Dam Irrigation colony. ▪ Since the development is at a limited scale, concrete will be procured from nearby batching plants. This will reduce air and noise pollution at the project site.
Mr. Mazhar Nadeem, Deputy Director Development	Office of Deputy Comisioner, Rawalpindi	▪ The project is an urgent need of the Government of Punjab and thus all activities will be carried out at an urgent pace. ▪ Government of Punjab in order to fulfil all legal and codal requirements to initiate a project has approached Pakistan Environmental Protection Agency to grant environmental approval to the project. ▪ During the construction phase of the project, we will plant 5000 trees in the vicinity of the project site and along the green space of Rawal lake and Korang River.
Mr. Tahir Hassan	Deputy Director Environment, CDA	▪ EPA guidelines should be followed during construction as well as the operational phase of the project; if the

Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
	Environmental Wing	construction activities involve the cutting of trees, then the cutting should be compensated with the plantation of 10 trees against each cut tree. ▪ The proponent must incorporate the fire safety measures in the layout plan and submit it to the Emergency and Disaster Management Directorate for approval. ▪ Smoke detection and automatic sprinkler system must be installed as part of the fire safety plan. ▪ The fire control room, along with generators, should be outside the building and should be properly protected if located inside the building. ▪ 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. ▪ Exit routes are to be incorporated in the layout plan, following the Building Code of Pakistan – Fire Safety Provisions 2016.
Mr Muhammad Hussain Mr. Adnan Mr. Muhammad Yousaf	Irrigation Department, Government of Punjab, Islamabad	▪ The proponent should construct a gabion wall / retaining wall in order to protect the circuit house from damage due to any extreme event of flooding in the Korang River. ▪ The proponent should plant trees near the Korang River in order to provide a natural protection to soil erosion.
Mr. Sheikh Hamza Mr. Arsalan Mr. Faqeer Muhammad Mr. Ali Shan	SDO, Executive Engineer and other employees of Rawal Dam management	▪ The proposed project will improve the infrastructure of the area and will contribute to the economic growth of the country. ▪ This would provide efficient resource to public servants ▪ Solid and liquid effluents are part of the construction activities. The solid waste should be collected in dustbins and must be disposed of at a designated dumping site. While for the liquid effluents, a septic tank along with a soakage pit should be constructed, which will be used during the operational phase as well.
Aftab Ahmed Gujjar	ASI, Islamabad Traffic Police	▪ Trucks should only be allowed during 10 pm to 6 am and no machinery should be moved during school and office hours. ▪ All trucks and heavy vehicles should drive in the left lane. ▪ Construction material should be covered and any spillage during transportation must be cleaned immediately by the proponent. ▪ Use traffic cones for proper traffic management
Mr. Sher Afzal	Environmental & Social Safeguard Section, IESCO	▪ Although the project is of small scale and proposed land use is residential in nature. The proponent should install renewable energy such as solar panels to conserve electricity and harness the solar energy potential in the project area.

Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
		▪ Construction period should be minimized by using prefabricated material. This not only reduces time but also conserves the environment.
Mr. Sami Naeem Khan, Environmental Specialist	ERS Limited Islamabad	▪ The proposed circuit house project is the need of the area, so it should be established as soon as possible. ▪ Environmental impacts due to the proposed project will be easily mitigated. ▪ Septic tanks should be incorporated in the residencies. ▪ Drainage lines should be established for the proper disposal of sewage water. ▪ All the environmental parameters must be considered during the planning phase of the project.

6.9 Consultation with the Communities (Affected and Wider Communities)

The general consultation included community members around Rawalpindi Circuit House project site to find out their opinion about the project.

During the discussion, the community adjacent to the project site was informed about the salient features of the project, its location, and its activities.

The list of people consulted during public consultation is attached in **Annexure 2.**

The viewpoints of respondents are as follows:

- Overall, the residents of adjoining opportunities had no issue with the development of this project and supported the project.
- Solid waste littering can cause environmental issues to the flora and fauna in project area. Proper collection mechanism should be in place during construction and operational phase.
- Untreated wastewater should not be disposed of into the Korang River.
- The community should not be disturbed in any way by the operation and construction activities.
- Proper Plantation should be done to compensate for the cut of trees and clearing of shrubs during the project construction.
- The workers at the construction site should be equipped with PPEs, and they should be properly trained.

Figure 6.1: **Pictorial Presentation of Public and Stakeholders Consultation for Project**

Exhibit 6.1: Consultation with geotechnical survey team at the project site

Exhibit 6.2: Consultation with staff at Rawal Dam Spillways

Exhibit 6.5: Consultation with residents of the adjacent community

Exhibit 6.6: Discussion with residents of the Rawal Dam Irrigation Colony

Exhibit 6.7: Consultation with commuters at nearby workers

Exhibit 6.8: Consultation with public in surrounding area

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 Environmental Screening of the Project

To examine the environmental impact of the project, an Environmental Screening Matrix has been developed as part of the present EIA study that focuses on the potential environmental impacts of the project during pre-construction/design, construction and operational phases.

7.2.1 Impact Identification with Matrices

Environmental metrics are designed to assess the environmental impact of technology or activity. Such impacts are primarily related to using natural resources (lifecycle INPUTS) and generating waste and emissions (lifecycle OUTPUTS). The ultimate sustainability goal is to minimize the environmental impacts due to using non-renewable resources and minimizing waste and pollution. Since the complete elimination of these impacts is hardly possible (any technology has its environmental costs), it is also important to evaluate the rate at which environment can absorb the impacts and become remediated.

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.

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 influence the environment as well as the consequence of the effect occurring. It is often described as 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: Will probably happen/recur, but it is not a persisting issue/circumstances.
- 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), 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: Environmental Screening Matrix (un-mitigated) of Rawalpindi Circuit House, Islamabad

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 which can be mitigated easily
- Low Risk (score 1-4): professional judgment

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 7.3 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 not have any significant impact

Table 7.3: Impact Identification with Matrix

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 historic/cultural values	1	1	1	Site selection has been done in a way to ensure no historical site in a 500 m radius.	1	1	1
	Disruption of Flora and Fauna	3	6	9	Through astute planning the number of trees to be cut will be minimized. 80% of the trees at the project site are of Paper Mulberry (invasive species). 5000 trees will be planted along the boundary of Rawal Lake.	1	3	3
	Resettlement	2	5	10	No resettlement will be caused by the project.	1	3	3
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 to be applied for dust suppression during dry weather.	3	2	6
	Damage to vegetation	3	6	9	A tree plantation plan has been devised which envisages plantation of 5000 trees.	2	2	4
Construction Phase Impacts								
Construction Works	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. Slope stabilization measures to be taken during the project.	3	2	6
	Air Quality Deterioration	5	3	15	Construction equipment to be well maintained to reduce exhaust emissions. Workers to be provided with Personal Protective Gears (e.g., masks). Water to be used for dust suppression.	3	2	8

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
	Loss of vegetation	5	3	15	Spilling of chemicals and other effluents on the soil will be avoided. Tree plantation will also be carried out.	3	2	6
	Damage to Wildlife	3	6	9	Minimal impacts on the local bird population	3	2	6
	Noise and Vibration	4	3	12	Barriers to be constructed in sensitive areas. Night-time activities will not be held unless unavoidable.	3	2	6
	Quarrying Hazards	3	4	12	Exposed soils to be stabilized with mulch and grass to prevent hazards.	3	2	6
Waste Disposal	Surface (and Groundwater) quality	4	3	12	Wastewater will be properly drained into the nearest sewerage line or nullah on the site.	3	2	6
	Solid Waste Disposal	4	4	16	Any solid waste generated during construction will be recycled or disposed of in the nearest waste disposal site after consultation with CDA.	2	3	6
	Waste Effluent Disposal	4	4	16	Waste effluent generated from the septic tank will be properly drained into the nearest sewerage line on the site.	3	3	9
Positive impact	Job opportunities	4	4	16	Training will be arranged to hire a local crew for the project.	5	4	20
Operational Phase Impacts								
Operation of Office facility	Air Quality	3	5	15	The project area is located in an serene environment. Indoor air quality will be improved through placement of indoor plants.	2	4	8
	Safety Hazard, Public Health & Nuisance	4	4	16	The building will be properly monitored by the HSE Officer to ensure that all the health and safety measures are applied.	3	3	9
	Noise	4	3	12	Noise barrier and mufflers will be used to minimize noise generation.	3	3	9
	Wastewater	4	3	12	Wastewater will be properly drained into the septic tank afterward disposal into the city sewerage line.	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
	Traffic congestion	3	3	9	Defensive and best driving practices will be inculcated in the project drivers.	2	2	4
	Solid waste	4	4	16	Solid waste will be disposed properly collected and handed over to CDA.	3	3	9
Positive impact	Employment	4	4	16	Availability of more residences for government employees.	5	4	20
	Efficient land use	4	4	16	The project site is located within the premises of Rawal Dam Irrigation Colony. The proposed land use is similar to the surrounding existing land use.	5	4	20
	Reduction of energy consumption	4	4	16	The building will use innovative and advanced energy saving technologies such as double-glazing glass, emergency lights, LED energy savers etc.	4	5	20
	Business opportunities	4	3	12	The project will give rise to small scale businesses in the vicinity.	4	4	16

7.3 Environmental Impact Characterization

During the environmental impact assessment process of Rawalpindi Circuit House, 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)
- Significance of impact (High, medium, low)

The above aspects of environmental characterization are defined in **Table 7.1**.

Table 7.4: Impact Characterization of Rawalpindi Circuit House

Categories	Characteristics
Nature	Direct: The environmental parameter is directly changed by the project.

Categories	Characteristics
	Indirect: The environmental parameter changes because 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 a few months to a year 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)
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 socio-economic 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:

7.4 Pre-Construction/Design Phase Impacts

7.4.1 Project Sitting Impacts

The impacts associated with the project sitting are those which relate to its location at the designated site in Islamabad. 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 Rawalpindi Circuit House, Islamabad should be in line with the guidelines for residential buildings. The land use and design should be in accordance with the building codes and by-laws for the construction of guest houses.

The design of the project should be able to withstand seismic activity, and necessary arrangements are in place for the health and safety of the workers and patients.

The project might increase energy consumption and will put the burden on the already existing energy crisis in the country. Furthermore, the extraction of water to meet the construction as well as operational needs of the project might put pressure on ground water resources.

In addition, more solid waste will have to be collected, transported, and disposed of at the dumping site of Islamabad. The proposed project can contribute towards the landfill crises indirectly.

The unmitigated impact associated with not following the building guidelines 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: The land of project site is located is in possession of Government of Punjab. There is no issue of land acquisition and resettlement. The Rawal Dam Irrigation colony already houses residential facilities for irrigation department employees.

Land Use: The land use of Rawalpindi Circuit House, Islamabad is similar in nature to the existing land use of the surrounding Rawal Dam Irrigation Colony. The nearby land is a part of Rawal Dam Irrigation Colony and is in use for similar residential purpose.

Design: The proposed structure of Rawalpindi Circuit House, Islamabad will be in accordance with existing building by-laws. The following mitigation measures are proposed for earthquake and firefighting:

- The Building By-Laws and Codes 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.
- The adequate internal and external water distribution system will be designed, with a standby system for sufficient water, which could also supply adequate quantity for firefighting.
- Sufficient access points should be provided for access of firefighting staff to enter into the project building.
- Provision for pumping out water from the basement will be kept, to meet any emergency in case of water flooding the basement.
- The solid waste reduction, reuse and recycling will be encouraged during operational phase of the project.
- Adequate water storage for firefighting will be provided in the building. The pumps for firefighting will maintain 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 Rawalpindi Circuit House can potentially damage the natural landscape, and visual impact may be observed. 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 the Rawalpindi Circuit House 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 impact of the project will be greatly reduced. There will be some residual impact; however, its significance is expected to be low.

7.5 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 issue
- 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 into the construction of the project.

These impacts and their respective mitigation measures are discussed below:

7.5.1 Soil Degradation and Contamination

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

7.5.2 Air Quality Deterioration

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

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 the soil, where required and appropriate.

Residual Impacts

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

7.5.3 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 the above mitigation measures, the residual noise impact will be low to medium.

7.5.4 Surface Water and Groundwater Contamination

The Rawal Dam Lake and Korang River are located in close vicinity of the project site. 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

- 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

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

7.5.5 Loss of Vegetation

There may be damage and/or loss of vegetation and clearing of other indigenous and introduced species, as well as undergrowth species comprising bushes, grass, etc.

The construction crew might 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 the project has been prepared. The plan has a mix of appropriate trees/bushes which will be planted within the premises as well as any designated plantation site.
- 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.

7.5.6 Damage to Wildlife

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

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

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

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 site office 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.
- Destruction of habitat and consequent check on the population of pest rodents 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.

7.5.7 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 local authorities.

The contractors will be bound by contractual obligations to take care of the waste generated from the construction activities.

7.5.8 Traffic Management

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

Mitigation Measures

- A traffic management plan will be 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.

7.5.9 Safety Hazards, Public Health and Nuisance

The project is located close to a residential area and may pose some safety hazards to the public.

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 the 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 15 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 with firefighting training.
- The construction camps and site offices will have first-aid kits.
- The construction crew will be provided with an 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 the residual impact of safety hazard associated with the vehicular traffic and construction activities.

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

7.5.10 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 Operational Phase Impacts

The operation of Rawalpindi Circuit House 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 the project during operational phase are discussed below:

7.6.1 Solid Waste Management

The solid waste generated during construction activities will be safely disposed of at an approved waste disposal site. The management will prepare a solid waste management plan which details municipal waste collection and disposal as well as promotes recycling.

The unmitigated impacts related to 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 the Rawalpindi Circuit House.

- A small secondary point should be available at the project site where segregation of recyclable and non-recyclable waste can take place.
- All the solid waste from the building will be collected at one location and will be transported for disposal and the designated dumping site.

Residual Impact

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

7.6.2 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 Rawalpindi Circuit House on the water resources of the area will be negligible.

7.6.3 Safety Hazard, Public Health and Nuisance

The nature of the 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 project.

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.

7.7 Positive Impacts of the Project

The positive impacts of Rawalpindi Circuit House are as follows:

The Rawalpindi Circuit House will provide residential facilities to the Punjab government officers who have to travel due to official work.

The multi-dimensional impact of the proposed project will be to

- Provide sustainable development.
- Provide better residential facilities.
- Enhance economic activities.
- Reduce the expenses of government organizations

7.7.1 Business Opportunity

With the start-up of operation of Rawalpindi Circuit House, business opportunities in the area will be enhanced, thus, boosting up the local economy.

7.7.2 Employment

The operation of the project will improve the employment opportunities in the project area. It is anticipated that the local community will get direct or indirect employment due to the project. Employment will have a positive impact on the local economy.

7.8 Summary of Impacts and their Mitigation Measures

The impacts, mitigation measures have been developed to minimize the likelihood, extent or duration of their occurrence and any associated adverse effects. **Table 7.5** summarizes potential impacts and proposed avoidance and mitigation measures associated with construction camps.

Table 7.5: Summary of Impacts and Mitigation Measures

Impact	Mitigation Measures
Pre-construction Phase Impacts	
Project Site, Land Use, and Design	Rawalpindi Circuit House is being constructed in an urban area and is accessible by Park Road. The land use and design of the project will be in line with the existing by-laws.
Air Quality Deterioration	The project site should be monitored throughout to keep a record of air quality and any change in it. Vehicular traffic on unpaved track will be avoided as far as possible, and the track will be sprinkled with water to control dust.
Surface Water and Groundwater Contamination	Protection of the groundwater and surface water reserves from any contamination. Excavation should be done in the supervision of the site engineer so he can decide up to which limit excavation should be done. Prohibit the washing of vehicles and machinery in the project area.
Noise and Vibration	To mitigate these impacts noise barriers should be constructed in sensitive areas. Construction equipment and vehicles will have exhaust mufflers (silencers) to minimize noise generation. Premix Concrete will be hauled in to reduce the noise that is generated due to preparation of concrete at the site.

Impact	**Mitigation Measures**
Safety Hazards, Public Health and Nuisance	There should be proper check and balance on construction activities. There should be proper control on oil spillage and leakage of vehicles. Firefighting equipment will be made available at the camps. The camp staff will be provided for firefighting training.
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 artefact of such significance is found during the construction activities, the Archaeology Department, Government of Pakistan will be informed.
Operational Phase	
Contamination of Surface and Ground Water	The mitigation measures against soil contamination discussed above for the operation activities will forestall any possible water contamination as well.
Solid Waste Management	The Rawalpindi Circuit House will have a proper solid waste management system. All collected waste will be segregated and will be disposed on an approved and designated landfill site.

8 Environmental Management Plan

8.1 Environmental Management Plan

8.1.1 Introduction

This section outlines the implementation mechanism for the Environmental Management Plan (EMP) and defines the institutional arrangements required for the implementation of the plan.

8.1.2 Purpose and Objectives of EMP

The Environmental Management Plan (EMP) will provide a delivery mechanism to address the adverse environmental impacts of the project, to enhance project benefits and to introduce standards of best practices to be adopted for all phases of the project.

The primary objectives of the EMP are to:

- Facilitate the implementation of the earlier identified mitigation measures.
- Develop a proper monitoring mechanism and identify requisite monitoring parameters to confirm the effectiveness of the proposed mitigation measures.
- Define the responsibilities of the project proponent and provide a means of effectively communicating environmental issues with different stakeholders.

8.1.3 Institutional Capacity

8.1.4 Pre-Construction and Construction Phase

The organizational roles and responsibilities are summarized below:

a) **Project Proponent**

The overall responsibility for the compliance of with the Environmental Management Plan rests with the project proponent i.e. Board of Revenue, GoPb.

b) Project Manager

The project manager, M/s Infrastructure Development Authority Punjab will carry out field activities and will be responsible for implementing various mitigation actions prescribed in the EIA report relevant to the contract. The project manager will make sure the Environmental Monitoring Plan is being followed and complied with on the project site. The Executing Agency, IDAP, will monitor the project site and ensure the implementation of the EMP and the EIA report.

c) **Engineers, Contractor / Sub Contractors**

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

d) **Pakistan Environmental Protection Agency**

The Environmental Protection Agency, Government of Pakistan, will periodically visit the project site to monitor the compliance of environmental protection measures detailed in the EIA report.

Operational Phase

The magnitude of environmental impacts during the operational phase will be less as compared with the construction phase; therefore, Rawalpindi Circuit House will have to implement various mitigation actions as described in the operational phase. Furthermore, keeping in view the magnitude of environmental impacts, an Environmental Monitoring Plan has been proposed for the operational phase of the project.

8.1.5 The Responsible Authority

Primary Responsibilities

- Board of Revenue, GoPb will be responsible for the compliance with the EIA and the EMP throughout the project.
- The Project Manager, IDAP will be responsible for monitoring and ensuring the implementation of the EMP and the EIA on the ground.

Approvals

Board of Revenue, GoPb will obtain all the relevant clearances and necessary environmental approvals required by the Pakistan Environmental Protection Agency and other regulatory agencies.

8.2 Project Monitoring

Board of Revenue, Government of Punjab will make necessary arrangements to monitor the key environmental data during the operational phases at intervals. These will include a record of waste produced, a record of waste disposal, and vehicular traffic.

The Project Manager, Rawalpindi Circuit House shall monitor project impacts during the operation. He will keep a record of all non-conformances observed and report these along with actions to management for further action. He will also have to report any impacts anticipated, along with his recommendations for further action.

8.3 Schedule of Implementation Environmental Monitoring Plan

Environmental Monitoring will be conducted during the operational phase 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. Pakistan Environmental Protection Agency is entrusted with the overall responsibilities of monitoring the environment in Islamabad.

An Environmental Monitoring Plan for Rawalpindi Circuit House has been provided in **Table 8.1**. 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 8.1: Environmental Monitoring Plan for Rawalpindi Circuit House

Environmental Component	Project Phase	Parameters	Locations	Frequency	Standards	Implementing	Supervision
Construction Phase							
Air Quality	Construction	SO_2, NO, NO_2, O_3, PM_{10}, $PM_{2.5}$, Pb and CO	At the project site of Rawalpindi Circuit House	PM_{10}, for continuous 24 hours, on a quarterly basis	NEQS, WHO/USEPA guidelines,	Project Manager	IDAP
Roadside Plantation	Construction	Visual inspection of plant species survival rate and status of maintenance	At sites where the plantation was carried out	(1) One month after plantation (2) One year after plantation 1 month, 3 months, 6 months, and 12 months after planting	75 % survival rate	RFO	CDA Environment Wing
Noise Levels	Construction	dB (A)	At the project site of Rawalpindi Circuit House	Twice in 24 hours at a selected site on a quarterly basis	EPA Ambient Noise standards	Project Manager	IDAP
Surface Water Quality	Construction	pH, TDS, TSS, DO, coliforms, hardness, nitrate, chloride, sulfate	Composite samples from the Rawal Dam Lake	Quarterly	WHO and NEQS	Project Manager	IDAP
Vegetation cutting for land clearing	Construction	Record of all cutting of trees	Throughout the project site for Rawalpindi Circuit House	When a decision for a tree cutting is made.	-	RFO	CDA Environment Wing
Operational Phase							
Septic Tanks	Operation	NEQS parameters for liquid effluents	At Septic Tanks	Once in a month by the in-house laboratory	NEQS	Project Manager	Rawalpindi Circuit House

Environmental Component	Project Phase	Parameters	Locations	Frequency	Standards	Implementing	Supervision
Plantation	Operation	Visual inspection of plant species survival rate and status of maintenance	At sites where the plantation was carried out	(1) 2.5 years after plantation	75% survival rate	RFO	CDA Enviroment Wing
Safety and Traffic Rules Compliance	Operation	(1) Faulty, overloaded and speeding vehicles (2) Inspection of signage	All along with the estate, with spot check at accident-prone black spots	Quarterly basis, for 5 years	To be determined	Project Manager	IDAP

Key:

dBA = *decibels (measured in the audible range)*

EPA = *Environmental Protection Authority,*

PEQS = *Punjab Environmental Quality Standards*

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

SPM = *Suspended Particulate Matter*

TSS = *Total Suspended Solids*

USEPA = *United States Environmental Protection Agency*

WHO = *World Health Organization*

Table 8.2: Estimated cost for the implementation of the Environmental Monitoring Plan for Rawalpindi Circuit House

Environmental Monitoring Activities	Units/ No. of Samples	Unit Cost specification	Cost (Rs)
Construction phase			
Ambient air quality monitoring Quarterly basis for 16 months	4	@ 35,000 per sample for 24 hr monitoring	140,000
Ambient water quality monitoring Quarterly basis in one location for 16 months	4	@ 15,000 per sample	60,000
Noise levels, the quarterly basis for 16 months	4	@ 5,000 per sample	20,000
Environment, Health Safety Engineer	16 months	@ 100,000	1,600,000
Quarterly Visit of Environmental Consultant for QEMR	4	@ 150,000	600,000
		Total	**2,420,000**

Source: *IDAP Estimates, 2023*

8.4 Training Schedules

The key objective of the training program is to ensure that the requirement of EMP is clearly understood and followed throughout the project. The training shall cover the following areas:

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

Rawalpindi Circuit House will be primarily responsible for providing training to all project personnel. A lump sum fee of Rs. 500,000 has been set aside for Environmental & Social Training Program.

The details about the program are shown in **Table 8.3**.

Table 8.3: Framework for Environmental & Social Training Program

Type of Training	Training Description	Period	Duration	Training By	Trainee
Occupational Health and Safety	Training should be provided to aware staff to conform to safety codes	Before Commencement of Project Activities	Full day	External Sources	Site Supervisor, Site Engineer.
Environment & Social Laws, Regulations, procedure, and guidelines of the government	The training should detail the laws and regulation concerning the environment, Labor laws and compliance with government regulation.	Before Commencement of Project Activities	Full day	External Sources	Company manager, Site Supervisors, Site Engineers.
Occupational Health & Safety	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	Site Supervisor, Site Engineer	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
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	Site Supervisor, Site Engineer

8.5 Schedule for Implementation and Environmental Budget

- Health Safety and Environment (HSE) induction/orientation will be provided to all workforce at the project site by a well-trained Site Supervisor.
- Assembly point will be established for the gathering of workforce regarding daily HSE Toolbox Talk at the project site.
- Special education sessions will be conducted at the site.
- The daily walkthrough will be conducted at the project site by the site supervisor and site engineer.
- All the Mandatory PPE's (Safety Helmet, Safety Jacket, Safety Shoes, Coverall, Safety Goggles, Earplug, Dust mask, Safety Gloves, etc.).
- All the heavy machinery will be inspected properly at the site.
- Inspection & Tagging system will be maintained at the project site.
- Safety signage will be provided at the project site.
- Fire posts will be established at the project site at easy approach location.
- Waste will be maintained properly.
- HSE Signboard will be installed at the project site for an emergency response.
- Rest area & smoking zones will be established at the site.
- First aid box with full supplies will be available at the project site.
- In-house training will be conducted on the project site.

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

- First Aid Boxes: First aid boxes will be provided at all active construction sites to cope up the emergency situations. Usually, a typical first aid box mainly contains antibiotics, basic medicines, cotton, bandages, healing balms, pyodine, spirit, pain killer, etc.
- PPEs: Site Engineer will be responsible for providing PPEs to all workers.
- Safety Signs: Relevant safety signboards will be displayed on the worksites and labour camps to make aware / train workers about safety rules. Mainly safety signs include signs of speed limits, electric spark, etc.
- TBTs: Toolbox Talks (TBTs) will be delivered on a regular basis to promote safety culture by the site engineer.
- 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.
- Training: Safety training will be delivered by the site supervisor and site engineer to achieve its objectives. Training will be conducted for capacity building of employees / workers /labour/ sub-contractors to make them well effective to respond in any kind of emergency situation.

The breakup cost for safety of workers is described in **Table 8.4.**

Table 8.4: Estimated cost for the implementation of Health & Safety Plan for Rawalpindi Circuit House Project

Sr No	Item	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
Personal Protective Equipment (A)				
1	Dust Masks	300	5	1500
2	Safety Shoes	100	1500	150,000
3	Gloves	200	100	20,000
4	First Aid Box	2	3000	6,000
5	Ear Plugs	200	50	10,000
6	Safety Helmets	100	1000	100,000
7	Safety Jackets (Hi Vis)	100	500	50,000
Others (B)				
8	Provision of Dust Bins	5	1000	5,000
9	Warning Tape	10	500	5,000
10	Safety Cones	10	1000	10,000
11	Safety Sign Boards	10	1500	15,000
12	Raincoats	100	1000	100,000
			Total (A + B)	**472,500**

- Time Required for Construction Period = 16-month
- Number of Labor Required for Construction = 100
- Personal Protective Equipment PPEs
- Dust Musk: 3 Dust Mask for each labourer
- Safety Shoes: 1 Safety shoe for each labourer
- Gloves: 2 pair of gloves for each labourer
- First Aid Box: 2 first aid box for 100 labourer
- Ear Plug: 2 set of ears plug for each labourer
- Safety Helmet: 1 safety helmet for each labourer
- Safety Jackets: 1 safety Jackets (Hi-Vis) for each labourer
- Dust Bin: Rough estimate
- Water Sprinkling the whole construction period
- Raincoats: 1 Raincoat for each labourer

8.6 Plantation Plan

The plantation plan recommends planting 5,000 mature plants in the green area designated of the boundary of Rawal Lake. The practice of plantation of mature plants will enhance the beauty and environment of the project area.

Board of Revenue, Government of Punjab will ensure the provision of the budget for the implementation of the plantation plan.

The plantation of recommended indigenous species will be carried out at a distance 8 feet having a distance of 8-10 feet among rows (in case of multiple rows). The recommendations about the new plantations are based upon the fact that currently there are few trees at the project site with wild vegetation cover.

The plantation plant consists of trees and shrubs.

Trees (20 ft. and above): A total of 5,000 trees comprising of shady, flowering, fruit trees have been recommended for plantation along boundaries as well as designated plantation sites in the vicinity.

Table 8.5: Recommended Trees for Rawalpindi Circuit House

Sr.#	Botanical Name	Local Name	Description
1	Cassia fistula	Amaltas	It is a large flowering tree having a beautiful yellow blossom
2	*Bombax ceiba*	Seemal	A large flowering tree
3	*Vaccinium calycinum*	Kau	A tree having twice blossom in a year with beautiful yellow flower
4	*Morus alba Linn*	Toot	It is an evergreen fruit tree small size fruit tree with good quality wood
5	*Dalbergia sissoo*	Shisham	A fruit tree with large shade
6	*Vachellia nilotica*	Kikar	A fruiting plant which can easily be grown in a semi-arid climate
7	*Melia azedarach*	Dharek	A large tree mainly used for good quality Timber wood

Plantation Plan Cost

A total number of 5,000 trees will be planted. The cost of plantation includes the cost of equipment, initial planting (including restocking during the first 2 years) and maintenance cost for the first four years of plantation. The cost of raising one plant and its maintenance for 4 years is Rs. 1,185.

The tentative cost of equipment for is given below in **Table 8.6.**

Table 8.6: Tentative Cost of Equipment

Sr.	Equipment	Numbers	Cost in PKR
1	Grub hoe (earth digging tool) and others	Lump-sum	30,000
2	Lift Pump for Water	2	50,000
3	Others	Lump-sum	20,000
	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 8.7** to **Table 8.11.**

Table 8.7: Estimated Cost of Unit Plantation (5000 Plants)

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
1	Clearance of Site (12,111)	5000	5/plant	25,000
2	Layout/ unit	5000	2/plant	10,000
3	Digging of Pits	5000	50/pit	250,000
4	Average cost per unit plant	5000 plants	500/plant	2,500,000

5	Carriage/unit of plants from Nursery to Site including loading/unloading	5000 plants	10/plant	50,000
6	Plantation of plants with ball of earth/unit	5000	30/plant	150,000
7	Addition of Manure 1 cft. / Pit	100 cft.	Lump-Sum	100,000
8	Hand watering 100 times Approx. x 5,000 = 500,000	500,000	1/watering	500,000
9	Weeding 4 times 5,000x4	20,000	5/plant	100,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	200,000
Total				**3,885,000**

Table 8.8: Estimated Unit Cost of Plantation of (1000 Plants) & Maintenance for 2nd Year in case of 20% Mortality

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
3	Re-Digging of Pits	1000	5/pit	5000
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	10,000
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	100,000
8	Hand watering 100 times Approx. x1,000=100,000	100,000	1/watering	100,000
9	Weeding 4 times 1,000x4=4,000	4,000	5/plant	20,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	200,000
Total				**680,000**

Table 8.9: Estimated Cost of Plantation Unit (300 Plants) & Maintenance for 3rd Year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
3	Re-Digging of Pits	300	50/pit	15,000
4	Average cost per unit plant	300 plants	215/plant	64,500
5	Carriage/unit of plants from Nursery to Site including loading/unloading	300 plants	15/plant	4,500
6	Plantation of plants with a ball of earth/unit	300	30/plant	9,000
7	Addition of Manure 1 cft. / Pit	100 cft.	Lump-Sum	100,000
8	Hand watering 50 times Approx. x300=15,000	15,000	1/watering	15,000
9	Weeding 3 times 300x3=900	900	5/plant	4,500
10	Miscellaneous/ Contingencies	Nil	Lump Sum	200,000
Total				**410,250**

Table 8.10: Estimated Cost of Maintaining 500 plants for 4th Year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
1	Hand watering 50 times 5000x50=25,000	250,000	1/time	250,000
2	Weeding	15,000	5/unit	75,000
3	Trimming/pruning of plants	5000	5/unit	25,000
4	Miscellaneous			500,000
			Total	**850,000**

Table 8.11: Final Cost per Tree Planted

Activity	Amount (PKR)
Total cost of planting and maintaining 5,000 plants for 4 years	5,825,000
Cost of equipment	100,000
Total cost	5,925,000
Cost for raising one plant and its maintenance for 4 years	**1,185**

8.7 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 the waste left at the end of the construction activities would lead to extensive disturbance to the environment.

Following measures will be adopted for site restoration and rehabilitation:

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

8.8 Environmental Monitoring & Mitigation Cost

The cost required to effectively implement the mitigation measures is important for the sustainability of the project both in the construction and operational phases of the Project. The summary of the cost of monitoring environment and mitigation cost is shown in **Table 8.12**.

Table 8.12: Summary of Estimated Environmental Mitigation & Monitoring Cost

Activity	Basis	Cost (Rs)
Environmental Monitoring Cost	Ambient Air, Noise and Water Quality Monitoring & Cost of Hiring Environmental Consultant for HSE Monitoring Quarterly.	2,420,000
Health & Safety Plan for Workers	For 100 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi-Vis) And Provision of dust bins, warning tap, safety cones, safety sign boards and water sprinkling	472,500
Plantation Plan	Implementation of Plantation Plan	5,925,000
Septic Tank	Construction of Septic Tank	5,000,000
Cost of environmental training	For the whole construction period	500,000
	Grand Total	**14,317,500**

8.9 Traffic Management and Construction Material Transportation Plan

- All the contractor's construction material will be transported to the project site via Park Road.
- 20 km/hr speed limited will be maintained at the project site.
- All the vehicles will be parked in a designated area.
- Speed breakers will be constructed at appropriate distances.
- 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 signboards will be installed at the project site.
- All the (headlights, backlights, Indicator, etc.) will be checked and maintained regularly.
- All the warning light, reverse back alarms will be maintained properly.
- All the routes within the project site will be marked and designated properly.

8.10 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.
- Close coordination will be carried out with the emergency response units of Islamabad
- Close coordination will be carried out with all law enforcement agencies (police) in case of any aggressive mob of people in the shape of any kind of protest.
- First Aid Box will be available at the project site around the clock.
- All the new entrants will be oriented regarding the required awareness towards the hazardous and risky situation and control.
- The entire workforce will be provided with all the mandatory PPEs for the risk-free environment.
- Proper water sprinkling will be carried out at service road along within the project site for dust control to avoid any hazardous and risky situation which can be a cause of transport emergency.

8.11 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 any emergency situation or any emergency risk.

All the camp residents will be trained and well communicated how to immediately respond to the emergency alarm and reach assembly point. 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 high severe emergency, but it can be much severe; and
- If it rings for 60 seconds or more continuously, then the emergency situation is most difficult so, everyone should respond to it immediately, evacuate the workplace and move towards the assembly point.

Proper evacuation routes will be designated, nominated, and well communicated to all. All the workers will be trained to follow the particular evacuation routes and reach the assembly point in case of any emergency situation.

8.12 Reporting/ Communication and Documentation

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

- Precise recording and maintenance of all information generated during the monitoring in a pre-determined 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, and results of effecting monitoring.

Meeting: For effective monitoring, management, and documentation of the environmental performance during the operation, environmental matters will be discussed during a daily meeting held on-site. Environmental concerns raised during the meetings will be mitigated after discussions with the higher management.

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

8.13 Change Management Plan

The EIA for Rawalpindi Circuit House 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, IDAP who upon approval from Pak EPA and MCI under the order of Government of Punjab will implement the Change of 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, Infrastructure Development Authority (IDAP).

8.14 Post Project Monitoring

Infrastructure Development Authority (IDAP) 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 the Environmental Protection Agency, Government of Pakistan.

9 Conclusion and Recommendations

9.1 Introduction

This Chapter presents the assessment of the possible environmental impacts of the Construction of Rawalpindi Circuit House, 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:

- Rawalpindi Circuit House is proposed in Rawal Dam Irrigation Colony, Chak Shehzad, Islamabad.
- The project site is accessible from Park Road which is further connected to Rawal Road, Murree Road and Jinnah Road.
- The objective of the project is to provide a rest house for government officials who have to travel to Rawalpindi due to official work, as there is no circuit house currently present in Islamabad or Rawalpindi.
- Rawalpindi Circuit House has been proposed on land measuring 24 Kanals. The project site is approximately 0.5 km away from the Rawal Lake and is adjacent to the Rawal Dam Irrigation Colony.
- The project will comprise 5 blocks in total, having a covered area of 76,918 square feet and will be developed in 16-month time.
- Infrastructure to be developed in Rawalpindi Circuit House includes 4 residential blocks and 1 servant quarter block.
- The residential apartments will be 3 floors high (ground + 2 floors) and will comprise a total of 24 duplex suites (2 on each floor).
- The servant quarters will be 2 floors high (ground + 1 floor) and will comprise of 16 servant quarters.
- Significant environmental management issues may arise during pre-construction, construction and operational phase include air pollution, sewage disposal, solid waste, noise pollutions, vehicular traffic, and water consumption.
- The project operational activities can potentially affect the natural resources of the area, especially the natural vegetation. These adverse impacts can be largely reduced by implementing the appropriate mitigation measures, which has been discussed in this report.

- The local residents have shown their satisfaction for the project as it will provide employment opportunities at and help in the socio-economic development of the project area.

- Based on the recommended mitigation measures in Chapter 6, the impacts identified in **Table 7.1** will be reduced with residual impacts having insignificant levels. The impact assessment and mitigation matrix presents the assessment of the residual impacts (mitigated).

9.3 Recommendations

- A plantation plan has been proposed in the EIA report, which needs to be strictly implemented.
- A traffic management plan during construction phase needs to be developed to ensure the existing surrounding road infrastructure is not impacted in a negative way.

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 the Construction of Rawalpindi Circuit House is likely to cause minor environmental impacts mainly during its construction phase. However, these impacts can be mitigated by the implementation of proposed mitigation measures.

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	Tasks Assigned
Engr. Saadat Ali	Team Lead /Environmental Engineer	Postgraduate Diploma in Sanitary Engineering, International Institute for Hydraulic and Environmental Engineering, the Delft, Netherlands, 1984 B. Sc. Civil Engineering, Engineering College, University of Peshawar, 1978	▪ 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 a draft and final study reports.
Engr. Ali Abdullah	Environmental Engineer	M. Sc. Environmental Engineering, Newcastle University, UK (2016) B. Sc. Civil Engineering, The University of Lahore, Lahore (2010-2014)	▪ Suggest mitigation measures for impacts that affect the environment. ▪ Identification of site for baseline data collection for water, wastewater, noise, soil, traffic and ambient air quality
Ms. Ayesha Hanif	Environmental Scientist	BS Environmental Science, International Islamic University Islamabad (2019-2023)	▪ Suggest mitigation measures for impacts that affect the environment. ▪ Identification of site for baseline data collection for water, wastewater, noise, soil, traffic and ambient air quality ▪ Prepare Draft & Final Report of the Project

Annexure-2: List of the People Consulted During the EIA Study

No.	Name of Person	Designation
1	Mr. Wajid	Project Director, IDAP
2	Ms. Zill-e-Huma	Manager Environment and Public Health, IDAP
3	Mr. Mazhar Nadeem	Deputy Director Development, Office of Deputy Commissioner Rawalpindi
4	Mr. Atif Pervaiz	Assistant Director Development, Office of Deputy Commissioner Rawalpindi
5	Mr. Sami Naeem Khan	Environmental Consultant, ERS Limited.
6	Mr. Tahir Hassan	Director General Environment CDA
7	Mr. Aftab Ahmed Gujjar	Additional Sub-Inspector Islamabad Traffic Police
8	Mr. Arsalan	SDO Rawal Dam
9	Mr. Sheikh Hamza Saeed	Executive Engineer Irrigation Department
10	Mr. Ishtiaq Hussain	Geologist
11	Mr. Sher Afzal	Deputy Director (E & SS), IESCO

No.	Area	Name	Age	Education	Occupation	Marital Status
12	Rawal Dam Irrigation Colony	Amjad Javed	54	Middle	Govt Employee	Married
13		Qaisar Abbas	30	Inter	Govt Employee	Married
14		M. Sharif	41	Matric	Govt Employee	Married
15		Muneeba Basharat	35	Inter	Housewife	Married
16		Sumeira Parveen	30	Matric	Housewife	Married

No.	Area	Name	Age	Education	Occupation	Marital Status
17	Roadside consultation	Ali Queshi	26	Graduate	Private Job	Unmarried
18		Robin Masih	22	Matric	Student	Unmarried
19		Muhammad Amin	35	Graduate	Bank Employee	Married
20		Saeed Ahmed	40	Graduate	Job	Married

Annexure-3: 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 colorless gas that is naturally produced from animals and people in exhaled air and the decay of plants.
Carbon monoxide	A highly poisonous, odorless, tasteless and colorless gas that is formed when carbon material burns without enough oxygen.
Climate	The pattern of weather in a particular region over a set period of time, usually 30 years.
Compost	A rich soil-like material produced from decayed plants and other organic matter, such as food and animal waste, that decomposes (breaks down) naturally.
Composting	The process of deliberately allowing food, garden and other suitable organic wastes to break down naturally over time to produce compost.
Conservation	Preserving or protecting animals and resources such as minerals, water and plants through planned action (such as breeding endangered species) or non-action (such as not letting taps run unnecessarily).
Deforestation	The reduction of trees in a wood or forest due to natural forces or human activity such as burning or logging.
Effluent	Liquid wastes such as sewage and liquid waste from industries.
Energy efficiency	Actions to save fuels, for example, better building design, changing production processes, developing better transport policies, using better road vehicles and using insulation and double glazing in homes.
EIA	An environmental impact assessment (EIA) is an analytical process that systematically examines the possible environmental consequences of the implementation of projects, programs and policies.
EMP	An environmental management plan (EMP) is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.
Fauna	The animals of a particular region, habitat, or geological period.

Flora	The plants of a particular region, habitat, or geological period.
Habitat	The area occupied by a community or species (the 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).
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-4: Terms of Reference

An EIA will be carried out 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 project planning and design.
- Developing appropriate management plans for implementing, monitoring, and reporting of the environmental mitigation and enhancement measures suggested.
- Respond to queries generated by Pak-EPA until issuance of the NOC.

Annexure-5: Ambient Air, Noise and Water Testing Results

ESPAK

ENVIRONMENTAL SERVICES PAKISTAN

CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: ESPAK/0098I/23/AA/2583/00245 **Date:** 26/05/2023
Name of Industry/Client: Project Procurement International
Address: Office #26, 2nd Floor, Silver City Plaza, G11 Markaz, Islamabad
Telephone No.:

Nature of Sample: Ambient Air
Monitoring Location: Circuit House Rawal Dam, Islamabad (GPS: 33°691753"E 73°119875"E)
Date of Sample Collection: 24/05/2023
Sample Collected/Sent By: Farhan Ali, Analyst (Field), ESPAK
Grab / Composite: Continuous 24- Hours
Date of Completion of Analysis: 25/05/2023

S. No	Parameters	Limit Values (NEQS-24Hours)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	5 mg/m³ (8 Hours)	2.0 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Sulfur Dioxide (SO_2)	120 µg/m³	21.6 µg/m³	UV Fluorescence (UVF)	Within Prescribed Limits
3	Ozone (O_3)	130 µg/m³ (1 Hour)	15.8 µg/m³	Non Dispersive UV Absorption	Within Prescribed Limits
4	Oxides of Nitrogen as NO	40 µg/m³	13.9 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
5	Oxides of Nitrogen as NO_2	80 µg/m³	23.2 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
6	Particulate Matter $PM_{2.5}$	35 µg/m³	28.3 µg/m³	Particulate Sensor	Within Prescribed Limits
7	Particulate Matter PM_{10}	150 µg/m³	133 µg/m³	Particulate Sensor	Within Prescribed Limits
8	Suspended Particulate Matter (SPM)	500 µg/m³	254 µg/m³	High Volume Sampler (HVS)	Within Prescribed Limits

NEQS: National Environmental Quality Standards for Ambient Air, 2010
• 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.

Note:

- **The report should be reproduced as a whole and not in parts.**
- **The responsibility of the ethical use of this report lies with the client.**
- **The values represent sample conditions when monitoring/testing was carried out.**
- **The report data is not intended to be used legally by the client.**

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: 26/05/2023

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

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ENVIRONMENTAL SERVICES PAKISTAN

PAK EPA & PUNJAB EPD CERTIFIED

NOISE MONITORING REPORT

Reference Number: ESPAK/0098I/23/N/2584/00286 **Date:** 26/05/2023
Name of Industry/Client: Project Procurement International
Address: Office #26, 2nd Floor, Silver City Plaza, G11 Markaz, Islamabad
Telephone No.:

Nature of Sample: Noise
Date of Sample Collection: 24/05/2023 **Grab / Composite:** Continuous - 24 Hours
Sample Collected/Sent By: Farhan Ali, Analyst (Field), ESPAK
Date of Completion of Analysis: 25/05/2023
Method/Equipment Used: Sound Level Meter

S. No	Measurement Point	Limit Values (NEQS)	Noise Level in dB(A) Leq	Remarks
1	Circuit House Rawal Dam, Islamabad (GPS: 33°691753"E 73°119875"E)- Day Time	65 dB(A)	65 dB(A)	Within Prescribed Limits
2	Circuit House Rawal Dam, Islamabad (GPS: 33°691753"E 73°119875"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: 26/05/2023

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

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ENVIRONMENTAL SERVICES PAKISTAN

PAK EPA & PUNJAB EPD CERTIFIED

CHEMICAL ANALYSIS TEST REPORT (SURFACE WATER)

Reference Number: ESPAK/0098I/23/WW/2582/00347 **Date:** 25/05/2023
Name of Industry / Client: Project Procurement International
Address: Office #26, 2nd Floor, Silver City Plaza, G11 Markaz, Islamabad
Telephone No.:
Nature of Sample: Surface Water (GPS: 33°41'13.89"N, 73°7'32.8"E)
Date Sample Received: 19/05/2023 **Grab / Composite:** Grab
Date of Sample Collection: 18/05/2023
Sample Collected / Sent By: Shahzaib Ali, Analyst(Field), ESPAK
Date of Completion of Analysis: 25/05/2023

S. No	Parameters	Limit Values (WW-NEQS)	Concentration	Method / Equipment Used	Remarks
1	pH value (H^+)*	6-9	7.6	SMWW 4500H^+ B	Within Limits
2	Biochemical Oxygen Demand (BOD_5) at 20 °C	80 mg/L	10 mg/L	SMWW 5210 B	Within Limits
3	Chemical Oxygen Demand (COD)*	150 mg/L	21 mg/L	SMWW 5220 D	Within Limits
4	Total Suspended Solids (TSS)*	200 mg/L	7 mg/L	SMWW 2540 D	Within Limits
5	Total Dissolved Solids (TDS)*	3500 mg/L	293 mg/L	SMWW 2540 C	Within Limits
6	Phenolic Compounds (as Phenol)	0.1 mg/L	ND	SMWW 5530 C	Within Limits
7	Grease and Oil (as n-HEM)	10 mg/L	ND	U.S.EPA 1664 B	Within Limits
8	Chloride (as Cl^-)*	1000 mg/L	18 mg/L	SMWW 4500Cl^- -B	Within Limits
9	Fluoride (as F^-)*	10 mg/L	0.1 mg/L	U.S. EPA 9214	Within Limits
10	Cyanide (as CN^-)	1.0 mg/L	ND	SMWW 4500 CN- F	Within Limits
11	An-ionic detergents (as MBAS)	20 mg/L	ND	SMWW 5540 C	Within Limits
12	Sulfate (SO_4^{2-})*	600 mg/L	46 mg/L	SMWW 4500 - SO_4^{2-} C	Within Limits
13	Sulfide (S^{2-})	1.0 mg/L	ND	SMWW 4500 - S^{2-} F	Within Limits
14	Ammonia (NH_3)	40 mg/L	ND	SMWW 4500-NH_3- D	Within Limits
15	Chlorine (Cl)	1.0 mg/L	ND	SMWW 4500-Cl B	Within Limits
16	Cadmium (Cd)	0.1 mg/L	ND	U.S. EPA-200.7	Within Limits
17	Chromium (Trivalent and Hexavalent)	1.0 mg/L	ND	U.S. EPA-200.7	Within Limits
18	Copper (Cu)	1.0 mg/L	ND	U.S. EPA-200.7	Within Limits
19	Iron (Fe)	8.0 mg/L	0.2 mg/L	U.S.EPA-200.7	Within Limits
20	Lead (Pb)	0.5 mg/L	ND	U.S. EPA-200.7	Within Limits
21	Manganese (Mn)	1.5 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
22	Mercury (Hg)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
23	Selenium (Se)	0.5 mg/L	ND	U.S. EPA-200.7	Within Limits
24	Nickel (Ni)	1.0 mg/L	ND	U.S. EPA-200.7	Within Limits
25	Silver (Ag)	1.0 mg/L	ND	U.S. EPA-200.7	Within Limits
26	Zinc (Zn)	5.0 mg/L	ND	U.S. EPA-200.7	Within Limits

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CHEMICAL ANALYSIS TEST REPORT (SURFACE WATER)

Reference Number: ESPAK/0098I/23/WW/2582/00347 **Date:** 25/05/2023

Name of Industry / Client: Project Procurement International

S. No	Parameters	Limit Values (WW-NEQS)	Concentration	Method / Equipment Used	Remarks
27	Arsenic (As)	1.0 mg/L	ND	U.S. EPA-200.7	Within Limits
28	Barium (Ba)	1.5 mg/L	0.4 mg/L	U.S. EPA-200.7	Within Limits
29	Boron (B)	6.0 mg/L	0.1 mg/L	U.S.EPA-200.7	Within Limits
30	Total Toxic Metals	2.0 mg/L	0.5 mg/L	Calculated Value	Within Limits

NEQS: National Environmental Quality Standards for Municipal & Liquid Industrial Effluents, 2000
SMWW: Standard Methods for the Examination of Water and WasteWater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
n-HEM: Hexane Extractable Material
USEPA: United States Environmental Protection Agency
ND: Not Detected

- Laboratory tests and measurements were carried out at 25 ± 2 °C and 50 ± 10 % Relative Humidity conditions unless stated otherwise.
- Uncertainty of Measurement (UoM) data will be provided on request, 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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- **Only parameters marked with asterisk (*) are ISO 17025:2017 accredited.**

1. **Sample Analyzed By:** Waqas Ahmad (Analyst (ICP-AES)); Muhammad Shahid (Analyst (Chemical)); Ghulam Mustafa (Analyst (Chemical)); Abdul Aziz (Analyst (Chemical)); Ayesha Javaid (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: 25/05/2023

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