# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

## M/S APARTMENT BUILDING

### Plot # 28-A, View Forth Road, Kashmir Point, Tehsil Murree, District Rawalpindi

**SUBMITTED BY:**

**MR. ADIL WAHEED**

**PREPARED BY:**

**ENVIRO STEWARDS COMPANY (PVT) Limited**

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1st Floor, Allied Bank, A-Block Commercial Market, Canal View Housing Society, Lahore

**TABLE OF CONTENT**

# DISCLAIMER

The information presented herein is derived from the unique attributes of the project site as disclosed by the project proponents, stakeholders, and promoters, through provided maps, verbal communications, and all associated documentation. The veracity of the detail's rests solely with the project proponents, stakeholders, and promoters, and not with the environmental consultant. The Environmental Impact Assessment (EIA) or Initial Environmental Examination (IEE) report is not subject to dispute in any court of law.


Representative: EIA & IEE Team

# EXECUTIVE SUMMARY

This Environmental Impact Assessment (EIA) report presents a comprehensive overview of the key environmental and social considerations related to the project Apartment building, located at Plot # 28-A, View Forth Road, Kashmir Point, Tehsil Murree, District Rawalpindi, spanning a total area of 3 Kanal 16 Marla.

The project aims to develop a well-planned residential apartment that enhances livability, fosters economic growth, and contributes to the Sustainable Development Goals (SDGs).

Enviro Stewards Company (Pvt.) Limited has been engaged as the environmental consulting firm responsible for preparing this assessment.

In accordance with the Punjab Environmental Protection Act and the Review of IEE & EIA Regulations, 2022, the project falls under Schedule II (list of projects requiring an EIA), Category I (Environmentally Sensitive Areas i.e., All Projects Situated in environmentally sensitive areas). As such, the preparation and submission of an EIA is mandatory to obtain the required Environmental Approval from the relevant authorities.

This report evaluates the potential environmental and social impacts of the project across its entire lifecycle. Key areas of focus include land use, water and air quality, solid waste management, traffic patterns, noise levels, and the socio-economic well-being of nearby communities. The findings are supported by field data, stakeholder consultations, and technical analysis.

To address potential adverse impacts, a range of mitigation and management measures have been proposed, aimed at minimizing harm to the environment and surrounding population. These include best practices in construction management, pollution control, and community engagement.

Further technical details and a full description of the project, including planning and construction methodology, are provided in Chapter 05: Project Detail.

## Brief of Project

**Table 1 Brief of Project**

| | | |
|---|---|---|
| I. | Title of Project | Apartment Building |
| II. | Location of Project | Plot # 28-A, View Forth Road, Kashmir Point, Tehsil Murree, District Rawalpindi |
| III. | Area of Project | 3 Kanal 16 Marla |
| IV. | GPS Coordinates | 33.907432 N, 73.401409 E |
| V. | Current Status of Project | Proposed |
| VI. | Cost of Project | 159 million PKR |
| VII. | No. of Floors | It's a 03 Storeys building including parking area and different blocks. |
| VIII. | Proponent of Project | Adil Waheed |
| IX. | Purpose of Project | Sustainable & planned residential apartment |
| X. | Description of Project | The apartment complex is designed to provide modern residential facilities for local and visiting populations in Murree, catering to the increasing demand for safe and sustainable housing. The development will include:<br>• Residential apartments with supporting amenities.<br>• Adequate internal road and parking space.<br>• Water supply, wastewater, and solid waste management systems. |

| | | |
|---|---|---|
| | | • Landscaping and open space to blend with the natural hilly terrain. |
| XI. | Cutting of Trees | There will be no cutting of trees. After construction trees will be planted |
| XII. | Water Usage | 500 liter per day of water will be used |
| XIII. | Manpower | 20-25 person during construction and 10-15 maintenance staff |
| XIV. | Period of construction | 05-06 months |
| XV. | Assessed environmental issues | Dust emissions, noise, solid waste, wastewater, traffic congestion, land use change will be the environmental issues |
| XVI. | Solid waste generation | 50-65 kg/day of solid waste will be generated |
| XVII. | Solid waste management | On site collection method will be applied. |
| XVIII. | Wastewater generation | About 2-3 $m^3$/day of wastewater will be generate during operational phase of project |
| XIX. | Wastewater management/ disposal | After treatment in septic tanks, it will be disposed of |
| XX. | Air & Noise pollution & control measures | Dust suppression through water sprinkling, tree plantation, machinery maintenance, use of PPEs will be mitigation measures |
| XXI. | Rainwater Harvesting Plan | Infiltration trenches and storage tanks will be installed for RWH, detail in given |
| XXII. | Protected Areas | As per field visits and consultations with wildlife and forest departments, |

| | | |
|---|---|---|
| | | the proposed project area **does not fall** in any protected area i.e. National Parks, Wildlife Sanctuaries, or Forest areas, etc. |
| XXIII. | Consultant Company | Enviro Stewards Company (Pvt) Limited |
| XXIV. | Compliance | In accordance with Punjab Environmental Protection Act & IEE/EIA Regulations 2022 |

## Legal and Administrative Framework

These include the National Conservation Strategy (1992), National Environmental Policy (2005), Pakistan Labor Policy (2010), and the Punjab Environmental Protection Act (PEPA 1997), along with its subsequent amendment in 2012. Additionally, the project ensures compliance with the Punjab Environmental Quality Standards (PEQS), the Land Acquisition Act (1894), the Prohibition of Cutting of Trees Act (1975), the Punjab Wildlife Act (1974), the Punjab Plantation and Maintenance of Trees Act (1974), and the Antiquities Act (1975).

A thorough review of environmental documents has been conducted, underscoring the mandatory submission of an environmental assessment study report as required by the Pakistan Environmental Protection Ordinance (PEPO), 1983, and reinforced by the Pakistan Environmental Protection Act (1997). Specifically, Section 12(1) of the amended PEPA (2012) stipulates that any project involving the construction or modification of the physical environment must conduct an Environmental Impact Assessment (EIA) or an Initial Environmental Examination (IEE) and obtain approval (NOC) from the relevant provincial environmental authority.

In the preparation of the Environmental Impact Assessment (EIA) report for Proposed project, full consideration has been given to the PEPA (1997), the Punjab Environmental Protection (Amendment) Act (2012), and all other applicable legal requirements from both the Pakistan and Punjab governments, including the Land Acquisition Act (1894).

## Assessment of Major Impacts

### During Construction Phase

The construction phase of the Proposed project will involve significant land development and infrastructure activities, which are likely to result in several environmental impacts. These impacts will primarily include soil erosion, dust generation, noise pollution, and disruption of local ecosystems. Soil erosion may occur due to excavation and land grading, particularly during heavy rainfall, which can lead to sedimentation of nearby water bodies. The generation of dust during construction activities can have adverse effects on air quality, leading to health issues for workers and the surrounding community. Noise pollution from machinery and construction activities will likely impact both the local community and wildlife in the vicinity, especially during nighttime construction. Additionally, the project may disrupt local wildlife habitats, potentially leading to displacement of species, especially if there are areas of natural vegetation or wetland ecosystems within the project site.

### During Operational Phase

Once operational, the project will generate a different set of environmental impacts primarily related to waste management, water consumption, energy use, and increased traffic. The operational phase will lead to higher water consumption due to the development's residential and commercial needs, which may put pressure on local water resources. Additionally, the disposal of solid waste and sewage from the residents and businesses will need to be carefully managed to avoid contamination of local water bodies and soil.

Energy consumption will increase as residents and businesses rely on electricity for daily activities, which may result in increased emissions if the energy source is not environmentally friendly. The demand for electricity, especially if sourced from non-renewable energy, will also contribute to the carbon footprint of the development. The increase in vehicular traffic will lead to higher emissions of greenhouse gases and pollutants, as well as the potential for traffic congestion in the surrounding areas.

## Proposed Mitigation Measures

### Mitigation Measures During Construction Phase

- **Dust Control:** Water sprinkling on unpaved roads, construction sites, and material stockpiles will be carried out regularly to suppress dust. Construction materials such as sand and cement will be stored in covered areas or containers.
- **Noise Reduction:** Use of well-maintained and quieter machinery, along with limiting high-noise activities to daytime hours, will help reduce the impact on nearby communities and wildlife. Workers will be provided with protective hearing equipment where needed.
- **Erosion and Sediment Control:** Proper grading, construction of drainage channels, and installation of silt fences will help manage stormwater runoff and reduce soil erosion during excavation and site leveling.
- **Waste Management:** Construction waste will be segregated and disposed of by EPA approved vendor. Recyclable materials such as metal, wood, and concrete will be separated and reused where possible.
- **Protection of Flora and Fauna:** Vegetation clearance will be minimized, and native plants will be preserved where feasible. Construction zones will be clearly marked to avoid encroachment into ecologically sensitive areas.
- **Health and Safety:** Workers will be provided with safety gear and training. On-site medical aid and emergency response protocols will be established.
- **Traffic Management:** A traffic management plan will be implemented to control heavy vehicle movement and reduce inconvenience to local traffic, especially near residential areas.

### Mitigation Measures During Operational Phase

- **Solid Waste Management:** A proper waste collection and disposal system will be established. Segregation and provision of designated recycling points will help reduce landfill load.

- **Sewage and Wastewater Treatment:** A modern sewage treatment plant (STP) will be installed to treat wastewater before its safe discharge or reuse, thereby protecting groundwater and surface water bodies.
- **Water Conservation:** Water-efficient fixtures will be installed, and public awareness campaigns will promote water-saving practices among residents. Rainwater harvesting systems may also be integrated.
- **Energy Efficiency:** Buildings will be designed with energy-efficient lighting, insulation, and ventilation. Solar panels or other renewable energy sources may be used to reduce dependency on the national grid.
- **Green Landscaping:** Native and drought-resistant plant species will be used in landscaping to reduce water use and enhance biodiversity. Green belts and parks will be maintained to improve air quality.
- **Traffic and Transportation:** Road infrastructure will be developed with dedicated pedestrian walkways and cycling lanes. Encouragement of public transport usage and smart traffic systems will help reduce emissions.
- **Environmental Monitoring:** Regular monitoring of air, water, and noise levels will be carried out to ensure compliance with environmental standards. An environmental management plan (EMP) will guide sustainable practices throughout the project's life.

## Proposed Monitoring Framework

Given the requirement for an Environmental Examination due to the potential long-term, significant, or adverse environmental impacts associated with the housing scheme, it is essential to implement a comprehensive Environmental Monitoring Program. This program will systematically monitor key environmental parameters throughout all phases of the project—planning, construction, and post-construction to ensure full compliance with the Punjab Environmental Quality Standards (PEQS) and other applicable legal requirements.

The Environmental Management and Monitoring Plan serves as a strategic tool to minimize potential negative environmental effects during the development and

operational stages of the housing scheme. It also seeks to enhance the overall project value by enforcing high standards for health, safety, and environmental protection.

The project proponent is fully committed to implementing all proposed mitigation measures during the land development, construction, and habitation phases. Environmental monitoring is a core element of this commitment and will be conducted regularly to assess compliance and performance. The specific details of the monitoring approach and frequency are provided in Chapter 07 of the report

## Conclusions and Recommendations

The proposed project is expected to bring numerous positive impacts, particularly by creating employment opportunities and fostering new business activities. These developments are likely to contribute to increased income levels, improved social infrastructure, and overall enhancement of socioeconomic conditions in the project area. The initiative holds strong potential to stimulate local economic growth and uplift the living standards of the community.

Although some minor to low-level adverse environmental impacts may occur during the project's implementation such as temporary effects on air quality, noise levels, dust generation, and local biodiversity these are considered manageable. The proposed mitigation measures are practical and cost-effective, ensuring that any negative effects can be minimized effectively.

To ensure the environmental sustainability of the project, a robust set of mitigation and monitoring measures has been designed, along with clear selection criteria and assessment procedures for any sub-components of the development.

It is strongly recommended that the project proponent obtains the required environmental clearance, including the No Objection Certificate (NOC) from the Punjab Environmental Protection Agency (Punjab-EPA), prior to commencing any construction activities. This step is essential to ensure compliance with legal and regulatory frameworks.

# 1 INTRODUCTION

## 1.1 General

The construction and development of apartment buildings are integral to addressing the growing demand for urban housing. The scope of apartment development involves the planning, design, and construction of multi-story residential buildings, often with amenities such as parking and communal spaces. This trend is particularly prominent in urban areas where land availability is limited. The benefits of apartment buildings include efficient land use, higher residential density, and the provision of affordable housing in metropolitan areas. They also promote the creation of vibrant, self-contained communities with easy access to work, schools, and public services.

On a broader scale, these developments often attract more businesses to the area, including shops, restaurants, and service providers, creating a thriving commercial environment. This can lead to further job creation and higher income levels for the community. First, it stimulates local economies by creating jobs in various sectors such as construction, architecture, engineering, and property management. Workers such as laborers, electricians, plumbers, and designers all benefit from the building process. Environmentally, apartment buildings can be designed to maximize energy efficiency, minimize waste, and reduce the carbon footprint compared to traditional housing. However, there are environmental concerns, such as increased water and energy consumption, traffic congestion. Additionally, the rapid development of apartment complexes can strain existing infrastructure if not properly managed. Despite these challenges, apartment building development plays a crucial role in urban planning, balancing the needs for growth, sustainability, and economic progress.

## 1.2 Purpose of the Report

This report has been prepared to conform to the requirements of the Punjab Environmental Protection (Amendment) Act 2012 (PEPA), which states that:

*"No proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an Initial Environmental Examination or where the project is likely to cause an adverse environmental effect, an Environmental Impact Assessment, and has obtained from the Provincial Agency approval in respect thereof."*

The EIA report is comprehensive, covering socio-economic, physical, and environmental aspects, including land use, forestry, crops, water bodies, biodiversity (flora and fauna), heritage, and other factors relevant to the project and its surrounding area. It meticulously details mitigation strategies intended to address and neutralize potential environmental impacts on human and environmental health in the vicinity of the project site. These strategies are applicable during both the construction phase and the regular operation of the project.

Moreover, the report serves as a crucial document for decision-makers, particularly the EPA of Punjab, providing all necessary information in the officially approved format. This facilitates an informed decision-making process regarding the issuance of the required environmental approval. Through this report, the proponent demonstrates a commitment to adhering to the Punjab Environment Quality Standards (PEQS) and maintaining a robust environmental management order throughout the lifecycle of the project.

## 1.3 Identification of the project and proponent

The detail of the project and proponent is given below:

| **Name of project** | **Apartment Building** |
|---|---|
| **Location of project** | Plot # 28-A, View Forth Road, Kashmir Point, Tehsil Murree, District Rawalpindi |
| **Proponent name** | Mr. Adil Waheed |
| **Proponent Address** | House # E-101/1, Mohalla Satellite Town, Rawalpindi |

## 1.4 Consultant Information

The initiator has contracted with M/s Enviro Stewards Company (Private) Limited for the execution of report for the aforementioned project, in alignment with the standards and guidelines set forth by the Environmental Protection Agency (EPA) of Punjab. To fulfill this objective, M/s Enviro Stewards Company (Private) Limited has assembled a team of experts, including environmental specialists, environmental engineers, and chemical engineers. Further information on the consultancy team is provided below:

| Detail of the Consultant | |
|---|---|
| **Company name** | Enviro Stewards Company (Private) Limited |
| **Address** | 1st Floor Allied Bank A-Block Commercial Market Canal View Society, Lahore. |
| **Contact No.** | 0301-1199600 |

## 1.5 Nature, Size and Location of Project

The project under consideration involves the establishment of a facility designed to provide high-quality residential spaces. The development aims to offer modern living accommodations with a range of amenities and services. The facility will include various apartment sizes, common areas, and essential infrastructure. This facility is to be situated at Plot # 28-A, View Forth Road, Kashmir Point, Tehsil Murree, District Rawalpindi, encompassing an area of 3 Kanal 16 Marla.

The project is expected to generate employment opportunities for approximately 20-25 individuals during its construction phase. Furthermore, upon transitioning to the operational phase, it is anticipated that an additional 10-15 personnel will be employed. Below is the detail of area

| Sr. # | Description of area | Area in SFT |
|---|---|---|
| 1) | Total area of plot | 17973 |
| 2) | Ground Coverage | 10769.917 |
| 3) | Open area of plot | 7203.083 |
| **Coverage area detail** | | |
| **Existing Block A** | | |
| 4) | Parking/ Ground Floor | 4207.87 |
| 5) | First Floor | 4533.25 |
| 6) | Second Floor | 4533.25 |
| 7) | Third Floor | 3862.792 |
| **Proposed** | | |
| 8) | Ground Floor (block-B) | 3192..917 |
| 9) | First Floor (Block B)<br>Ground Floor (Block C) | 7016.36 |
| 10) | Second Floor (Block B)<br>First Floor (Block C) | 7219.58 |
| 11) | Second Floor (Block C) | 4056.22 |
| **Total (Existing + Proposed)** | | **38622.239** |

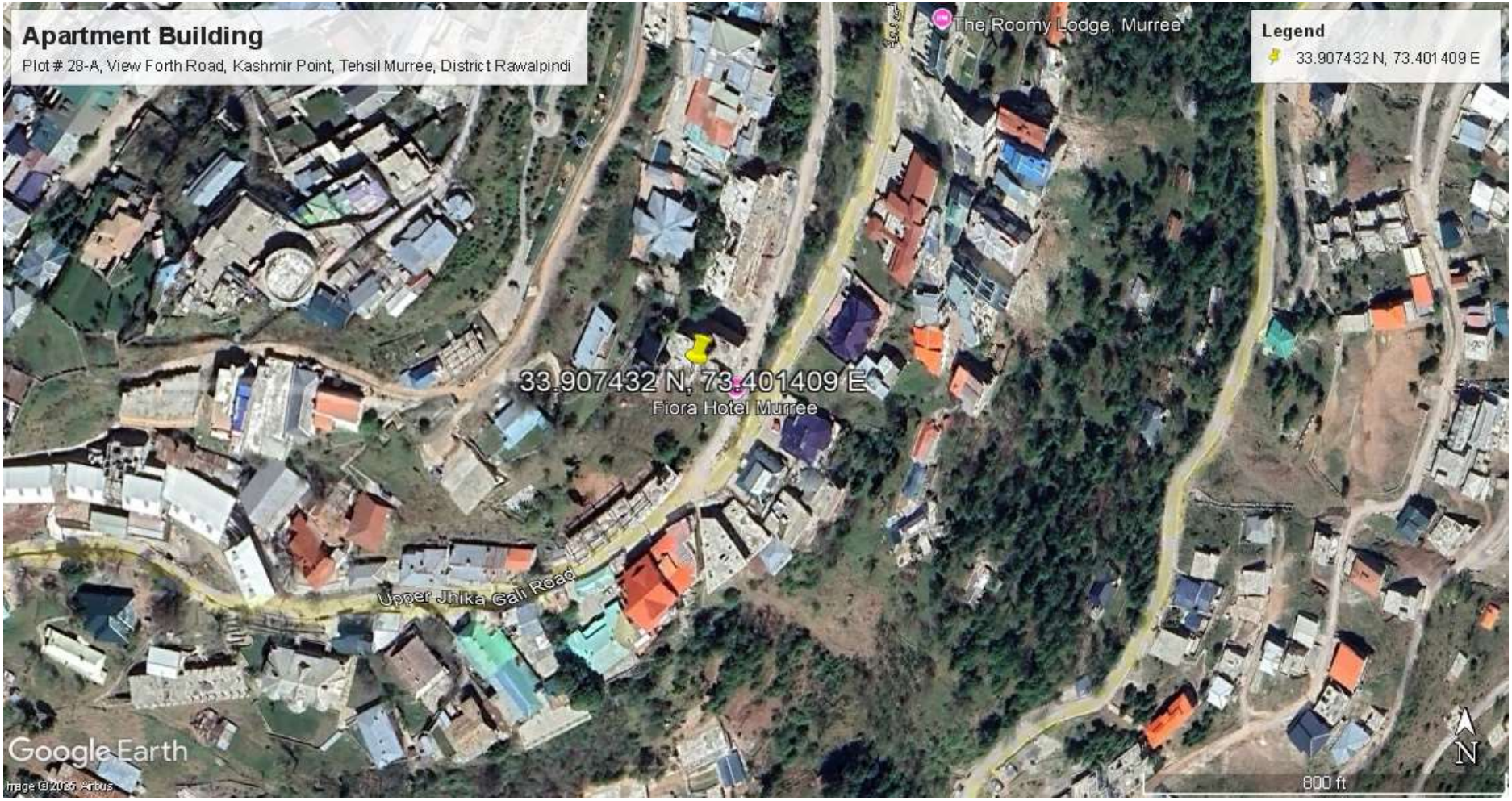



**Figure 1 Site Location**

## 1.6 Scope of the EIA Study, Area of Influence, and Magnitude of Efforts

The scope of this Environmental Impact Assessment (EIA) study covers all potential environmental, social, and safety impacts associated with the proposed Apartment Building storage and filling unit. It includes the assessment of impacts during construction, operation, and decommissioning phases, focusing on air quality, noise, soil and water resources, solid and liquid waste management, traffic impacts, occupational health and safety, and socio-economic conditions.

The area of influence extends beyond the project boundary to include the immediate surroundings that may be affected by vehicular movement, emissions, or accidental leaks, as well as nearby communities and sensitive receptors. It also considers regional impacts on local infrastructure, emergency response services, and economic activities.

The magnitude of efforts involves site inspections, stakeholder consultations, baseline environmental monitoring, risk assessment, and mitigation planning. Special emphasis has been placed on safety and environmental sustainability, in line with the Punjab Environmental Protection Act, and national environmental quality standards.

# 2 POLICY, LEGISLATION, LEGAL & ADMINISTRATIVE FRAMEWORK

## 2.1 General Overview

Environmental compliance is a cornerstone of responsible development in Pakistan. As urbanization accelerates, particularly in housing developments, adhering to the established environmental regulations ensures that the project does not cause undue harm to local ecosystems or communities. Housing projects, are required to undergo environmental review under Section 12 of the Punjab Environmental Protection Act, 1997 (Amended 2012). This law mandates the preparation of an Initial Environmental Examination (IEE) for projects listed under Schedule I of the Review of IEE and EIA Regulations, 2022.

By adhering to these requirements, the project ensures a sustainable approach to urban development that aligns with both provincial and national environmental policies, contributing positively to the broader goals of sustainable development.

## 2.2 Screening

Apartment Building, with a project area of 3 Kanal 16 Marla, falls under the following classification for environmental assessment Schedule II (list of projects requiring an EIA), Category I (Environmentally Sensitive Areas i.e., All Projects Situated in environmentally sensitive areas).

In line with the Review of IEE & EIA Regulations, 2022, this classification mandates that the project must conduct an EIA for obtaining environmental approval from the Punjab Environmental Protection Agency (Punjab EPA). This ensures that the project is subject to appropriate regulatory oversight while not unduly burdening developers with excessive requirements.

## 2.3 Regulatory and Framework Compliance

The EIA study is guided by a range of legal, regulatory, and policy instruments that ensure environmental and planning compliance. These instruments collectively form a

comprehensive framework that governs the environmental aspects of housing developments in Punjab.

## 2.4 Relevant Legal and Institutional Framework

### 2.4.1 Punjab Environmental Protection Act, 1997 (Amended 2012)

This Act is the cornerstone of environmental law in Punjab and mandates the preparation of an IEE/EIA for any project that could significantly impact the environment. It establishes the powers of the Punjab EPA to review, approve, and monitor environmental assessments, ensuring that development activities comply with environmental protection standards.

### 2.4.2 Review of IEE & EIA Regulations, 2022

These regulations under the Punjab Environmental Protection Act detail the procedures for the preparation, review, and approval of environmental reports. The regulations specify timelines, content requirements, and the classification of projects according to their potential environmental impact.

### 2.4.3 National Environmental Policy, 2005

The National Environmental Policy sets the overarching vision for environmental governance in Pakistan, promoting sustainable development across all sectors. It emphasizes the importance of integrating environmental considerations into the planning process and provides a framework for policy alignment at both federal and provincial levels. The housing sector must ensure that it aligns with this national policy, especially regarding urban planning, waste management, and resource conservation.

### 2.4.4 Punjab Local Government Act, 2022

This act defines the responsibilities of local governments in land development, waste management, municipal services, and infrastructure within urban settings. Apartment buildings must coordinate with local government authorities to ensure proper planning, waste management, and service delivery.

### 2.4.5 Punjab Private Housing Schemes and Land Subdivision Rules, 2021

Administered by local development authorities, these rules govern the approval and development of private housing schemes in Punjab. They cover aspects such as layout design, road infrastructure, drainage systems, and the provision of essential services (water, sanitation, electricity). Compliance with these rules ensures that housing schemes meet the required standards for urban living.

### 2.4.6 Punjab Land Use (Classification, Reclassification, and Redevelopment) Rules, 2009

These rules regulate land use in Punjab and ensure that zoning and land classifications are in accordance with environmental and urban planning standards. The rules govern the conversion of agricultural land to residential or commercial purposes, a process crucial to housing developments. Environmental assessments must evaluate the impact of such land-use changes on local ecosystems and resources.

### 2.4.7 Punjab Local Government Act, 2022

This act defines the responsibilities of local governments in land development, waste management, municipal services, and infrastructure within urban settings. Housing schemes must coordinate with local government authorities to ensure proper planning, waste management, and service delivery.

### 2.4.8 Building Code of Pakistan (Seismic Provisions), 2007

This code applies to the structural integrity of buildings, particularly in areas prone to seismic activity. The code ensures that residential and commercial buildings within housing schemes are designed to withstand earthquakes, thereby safeguarding residents and reducing potential damage.

### 2.4.9 Punjab Municipal Solid Waste Management Rules, 2022

These rules regulate the collection, storage, transportation, and disposal of solid waste in Punjab. Apartment buildings are required to establish waste management systems that comply with these rules, ensuring that the project does not contribute to environmental degradation through improper waste handling.

### 2.4.10 Punjab Water Act, 2019

The Punjab Water Act governs water resources, including the extraction of groundwater and the management of water systems. For Apartment buildings, it is crucial to ensure that water use is sustainable, that stormwater is managed effectively, and that any new water extraction activities do not deplete local aquifers.

### 2.4.11 Punjab Wildlife (Protection, Preservation, Conservation and Management) Act, 1974

This law is applicable if the Apartment building is located near any protected or sensitive wildlife habitats. It governs the protection and management of biodiversity, including native plant and animal species. If the project area affects such habitats, appropriate mitigation measures will need to be implemented.

### 2.4.12 Forest Act, 1927

If the project site is located in or near forested areas, this Act requires that the developer obtain permission before clearing any forested land. It regulates deforestation activities and mandates the preservation of forest cover wherever possible.

### 2.4.13 Labor, Safety and Health Laws

These laws ensure the safety, health, and welfare of workers during construction activities. They set guidelines for workplace safety, worker health conditions, and risk management.

### 2.4.14 Public Consultation Guidelines, 1997

This guideline emphasizes the importance of early and inclusive public consultation with stakeholders, especially with communities living near the project site. It mandates that affected populations and municipal bodies are consulted before finalizing project plans, ensuring that the community's concerns are addressed.

### 2.4.15 Guidelines for Sensitive and Critical Areas

If the project site is located near sensitive or critical areas such as schools, hospitals, water bodies, wetlands, or areas of cultural heritage, these guidelines must be

followed. They ensure that the project minimizes any adverse impacts on these sensitive environments.

### 2.4.16 Sustainable Development Goals (SDGs) Integration

Pakistan's commitment to the Sustainable Development Goals (SDGs), particularly SDG 6 (Clean Water and Sanitation), SDG 11 (Sustainable Cities), and SDG 13 (Climate Action), influences the design and implementation of housing schemes. These goals encourage projects that are environmentally sustainable, socially inclusive, and economically viable.

## 2.5 Institutional Framework

The following institutions play key roles in regulating and overseeing environmental compliance for housing schemes in Punjab:

- Punjab Environmental Protection Agency (Punjab EPA): Responsible for enforcing environmental laws and ensuring compliance with IEE/EIA regulations
- Housing and Physical Planning Department: Ensures that housing schemes adhere to urban planning and development standards.
- District Administration and Municipal Committees: Manage local governance and ensure that projects align with community needs and local laws.
- Punjab Local Government Board: Supervises local urban development and service delivery.

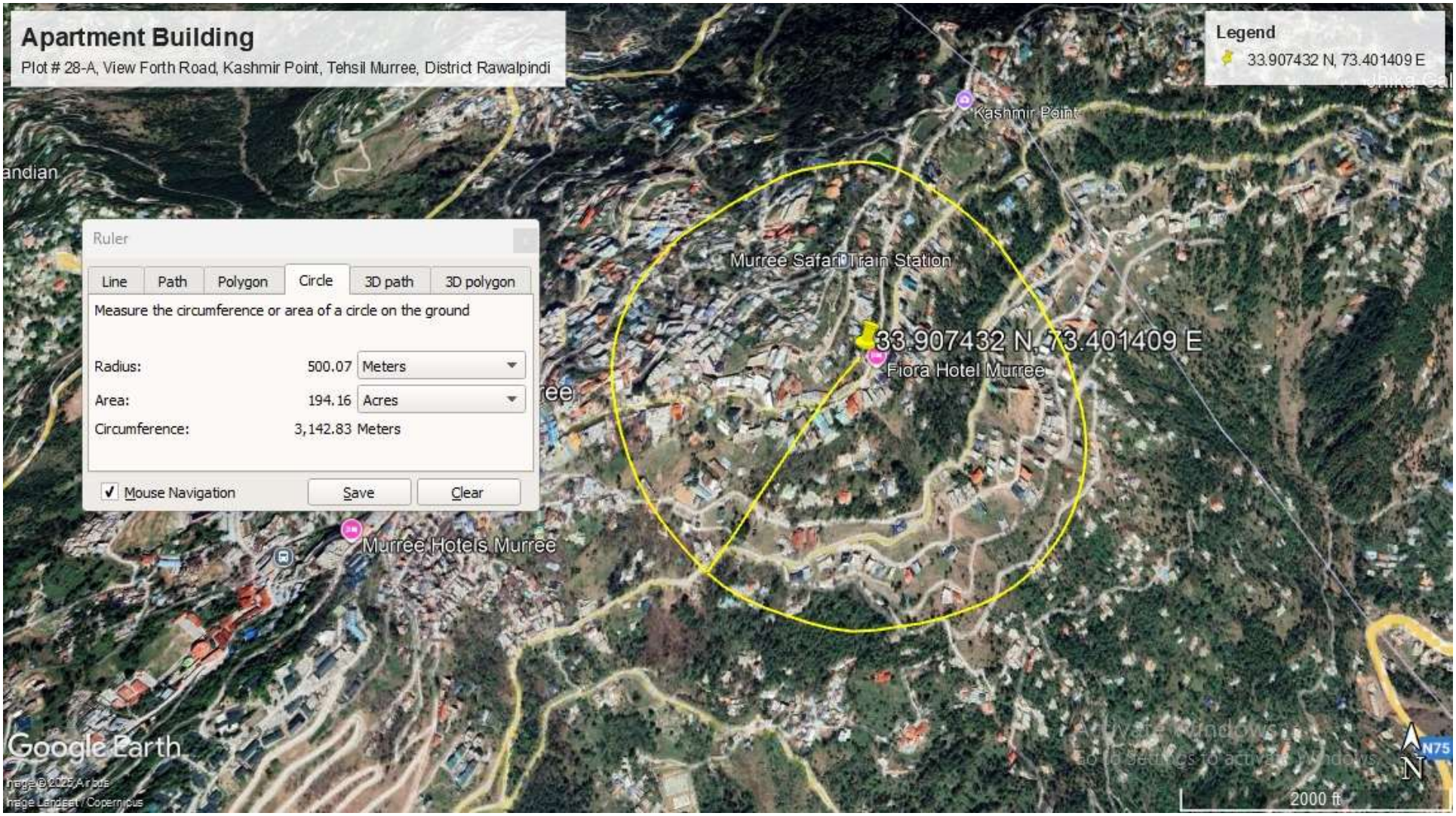
Irrigation Department, Forest Department, and Wildlife Department: Responsible for issuing NOCs related to water management, forest conservation, and wildlife protection.

# 3 SCOPING

The scoping in Environmental Impact Assessment involves a comprehensive assessment of the potential impacts of a project or activity, including direct and indirect impacts, cumulative impacts, and potential long-term effects. This assessment is carried out by a team of environmental and social experts, who analyze the proposed project or activity in detail and identify potential risks and impacts on various aspects of the environment, such as air quality, water quality, biodiversity, and cultural heritage. In this Environmental Impact Assessment, a public consultation process is involved, where members of the public and other stakeholders can provide feedback and raise concerns about the proposed project or activity.

## 3.1 Spatial and Temporal Boundaries of Environmental Assessment

Due to construction of the current project, land use will change from open land to commercial area by M/s Apartment Building. Within radius of 5-km, no industry can be seen but few commercial markets are there represents in figure given below but current project will be installed by adopting proper mitigation measures to avoid disturbance in nearby area and local community. In current project no significant emission will be observed because in proposed project there will be only storage. Wastewater quality will be measured to ensure PEQS. No environmentally sensitive area is present within safe distance that could be impacted due to proposed project.


Apartment Building
Plot # 28-A, View Forth Road, Kashmir Point, Tehsil Murree, District Rawalpindi
Legend
33.907432 N, 73.401409 E
Kashmir Point
Murree Safari Train Station
33.907432 N, 73.401409 E
Fiora Hotel Murree
Murree Hotels Murree
Ruler
Line
Path
Polygon
Circle
3D path
3D polygon
Measure the circumference or area of a circle on the ground
Radius: 500.07 Meters
Area: 194.16 Acres
Circumference: 3,142.83 Meters
Mouse Navigation
Save
Clear
Google Earth
2000 ft
N

## 3.2 Important Issues and Concerns Raised during Consultation

During consultation it was observed that many people were in favor of the project but some of the issues and concerns were raised. During survey following concerns of local community, Government Departments, Environmental Practitioners and Experts, nearby industries were noted:

- Local should be preferred for the job opportunities
- Proper training should be given to workers
- Noisy activities should be confined
- Air pollution should be controlled effectively
- There should be careful handling of devices
- Wastewater should not dispose of without proper treatment
- Solid waste must be collected timely
- Gas measurement devices should be used for continuous monitoring
- A proper wastewater treatment plant should be installed
- Ensure the tree plantation in the vicinity of area
- Health and safety of workers should be ensured
- EMMP should be designed and enforced with great spirit
- Respective team officers should be responsible for the implementation of management plan and actions
- Avoid the excessive use of groundwater. Limited amount of water should be use
- Cleanliness of area should be ensured
- To reduce or avoid air pollution transport vehicles should be covered in the construction phase
- Proponent shall work for betterment of community

## 3.3 Significant Impacts and Factors to be Determined

The factors and impacts to be determined around the project site are:

- Dust and Particulate emissions
- Wastewater generation and its treatment

- Control Air emissions
- Solid waste management
- Occupational Health and safety
- Site Security
- Check and balance of storage unit
- Traffic Management
- Hygiene management
- Community impacts
- Job opportunities for locals
- Confined noisy activities.
- Resource conservation
- Avoid excessive water consumption.
- Energy efficient techniques must be adopted
- Proper site restoration after construction
- Tree plantation at designated green areas
- Emergency preparedness

# 4 Alternatives Consideration

The assessment for the project includes a detailed evaluation of project alternatives to ensure environmentally sustainable and socially responsible development. The alternatives have been examined with the intent to minimize adverse impacts while meeting the core objective of providing affordable and planned housing.

Alternative assessment plays a vital role in promoting more effective decision-making by identifying potential environmental and social implications at the earliest stage of planning. The alternatives considered encompass site selection, design and layout planning, environmental integration, and economic feasibility, with an emphasis on long-term sustainability and compliance with legal standards.

## 4.1 Site Alternatives

The proposed site for the Apartment building was selected based on a combination of legal, geographic, and urban planning considerations. The land (3 Kanal 16 Marla) was earmarked for urban residential use and duly approved by the relevant Development Authority.

Alternative sites were not pursued for the following reasons:

* The selected plot lies within the municipal limits, compatible with land use zoning and regional master planning guidelines.
* Proximity to key infrastructure such as hospitals, road networks, and public utilities supports integrated community living.
* The land is non-agricultural, free from any protected ecosystems, water bodies, or heritage sites, thus minimizing ecological and cultural disruption.

Given these locational benefits and regulatory compatibility, no alternate site was found to offer similar viability and alignment with planning regulations.

## 4.2 Design and Layout Alternatives

Various design alternatives were explored during the planning phase, focusing on infrastructure efficiency, aesthetic appeal, environmental compatibility, and cost-effectiveness. The chosen layout includes:

* A balanced mix of residential area and community facilities.
* Hierarchical road networks and walkways designed for safe, efficient circulation and emergency access.
* Allocation of green belts and open spaces in accordance with the Punjab Private Housing Schemes & Land Subdivision Rules, 2021.

Modern urban planning principles, such as zoning, utility corridors, and drainage flow design, were integrated to ensure long-term resilience and comfort. This layout was selected over conventional grid or block planning due to its superior space utilization and environmental responsiveness.

## 4.3 Environmental Alternatives

Environmental sustainability was central to the project's planning. While alternative environmental strategies were reviewed, the final plan emphasizes:

* Green Space Allocation: Parks, tree-lined streets, and green belts are planned to mitigate the urban heat island effect
* Stormwater Management: A sustainable drainage system is designed to manage rainwater and prevent flooding.
* Solid Waste Management: Designated waste collection points and an agreement with municipal authorities ensure hygienic waste handling.
* Noise and Dust Mitigation: Plantation buffers and construction phase protocols help reduce temporary disturbances.

These features collectively minimize the project's ecological footprint while improving residential livability.

## 4.4 Economic Alternatives

To enhance the project's economic viability and community benefits, several cost-effective and resource-efficient strategies were selected over conventional methods:

* Energy-Efficient Street Lighting: Adoption of LED lighting reduces operational energy use.
* Water Conservation Measures: Provision for rainwater harvesting and water-efficient plumbing fixtures.
* Job Creation: The project supports employment for engineers, architects, laborers, and service providers, stimulating the local economy.

These economic considerations not only reduce project costs but also provide long-term social returns, making the selected approach more sustainable and inclusive.

# 5 PROJECT DESCRIPTION

This Chapter presents the detailed project description along with project cost, land acquisition, implementation schedule, workforce and water requirements, etc.

## 5.1 Objective of Project

The main objectives of the project are:

- ✓ To develop a modern apartment building that caters to the growing residential demand in Murree by offering safe, comfortable, and well-designed living spaces.
- ✓ To encourage planned vertical construction in hilly areas, minimizing unnecessary land consumption and protecting surrounding natural landscapes
- ✓ To provide quality accommodation for seasonal visitors, thereby contributing to Murree's tourism industry and creating economic opportunities for the local community.
- ✓ To integrate eco-friendly features such as rainwater harvesting, energy-efficient building design, and landscaping that complements the natural surroundings.

## 5.2 Location & Site Layout

### 5.2.1 Site Location

The proposed Apartment building, is located in the suburban periphery within the administrative jurisdiction of District, Punjab. The project area spans approximately 3 Kanal 16 Marla.

The site is strategically positioned to benefit from proximity to major transportation routes, public services, and urban infrastructure. It is:

- Accessible via main Road.
- Away from industries and hazardous zone.
- Free from ecologically sensitive areas, flood plains, and heritage zones.
- The land is non-forested, non-agricultural, and zoned for residential use. This ensures compliance with local zoning regulations and land use policies.

### 5.2.2 Site Coordinates

The GPS coordinates of the project site are 33.907432 N, 73.401409 E site location map is attached in next.

## 5.3 Land use of the site

The surrounding land is currently used for commercial purposes that aligns with the required land use.

## 5.4 Road Access

The project site is well-connected through paved roads, specifically providing direct and reliable access to the area. This road infrastructure is vital for facilitating the transportation of construction materials, machinery, and workforce during the development phase, and will also support smooth vehicular access. The road access enhances the project's feasibility and aligns with sustainable planning objectives. A detailed road access map is included to illustrate the site's connectivity with the surrounding transport network.

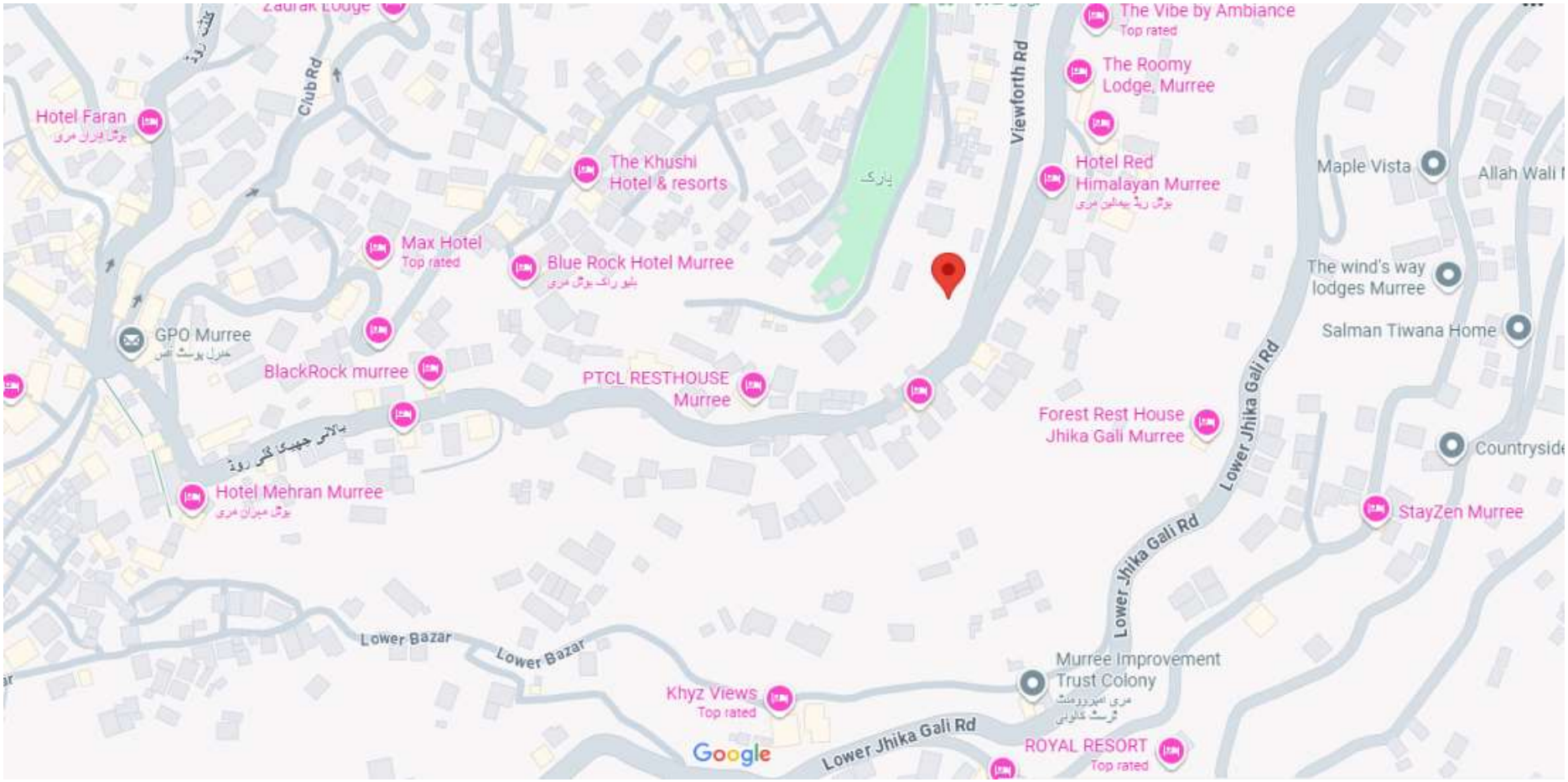



**Figure 2 Rod Access Map**

## 5.5 Vegetative Features of Site

The project site features sparse to moderate vegetation, primarily consisting of native grasses, scattered shrubs, and a few trees like kikar and sheesham. No rare or protected plant species are present, and the area has historically been used for intermittent agriculture.

## 5.6 Plantation Plan

To enhance environmental sustainability and aesthetic appeal, the proposed project includes the plantation of approximately 1,000 to 2,000 trees and shrubs within and around the site. The plan emphasizes shade-providing, ornamental, and native species, ensuring long-term ecological balance and improved air quality.

### 5.6.1 Key Features

**Boundary Plantation:** Fast-growing, pollution-tolerant species such as Neem and Peepal will be planted along the perimeter for screening, dust control, and noise reduction.

**Ornamental Trees and Shrubs:** Selected for visual appeal, seasonal flowering, and biodiversity support.

**Native Species Priority:** Focus on low-maintenance, drought-tolerant plants suited to climate.

### 5.6.2 Maintenance Plan

- **Watering**: Efficient irrigation to meet species-specific needs and minimize water wastage.
- **Pruning & Trimming:** Regular maintenance to ensure healthy growth and landscape aesthetics.
- **Annual Evaluation:** Yearly health assessments with prompt replacement of dead or unhealthy plants.

### 5.6.3 Landscaping Considerations

- **Sustainability:** Use of natural fertilizers and drought-resistant species to reduce resource consumption.

- **Seasonal Variety:** Integration of flowering plants for year-round color and visual interest.
- **Soil Health:** Maintenance of fertility using organic methods to support long-term plant growth.

**Recommended Species**

| S. No. | Common Name | Scientific Name | Benefits |
|---|---|---|---|
| 1. | Neem | *Azadirachta indica* | Air purification, drought-tolerant |
| 2. | Peepal | *Ficus religiosa* | Shade-providing, improves air quality |
| 3. | Kikar | *Acacia nilotica* | Native, soil enrichment, fast-growing |
| 4. | Shisham | *Dalbergia sissoo* | Timber value, soil stabilizer |
| 5. | Siris | *Albizia lebbeck* | Fast-growing, nitrogen-fixing |
| 6. | Dherek | *Melia azedarach* | Ornamental, pollution control |
| 7. | Bakain | *Melia azadirachta* | Aesthetic, hardy tree |
| 8. | Mulberry | *Morus alba* | Provides shade, supports bird habitat |
| 9. | Amaltas | *Cassia fistula* | Seasonal flowers, ornamental |
| 10. | Bottlebrush | *Callistemon citrinus* | Attractive flowers, pollution absorber |

### 5.6.4 Plantation Impact Assessment

The proposed Apartment building project site, consists mainly of open land with limited existing plantation, including a few scattered shrubs and small trees. Satellite imagery and on-site observations confirm that no dense or structured plantations currently exist within the project boundary. However, green patches are visible in surrounding areas, particularly toward the northeast and southeast.

**Potential Impacts:**

**Vegetation Disturbance:** Minor vegetation may be removed during land development, especially in zones designated for infrastructure such as roads and utilities.

**Dust Emissions During Construction:** Dust generated from earthworks, vehicle movement, and material handling may temporarily affect surrounding greenery, particularly during dry or windy conditions.

**Soil Compaction:** Heavy machinery could compact soil, potentially affecting soil fertility and plant growth in adjacent areas.

**Mitigation Measures:**

✅ Controlled and phased clearing of vegetation, preserving mature trees where feasible.

✅ Frequent water sprinkling during construction to suppress airborne dust.

✅ Use of green mesh barriers around the construction area to protect adjacent green patches.

✅ post-construction plantation of native, shade-giving, and pollution-tolerant species along internal roads, plot boundaries, and open spaces.

✅ Development of green belts and community parks within the scheme to enhance overall greenery and reduce environmental footprint.

## 5.7 Magnitude & Cost of Project

The Proposed project spans a total area of, marking it as a significant urban development initiative in the region. The project carries an estimated total capital investment of 159 million PKR, covering land development, infrastructure construction, utilities installation, and operational setup. The financial plan includes all costs associated with ensuring operational safety and environmental protection, eliminating the need for separate allocations for these aspects. Strong emphasis will be placed on

the safe management of equipment and operations through rigorous and proactive practices. This integrated financial and operational planning underscores the project's commitment to both economic viability and environmental responsibility.

### 5.7.1 Cost Breakdown

- **Land Cost:**

Total cost of land is 103 million

- **Construction Works**

Infrastructure Development = 50 million

Sewerage system = 0.3 million

Electricity = 0.5 million

- **Public Area Facilities & Development**

Green belt, Landscaping = 01 million

Security system = 0.02 million

- **Environmental Management and Safety**

Environmental Mitigation Measures = 02 million

Firefighting system & emergency services = 0.1 million

Waste management system = 1.5 million

Rainwater Harvesting System = 01 million

**Total Cost = 159 million PKR**

## 5.8 Proposed Schedule of Implementation

**Stage I: Preliminary Phase**

The land will be cleared, surveyed, and prepared for construction activities. Initial documentation and preliminary planning will also be undertaken.

**Stage II: Design and Approval Phase**

During this phase, the detailed design of the building will be completed, and necessary approvals and NOCs from regulatory authorities will be obtained.

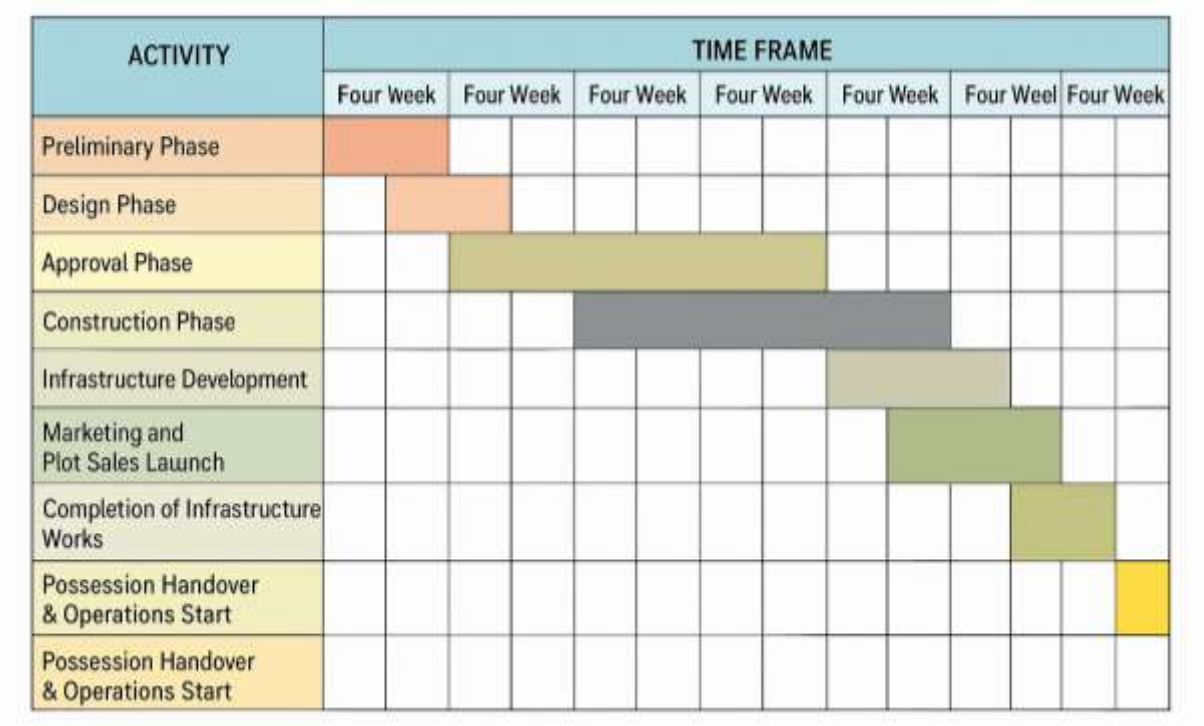
**Stage III: Construction and Infrastructure Development Phase**

Once approvals are in place, heavy machinery will be mobilized to the site. Core construction activities, including road networks, sewerage, water supply, and electrification works, will be initiated and completed.

**Stage IV: Marketing, Sales, and Operations Phase**

Upon substantial completion of infrastructure, marketing will launch. Employees will be recruited, operational staff will be trained, and the project will transition into the possession handover phase, where operations will officially commence.

**Table 2 Schedule of Implementation**




## 5.9 Description of Project

### 5.9.1 Project Overview

The Apartment Building, located at Plot # 28-A, View Forth Road, Kashmir Point, Tehsil Murree, District Rawalpindi, Punjab, is a planned residential community designed to meet the growing demand for quality urban living. Spanning 3 Kanal 16 Marla.

### 5.9.2 Area Breakdown

**Table 3 Features of Apartment building**

| Sr. # | Description of area | Area in SFT |
|---|---|---|

| | | |
|---|---|---|
| 1) | Total area of plot | 17973 |
| 2) | Ground Coverage | 10769.917 |
| 3) | Open area of plot | 7203.083 |
| **Coverage area detail** | | |
| **Existing Block A** | | |
| 4) | Parking/ Ground Floor | 4207.87 |
| 5) | First Floor | 4533.25 |
| 6) | Second Floor | 4533.25 |
| 7) | Third Floor | 3862.792 |
| **Proposed** | | |
| 8) | Ground Floor (block-B) | 3192..917 |
| 9) | First Floor (Block B)<br>Ground Floor (Block C) | 7016.36 |
| 10) | Second Floor (Block B)<br>First Floor (Block C) | 7219.58 |
| 11) | Second Floor (Block C) | 4056.22 |
| **Total (Existing + Proposed)** | | **38622.239** |

### 5.9.3 Key Facilities & Functional Areas

#### i. Residential and Community Facilities

**Residential Area**: A variety of rooms to cater to different socio-economic groups, ensuring an inclusive community environment.

**Commercial Areas:** Strategically placed markets and shops to serve residents' daily needs and promote local businesses.

**Community Facilities:** Including mosques, graveyard, schools, health centers, and playgrounds for social and civic development.

#### ii. Utilities and Services

**Water Supply & Sewerage System:** A well-planned water distribution network and sewerage system to provide hygienic living conditions.

**Electricity:** Provision of electricity connections and space allocated for potential gas infrastructure installation.

**Solid Waste Management:** Dedicated collection points and waste transportation systems to manage municipal waste efficiently.

#### iii. External Development Features

Road Network Wide internal roads with streetlights and green medians for safe and aesthetically pleasing transport.

Green Spaces Parks, green belts, and tree-lined streets enhance environmental quality and promote a healthier lifestyle.

Stormwater Management Rainwater harvesting pits and drainage systems to prevent waterlogging and promote groundwater recharge.

### 5.9.4 Activities Related to Project

The following activities will be part of project execution:

- Transportation and storage of construction materials during the development phase.
- Handling and safety protocols for construction materials and equipment, ensuring compliance with environmental and labor safety standards.
- Installation of safety signage across construction and public areas.
- Traffic Management Plans during construction and operational phases to prevent congestion.
- Rainwater harvesting systems to manage stormwater sustainably.
- Installation of firefighting systems at public buildings (e.g., community centers, mosques).
- Development of parks and tree plantation across designated green areas.

- Waste management plan including solid waste collection points and regular disposal systems
- Sewerage and drainage system installation with environmentally sound disposal mechanisms.

## 5.10 Available Facilities

1. **Workforce**

Manpower demand estimation is an essential component to facilitate deployment of manpower. Project will be constructed in phases. Tentative workforce required for proposed project during the construction phase will be about 35-50 workers/employees. Unskilled labor should be hired locally.

2. **Source of Water**

It is supposed that water tanks will be used by the contractor on the site for construction activities. The source of water during the operation phase for the proposed project will be the ground water.

3. **Water requirement**

The water consumption for construction phase is estimated to be 500 liter per day of the proposed Project.

4. **Solid waste**

The solid waste generation is estimated to be 50-65 kg/day which will be collected at designated place.

5. **Power requirement / power source**

The main source of electricity/electric power will be Water & Power Development Authority (WAPDA).

6. **Health, Safety, and Environmental Controls:**

The facility will implement standard operating procedures (SOPs) for hygiene, emergency response, and safety. All workers will be provided with personal protective

equipment (PPE), and training will be conducted regularly. Fire safety measures will include extinguishers, alarms, and a dedicated open emergency assembly area within the site boundary.

7. **Personnel Protective Equipment (PPE)**

To safeguard workers during both construction and operational phases, the following personal protective equipment will be provided, tailored to the specific activities undertaken:

- Protective goggles
- Leather or rubber safety shoes
- Gloves
- Face masks
- Helmets
- Overcoats

These measures emphasize the project's dedication to maintaining high standards of workplace safety, environmental protection, and operational efficiency, aligning with best practices and regulatory requirements.

## 5.11 Restoration and Rehabilitation Plan

The project is located within a residential area, but given the nature of the development, there are no significant concerns related to displacement or disruption to local residents. The project is designed to avoid the need for relocation or demolition of any existing structures, ensuring minimal impact on the surrounding community. Therefore, there is no immediate need for restoration, rehabilitation, or relocation. The development will proceed in alignment with sustainable practices within the designated area. Over its estimated 25-year operational lifespan, all civil structures and infrastructure will undergo periodic renovations to maintain operational efficiency and safety standards, without requiring extensive rehabilitation or affecting the residential community.

## 5.12Safety Signs/Safety Boards

Safety signage plays a crucial role in accident prevention and risk communication at the workplace. These signs and symbols, designed to be easily understood by all employees, are essential for conveying important safety information and instructions. The project will ensure that safety signs, symbols, and boards are prominently displayed across all departments, facilitating a culture of safety and awareness among workers and staff. This approach not only helps in mitigating hazards but also reinforces the project's commitment to maintaining a secure and health-conscious work.


Figure 3 Safety Signs & Symbols

## 5.13Government Approvals and Leases

Compliance with environmental regulations is paramount, necessitating approval from the Environmental Protection Agency (EPA) of Punjab, as per Section 12 of the Punjab Environmental Protection (Amendment) Act 2012. The preparation of this report for submission to EPA Punjab is a critical step towards securing the necessary governmental endorsements to commence construction, underscoring the project's adherence to legal and environmental mandates.

# 6 DESCRIPTION OF ENVIRONMENT

An environmental baseline study is intended to establish a database against which potential impacts can be predicted and managed subsequently. The EIA of the project covers a comprehensive description of the project area, including regional resources which are expected to be affected by the project, as well as those which are not expected to be directly affected by the construction and operation of the project.

A site visit was conducted to survey the field area for collection of relevant data. Interviews were conducted with the public and stakeholders of the project area to seek the public opinion on the implementation of the project. Various Governmental and Non-Governmental Organizations (NGOs) were also visited for the collection of relevant data and their views on the project were recorded for incorporation into the EIA report. The environmental impacts of any activity or process will be assessed based on deviation from the baseline or normal situation. The following components form part of the baseline:

- Physical Environment
- Ecological Environment
- Socioeconomic Environment

## 6.1 Physical Environment

The following section provides an overview of the information on physical environment of the proposed Project study area collected from primary as well as secondary sources. The major parameters covered include Physiographic and Topography, Geology, Soil, Seismicity, Climate and Meteorology, Ambient Air & Noise, Water Resources, Solid Waste, and Land Use.

### 6.1.1 Topography

Rawalpindi district is divided into 3 distinct portions:

- Mountainous region: This contains the hills of Murree, the northern portion of Kahuta, and Kotli Sattian Hills.
- The Piedmont Plains or the sub-montane areas of Rawalpindi: These extend up to Kahuta and the west bank of River Jhelum, then down into Gujar Khan Town till it reaches the borders of Jhelum district.
- Plains or Potowar: The plains include the area of Rawalpindi Town on the southwest of Murree, and the entire Gujar Khan Town except its hilly areas on the bank of Jhelum and the southeastern portion of Kahuta town.

### 6.1.2 Geology

Rawalpindi district, now called Rawalpindi City District is situated between 33° 4' to 34° 1' north latitudes, and 72° 38' to 73° 37' east longitudes. The district is bounded on the north by Islamabad Capital Territory, Abbotabad and Haripur districts of Khyber Pakhtunkhwa on the south, it is bounded by Chakwal and Jhelum districts; on the west by Attock district; and on the east by the River Jhelum across which lies Bagh, Rawalakot, and Kotli districts of Azad Kashmir.

### 6.1.3 Soil & Mountains

Clay soils in the district exhibit 5 distinct strata. They are (from south to north):

- coarse pebbles with sand or clay
- an alluvial stratum deposited by an older river system in the Soan Basin
- alluvial deposits of the present river system
- an airborne top layer of silt or clay (loess)
- conglomerate and loose gravel deposits.

Silty, sandy gravel in medium-dense to dense conditions exists below the topsoil cover of sandy silt.

### 6.1.4 Seismic Activity

The district belongs to zone 3 of the Seismic Zone Map of Pakistan. This means moderate to severe damage to property due to earthquakes.

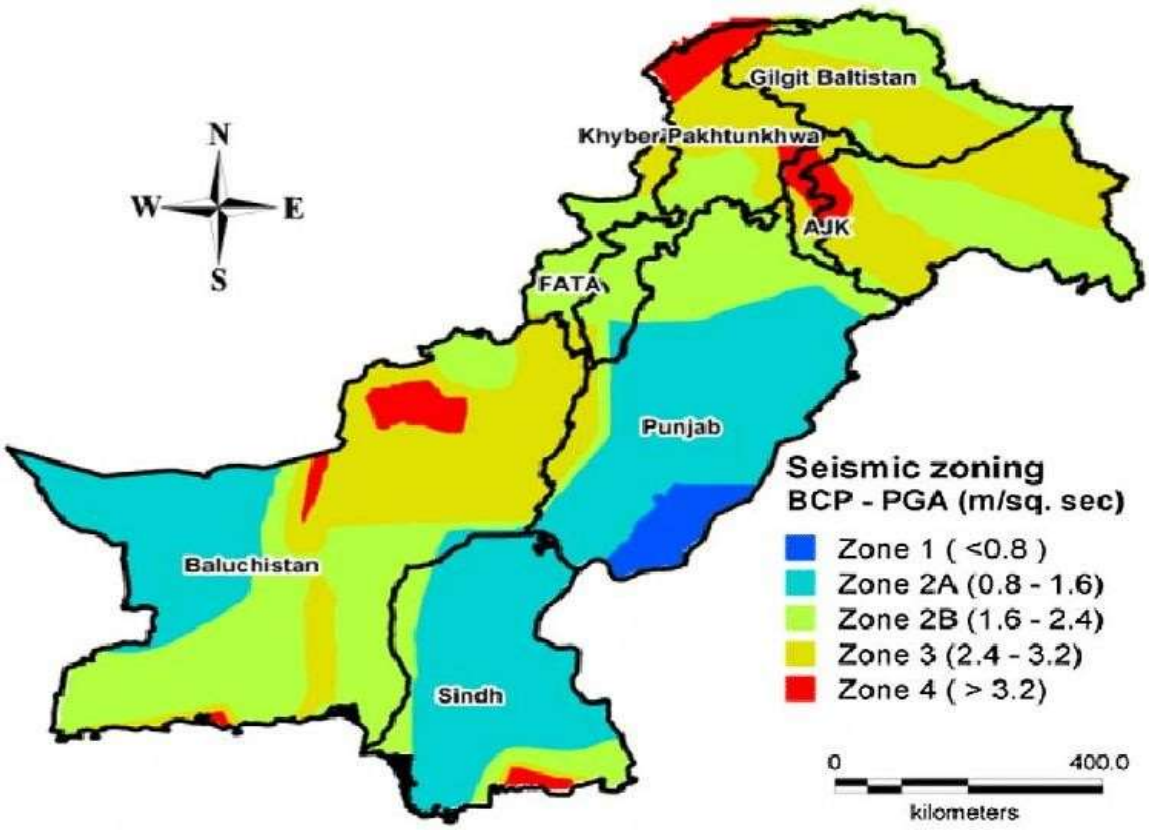



Figure 4 Seismic Zone of Pakistan

### 6.1.5 Climate and Rainfall

Rawalpindi features a humid subtropical climate, with long and very hot summers, a Monsoon, and short, mild, wet winters. There is a wide variation of climate among various parts of the district. The Murree and Kotli Sattian towns have severe winter and mild summers, while Gujar Khan, Rawalpindi, and Taxila towns have a hot summer and relatively mild winters.

In the Potowar region of the district, the summers are hot and winters are quite cold. June is the hottest month, when the mean maximum temperature reaches 39 °C, while the mean minimum temperature during winter goes down to between 0 to -1 °C.

There are 2 rainy spells in the district, one of which is the Monsoon, which begins in July and ends in September. There are far more rains in the eastern part of the district than the western, and rain falls on one side of Margalla Hills but not on the other. The other rainy season starts in January and lasts till the beginning of March.

In Murree, the average rainfall is about 1,142 mm, with about 140 rainy days in a year. In the Plains, the mean average annual rainfall is about 913 mm.

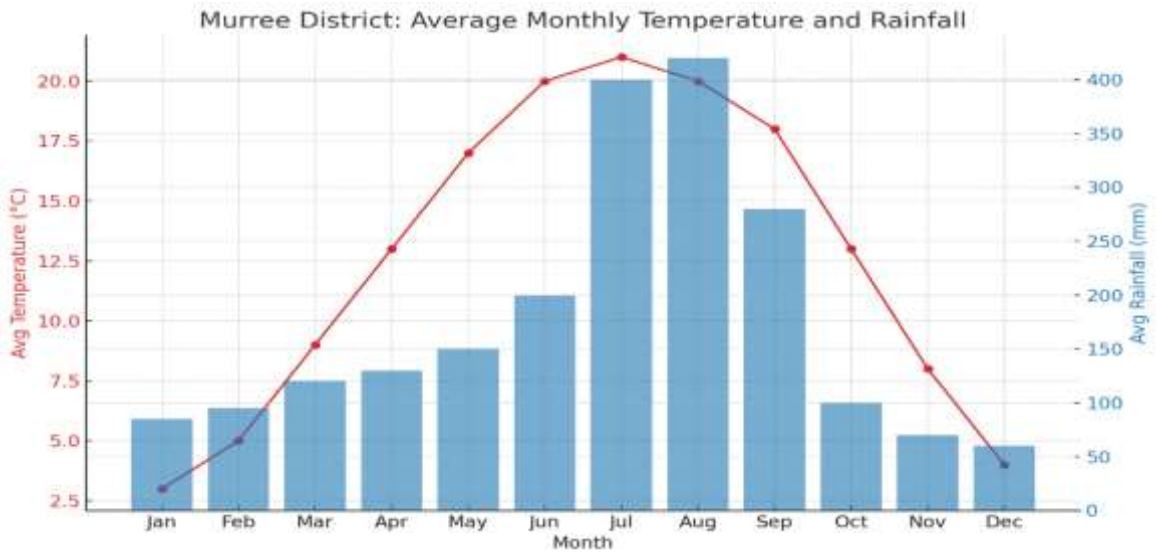
**Humidity and Wind**

Humidity remains relatively high during the monsoon months and drops during winter. Light to moderate winds are typical throughout the year, but strong gusts may occur during storms or transitional weather.

**Climate Sensitivity**

Due to its location and elevation, Murree is highly sensitive to climatic variations. Climate change impacts such as erratic rainfall patterns, increased frequency of extreme weather events, and temperature fluctuations pose risks to both natural ecosystems and human settlements. These factors must be considered in the planning and design of infrastructure projects.

**Table 4 Average Weather in Rahim Yar Khan**



Here is a graph showing the average monthly temperature and rainfall in Rawalpindi District:

- The red line represents the average temperature (°C), which ranges from around 3°C in January to 21°C in July/August.
- The blue bars show average monthly rainfall (mm), with the monsoon peak in July and August reaching up to 400+ mm, indicating a high risk of landslides and soil erosion during this period.

### 6.1.6 Ground Water

Groundwater in Rawalpindi District exists primarily within fractured bedrock aquifers and weathered rock zones, typical of hilly and mountainous terrain. Unlike plain areas with extensive alluvial deposits, Murree lacks deep, continuous aquifers. As a result, groundwater availability is limited, discontinuous, and highly dependent on local geology, slope, and rainfall recharge.

The main sources of groundwater recharge are rainfall and snowmelt, which infiltrate through cracks, joints, and weathered zones in the sedimentary rocks of the Murree Formation. The average annual rainfall of approximately 1,400–1,800 mm plays a crucial role in sustaining springs, shallow wells, and tube wells that serve as the primary water sources for both domestic use and small-scale developments.

Groundwater yields in the region are generally low to moderate. In many areas, especially on ridge tops and steep slopes, shallow wells may dry up during dry seasons, and water extraction from deep boreholes is often not feasible or economically viable due to the hard rock geology and low permeability of subsurface formations.

Water quality is usually acceptable for domestic use, although localized contamination from poorly managed sanitation systems, septic tanks, or waste dumping sites has been reported. There is also growing pressure on the aquifer system due to increased population, tourism, and unregulated construction

### 6.1.7 Surface Water Hydrology

Rawalpindi District features a well-defined yet delicate surface water hydrology, shaped by its mountainous terrain, high rainfall, and forested slopes. The area is part of the Soan River catchment, which eventually drains into the Indus River system. Surface water in Murree primarily consists of perennial and seasonal streams (locally known as "nullahs"), springs, and rainwater runoff channels that flow through the narrow valleys and steep slopes of the region.

Key streams in the region include the Mall Nullah, Bhurban Stream, and Dewal Nullah, among others, which play a vital role in draining the upland watershed. These streams are rain-fed and highly seasonal, with flows peaking during the monsoon season (July to September) when rainfall intensifies. During this period, the area is prone to flash floods and rapid runoff, especially in zones with deforestation, poor drainage design, or disturbed slopes.

The region also contains numerous natural springs and small freshwater reservoirs, which are vital for the local water supply. These surface water bodies also contribute to groundwater recharge and support biodiversity and ecosystem services.

However, Murree's surface water systems are increasingly under stress due to urban expansion, unregulated construction, solid waste dumping, and poor sewage management. Many watercourses are at risk of contamination from domestic effluents, surface runoff, and tourism-related pollution, which can degrade water quality and ecosystem health.

## 6.2 Ecological Environment

Following is the description of the baseline ecological environment of the area.

### 6.2.1 Flora

The flora of Rawalpindi District is rich and diverse, owing to its location in the Himalayan moist temperate zone. The region is characterized by dense forest cover comprising both coniferous and broad-leaved species that play a vital ecological role in slope stabilization, water regulation, and habitat provision. Dominant tree species

include Chir Pine (*Pinus roxburghii*), Blue Pine (*Pinus wallichiana*), Himalayan Deodar (*Cedrus deodara*), Silver Fir (*Abies pindrow*), and various Oak species (*Quercus incana*, *Quercus dilatata*), along with deciduous trees such as Maple (*Acer caesium*) and Horse Chestnut (*Aesculus indica*). The forest understory is composed of a variety of shrubs and herbaceous plants including Berberis (*Berberis lycium*), Dodonaea (*Dodonaea viscosa*), wild roses (*Rosa* spp.), blackberries (*Rubus fruticosus*), and honeysuckle (*Lonicera* spp.), along with grasses, ferns, and seasonal wildflowers that thrive in the cool, moist environment.

These forests not only enhance the natural beauty of the region but are crucial for preventing soil erosion, maintaining groundwater recharge, and supporting biodiversity. However, Murree's natural vegetation is under growing pressure from human activities such as deforestation, illegal wood cutting, overgrazing, and unplanned urban expansion. These threats have led to forest degradation, habitat loss, and increased vulnerability to environmental hazards such as landslides and flash floods. In the context of development, it is imperative to minimize disturbance to native vegetation through careful site planning, restricted tree cutting, and implementation of compensatory plantation programs. Conservation of existing green belts and buffer zones should also be prioritized to preserve the ecological balance of the region.

### 6.2.2 Fauna

Rawalpindi District supports a diverse assemblage of fauna due to its forested hills, cool temperate climate, and relatively undisturbed natural habitats. Among the most commonly observed mammals are the Rhesus monkey (*Macaca mulatta*), often seen near populated areas, and the Indian leopard (*Panthera pardus fusca*), a highly elusive and ecologically significant predator whose presence indicates a healthy forest ecosystem. The Indian pangolin (*Manis crassicaudata*), a nocturnal and insect-eating mammal, is also found in the region and is listed as Endangered by the IUCN due to habitat loss and illegal trade. Other mammals include the red fox (*Vulpes vulpes*), jackal (*Canis aureus*), wild boar (*Sus scrofa*), and porcupine (*Hystrix indica*), all of which play

important roles in maintaining the ecological balance by controlling pests and recycling organic matter.

Murree is also rich in avifauna, with a wide range of resident and migratory bird species. Notable among them are the Khalij pheasant (*Lophura leucomelanos*), Himalayan monal (*Lophophorus impejanus*), woodpeckers, partridges, bulbuls, sparrowhawks, and various mynas. These birds contribute to the ecosystem through seed dispersal, pollination, and insect population control. Seasonal migrations also bring in diverse bird species that use Murree's forests and water bodies as temporary habitats. Reptilian and amphibian fauna are represented by species such as the garden lizard (*Calotes versicolor*), skinks, geckos, and a variety of frogs and toads, particularly abundant during the monsoon season.

### 6.2.3 Endangered Species

Rawalpindi District is home to several wildlife species of conservation concern, including the Indian pangolin (*Manis crassicaudata*), listed as *Endangered* by the IUCN and protected under national wildlife laws due to threats from poaching and habitat loss. The Indian leopard (*Panthera pardus fusca*), although classified as *Vulnerable*, faces local endangerment from shrinking habitats and human-wildlife conflict. Avian species such as the Himalayan monal (*Lophophorus impejanus*), considered *Near Threatened*, and the Khalij pheasant (*Lophura leucomelanos*), though not globally threatened, are also under pressure due to forest degradation and hunting. The presence of these species highlights the ecological sensitivity of the area, emphasizing the need for wildlife impact assessment and protective measures in any development activity.

## 6.3 Socio-economic Information

The objectives of the current study are as follows:

- To conduct a detailed assessment of the project's social impacts and collect relevant socio-economic data.
- To evaluate community needs with a focus on environmental and infrastructural concerns.

- To identify both adverse and beneficial socio-economic and public health effects of the project.
- To propose remedial actions aimed at improving socio-economic conditions in the area.
- To analyze the current socio-economic situation, particularly in relation to environmental conservation and sustainable development.

### 6.3.1 Demographic Profile

Rawalpindi District, located in the Rawalpindi Division of Punjab, has a population density of approximately 620 persons/km$^2$, with a near-equal gender distribution—50.6% male and 49.4% female. The region has both urban and rural populations, but much of it comprises small towns and scattered hillside settlements. The population is steadily increasing due to migration and tourism-driven development.

### 6.3.2 Economic Conditions

The economy is largely driven by tourism, with supporting sectors including hospitality, retail businesses, transportation, and handicrafts. A significant portion of the local population is also engaged in government services, small businesses, and seasonal employment tied to tourism. Agriculture and livestock farming occur on a small scale due to the hilly terrain and limited arable land.

### 6.3.3 Agriculture

Agriculture is limited and primarily consists of small-scale farming of maize, potatoes, and seasonal vegetables. The region falls within the Northern Dry Mountains Agro-Ecological Zone, where farming is mostly rain-fed due to the lack of large-scale irrigation infrastructure. Fruit orchards—including apple, apricot, walnut, and cherry—are cultivated in some areas and contribute modestly to local livelihoods.

### 6.3.4 Religion

The population is overwhelmingly Muslim, accounting for over 98% of the total, with a small minority belonging to other religious communities. Religious practices are deeply embedded in daily life, with local mosques and shrines being central to community activities.

### 6.3.5 Languages and Major Castes

The primary languages spoken are Punjabi (Potohari dialect) and Urdu. Some communities also speak Kashmiri and Pashto. Major castes and ethnic groups in Murree include Abbasi, Gujjar, Jat, Rajput, Awan, Dhund, and Satti, many of whom are indigenous to the hilly regions of northern Punjab.

## 6.4 Quality of Life Values

### 6.4.1 Customs

Murree's residents maintain strong ties to cultural traditions and caste-based social structures. Visiting shrines, participating in local festivals, and observing religious rituals are common. Hospitality and communal bonding are highly valued.

### 6.4.2 Electric Supply

Electricity is supplied by IESCO (Islamabad Electric Supply Company), and the project site is connected to the national grid, ensuring adequate power availability.

### 6.4.3 Telephone Facilities

The project area has access to both landline and mobile communication networks, with reliable coverage from major telecom providers. Internet services are also available, although signal strength may vary with terrain.

### 6.4.4 Educational Facilities

Several government and private schools exist within Rawalpindi District, but higher education institutions are limited and mostly located in Rawalpindi or Islamabad. Within a 3–5 km radius of the project site, basic educational facilities are available for both boys and girls.

## 6.5 Site Suitability

The proposed site is located in an area that is already partially urbanized, with other residential and small-scale commercial developments nearby. It does not fall in an environmentally protected or ecologically sensitive zone, making it suitable for construction. There is no requirement for land acquisition, displacement, or relocation of existing communities. The project is expected to complement existing infrastructure

and bring economic opportunities to the local population without adverse impacts on surrounding land uses.

## 6.6 Project Response

Community consultations indicate that over 90% of local respondents are in favor of the project. The apartment complex is seen as a positive addition to the area, offering employment opportunities, improved residential infrastructure, and economic uplift through construction and service-related jobs. Respondents emphasized the need for proper mitigation measures, including the use of certified contractors, controlled construction practices, environmental safeguards, and green landscaping. If these are adhered to, residents expressed no objection to project implementation and are hopeful it will enhance the standard of living in the area.

# 7 IMPACTS AND MITIGATION MEASURES

This chapter provides a review of the potential impacts of the Apartment building located at Plot # 28-A, View Forth Road, Kashmir Point, Tehsil Murree, District Rawalpindi over an area of 3 Kanal 16 Marla. The estimated cost for the subject project will be about 159 million PKR. These impacts could be both positive and negative and have been classified accordingly by a thorough review of the construction and operational phases of the project. This assessment numerates the magnitude of these impacts with the aid of environmental checklist and presents effective mitigation measures to counter their adverse nature.

## 7.1 Purpose of Environmental Mitigation Measures

Environmental mitigation measures are essential for ensuring the sustainable operation of the asphalt manufacturing unit, aligning with environmental compliance, and safeguarding ecological integrity. The rationale behind these measures is dissected through a series of critical inquiries:

1. **Identification of the Problem**

The core issue arises when environmental resources are exploited unsustainably, leading to significant degradation. Such exploitation diminishes the environment's resilience and carrying capacity, severely impeding its natural recovery processes. In the context of the proposed project, this could manifest as pollution, habitat disruption, or resource depletion, directly impacting the local ecosystem's health and functionality.

2. **Timing for Addressing the Problem**

The environmental impacts of the project will become apparent from the onset of construction activities and continue throughout the operational phase. These effects are not confined to the project site but may extend to surrounding areas influenced by project activities. Early identification and timely intervention are crucial for

preventing long-lasting or irreversible damage. Mitigation efforts should be initiated at the planning stage and integrated into all phases of the project lifecycle.

3. **Location for Mitigation Efforts**

Mitigation strategies should be applied at the source of the environmental impact. This means implementing measures directly within the project site and, as necessary, in adjacent areas that might be affected by project-related activities. Focusing on the origin of potential problems ensures targeted and effective mitigation, reducing the overall environmental footprint of the project.

4. **Approach to Addressing the Problem**

Addressing environmental issues necessitates adopting eco-friendly practices and technologies throughout the project's development and operation. Mitigation plans should include:

- Resource Efficiency: Minimizing the use of natural resources and promoting recycling and reuse to reduce waste.
- Pollution Control: Implementing advanced pollution control technologies and practices to minimize emissions, effluents, and waste generation.
- Habitat Protection: Avoiding or minimizing impacts on natural habitats and biodiversity, including the development of green belts and conservation areas.
- Community Engagement: Involving local communities and stakeholders in decision-making processes to ensure that mitigation measures address their concerns and benefit the local environment and population.
- Monitoring and Compliance: Establishing rigorous monitoring systems to assess the effectiveness of mitigation measures and ensure compliance with environmental regulations.

## 7.2 Impact Identification Methodology

The methodology for identifying potential environmental impacts associated with the proposed facility involves a comprehensive approach. It includes:

**Review of Project Activities:** Detailed examination of all phases of the project to understand the range of activities and their potential environmental interactions.

**Environmental Study:** Assessment of the surrounding environment to identify sensitive areas, ecological value, and any existing vulnerabilities.

**Literature Review:** Analysis of existing studies, reports, and publications related to similar projects to draw parallels and learn from past experiences.

**Expert Judgment:** Utilization of insights from environmental experts to predict potential impacts based on their expertise and knowledge of similar projects.

## 7.3 Approaches for Mitigation Measures

Mitigation of environmental impacts involves several strategies:

* **Avoid:** Altering project plans such as route or site adjustments to protect ecological or archaeological features.
* **Replace:** Creating equivalent ecological habitats elsewhere if the original habitat is disturbed.
* **Reduce:** Implementing measures like filters, cyclones, noise barriers, and visual screening to lessen impacts.
* **Restore:** Rehabilitating the site post-operations to their original state or better.
* **Compensate:** Providing support to displaced communities or individuals through relocation, facilities, or financial means.

## 7.4 Impacts and Mitigation Measures due to Location

Development will permanently alter the existing land use from open land to urban residential and commercial usage, impacting the rural character of the area. Construction activities will generate dust and noise, potentially affecting nearby communities and air quality temporarily. Movement of construction materials and, later, residential traffic could increase congestion on local access roads.

**Mitigation Measures**

Allocate green areas, parks, and open spaces within the project to maintain environmental balance. Sprinkle water on unpaved areas during construction to control dust emissions. Use noise barriers or schedule high-noise activities during daytime hours to minimize disturbance. Ensure that construction machinery is fitted with appropriate noise suppression equipment. Implement landscaping plans that use native tree and shrub species.

## 7.5 Impacts and Mitigation Measures in Construction Phase

### i. Air Pollution

**Impacts:**

During the construction phase, significant dust emissions are expected from activities such as land clearing, excavation, movement of vehicles, and material handling. Construction machinery powered by diesel engines will also release particulate matter (PM), carbon monoxide (CO), and nitrogen oxides (NOx) into the atmosphere, potentially deteriorating local air quality. Dust may cause respiratory problems among workers and nearby residents if left uncontrolled.

**Mitigation Measure:**

Dust emissions, one of the major concerns, will be controlled through regular water sprinkling on all unpaved roads, open construction sites, and storage areas, particularly during dry and windy conditions. Additionally, construction material transport vehicles will be covered with tarpaulin sheets to prevent dust dispersion. Machinery and equipment will be regularly maintained to ensure that emissions remain within permissible limits, reducing air pollution.

### ii. Noise Pollution

**Impacts:**

Construction activities, including excavation, operation of heavy machinery, and material transport, will generate high noise levels, potentially affecting the quality of

life of nearby residents and creating stressful working conditions for laborers. Prolonged exposure to elevated noise levels can cause hearing loss and increase stress.

**Mitigation Measure**

Noise pollution will be mitigated by limiting noisy construction activities to daytime hours, especially in proximity to residential areas. Construction machinery will be fitted with silencers and sound-dampening equipment to minimize noise levels. Workers will be provided with ear protection gear such as earmuffs and earplugs, and a noise monitoring program will be initiated to ensure compliance with National Environmental Quality Standards (NEQS).

### iii. Soil Erosion and Degradation

Excavation, land leveling, and uncontrolled surface runoff during construction can cause soil erosion, leading to sediment deposition in local water bodies and loss of fertile topsoil. The disturbed soil surface becomes highly vulnerable to erosion by wind and water.

**Mitigation Measures**

To prevent this, temporary stormwater drainage channels and sediment control pits will be constructed around the site. Excavated soil will be stored properly with protective coverings to minimize erosion. Re-vegetation and re-compaction of exposed areas will be done promptly after construction activities to stabilize the soil.

### iv. Water Pollution

**Impacts:**

During the construction phase, accidental spills of fuels, lubricants, and other hazardous substances could pollute nearby surface water resources or groundwater. In addition, improper disposal of wastewater from construction camps and equipment washing areas could contaminate water bodies.

**Mitigation Measures**

To mitigate this, all chemicals and fuels will be stored in designated areas with secondary containment. Mobile toilets and septic tanks will be provided for workers, and wastewater will be managed through proper drainage and treatment systems. Construction sites will be designed to minimize runoff carrying pollutants into natural drainage courses.

### v. Solid Waste Generation

**Impacts:**

Solid waste will be generated from packaging materials, construction debris, leftover concrete, discarded steel, wood, and plastic materials. Improper disposal of such waste can create land pollution, visual nuisance, and health hazards.

**Mitigation Measure:**

A proper waste management plan will be implemented where waste materials will be segregated into reusable, recyclable, and non-recyclable categories. Authorized vendors will be hired for the collection, recycling, and disposal of waste. Efforts will also be made to reuse construction material, such as wood and scrap metal, to minimize waste generation.

### vi. Occupational Health & Safety

**Impacts:**

The construction phase will expose workers to numerous health and safety risks, including falling from heights, injuries from machinery, exposure to hazardous chemicals, and accidents due to inadequate site safety. Without proper precautions, these risks could result in serious injuries or fatalities.

**Mitigation Measure:**

A comprehensive Health and Safety Management Plan (HSMP) will be developed and enforced. Workers will be provided with personal protective equipment (PPE) such as helmets, safety boots, gloves, high-visibility jackets, and safety harnesses. Regular

safety training sessions will be conducted, and first-aid kits and emergency medical services will be readily available onsite.

### vii. Flora and Fauna Disruption

**Impact:**

Site preparation activities may require the removal of trees, shrubs, and other vegetation, leading to habitat loss for small wildlife species. The clearing of vegetation could also contribute to soil erosion.

**Mitigation Measures:**

To mitigate these impacts, vegetation clearance will be minimized as much as possible. Trees of significant ecological or aesthetic value will be preserved. After construction, compensatory plantation with native species will be undertaken to restore green cover and re-establish ecological balance in the area.

| Basic Components | Duration | Location | Frequency | Extent | Significance | Nature |
|---|---|---|---|---|---|---|
| | Long | Short | Direct | Indirect | Continuous | Intermediate |
| Soil Erosion | | ✔ | ✔ | | | ✔ |
| Air Quality | | ✔ | ✔ | | ✔ | |
| Ground Water Quality | ✔ | | | ✔ | | ✔ |
| Noise Level | | ✔ | ✔ | | ✔ | |
| Wastewater Generation | ✔ | | ✔ | | | ✔ |
| Solid Waste | | ✔ | ✔ | | ✔ | |
| Aesthetic | | ✔ | ✔ | | ✔ | |
| Flora | ✔ | | ✔ | | | ✔ |
| Fauna | ✔ | | ✔ | | | ✔ |
| Employment Rate | ✔ | | ✔ | | ✔ | |
| Economic Uplift | ✔ | | ✔ | | ✔ | |
| Health & Safety | ✔ | | ✔ | | ✔ | |

## 7.6 Impacts and Mitigation Measure During Operational Phase

### i. Air Pollution

**Impact:**

During the operational phase, continuous vehicular movement by nearby area may lead to the deterioration of ambient air quality. Dust emissions from internal roads, open plots, and landscaping activities can also contribute to particulate matter (PM) levels, impacting both human health and the surrounding environment.

**Mitigation Measure:**

To control air pollution, a comprehensive greenbelt development plan will be implemented, with the plantation of indigenous trees and shrubs along internal roads, parks, and open spaces. Paved roads and footpaths will help reduce dust. Residents will be encouraged to adopt environment-friendly practices such as carpooling and using fuel-efficient vehicles. Regular road cleaning with water sprinkling, especially in dry seasons, will be carried out to minimize dust generation.

### ii. Solid Waste Generation

**Impact:**

The generation of solid waste during the operational phase from residents, and communal areas could create unhygienic conditions, leading to pest infestations, unpleasant odors, and environmental degradation if not managed properly.

**Mitigation Measure:**

A structured solid waste management plan will be put into practice involving daily waste collection from each household. Households will be encouraged to segregate waste at the source (biodegradable, recyclable, hazardous). Designated waste collection bins will be placed strategically, and the collected waste will be transported to an approved municipal landfill. Public awareness programs and signage promoting waste reduction and recycling will be conducted periodically.

### iii. Water Resource Depletion

**Impact:**

The increased water demand for household use, irrigation of parks, and commercial activities could place stress on local groundwater resources, potentially leading to depletion and sustainability challenges.

**Mitigation Measure:**

Water conservation strategies will be emphasized, including the installation of low-flow water fixtures, water-saving appliances, and awareness campaigns about responsible water usage. Rainwater harvesting systems will be incorporated in mosques, parks, and other community buildings to recharge the groundwater. Moreover, treated wastewater from the sewerage system may be reused for irrigation purposes to reduce freshwater consumption.

### iv. Wastewater Generation

**Impact:**

Domestic sewage generated by residents could lead to soil and groundwater contamination if untreated wastewater is discharged into the environment.

**Mitigation Measure:**

A centralized sewerage system will be developed, connecting all residential and commercial units to a sewer network leading to a modern wastewater treatment plant (WWTP). Treated effluent will comply with Punjab Environmental Quality Standards (PEQS) before safe discharge or reuse in landscaping. Regular maintenance and monitoring of the sewerage system will be ensured to prevent leakages and blockages.

### v. Noise Pollution

**Impact:**

Vehicular traffic, commercial activities, and general urban life could contribute to an increase in noise levels, adversely affecting the quality of life for residents, especially during peak hours.

**Mitigation Measure:**

To minimize noise levels, green buffers (trees, shrubs) will be developed along the roads and near commercial areas. Commercial activities will be properly zoned, away from purely residential sectors. Residents will be encouraged to avoid unnecessary honking. Noise levels will be regularly monitored, and enforcement of Punjab Environmental Quality Standards (PEQS) for noise will be carried out.

### vi. Traffic Congestion and Safety Issues

**Impact:**

The increased number of vehicles during peak times and the movement of goods and service vehicles can lead to traffic congestion, road safety risks, and delayed emergency response.

**Mitigation Measure:**

The internal road network is designed with sufficient width, turning radii, and parking spaces to accommodate the anticipated traffic volume. Speed limits will be enforced through signage, speed breakers, and traffic calming measures. Dedicated pedestrian walkways and cycle tracks will be provided. A traffic management plan will be updated regularly based on changing traffic patterns.

### vii. Visual and Aesthetic Impacts

**Impact:**

Neglected landscapes, unmanaged waste, and deteriorating public spaces could harm the visual appeal and livability of the housing scheme.

**Mitigation Measure:**

A regular maintenance schedule will be followed for parks, green belts, and public areas. Landscaping will use native and drought-resistant plant species for easy maintenance and year-round aesthetics. Strict enforcement of architectural controls and façade guidelines for commercial units will ensure uniformity and aesthetic appeal across the housing scheme.

| Basic Components | Duration | Location | Frequency | Extent | Significance | Nature |
|---|---|---|---|---|---|---|
| | Long | Short | Direct | Indirect | Continuous | Intermediate |
| Soil Erosion | | ✔ | ✔ | | | ✔ |
| Air Quality | | ✔ | ✔ | | ✔ | |
| Ground Water Quality | ✔ | | | ✔ | | ✔ |
| Noise Level | | ✔ | ✔ | | ✔ | |
| Wastewater Generation | ✔ | | ✔ | | | ✔ |
| Solid Waste | | ✔ | ✔ | | ✔ | |
| Aesthetic | | ✔ | ✔ | | ✔ | |
| Flora | ✔ | | ✔ | | | ✔ |
| Fauna | ✔ | | ✔ | | | ✔ |
| Employment Rate | ✔ | | ✔ | | ✔ | |
| Economic Uplift | ✔ | | ✔ | | ✔ | |
| Health & Safety | ✔ | | ✔ | | ✔ | |

## 7.7 Environmental Enhancement Measures

Here are the environmental and safety measures:

- ✓ Workers will be trained in first aid and provided with medical facilities.
- ✓ Drugs and narcotics are prohibited during working hours.
- ✓ Machinery operators will wear proper protective gear.
- ✓ Water will be sprinkled on dusty roads and tracks.
- ✓ Personal Protective Equipment (PPE) will be provided during construction activities.
- ✓ Construction and domestic waste will be properly disposed of or utilized.
- ✓ Local communities will be informed in advance about construction work.
- ✓ Machinery will never be left unattended.
- ✓ Traffic management will be implemented to avoid disruptions, and overloading will be prohibited.
- ✓ Safety signs and boards will be displayed during construction.
- ✓ Standard Operating Procedures (SOPs) will be followed, along with Health, Safety, and Environmental (HSE) conditions.
- ✓ Native plants will be used to restore the area, and a tree plantation plan will be created.
- ✓ Solid waste will be handed over to contractors with an agreement.
- ✓ Noise levels will be controlled using appropriate measures.
- ✓ PPE will be provided to all workers.
- ✓ First aid facilities will be available at the site.
- ✓ All possible measures will be adopted to ensure the project is safe and environmentally friendly.
- ✓ Detailed planning for occupational health and safety (OHS) mitigation measures will be implemented.
- ✓ Employees will be trained in Environmental, Health, and Safety (EHS) policies and practices.
- ✓ Environmental management and compliance monitoring will be strictly followed.

# 8 ENVIRONMENTAL MANAGEMENT & MONITORING PLAN

The Environmental Management and Monitoring Plan (EMMP) is a crucial component of the project's overarching strategy to ensure environmental sustainability and compliance throughout the construction and operational phases of said project. The primary aim of the EMMP is to effectively manage and mitigate adverse environmental impacts identified in the report, promoting environmental stewardship and sustainable development practices.

## 8.1 Objectives of the Environmental Management Program

The objectives of the EMMP are multi-faceted, focusing on the comprehensive management of environmental aspects associated with the project:

- Defining Roles and Responsibilities
- Mitigation Measures
- Monitoring Mechanism
- Communication and Documentation
- Training and Capacity Building
- Management and Implementation

By addressing these objectives, the EMMP serves as a comprehensive guide for the project team to not only comply with regulatory requirements but also to adopt best practices in environmental management. This initiative-taking approach to environmental protection will help to minimize the project's ecological footprint, promote sustainability, and contribute positively to the local community and environment.

Table 5 Environmental Management Plan

| Sr. # | Impacts | Mitigation Measure | Responsibility | |
|---|---|---|---|---|
| | | | Implementation | Monitoring |
| **Construction Phase** | | | | |
| 1. | **Soil Erosion & Contamination**<br><br>Due to the proposed construction activities, soil erosion and contamination may occur. Soil erosion may occur on roadside and excavation of earth/cutting operations whereas contamination of soil may be caused by oil and chemical spills at asphalt plant sites, equipment washing yards, camp sites and temporary construction site office. This impact is, however, temporary and low adverse in nature | • Excess spoil should be reused where possible and residual spoil can be disposed of at designated site to prevent erosion<br>• Loss of topsoil can be avoided by stripping and storing topsoil prior to construction, then re-using it to cover the completed cell<br>• Confining excavations to the specified spots as per the approved engineering drawings. Unnecessary excavations need to be avoided; | Construction Contractor | Proponent |

| | | | | |
|---|---|---|---|---|
| 2. | **Air Quality and Dust**<br><br>Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. Besides, multifarious construction activities and increased vehicular traffic (construction vehicles) would also contribute to the localized airborne dust. The Suspended Particulate Matter (SPM) of the size smaller than 10 | • All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions<br>• Preventive measures against dust should be adopted for on-site mixing and unloading operations;<br>• Construction materials (sand, gravel, and rocks) and spoil materials will be transported through trucks covered with tarpaulins and all vehicles (e.g., trucks, equipment, and other vehicles that support construction works) will comply with the PEQS for carbon emissions and noise;<br>• Regular water sprinkling of the site should be carried out to | Construction Contractor | Proponent |

| | | | | |
|---|---|---|---|---|
| | micrometre ($PM_{10}$) tends to remain suspended in the environment for much longer and persistent time and is an environmental hazard. The objectionable impacts of settling of the suspended dust would be its dry deposition on vegetation, motor vehicles, structures, and other exposed surfaces. Similarly, exhausts from generators can also have impacts on air quality in the vicinity. The deteriorated ambient air quality may cause health hazards to the residents of nearby residential colonies. The overall impact on the quality of air during the construction phase will be high adverse, however, it will be temporary and | suppress excessive dust emission(s);<br>• Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair is needed to minimize the hazardous emissions | | |

| | | | | |
|---|---|---|---|---|
| | limited to the project's implementation phase only. | | | |
| 3. | **Visual Aesthetics & Landscape Changes**<br><br>Visual intrusion from large piles of excavated and construction material is one of the possible adverse impacts during the construction phase of the project. This impact is considered to be temporary and low adverse in nature. | • Material stockpiles should be removed as soon as work is completed and the area re-landscaped. During work, these stockpiles should be covered with tarpaulin and watered regularly. | Construction Contractor | Proponent |
| 4. | **Noise and Vibration**<br><br>The noise and vibration will be produced due to the operation of construction machinery equipment. Sources of noise and vibration during construction are heavy | • The most common way to reduce the noise levels of common construction equipment is through worksite modifications.<br>• All workers who need to work within the zone must wear hearing protection | Construction Contractors | Proponent |

| | | | | |
|---|---|---|---|---|
| | machinery. Noise and vibration are perceived as one of the most undesirable consequences of construction activity. The above machinery is expected to generate noise levels that would be severe in the Project Area. The noise and vibration may cause health hazards to the residents of nearby residential areas and sensitive receptors e.g. hospitals, educational institutes and mosques etc. | | | |
| 5. | **Solid Waste Generation**<br><br>Different type of waste is likely to be generated during the construction phase of the proposed Project. The municipal waste will be in the form of food, cans, paper and | • Waste disposal plan must be reviewed during the entire construction phase<br>• Solid Waste generated during construction will be safely disposed in demarcated waste disposal sites and the contractor will provide a proper waste management plan; | Construction Contractor | Proponent |

| | | | | |
|---|---|---|---|---|
| | wastewater from construction camps toilets and washing yards. Construction waste will include excavated soil, sand, gravel, rocks, asphalt, pieces of concrete, bricks, wood, metal pieces and electrical wires. Whereas, hazardous waste can be comprised of paints and construction chemicals. All these, if left unattended, can become a source of nuisance and environmental pollution in the Project Area. | • Construction waste such as waste wood can be recovered and recycled into wood for new building projects, and cement, bricks, and plaster can be crushed and reused in other construction and building projects | | |
| 6. | **Wastewater Generation**<br><br>Wastewater will be generated at the construction site by the workers. If the generated wastewater is not properly treated or disposed of, this | • Proper monitoring to check the compliance of PEQS will be carried out | Construction Contractors | Proponent |

| | | | | |
|---|---|---|---|---|
| | may contaminate the surface water sources | | | |
| 7. | **Flora & Fauna**<br><br>No negative impact on the ecological environment will take place on account of cutting of any trees in the project area and clearing of vegetation from the site. | • Trees and ornamental plants shall be planted along the project boundary which will increase the aesthetic value of the site and will combat pollution.<br>• Landscaping seemed to be a powerful mitigation activity with a positive impact. | Construction Contractors | Proponent |
| **OPERATIONAL PHASE** | | | | |
| 8. | Air quality of the Project Area may be affected in the operational phase mainly due to increased vehicular movement and open burning of solid waste and garden waste.<br>Deteriorated air quality may result in causing public health risks, nuisance and other potential adverse impacts | • Regular vehicle checks to control/ensure compliance with PEQS. Vehicles with excessive smoke emissions should be monitored and penalties should be imposed in case of non-compliance.<br>• Roadside tree plantations as applicable and feasible under local climatic conditions. Plants should be selected in accordance to their ability to absorb emissions; | Regular Monitoring | Proponent |

| | | | | |
|---|---|---|---|---|
| | on bio-physical environment | | | |
| 9. | **Noise**<br>During the operational phase, the noise levels are anticipated to increase mainly due to traffic related noise pollution and due to commercial activities in the Project Area. | • Penalties should be imposed for the use of vehicles having faulty silencers; and<br>• People should be educated to promote using of less horns e.g. by placing signboards at road side | Regular Monitoring | Proponent |
| 10. | **Wastewater**<br>Improper operation and maintenance of sewerage system may lead to illegal ingress of municipal solid waste into manholes/sewers, deposition of silt/sludge reducing capacity of sewers significantly, choking of sewer resulting in stagnant of wastewater in the streets or in low lying | • Solid waste bins/containers should be placed at appropriate location along the roads and in streets to avoid entrance of solid waste into sewers.<br>• Residents should be educated not to throw solid waste in wastewater sewers.<br>• Installation of treatment plan for the treatment of wastewater | Regular Monitoring | Proponent |

| | | | | |
|---|---|---|---|---|
| | areas. Stagnant wastewater may cause inconvenience to pedestrians, foul smell, unhygienic environment and health issues. | | | |
| 11. | **Solid Waste**<br><br>Solid waste management is a critical issue in the operational phase. Improper management of solid waste and accumulation of solid waste due to non-collection give rise to various severe issues to environment and health. Presence of solid waste heaps results in degradation of soil and land, choking of sewers if got way, create obnoxious odour | • An efficient and responsive general municipal solid waste collection, disposal, and management system should be strictly implemented<br>• Waste bins should be provided at various convenient locations in the parks and the marketplaces for solid wastes by the passers-by. They should be regularly emptied and replaced, if found damaged and unserviceable.<br>• Throwing of garbage and solid wastes onto greenbelts or vacant plots should be prohibited and fine should be imposed in the case of noncompliance | Regular Monitoring | Proponent |
| 12. | **Fauna** | • Maintenance of the green areas and the protection of saplings to | Regular Monitoring | Proponent |

| | | | | |
|---|---|---|---|---|
| | There is no protected area, game reserve, game sanctuary, or national park in the project area so, no major impact on wildlife and livestock in the area is expected through noise, vibration, and any type of normal activity in the project area. This impact is Insignificant. | ensure better environmental conditions<br>• Use of fertilizers should be strictly monitored in order to avoid any incident. Natural nutrients should rather be preferred | | |

Table 6 Environmental Monitoring Plan

| ENVIRONMENTAL MONITORING PLAN | | | |
|---|---|---|---|
| **Receptors** | **Monitoring Parameters** | **Monitoring & Reporting Frequency** | **Responsibility** |
| Water Resources/ Water Quality | Monitoring of Physical, Chemical and Biological parameters and its compliance with PEQS, 2016 for surface water and drinking water. | • Once before the start of construction activities;<br>• On quarterly basis during the construction phase;<br>• Bi-annually for at least one year during O&M phase; and<br>• Visual inspection daily. | Proponent/ Management |
| Soil Contamination | Soil contamination due to effluent / surface runoff and uncontrolled solid waste disposal activities at sites. | • Once before the start of construction activities;<br>• On quarterly basis during the construction phase;<br>• Bi-annually for at least one year during O&M phase | Proponent |
| Dust Emissions | Monitoring of $PM_{10}$ and $PM_{2.5}$ and its compliance with PEQS, 2016 for Ambient Air. | • Once before the start of construction activities;<br>• On quarterly basis during the construction phase;<br>• Bi-annually for at least one year during O&M phase | Proponent |

| | | | |
|---|---|---|---|
| Noise Pollution | Monitoring of Noise Level and its compliance with PEQS 2016 for Noise. | • Once before the start of construction activities;<br>• On quarterly basis during the construction phase;<br>• Bi-annually for at least one year during O&M phase | Proponent |
| Ecological Resources | Disturbance to natural habitat and uncontrolled floral cutting which can be avoidable. | • Start of construction activities;<br>• Visual inspection daily / weekly during construction phase<br>• Annually for at least one year during O&M | Proponent |
| Safety of workers | Medical record of workers | • On quarterly basis during the construction phase. | • Contractor |
| Restoration of work sites | Site cleared and no solid and construction waste along the alignment | • After completion of construction work | • Contractor |

## 8.2 Training of Workers

Prior to the commencement of project activities, an environmental and social training and technical support program will be implemented for Proposed project. This program is essential to strengthen institutional capabilities and ensure effective management of environmental and social aspects throughout the project lifecycle.

Building environmental awareness and providing relevant technical knowledge to the Contractor's workforce is crucial for the successful execution of the Environmental Management Plan (EMP). Without adequate training, the workforce may lack the understanding and skills necessary to implement the required environmental protection measures effectively.

Management will be responsible for engaging a Technical Assistance (TA) consultant to design and deliver comprehensive environmental and social training sessions.

The key objectives of the TA program will be:

- To assist in the development and establishment of effective environmental and social management systems;
- To deliver targeted training to senior management, contractors, subcontractors, and supervision consultants involved in environmental and social planning and management during both construction and operational phases; and
- To conduct specialized training modules covering monitoring techniques for air quality, water quality, and noise pollution.

**Table 7 Training Schedule**

| Participants | Date, Time & Location | Training Topics | Schedule | Responsible Authority |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| Staff of project and the contractor | As specified | • Introduction to project EIA/IEE and EMMP<br>• EMMP communication, documentation, monitoring, and reporting requirements | Every month | Project Manager |
| All site personnel | As specified | • Site induction training on HSE system and requirements at Incinerating Site<br>• Environmental sensitivities of the project area<br>• Communication of environmental problems to corresponding officials | After every week | Project Manager |
| Drivers | As specified | • Road safety<br>• Road restrictions<br>• Vehicle restrictions<br>• Waste disposal.<br>• Defensive driving | After every 3 months | Project Manager |
| Camp Staff | As specified | • Camp operations.<br>• Waste disposal.<br>• Good housekeeping | Monthly | Project Manager |

## 8.3 Environmental Management Team

The successful implementation of the Environmental Management and Monitoring Plan (EMMP) for the project hinges on the coordinated efforts of a dedicated environmental management team. This team comprises various functionaries, each

with distinct roles and responsibilities throughout the construction and operational phases of the project.

### 8.3.1 Key Members of the Environmental Management Team:

**Proponent:**

Serves as the project proponent and owner of the Environmental Management Plan, overseeing its execution during both construction and operational stages.

**Project Contractor(s):**

Act as executors of the EMMP during the construction phase, responsible for integrating environmental mitigation measures into project activities.

**Operational & Maintenance & Health, Safety, and Environment Team:**

Execute the EMMP during the operational phase, ensuring ongoing compliance with environmental standards.

**Environmental Protection Agency (EPA), Punjab:**

Functions as the regulatory body for reviewing and monitoring the project's compliance with environmental remediation and mitigation measures outlined in the report.

### 8.3.2 Responsibilities of Functionaries:

a) **Project Management:**

Charged with overall environmental supervision, monitoring progress, overseeing mitigation measure implementation, documentation, training program development, and reporting on EMMP status.

b) **Project Contractor**

Responsible for adhering to all EMMP provisions, and environmental codes of conduct, and ensuring workers are equipped with and trained in the use of Personal Protective Equipment (PPE).

c) **Environmental Protection Agency (EPA):**

Reviews and monitors the project's adherence to the EIA's remedial and mitigation strategies.

## 8.4 Equipment Maintenance Details

A well-organized maintenance program is critical for ensuring the safety and efficiency of all tools, equipment, and vehicles used in the project. Regular inspections and adherence to safety regulations are mandatory to prevent accidents and injuries.

## 8.5 Proposed Environmental Monitoring

Environmental monitoring is vital for assessing the project's compliance with environmental regulations and its effects on the environment. It is divided into: Compliance Monitoring: Ensures the project's adherence to EIA and EMMP requirements through routine inspections and site monitoring.

Effects Monitoring: Identifies unanticipated impacts or those exceeding anticipated levels, allowing for the timely implementation of additional mitigation measures.

### 8.5.1 Monitoring Components:

Comprehensive baseline monitoring will be conducted across several key environmental parameters, including:

- Noise Levels
- Ambient Particulate Matter
- Ambient Air Gases
- Ground Water Quality
- Wastewater Quality
- Soil Contamination
- Solid Waste Management
- Vehicular Traffic and Emissions
- Flora & Fauna
- Health & Safety Practices
- Machinery and Equipment Maintenance

By establishing a robust environmental management framework, the project aims to minimize its environmental footprint, ensure the safety of its workers, and contribute positively to the local ecosystem and community.

## 8.6 Environmental Budget

Table 8 Environmental Budget

| Environmental Component | Quantity | Amount Pak Rs. | Details/Basis |
|---|---|---|---|
| **Landscaping/Plantation** | 1000-2000 approx. | 1.5 million | Cost includes plantation and maintenance up to three years |
| **Solid waste management** | L.S | 1.5 million | Lump Sum |
| **Health & Safety Measures** | L.S. | 0.5 million | Lump sum |
| **Wastewater management** | L.S. | 1.5 million | Lump sum |
| **Miscellaneous Cost** | L.S. | 02 million | Lump sum |
| **Air Quality Monitoring** | 2 | 12,000 | 2 samples @ 6000/sample |
| **Water Quality Monitoring** | 2 | 12,000 | 2 samples @ 6000/sample |
| **Noise Level Monitoring** | 2 | 10,000 | 2 samples @ 5000/sample |
| **Soil Tests** | 2 | 10,000 | 2 samples @ 5000/sample |
| **Training** | | 15,000 | Lump sum |
| **External Monitoring** | | 100,000 | |
| **Total Environmental and Social Management Cost** | | **09 million PKR** | |

# 9 STAKEHOLDER CONSULTATION

Stakeholder consultation is a critical component in the environmental assessment process for the proposed project. It fosters communication among diverse groups, facilitating information exchange, feedback collection, and collaborative decision-making.

## 9.1 Benefits and Objectives of Stakeholder Consultation

Engaging with stakeholders offers several advantages, including improved project understanding, identification of environmental concerns, and incorporation of local insights into project planning. Key objectives include:

- **Enhancing Understanding:** Clarifying the project's aims and potential impacts to ensure stakeholders are well-informed.
- **Addressing Concerns**: Identifying and resolving stakeholder issues to prevent opposition and build consensus.
- **Building Trust:** Establishing a foundation of trust and cooperation between the project Proponent and stakeholders.
- **Informed Decision-Making:** Leveraging stakeholder input to make informed decisions regarding project design and implementation.

## 9.2 Identification and Classification of Stakeholders

A comprehensive stakeholder identification process was undertaken to recognize all parties with a personal stake in the project, classified as:

- **Industries:** Businesses and institutions directly affected or influential to the project outcome.
- **Local Communities:** Residents and groups in proximity to the project site are likely to experience its direct impact.

## 9.3 Views, Concerns, and Suggestions of Various Stakeholders

Stakeholder feedback highlighted several areas of concern and interest:

- **Environmental Preservation:** Emphasis on minimizing tree removal and establishing green zones.
- **Local Employment:** Dedicated support for prioritizing local residents in hiring processes.
- **Dust and Air Pollution Control:** Recommendations for regular dust suppression measures and continuous air quality monitoring.
- **Noise Management:** Suggestion to limit noise-generating activities to daytime hours.
- **Solid Waste Management:** Advocacy for proper waste disposal techniques to mitigate environmental impacts.

## 9.4 Methodology for Consultation

The consultation process involved a dynamic exchange of ideas through discussions, meetings, and field visits, aimed at:

- **Scoping Sessions:** Initial meetings to define project scope and identify key stakeholder concerns.
- **Focus Group Discussions:** In-depth conversations with local communities and government representatives to gather detailed feedback.
- **Location-Based Meetings:** Engagements held at various sites to ensure broad stakeholder participation and input.

This stakeholder consultation process underscores the project's commitment to environmental stewardship, community engagement, and sustainable development. By incorporating stakeholder feedback into the process, the project aims to achieve a balance between development objectives and environmental conservation, fostering positive relationships with all affected parties.

## 9.5 Environmental Management Team and Experts

| Sr. # | Managers | Responsibilities |
|---|---|---|
| 1. | **Contract Manager** | • Implementation of EMP<br>• Environmental issues identification during pre-construction phase.<br>• Communication EMP to all employees. |
| 2. | **Contractor** | • Ensure that the control measures identified during environmental surveys are implemented as they are relevant to their work/visit.<br>• Ensure that the project management team is notified of any non-conformance of control measures or environmental incidents where the environment has been put at risk. |
| 3. | **Site Manager** | • Ensure site material and safe handling of hazardous waste.<br>• Controlled access arrangement to avoid hazards.<br>• Emergency egress arrangements to avoid any unfortunate incident.<br>• First aid facilities/services should be readily available on-site. |
| 4. | **Site HSE Advisor** | • Ensure good standards of workmanship.<br>• Engaged health and safety to devise site waste management plan to be followed and implemented.<br>• Daily checks & weekly checks.<br>• Regular consultation with workers. |
| 5. | **Site Environment Advisor** | • According to legislation and consent develop EMP.<br>• Ensure application of EMP.<br>• Conduct regular site inspection. |
| 6. | **Public Contact Officer** | • First point of contact for members of the public.<br>• Arrange and manage public forums.<br>• Maintain relation with stakeholder |

## 9.6 The Responsible Authority for EMP Implementation

The successful implementation of the Environmental Management Plan (EMP) is a pivotal aspect of ensuring the environmental integrity and sustainability of the proposed unit. The ultimate responsibility for overseeing and ensuring the effective execution of the EMP lies with the project Proponent.

### Appointment of an HSE/Project Manager

To facilitate this, the project Proponent will appoint a Health, Safety, and Environment (HSE)/Project Manager possessing the necessary qualifications and expertise. This individual will assume the role of Environmental Manager, tasked with the comprehensive management of all health, safety, and environmental conditions as per the Punjab Environmental Quality Standards (PEQS).

### Responsibilities of the HSE/Project Manager

As Environmental Manager, the HSE/Project Manager's responsibilities will encompass a broad spectrum of duties, designed to ensure that the project not only complies with all relevant environmental regulations but also adopts best practices in environmental stewardship.

## 9.7 Environmental Practitioners and Experts

Consultation with Environmental Practitioners and experts was done, and the following comments and suggestions were noticed.

**Table 9 Environmental Consultant Team**

| Sr. No. | Name | Designation | Comment/ Suggestions |
|---|---|---|---|
| 1. | Sara Fatima | Senior Environmentalist | • She said that the project will have a positive impact on the economy, but its construction should be done in an environmentally friendly way.<br>• Basic facilities should be provided to local community |

| | | | |
|---|---|---|---|
| 2. | Zia Ur Rehman Farooqi | Ph.D. Scholar Environmental Sciences | • Tree plantation in designated green zones should be conducted.<br>• Proper disposal of the solid waste<br>• HSE management measures should be adopted and implemented effectively |
| 3. | Dr. Hina Ahmed Malik | Ph. D Environmental Sciences | • He said that locals should be preferred for employment.<br>• Value addition of area. Proper mitigation measures must be adopted while construction and operation of this project |
| 4. | Engr. Kanza Fatima | Junior Environmentalist | • Waste must be collected and disposed of properly.<br>• Ensure the use of PPE's during the operational activities.<br>• Wastewater should be treated.<br>• Ensure the tree plantation |
| 5. | Engr. Aleeza Kanwal | Junior Environmentalist | • Health and safety department and trained people should be there in case of any emergency.<br>• Periodic monitoring of every fire extinguisher (expiry date, type) |
| 6. | Engr. M. Bilal | Environmental Engineer | • It should be ensured that the pollution abatement technique |

## 9.8 Other Departments and Agencies

Following officers of government departments were consulted by the socio-environmental team of the consultants and concerned details about the project were noted down through personal interviews, group meetings, etc, in their offices, for instance.

| Sr. No. | Designation | Concerns |
|---|---|---|
| **1.** | **Environment Protection Department (EPD)** | |
| | General Manager | • Solid waste should be managed in Environmentally friendly manner.<br>• Wastewater should be treated effectively & approval should be acquired from concerned agency before disposing off in nearby drain.<br>• HSE* at the site should be managed effectively.<br>• No impact is being foreseen due to the selected location.<br>• Locals should be given job opportunity. |
| | Environmental Inspector | |
| **2.** | **Social Welfare Department (SWD)** | |
| | Deputy Director Officer | • Final goods should be affordable for the locals.<br>• The proposed product should facilitate locals and they should be economical.<br>• Job opportunities should be given to the locals.<br>• Wages should be given according to the work assigned to them.<br>• Life insurance of the workers should be given as well as all the facilities should be given as per labor laws. |
| **3.** | **Irrigation Department** | |
| | Subdivision | Following comments were suggested:<br>• Untreated wastewater should not be disposed of in the nearby drains without proper treatment.<br>• Beneficial as job opportunities will be available to the residents. |
| | Executive Engineer | |
| **4.** | **Forest Department** | |

| | | |
|---|---|---|
| | District Forest Officer | Following recommendation were suggested by the forest department:<br>• Plantation and landscape activities should be conducted on a broader scale.<br>• Proper drainage system must be available at site |

## 9.9 Consultation with Affected and Wider Community

In addition, the use of direct methods to evince the response of the various stakeholders in targeted population residing in study area was ascertained by conducting a sample survey, through specially formatted questionnaires. Questions posed to the public were related to the creation of impacts, adverse impacts, and beneficial impacts, including employment opportunities, income generation activities, change in living standards and provision of the basic amenity.

Personal views of the respondents on the establishment of proposed project disturbance to the residents near the AOI and infringement of their privacy were also recorded. Various rounds of public meetings and consultations were arranged in the project and study area. The stakeholder category involves nearby residents, different industries, shopkeepers. The issues discussed with them are mostly related to the following:

- Activities of project.
- Impacts caused due to certain activities during construction and operational phase.
- The proposed mitigation measures.

# 10 RAINWATER HARVESTING SYSTEM

### 1) Understanding the Building & Area

Total Catchment Area (approx.)

i. 2300-2500 SFT

Total effective catchment = ~215-230 $m^2$

### 2) Murree Rainfall Data

Murree is a high rainfall area with annual rainfall ~1,750–1,900 mm.

Let's assume 1,800 mm/year (1.8 m/year) for calculation.

### 3) Potential Rainwater Yield

Formula:

Annual (Liters)=Roof Area($m^2$) ×Rainfall(m)×Runoff Coefficient

- Roof Area = 225 $m^2$
- Rainfall = 1.8 m/year
- Runoff Coefficient = 0.85 (for RCC roof)

So,

Annual (Liters) = 225 $m^2$ * 1.8 m/year * 0.85

= 344.25 $m^3$/year

### 4) System Components

#### i. Collection System

Roof gutters & downpipes

First-flush diverters (to discard dirty initial rainwater)

Leaf screens

#### ii. Conveyance

PVC/HDPE pipes leading to filtration unit

**iii. Filtration**

Sand & gravel filter, charcoal for odor control

**iv. Storage**

Ground-level RCC tank or overhead tank

Size based on demand & supply gap

**v. Distribution**

Pump + pipeline for flushing, gardening, car wash, or even potable use after treatment

**5) Storage Tank Sizing**

For 10–12 apartments, 20,000 L tank still works well for non-potable use.

**6) Basic Layout**

- Rooftop → Gutters → Downpipe → First flush diverter → Filter → Storage tank → Pump → Distribution
- Overflow from tank → soak pit or recharge pit

**7) Additional Option: Groundwater Recharge**

If storage exceeds demand, recharge pits can be constructed:

- 1.5m × 1.5m × 2m pit filled with gravel & sand
- Helps recharge local aquifer

**8) Advantages for Murree**

- Reduces water tanker dependency
- Helps in monsoon storage for dry winter months
- Reduces urban flooding

# 11 CONCLUSION

The project aims at the development of Apartment building. The project falls under the category of projects requiring Environmental Impact Assessment (EIA).

At the end of this study, it has been found that:

- There are no sensitive elements/segments of environment around the project site.
- It has also developed ways and means for environmentally sustainable disposal of solid wastes to be generated from the project operations.
- The noise levels will be kept well within the required limiting values of the NEQS Pakistan.
- This project will create job opportunities during construction and operation stages leading towards reduction of poverty.
- Sewage will be passed through Septic Tanks before final treatment and disposal.
- It will help in the improvement of the community in the local area. It will also provide such facilities for people from other places.
- Project site means the development criteria like electricity supply, gas supply, water supply and sewage system.
- EMP, as recommended in this EIA Report, is to be put in place during all operational stages of the project.
- Environmental monitoring by the project proponent and a third party also ensures that the project will run in accordance with legal requirements.

Based on these findings of the EIA Report the project merits the issuing of Environmental Approval by the Environmental Protection Agency, Government of Punjab, and Lahore.

## GLOSSARY

| | |
|---|---|
| **Accommodate** | (of a building or other area) provide lodging or sufficient space for. "The cottages accommodate up to six people |
| **Assessment** | The action of assessing someone or something. "The assessment of educational needs" |
| **Aspects** | A distinct feature or element in a problem |
| **Adverse** | - Preventing success or development; harmful; unfavorable. "Taxes are having an adverse effect on production" |
| **Authorized** | - having official permission or approval. "An authorized dealer" |
| **Amendment** | a minor change or addition designed to improve a text, piece of legislation, etc. "an amendment to existing bail laws |
| **Ambient Air** | 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 |
| **Archaeological** | the scientific study of material remains (as fossil relics, artifacts, and monuments) of past human life and activities |
| **Annunciation** | A formal public statement |
| **Baseline** | The existing conditions against which impacts of the proposed action and its alternatives can be compared. |
| **Crushing** | Deform, pulverize, or force inwards by compressing forcefully. "You can crush a pill between two spoons" |
| **Containers** | An object for holding or transporting something. "The cakes will keep for up to two weeks if kept in an airtight container" |
| **Compliance** | Acting according to certain accepted standards |
| **Discrepancies** | A difference between conflicting fact, claims or opinions |
| **Disposal** | the action or process of getting rid of something |
| **Dumped** | Deposit or dispose of (rubbish, waste, or unwanted material), typically in a careless or hurried way |

| | |
|---|---|
| **Effluent** | Any material in solid, liquid or gaseous form or combination thereof being discharged from industrial activity or any other source and includes a slurry, suspension or vapor |
| **Environmental impact statement (EIS)** | A document prepared to analyze the impacts on the environment of a proposed action and released to the public for review and comment. An EIS must meet the requirements of NEPA, CEQ, and the directives of the agency responsible for the proposed action. |
| **Emission** | The production and discharge of something, especially gas, or radiation." The effects of lead emission on health" |
| **Evaluated** | Estimate the nature, value, quality, ability, extent or significance |
| **Graded** | Arranged in a sequence of grades or ranks; "stratified areas of the distribution" |
| **Generation** | The production or creation of something |
| **Incinerator** | A furnace or a container for burning waste materials |
| **Inadequate** | Not capable or competent; lacking |
| **Implementation** | The process of putting a decision or plan into effect; execution |
| **Intends** | To have in mind as something to be done or brought about, plan to design or mean for a particular purpose, use, recipient, etc. |
| **Landfill site** | for the disposal of solid waste in which refuse is buried between layers of dirt to fill in or reclaim low-lying ground |
| **Legislation** | Law enacted by a legislative body |
| **Mobilization** | To release or make available, as cells or chemical substances |
| **Mitigation** | The action of lessening in severity or intensity |
| **Noise** | Loud, unpleasant, unexpected, or undesired sound that disrupts or interferes with normal human activities |
| **Potential** | Having or showing the capacity to develop into something in the future |

| | |
|---|---|
| **Pedestrian** | A person who goes or travels on foot; walker |
| **Proponent** | The person who proposes or intends to undertake a project |
| **Sanitary** | Relating to the conditions that affect hygiene and health, especially the supply of sewage facilities and clean drinking water |
| **Segregate** | Set apart from the rest or from each other; isolate or divide. "Disabled people should not be segregated from the rest of society |
| **Settlement** | An official agreement intended to resolve a dispute or conflict. "Unions succeeded in reaching a pay settlement |
| **Ton** | A short or net ton is equal to 2,000 pounds; a long or British ton is 2,240 pounds; a metric ton is approximately 2 to 205 pounds |
| **Transportation** | The action of transporting someone or something or the process of being transported. "The era of global mass transportation" |
| **Ultimate** | Being or happening at the end of a process; final. "Their ultimate aim was to force his resignation" |
| **Violations** | the action of violating someone or something |
| **Working place** | From the out by side of the last open crosscut to the face |
| **Flora** | All the plant life in a particular region or period |
| **Fauna** | All the animal life in a particular region or period |
| **Demarcated** | Separately clearly, as if by boundaries |
| **Screening** | The display of a motion picture |
| **Substitutions** | An event in which one thing is substituted |
| **Smelting** | extract from its ore by a process involving heating and melting |
| **Regulations** | An authorized rule |
| **Recycling** | process of converting waste materials into new materials and objects |
| **Stakeholders** | A person or organization with an interest or concern in something |
| **Rehabilitation** | The conversion of waste land into land suitable for use of habitation or cultivation |

# LIST OF ABBREVIATIONS

| | |
|---|---|
| **AA** | Ambient Air |
| **APHA** | American Public Health Association |
| **AOI** | Area Of Influence |
| **$BOD_5$** | Biological Oxygen Demand |
| **CMS** | Convention On Migratory Species |
| **COD** | Chemical Oxygen Demand |
| **dB(A)** | Decibel |
| **EA** | Environmental Assessment |
| **EHS** | Environmental Health Safety |
| **EIA** | Environmental Impact Assessment |
| **EPD** | Environmental Protection Department |
| **PEPA** | Pakistan Environmental Protection Act |
| **EPA** | Environmental Protection Agency |
| **ESIA** | Environmental And Social Impact Assessment |
| **ESA** | Environmental And Social Assessment |
| **ESMP** | Environmental/Social Management Plan |
| **EMP** | Environmental Management Plan |
| **EC** | Electrical Conductivity |
| **GIS** | Geographical Information System |
| **GOP** | Government Of Pakistan |
| **GPS** | Global Positioning System |

| | |
|---|---|
| **GRC** | Grievance Redress Committee |
| **GRM** | Grievance Redress Mechanism |
| **HSE** | Health Safety & Environment |
| **HWMS** | Hazardous Waste Management System |
| **EIA** | Environmental Impact Assessment |
| **I & D** | Irrigation And Drainage |
| **IAIA** | International Association for Impact Assessment |
| **IWM** | Industrial Waste Management |
| **IUCN** | International Union for Conservation of Nature |
| **KM** | Kilometers |
| **LGO** | Local Government Ordinance |
| **MW** | Mega Watt |
| **MEAS** | Multilateral Environmental Agreements |
| **MSDS** | Material Safety Data Sheets |
| **NEQS** | National Environmental Quality Standards |
| **PMD** | Pakistan Meteorological Department |
| **PPE** | Personal Protective Equipment |
| **PEQS** | Punjab Environmental Quality Standards |
| **NEAP** | National Environmental Assessment Plan |
| **NWFP** | Northwest Frontier Province |
| **Q&EHS** | Quality, Environment, Health & Safety |
| **O & M** | Operation And Maintenance |
| **PKR** | Pak Rupees |

| | |
|---|---|
| **PAP** | Project Affected People |
| **PEPC** | Pakistan Environmental Protection Council/Punjab |
| **PSC** | Project Steering Committee |
| **QA/C** | Quality Assurance/Quality Control |
| **RAP** | Resettlement Action Plan |
| **ROG** | Reactive Organic Gas |
| **SWM** | Solid Waste Management |
| **TDS** | Total Dissolved Solids |
| **UNFC** | United Nation Framework Convention on Climate Change |
| **UNCC** | United Nation Convention to Combat Desertification |
| **UNEP** | United Nations Environmental Programs |
| **GOP** | Government Of Pakistan |
| **WHO** | World Health Organization |
| **R&R** | Rehabilitation And Resettlement |
| **WWTP** | Waste Water Treatment Plant |

## LIST OF INDIVIDUALS AND THEIR FEEDBACK

| Sr.# | Name | Concerns |
|---|---|---|
| 1 | Kamran Ali Khan | During the survey in the study area following concerns of the local community were noted:<br>• Air pollution should be controlled effectively, such as emissions generated from power-generating activities.<br>• Solid waste should be collected timely and avoid the spreading of waste.<br>• Locals should be preferred for the job opportunities.<br>• Wastewater should be treated prior to final disposal in a nearby drain.<br>• Solid waste should be managed effectively by adopting the standard practices of the area.<br>• The cleanliness of the area should be ensured.<br>• An effective EMMP should be designed and enforced with true spirit.<br>• The health of the workers should be ensured.<br>• Planation should be carried out on an extensive scale.<br>• Construction activity should be carried out during day hours.<br>• Noisy activities should be confined. |
| 2 | Muhammad Waqas | |
| 3 | Qaiser Farooq | |
| 4 | Ghulam Mujtaba | |
| 5 | Mehboob Alam Shahid | |
| 6 | Muhammad Latif | |
| 7 | Mazhar Hussain | |
| 8 | Shahbaz Khan | |
| 9 | Waseem Ahmed | |
| 10 | Rab Nawaz | |
| 11 | Allah Yar | |
| 12 | Ahmed Saeed | |
| 13 | Muhammad Jabbar | |
| 14 | Muhammad Ramzan | |
| 15 | Kamran | |

## SOURCE OF DATA


- Punjab Environmental Protection (Amendment) Act 2012 (PEPA)
- Guidelines for the preparation and review of Environmental Reports, October 1997
- Review of IEE/ EIA Regulation, 2022
- The 2004 Baseline Survey on Millennium Development Goals in AACs, Pakistan
- World Weather Online.com
- Water and Sanitation Agency (WASA), Lahore.
- RED Data Book of IUCN
- Material Safety Data Sheet (MSDS) of chemicals
- www.wsask.ca/Global/Water%20Programs/Water%20Conservation/SWA
- Water_Efficiency_on_the_Farm_Booklet_WEB.pdf
- https://attock.punjab.gov.pk/district_profile
- https://pakistanalmanac.com/punjab-attock/
- http://www.madehow.com/Volume-2/Lead.html
- http://www.ijirset.com/upload/2013/november/18_Disposal.pdf

**List Of Names, Qualifications and Roles of Team Members Carrying Out the IEE/EIA Study**

| Sr. # | Name | Qualification |
|---|---|---|
| **Team Leader** | | |
| 1. | Miss. Sara Fatima | M.Phil. Environmental Sciences |
| **Environmental Scientist** | | |
| 2 | Dr. Hina Ahmed Malik | Ph.D. Environmental Sciences |
| 3 | Mr. Zia Ur Rehman Farooqi | Ph.D. Environmental Sciences (Scholar) |
| 4 | Hafiz Zeeshan Safdar | M.Sc. Analytical Chemistry |
| 5 | Mr. Saffi Ahmed | M.Phil. Environmental Sciences |
| **Environmental Engineers** | | |
| 6 | Engr. Kanza Fatima | B.Sc. Environmental Engineering |
| 7 | Engr. Aleeza Kanwal | B.Sc. Environmental Engineering |
| **Sociologist** | | |
| 8 | Ahmed Raza | M. Phil Sociology |

## TERMS OF REFERENCES

Terms of References (Tor) for the Environmental Examination process are designed to ensure compliance with the regulatory framework and facilitate a thorough review of the project's environmental implications. These terms are outlined as follows:

**1. Review Fee Payment:**

As stipulated in Regulation 7 of the Review of IEE and EIA Regulations, 2022, the proponent is required to submit a nonrefundable review fee to the Environmental Protection Agency (EPA) at the time of submitting the IEE/EIA report. The specific amount of this fee is determined by the rates specified in Schedule III of the regulations.

**2. Submission of Required Documents:**

The proponent must provide all necessary documents and details essential for the completion of the EIA/IEE report. This includes, but is not limited to, technical studies, environmental impact analyses, mitigation strategies, and any other information pertinent to assessing the project's environmental footprint.

**3. Financial Responsibility for Fines and Penalties:**

The proponent shall bear full responsibility for any fines or penalties levied by the EPA Punjab or the Environment Tribunal. This includes violations of environmental standards, non-compliance with regulatory requirements, or any other infractions identified during the review or implementation phases of the project.

**4. Accuracy and Validity of Information:**

The proponent is responsible for ensuring the correctness and validity of all information and documents provided to the consultant for onward submission to EPA Punjab. The consultant facilitating the process will not bear any responsibility for inaccuracies or omissions in the information supplied by the proponent. It is imperative that the proponent conducts thorough due diligence to guarantee that all submitted materials accurately reflect the project's potential environmental impacts and proposed mitigation measures.

These Terms of References are critical to ensuring that the process is conducted in a transparent, accurate, and regulatory-compliant manner. Adherence to these terms will facilitate a comprehensive environmental review of the project, enabling informed decision-making by the EPA Punjab and contributing to the sustainable development and environmental stewardship goals of the region.

In M/s **Apartment Building**

For Enviro Stewards Co. Pvt. Ltd. Ms. Sara Fatima

Mr. Zia Ur Rehman