

# ENVIRONMENTAL IMPACT ASSESSMENT

## KARAKORAM GREENS, GULBERG GREEN, ISLAMABAD



Karakoram  
Enterprises



KARAKORAM GREENS

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# ENVIRONMENTAL IMPACT ASSESSMENT

## KARAKORAM GREENS, GULBERG GREEN, ISLAMABAD

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## **ABBREVIATIONS**

|                 |                                                |
|-----------------|------------------------------------------------|
| CDA             | Capital Development Authority                  |
| EMMP            | Environmental Management and Monitoring Plan   |
| EMP             | Environmental Monitoring Program               |
| EPA             | Environmental Protection Agency                |
| EPC             | Environmental Protection Council               |
| IUCN            | International Union for Conservation of Nature |
| LAA             | Land Acquisition Act                           |
| NEQS            | National Environmental Quality Standards       |
| NGOs            | Non-governmental Organizations                 |
| NO <sub>2</sub> | Nitrogen Dioxide                               |
| PAPs            | Project Affected Persons                       |
| MMM             | Mitigation Management Matrix                   |
| SC              | Supervisory Consultants                        |
| EO              | Environmental Officer                          |
| MER             | Monthly Environmental Report                   |



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## **EXECUTIVE SUMMARY**

This Environmental Impact Assessment (EIA) has been prepared for the proposed Karakoram Greens Residential Development, located in Gulberg Greens, Islamabad, in accordance with the requirements of the Pakistan Environmental Protection Act (PEPA), 1997, the IEE/EIA Regulations, 2000, and relevant guidelines issued by the Pakistan Environmental Protection Agency (Pak-EPA). The purpose of this study is to evaluate the potential environmental and social impacts of the proposed development, assess baseline environmental conditions, and recommend appropriate mitigation and management measures to ensure environmentally sustainable implementation of the project.

Karakoram Greens is a high-end, gated residential development planned over approximately 25 acres, comprising multi-storey apartment buildings with supporting commercial, recreational, and community facilities. The project has been designed as a vertical residential complex with 2-, 3-, and 4-bedroom apartments, supported by modern infrastructure including underground parking, water supply systems, sewerage networks, power supply, fire safety systems, landscaped open spaces, and internal road networks. Approximately 75% of the project area has been allocated to open and green spaces, ensuring a balanced built-to-open area ratio and enhanced environmental quality.

The project has been planned in full compliance with CDA planning regulations, Building Control Regulations, and applicable environmental standards. The master planning and architectural design emphasize efficient land utilization, natural ventilation, daylight access, energy efficiency, and climate-responsive orientation. The development integrates modern urban amenities while maintaining harmony with the surrounding natural and built environment of Gulberg Greens.

Baseline environmental studies were carried out to assess the existing physical, biological, and socio-economic conditions of the project area. The site lies within the Potohar Plateau, characterized by stable geological conditions, gently undulating terrain, and alluvial soils suitable for construction. No ecologically sensitive habitats or protected species were identified within the project footprint. The area is already designated for urban development and is supported by existing infrastructure including road access, utilities, and municipal services.

The estimated residential population of approximately 3,900 persons has been used to assess infrastructure demand, including water supply, wastewater generation, solid

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waste management, traffic, and energy consumption. Daily water demand is estimated at approximately 585,000 gallons, while wastewater generation is estimated at 470,000–500,000 gallons per day, all of which will be managed through a properly designed sewerage system connected to the Gulberg Greens Sewage Treatment Plant (STP). Solid waste generation is expected to be approximately 2.3–2.7 tonnes per day, and a structured waste management system involving segregation, collection, and authorized disposal has been proposed.

Potential environmental impacts associated with construction and operation phases such as dust generation, noise, waste production, traffic disturbance, and occupational health risks have been identified and evaluated. Mitigation measures have been proposed through a comprehensive Environmental Management and Monitoring Plan (EMMP), which includes dust suppression, noise control, waste handling protocols, water conservation measures, occupational safety procedures, and environmental monitoring mechanisms. The project also incorporates fire safety systems, emergency response planning, and disaster preparedness measures in accordance with CDA and national safety standards.

Public and stakeholder consultations were carried out to understand community concerns and incorporate stakeholder feedback into project planning. Key issues raised included construction-related disturbances, waste management, traffic safety, and environmental protection. These concerns have been addressed through design improvements and the formulation of mitigation and monitoring measures.

Based on the findings of this EIA, it is concluded that the Karakoram Greens project is environmentally feasible, provided that the proposed mitigation measures and environmental management plans are implemented effectively. The project does not pose any significant or irreversible environmental risks and is expected to contribute positively to planned urban development in Islamabad. With proper implementation of the Environmental Management and Monitoring Plan, the project will comply with applicable environmental regulations and support sustainable residential development in the region.

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# 1. INTRODUCTION

## **1.1. GENERAL**

This report presents the findings of the Environmental Impact Assessment (EIA) carried out for the proposed project titled “**Karakoram Greens, Gulberg Green, Islamabad**”.

This EIA report has been prepared to conform to the requirements of Section 12 of the Pakistan Environmental Protection Act 1997 (PEPA), the Pakistan Initial Environmental Examination and Environmental Impact Assessment Review Regulations, 2000 and the guidelines provided in the Pakistan Environmental Assessment Procedures, 1997.

## **1.2. THE PROJECT**

The Karakoram Greens Design Report refers to the planning and architectural concept of a premium residential development by Karakoram Enterprises located in Gulberg Greens, Islamabad. The project is conceived as a high-end, gated apartment community that emphasizes modern living standards, efficient space utilization, and a strong connection with its natural surroundings.

The development comprises luxury residential apartments designed with an emphasis on natural light, ventilation, and contemporary aesthetics. The apartments feature high-quality imported tiles and fittings, modern kitchens, double-glazed windows, dedicated storage areas, and provision for cable and utility connections. The overall design philosophy reflects an “innovative approach” to urban living, drawing inspiration from the elegance and scale of the Karakoram mountain range while maintaining functionality and comfort.

Karakoram Greens is planned as a self-contained and secure residential complex. Key building amenities include high-speed elevators, centralized security systems, firefighting infrastructure, standby power generators, basement and guest parking, and an organized waste collection system. The project aims to provide a safe, convenient, and high-quality living environment aligned with international residential standards.

The project is spread over approximately 25 acres within Gulberg Greens. About 75 percent of the total area is dedicated to landscaped open spaces, greenery, and communal areas, while the remaining 25 percent accommodates residential towers comprising 2-, 3-, and 4-bedroom apartments. Strategically located along the Islamabad Highway with views toward the Korang River, the development is envisioned as a vertical residential community that integrates modern urban living with expansive green spaces and a high standard of design and amenities.

### **1.3. NAME OF PROJECT**

The name of the Project under this study is “***Karakoram Greens, Gulberg Green, Islamabad***”.

### **1.4. AIMS & OBJECTIVES OF ENVIRONMENTAL IMPACT ASSESSMENT**

This report serves two purposes. Firstly, it provides necessary information to the Pakistan Environmental Protection Agency to determine whether the project poses any environmental threat. Secondly, it shall serve as a ready-reckoner for the proponents to manage the project during construction and operation in an environment-friendly manner and abide especially by recommendations of the Environmental Management Plan and the Environmental Monitoring Programme.

The main **aims and objectives** of this Environmental study are to identify baseline environmental, physical and socio-economic conditions pertaining to the project, examine project alternatives, and discuss potential impact, along with formulation of suitable mitigation measures for environment-friendly implementation of the project. These are summarised as follows:

- ✓ Identification and assessment of all environmental impacts or social sensitivity, whether major or minor, caused during the operational stage in order to formulate an effective Environmental Management Plan;
- ✓ Suggest measures required to mitigate any possible adverse environmental impact through minimisation, elimination, reversal or compensation of such impact;
- ✓ Pinpoint and assess all possible impacts of project operation on the natural, physical, biological and socio-economic environment of the project area and evaluate these both qualitatively and quantitatively, wherever possible, and determine their significance in light of technical and regulatory concerns, as well as those relating to public perceptions, and
- ✓ Prepare an Environmental Impact Assessment report presenting recommendations for effective implementation of the project in a manner that it does not compromise the

environment existing at the project site or pose any environmental threat in the immediate foreseeable future.

In order to ascertain possible environmental impacts posed by the project, the study has been divided into the following sub-tasks:

- ✓ Identification of various legal and statutory requirements as set forth by the Pakistan Environmental Protection Act, 1997, and guidelines for preparation and review of environmental studies;
- ✓ Collection and scrutiny of data related to physical, ecological and socio-economic aspects of the project site and surrounding areas;
- ✓ Identification and evaluation of salient environmental impacts;
- ✓ Identification of mitigation measures required to minimise negative externalities of the project, and
- ✓ Preparation of an Environmental Management Plan and an Environmental Monitoring Programme.

### **1.5. SCOPE OF EIA**

The scope of the Environmental Impact Assessment (EIA) for the Karakoram Greens, Gulberg Green, Islamabad, Islamabad encompasses a comprehensive evaluation of the project's potential environmental and social impacts throughout its pre-construction, construction, and operational phases, in accordance with the requirements of the Pakistan Environmental Protection Act, 1997, the IEE/EIA Review Regulations, 2000, and relevant CDA planning and zoning regulations. The EIA covers assessment of baseline physical environment (air quality, noise, soil, surface and groundwater resources, geology and drainage), biological environment (flora, fauna, and ecological sensitivity), and socio-economic conditions (population, livelihoods, land use, infrastructure, and public services) within the project area and its zone of influence. It includes identification and evaluation of potential impacts related to land development, construction activities, utility provision, traffic and transportation, water demand, wastewater and solid waste generation, and occupational health and safety. The scope further incorporates analysis of regulatory compliance, public consultation outcomes, and development of appropriate mitigation measures, monitoring protocols, and an Environmental Management and Monitoring Plan (EMMP) to ensure environmentally responsible implementation and sustainable operation of the proposed housing development.

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## **1.6. EIA METHODOLOGY**

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Key steps followed while conducting the study were screening, scoping, data collection and compilation, environmental screening and impact assessment, documentation and consultation. Environmental samples were collected by laboratory technicians and analysed at a certified laboratory. Screening comprised compilation and review of information on the project. Most of this information was obtained from the proponents and added to data on relevant legislation, regulations, guidelines and standards. Scoping involved a review of collected information and identification of potential environmental issues. Data collection and compilation was necessary to develop an environmental baseline of the project area. Review of secondary sources as well as primary and field data was also carried out. Environmental screening and impact assessment process of this study determined potential impacts of the project through examination and testing of environmental, socio-economic, and project information.

Subsequently, potential impacts were characterised in order to analyse significance. Mitigation measures were identified where required to minimise environmental impacts. A management framework was also developed in the form of an Environmental Management Plan for implementation of identified mitigation measures.

Consultation with the proponents and other stakeholders, such as local residents and persons that might be affected by the project was carried out at the same time essentially to establish public concerns about the project and pinpoint any aspect that may have been overlooked during preparatory work.

Documentation was the last step of the study, which comprised collation of data and preparation of the report along with requisite appendices in proof of the study and its findings. Accordingly, this report includes a brief description of the project, an overview of environmental legislation relevant to the project, a description of baseline environmental and socio-economic conditions in the project area, and potential project impacts and mitigation measures. Findings from visits to a number of housing estates of similar nature were examined to observe environmental concerns associated with operation of such projects in order to assess what adverse environmental impacts can be anticipated at Gulberg Greens and to evolve tested mitigation measures.

The environmental consultants also remain in touch with all government agencies involved in regulation of projects of such nature. These include authorities responsible for traffic regulation, civil defence, water and sanitation, forestry, environment, traffic

engineering and planning, housing and drainage in the Islamabad Capital Territory administration and the Capital Development Authority.

## **1.7. PROJECT JUSTIFICATION**

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## 2. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

### **2.1. GENERAL**

This Chapter provides an overview of the policy framework and national legislation for environmental and social assessment guidelines that apply to the proposed project for controlling the environmental consequences. The Karakoram Greens, Gulberg Green, Islamabad is expected to comply with all national legislation relating to the environment and obtain all the required regulatory clearances.

### **2.2. NATIONAL POLICY AND ADMINISTRATIVE FRAMEWORK**

The Pakistan National Conservation Strategy (NCS), which was approved by the federal cabinet in March 1992, is the principal policy document on environmental issues in the country (EUAD/IUCN, 1992).

The GoP promulgated PEPA in 1997. Two organizations, the Pakistan Environmental Protection Council (PEPC) and the Pakistan Environmental Protection Agency (Pak-EPA), are primarily responsible for administering the provisions of the Act. The PEPC oversees the functioning of the Pak-EPA. Its members include representatives of the government, industry, non-governmental organizations, and the private sector.

The Pak-EPA is required to ensure compliance with the National Environmental Quality Standards (NEQS) and establish monitoring and evaluation systems. As the primary implementing agency in the hierarchy, it is responsible for identifying the need for, as well as initiating legislation whenever necessary. The Pak-EPA is also authorized to delegate powers to its provincial counterparts, the provincial Environmental Protection Agencies/Department (EPAs or EPD). One of the functions delegated by the Pak-EPA to provincial EPAs/EPD is the review and approval of environmental assessment reports of projects undertaken in their respective jurisdictions.

### **2.3. POLICIES AND LEGISLATION RELATED TO ISLAMABAD**

This section provides an overview of the policy framework, national legislation and other guidelines regarding environment. The study is organized in light of laws, regulations and guidelines most relevant to scope of the project so that it becomes

compliant with national legislation relating to the environment and CDA development laws.

### **2.3.1. ICT DEVELOPMENT LAWS AND REGULATIONS**

The Capital Development Authority (CDA) has the responsibility for the overall planning, provision and supervision of public health services, covering adequate sanitation and garbage disposal within the territorial limits of the Islamabad Capital Territory (ICT). It also has the responsibility for the coordination of public health services with other relevant agencies. This includes collection, transportation and safe disposal of liquid and solid waste collected from residential areas, commercial areas, open spaces etc.

The CDA operations are governed generally by the provisions of the Islamabad Capital Territory Municipal Bye Laws, 1968 as amended from time to time; and specifically by the Islamabad Regulations 1979 (Upkeep of Cleanliness) as amended from time to time.

### **2.3.2. BUILDING ENERGY CODE OF PAKISTAN, 2008**

The scope of this code is to provide:

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

- ✎ New buildings and their systems.
- ✎ New portions of buildings and their systems.
- ✎ New systems and equipment in existing buildings.

(b) Criteria for determining compliance with these requirements.

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

## **2.4. ENVIRONMENTAL LAWS AND REGULATIONS**

The enactment of environmental legislation covering multiple areas of concern is a relatively newly initiated process in Pakistan. Whereas, a basic policy and legislative framework for the protection of the environment and biodiversity in the country is now in place, detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation are mostly formulated. The following sections present a brief overview of the existing national policies, legislation and guidelines as well as a few international conventions to which Pakistan is a signatory.

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#### **2.4.1. PAKISTAN ENVIRONMENTAL PROTECTION ACT 1997**

The Pakistan Environmental Protection Act, 1997 (PEPA) is the fundamental legislation empowering the government to formulate regulations for protecting the environment. It is broadly applicable to air, water, soil, marine and noise pollution, as well as to the handling of hazardous waste. Penalties have been prescribed for those contravening the provisions of the Act. The powers of the federal and provincial Environmental Protection Agencies (EPAs) have also been considerably enhanced under this legislation. In addition, the EPAs have been empowered to conduct inquiries into possible breaches of environmental law either upon the registration of a complaint or on their own accord. Under section 12 of PEPA (1997), no project involving construction activities or any change in the physical environment can be undertaken unless an Environmental Impact Assessment (EIA) or EIA, as required, is conducted and a report submitted to the federal or provincial EPA.

#### **2.4.2. NATIONAL ENVIRONMENTAL ACTION PLAN (NEAP-SP)**

The Government of Pakistan (GoP) and United Nations Development Program (UNDP) have jointly initiated an umbrella support program called the National Environmental Action Plan - Support Program (NEAP-SP) signed in October 2001 and implemented in 2002. The development objective supported by NEAP-SP is environmental sustainability and poverty reduction in the context of economic growth.

#### **2.4.3. NATIONAL ENVIRONMENTAL POLICY, 2005**

The National Environmental Policy (NEP) was approved by the Pakistan Environmental Protection Council (PEPC) in its 10th meeting on 27<sup>th</sup> December 2004 under the chairmanship of the Prime Minister of Pakistan. Thereafter, it was approved by the Federal Cabinet on 29<sup>th</sup> June 2005. NEP is the primary policy document of Government of Pakistan that addresses Pakistan's environmental issues. The broad goal of NEP is, "To protect, conserve and restore Pakistan's environment in order to improve the quality of life of the citizens through sustainable development". The NEP also provides the sectoral and cross-sectoral guidelines, listed in following paragraphs, for various sectors to achieve its goal of sustainable development:

**Sectoral Guidelines** - are available in the following areas:

Water Supply and Management; Air Quality and Noise; Waste Management; Forestry, Biodiversity and Protected Areas; Climate Change and Ozone Depletion; Energy Efficiency and Renewable Energy Resources; Agriculture and Livestock; and Multilateral Environmental Agreements.

### **Cross- Sectoral Guidelines**

All environment related policies, programs and projects would be gender sensitive, integrate Poverty, Population and Health. Incorporate effective environmental management in Trade, Local Governance and Natural Disaster Management.

In addition to these sectoral and cross-sectoral guidelines, the NEP 2005 also suggests the following policy instruments to overcome the environmental problems throughout the country;

- ✕ Integration of environment into development planning
- ✕ Legislation and regulatory framework
- ✕ Capacity building of various institutions
- ✕ Economic and market based instruments
- ✕ Public awareness and education
- ✕ Public-private-civil society partnership

While NEP 2005 is a policy document and does not regulate individual projects, however, adopting policy guidelines ensure that the project does not add to the environmental problems identified in NEP. Moreover, adopted mitigation measures will minimize or avoid any contribution to the already existing environmental problems in the project area.

#### **2.4.4. ISLAMABAD ENVIRONMENTAL IMPROVEMENT ACT, 1995**

Islamabad Environmental Improvement (Green Areas) Act, 1995 was proposed to (1) prevent the existing green area in the Islamabad Capital Territory from being used for purposes other than those for which they are reserved and (2) ensure that at least 20 % of the total area of any new scheme is reserved for the development of green areas. For the purpose of this Act, “green areas” means land in the Islamabad Master Plan, or other schemes, reserved exclusively for parks, playgrounds, forests, nurseries, vegetative cover, green belts and open spaces on which no construction is planned.

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#### **2.4.5. ISLAMABAD WILDLIFE ORDINANCE, 1979**

The Islamabad Wildlife (Protection, Preservation, Conservation and Management) Ordinance 1979 provides the protection, preservation, conservation and management of wildlife in Islamabad Capital Territory. Main aim of this act is the preservation and conservation of wildlife, flora and fauna for sustainable development to comply with the concept of national parks internationally.

### **2.5. ASSOCIATED LAWS AND REGULATIONS**

This section outlines the statutes apart from Pakistan Environmental Protection Act, 1997, which are relevant to the project.

#### **2.5.1. LAND ACQUISITION AND RESETTLEMENT REGULATIONS**

At present, the only legislation relating to land acquisition and compensation is the Land Acquisition Act (LAA) of 1894. The LAA is, however, limited to a cash compensation policy for the acquisition of land and built-up property, and damage to other assets, such as crops, trees, and infrastructure. The LAA does not consider the rehabilitation and resettlement of disrupted populations and the restoration of their livelihoods.

Experience with large-scale infrastructure development projects implementation has demonstrated the need for a cohesive national policy for resettlement due to reasons that the LAA does not consider the rehabilitation and resettlement of disrupted populations and the restoration of livelihoods and also does not provide any assistance to non-title holders and vulnerable groups. Following a national consultative process, a Draft National Resettlement Policy was prepared in 2002. Details of this policy are not under consideration as this policy is still in draft form. The Project may involve acquisition of private as well as government land. The land will be acquired under the LAA 1894.

#### **2.5.2. FACTORIES ACT, 1934**

The clauses of this Act relevant to the project are those that concern the health, safety and welfare of workers, disposal of solid waste and effluent, and damage to private and public property. The Factories Act also provides regulations for handling and disposing of toxic and hazardous materials. Given that construction activity is classified as 'industry' these regulations will be applicable to the project contractors.

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### **2.5.3. PAKISTAN PENAL CODE (1860)**

The Pakistan Penal Code (1860) addresses many offences that are liable to enforce levies, fines, imprisonment or both. The fouling of public springs or reservoirs that makes them less fit for ordinary use is also addressed as offensive. The current project is also to reduce violation of this code in case of surface water bodies.

### **2.5.4. THE BIODIVERSITY ACTION PLAN**

Pakistan, being a signatory to the Convention on Biological Diversity (Rio, June 1992), is obligated to develop a national strategy for the conservation of biodiversity. The Government of Pakistan has constituted a Biodiversity Working Group under the auspices of the Ministry of Environment, Local Government and Rural Development to develop a Biodiversity Action Plan (BAP) for the country. The project to protect water resources of Islamabad is quite supportive to conserve biodiversity in the downstream areas.

### **2.6. NATIONAL ENVIRONMENTAL QUALITY STANDARDS (NEQS)**

The NEQS promulgated under the PEPA 1997 specify standards for industrial and municipal effluents, gaseous emissions, vehicular emissions, and noise levels. The PEPA 1997 empowers the Provincial EPAs to impose pollution charge in case of non-compliance to the NEQS.

### **2.7. REGULATIONS FOR ENVIRONMENTAL ASSESSMENT**

Under Section 12 (and subsequent amendment) of the 1997 Act, a project falling under any category specified in Schedule II require the proponent to file an EIA with the federal agency. Within ten working days of the IEE or EIA having been deposited, the federal agency will confirm that the document submitted is complete for the purpose of review. During this time, should the federal agency require the proponent to submit any additional information, it will return the IEE or EIA to the proponent for revision, clearly listing those aspects that need further discussion. Subsequently, the federal agency shall make every effort to complete an IEE review within 45 days and an EIA review within 90 days of filing.

#### **2.7.1. PREPARING & REVIEW OF ENVIRONMENTAL REPORTS**

The Guidelines for the Preparation and Review of Environmental Reports, Pakistan Environmental Protection Agency, 1997 specify:

- ✕ The nature of the information to be included in environmental reports
- ✕ The minimum qualifications of the EIA/IEE conductors appointed.
- ✕ The need to incorporate suitable mitigation measures at every stage of project implementation.
- ✕ The need to specify monitoring procedures.
- ✕ The terms of reference for the reports are to be prepared by the project proponents themselves. The report must contain baseline data on the project area, detailed assessment thereof, and mitigation measures.

## **2.8. RELATED INTERNATIONAL CONVENTIONS, TREATIES & GUIDELINES**

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This section outlines the international conventions, treaties and guidelines regarding Environmental Protection, which are relevant to the project. Pakistan, being a signatory to these international treaties and conventions on the conservation of the environment and wildlife protection, is obliged to adhere to the commitments specified in these treaties. The relevant international treaties and conventions and the provisions therein have been described in the following paragraphs.

## **2.9. IUCN RED LIST (2000)**

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The red list is published by International Union for Conservation of Nature (IUCN) and includes those species that are under potential threat of extinction. These species have been categorized as:

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

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## **2.10. CONVENTION ON BIOLOGICAL DIVERSITY**

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

## **2.11. CONVENTION ON CONSERVATION OF MIGRATORY SPECIES**

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

## 3. DESCRIPTION OF PROJECT

### 3.1. GENERAL

This chapter presents an overview of the Karakoram Greens project, including its key components, planned infrastructure, and associated development activities to be undertaken within the project area. The project forms part of the approved development framework of Gulberg Greens, Islamabad, and has been planned in accordance with the applicable zoning and planning provisions. The master planning and conceptual design of the residential towers, internal circulation, parking areas, landscaped zones, and associated amenities have been prepared in line with the approved layout of the area. Detailed engineering design for individual structures, utilities, and services will be undertaken at subsequent stages of development. All building layouts, spatial configurations, and infrastructure provisions have been formulated in compliance with the Building Control Regulations and relevant planning guidelines applicable to Zone-IV, ensuring structural safety, functional efficiency, and environmental compatibility of the proposed development.

### 3.2. PROJECT DESCRIPTION

Karakoram Greens is a high-end residential development located within Gulberg Greens, Islamabad. The project is being developed by Karakoram Enterprises as a modern, gated residential complex designed to provide quality urban living while maintaining environmental sustainability and compliance with applicable regulatory requirements. The project is planned as a vertical residential development comprising multi-storey apartment buildings supported by commercial, recreational, and community amenities.

TABLE 3-1: AREA SCHEDULE OF KARAKORAM GREENS, ISLAMABAD

| S. No. | Description (Floors) | Footprint Area (SFT) | Deduction Area (Void) | Covered Area (SFT) | Deduction Area (Lift Well) | F.A.R Area (SFT) |
|--------|----------------------|----------------------|-----------------------|--------------------|----------------------------|------------------|
| 01     | Basement-02          | 167,324.00           | –                     | 167,324.00         | –                          | –                |
| 02     | Basement-01          | 151,626.00           | –                     | 151,626.00         | –                          | –                |
| 03     | Ground Floor         | 71,592.07            | 3,378.00              | 68,214.07          | 682.00                     | 67,532.07        |
| 04     | First Floor          | 71,009.70            | 1,978.00              | 69,031.70          | 682.00                     | 68,349.70        |
| 05     | Second Floor         | 74,117.97            | 3,705.52              | 70,412.45          | 682.00                     | 69,730.45        |
| 06     | Third Floor          | 69,524.20            | 170.00                | 69,354.20          | 682.00                     | 68,672.20        |

|              |                              |                     |                  |                     |                  |                     |
|--------------|------------------------------|---------------------|------------------|---------------------|------------------|---------------------|
| 07           | Fourth Floor                 | 69,528.90           | 1,978.00         | 67,550.90           | 682.00           | 66,868.90           |
| 08           | Typical Floor<br>(5th–11th)  | 371,601.60          | 15,824.00        | 355,777.60          | 5,456.00         | 350,321.60          |
| 09           | Typical Floor<br>(12th–16th) | 185,796.80          | 680.00           | 185,116.80          | 2,728.00         | 182,388.80          |
| 10           | Typical Floor<br>(17th–20th) | 92,911.20           | 3,936.00         | 88,975.20           | 1,364.00         | 87,611.20           |
| 11           | Typical Floor<br>(21st–22nd) | 46,453.60           | 170.00           | 46,283.60           | 682.00           | 45,601.60           |
| 12           | Mumty Floor                  | 3,376.00            | –                | 3,376.00            | –                | 3,376.00            |
| <b>Total</b> |                              | <b>1,374,862.04</b> | <b>31,819.52</b> | <b>1,343,042.52</b> | <b>13,640.00</b> | <b>1,010,452.52</b> |

The development aims to offer a well-planned, secure, and environmentally responsible residential environment, incorporating contemporary architectural design, efficient infrastructure, and landscaped open spaces. The project has been conceptualized in accordance with the approved master plan of Gulberg Greens and relevant provisions of the Building Control Regulations.



FIGURE 3-1: SITE LOCATION (5 KM) FROM ISLAMABAD EXPRESS WAY

### 3.3. PROJECT COMPONENTS

The Karakoram Greens development comprises a well-integrated mix of residential, infrastructural, and community-oriented components designed to deliver a high-quality living environment while ensuring compliance with applicable planning and

environmental standards. The core of the project consists of multi-storey residential towers offering 2, 3, and 4-bedroom apartments.

TABLE 3-2: PROJECT AREA AND BUILDING CONFIGURATION

| Parameter                             | Details                           |
|---------------------------------------|-----------------------------------|
| Total Area of Plot                    | 506,355.93 sq. ft                 |
| F.A.R (1:5)                           | 2,531,779.65 sq. ft               |
| Proposed Built-up Area                | 1,150,575.63 sq. ft               |
| Maximum Ground Coverage Allowed (50%) | 253,177.96 sq. ft                 |
| Proposed Ground Coverage              | 87,391.00 sq. ft                  |
| Block A & D (Cluster-01)              | 2 Basements + Ground + 16 Storeys |
| Block B & C (Cluster-01)              | 2 Basements + Ground + 22 Storeys |
| Block E                               | 2 Basements + Ground + 16 Storeys |
| Semi-Commercial Area                  | Single Storey                     |

These residential units have been planned to accommodate varying household sizes and income groups, with layouts that prioritize natural lighting, ventilation, and functional space utilization. The architectural design reflects modern construction practices while maintaining aesthetic harmony with the surrounding landscape.

Basement parking has been incorporated to minimize surface congestion and optimize land utilization, while surface parking areas are provided for short-term and visitor use. Internal circulation has been carefully planned through a network of internal roads and pedestrian pathways that ensure smooth traffic movement, safe pedestrian access, and connectivity between residential blocks and common facilities.

TABLE 3-3: RESIDENTIAL BLOCKS &amp; PARKING

| Parameter                             | Details  |
|---------------------------------------|----------|
| Setbacks (as per CDA Bylaws)          | 25'-0"   |
| Total Apartments (Cluster-01)         | 432      |
| 2-Bed Apartments                      | 168      |
| 3-Bed Apartments                      | 224      |
| 4-Bed Apartments                      | 40       |
| Required Parking (Cluster-01)         | 780 Cars |
| Provided Covered Parking (Cluster-01) | 789 Cars |
| Total Apartments (Block E)            | 64       |
| 2-Bed Apartments (Block E)            | 64       |
| Required Parking (Block E)            | 96 Cars  |
| Provided Covered Parking (Block E)    | 130 Cars |

A key feature of the development is the provision of landscaped green areas and open spaces, which form an integral part of the overall master plan. These areas include lawns, planted buffers, walkways, and recreational open spaces aimed at improving microclimatic conditions, enhancing visual appeal, and providing residents with accessible outdoor areas. Landscaping has been designed to incorporate native and climate-resilient plant species, contributing to ecological balance and reduced maintenance requirements.

The project also includes designated community and recreational facilities intended to enhance social interaction and overall quality of life. These facilities are planned to support community activities and provide shared spaces for leisure and relaxation within the residential complex.

Supporting infrastructure has been comprehensively planned to ensure efficient and reliable service delivery. This includes water supply systems with adequate storage capacity, sewerage and wastewater management systems, stormwater drainage infrastructure, electrical supply networks, and solid waste management arrangements. Waste collection and disposal systems will operate in coordination with authorized service providers to ensure hygienic and environmentally sound handling of waste.

In addition, the project incorporates modern security, fire safety, and emergency response systems. These include controlled access points, CCTV surveillance, fire detection and firefighting systems, emergency exits, and standby power arrangements to ensure safety and operational continuity. The overall project layout and infrastructure planning reflect a strong emphasis on safety, sustainability, and long-term operational efficiency.

The integrated planning approach ensures optimal land utilization while maintaining a high proportion of open and landscaped areas, thereby enhancing environmental quality, visual character, and livability of the Karakoram Greens development.

### **3.4. LOCATION OF THE SITE**

The project site is situated within Gulberg Greens, Islamabad, along the Islamabad Expressway, in close proximity to major residential and commercial areas of the city. The site falls within Zone V of the Islamabad Capital Territory and enjoys direct connectivity to key urban centers including Rawalpindi, Islamabad city, and the Islamabad International Airport.

The project location is characterized by relatively open terrain, with surrounding developments comprising residential schemes, green areas, and infrastructure

corridors. The site benefits from existing road access, availability of utilities, and planned urban infrastructure under the Gulberg Greens development framework.



FIGURE 3-2: LOCATION OF KARAKORAM GREENS, ISLAMABAD

### **3.5. MASTER PLANNING AND DESIGN CONCEPT**

The master plan of Karakoram Greens has been developed with a strong emphasis on sustainable urban design principles, efficient spatial organization, and optimal utilization of available land. The planning concept prioritizes environmental quality and livability by allocating approximately seventy-five percent of the total project area to open spaces, landscaped zones, internal circulation, and communal amenities, while limiting the built-up footprint to ensure a balanced and low-impact development pattern. This approach not only enhances the visual and ecological character of the site but also contributes to improved microclimatic conditions, reduced heat island effects, and better stormwater management.

The architectural design of the residential towers has been carefully formulated to maximize natural daylight penetration and cross-ventilation, thereby reducing dependence on artificial lighting and mechanical cooling. Building orientation and spacing have been optimized to ensure adequate air movement and minimize overshadowing between structures. Energy efficiency considerations have been integrated into the design through appropriate building orientation, façade treatment, and use of materials that support thermal comfort and energy conservation.

Open spaces and landscaped areas have been strategically integrated throughout the site to provide visual relief, recreational opportunities, and environmental buffering. These green areas serve both aesthetic and functional purposes, including enhancement of air quality, reduction of surface runoff, and provision of communal spaces that promote social interaction and well-being. The landscaping concept emphasizes the use of native and climate-resilient plant species to ensure long-term sustainability and reduced maintenance requirements.

The project also incorporates modern residential amenities designed to meet contemporary living standards, including secure access, parking facilities, pedestrian-friendly pathways, and shared community spaces. At the same time, the layout has been planned to ensure adequate privacy for residents through appropriate building setbacks, controlled access points, and thoughtful spatial zoning.

All architectural and structural designs have been prepared in compliance with applicable building codes, safety regulations, and seismic design standards. Structural systems are designed to withstand seismic loads relevant to the region, ensuring occupant safety and long-term structural integrity. Overall, the master plan reflects a balanced integration of functionality, sustainability, safety, and aesthetics, aimed at creating a high-quality residential environment aligned with modern urban development principles.



FIGURE 3-3: MASTER PLAN OF KARAKORAM GREENS

### 3.6. DESCRIPTION OF THE FLOORS

The Karakoram Greens project comprises a series of multi-storey residential towers designed to accommodate modern urban living while ensuring functionality, safety, and efficient use of space. The building configuration includes multiple basement levels, a ground floor, and upper residential floors arranged in accordance with the approved master plan and relevant building regulations.

#### Basement Levels:

The project includes two basement levels primarily designated for parking, building services, and utility installations. These basements are designed to accommodate the required number of parking spaces for residents and visitors, thereby reducing surface congestion and enhancing site aesthetics. The basement levels also house essential service areas such as water storage tanks, firefighting infrastructure, electrical rooms, and mechanical systems. Adequate ventilation, fire safety provisions, and emergency access have been incorporated in accordance with applicable building and fire safety codes.

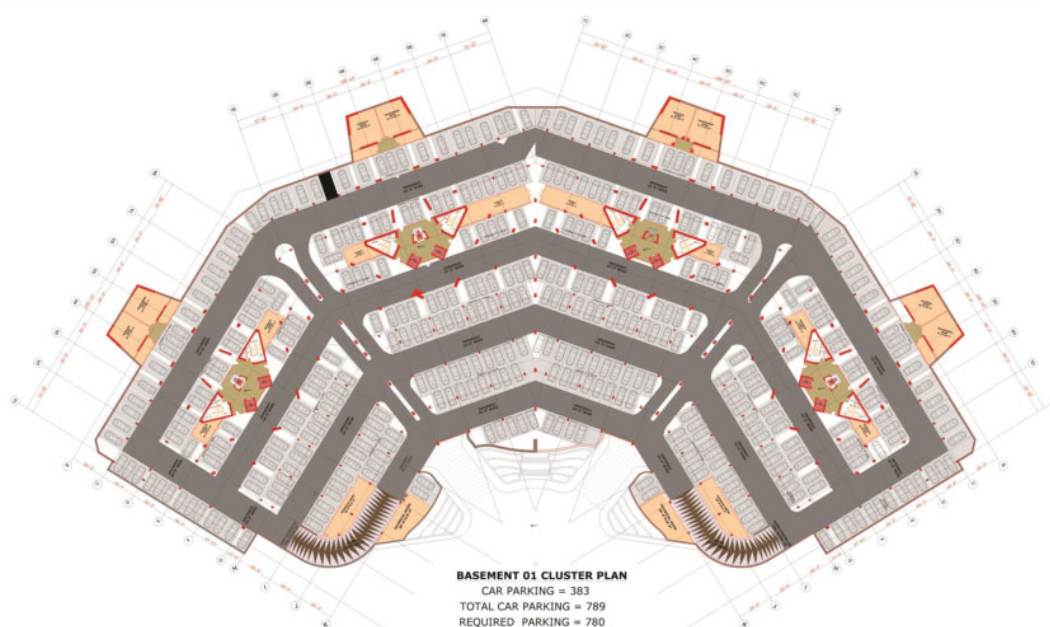


FIGURE 3-4: BASEMENT 01 FLOOR PLAN

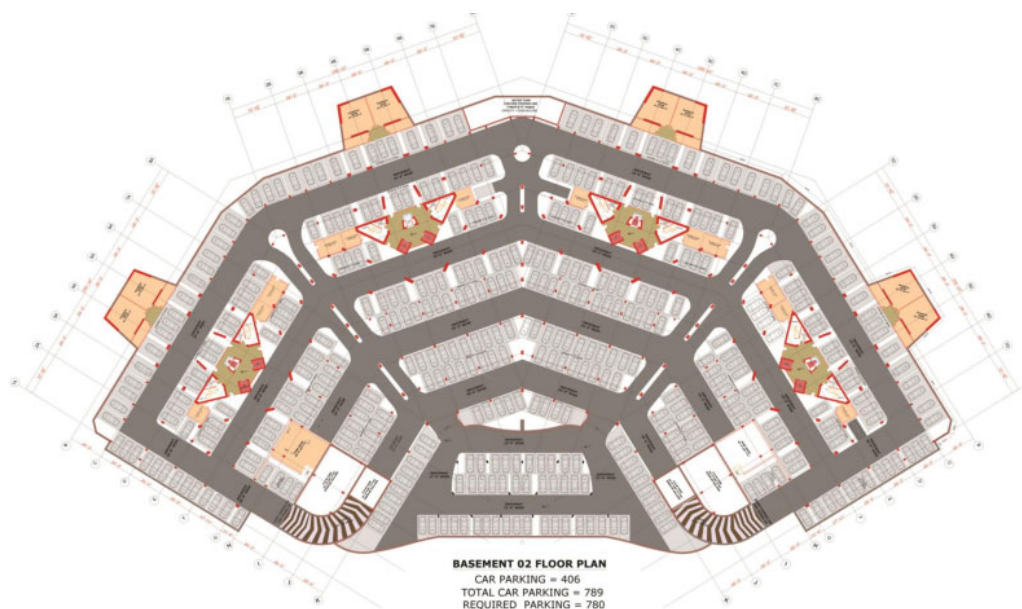


FIGURE 3-5: BASEMENT 02 FLOOR PLAN

**Ground Floor:**

The ground floor serves as the main interface between the residential blocks and the surrounding site infrastructure. It accommodates building entrances, lobbies, circulation areas, and in some blocks, semi-commercial or community-oriented spaces. The ground floor layout has been designed to allow smooth pedestrian movement, accessibility for persons with disabilities, and controlled access to residential areas. Landscaped open spaces and internal circulation pathways are integrated at this level to enhance the visual and functional quality of the development.

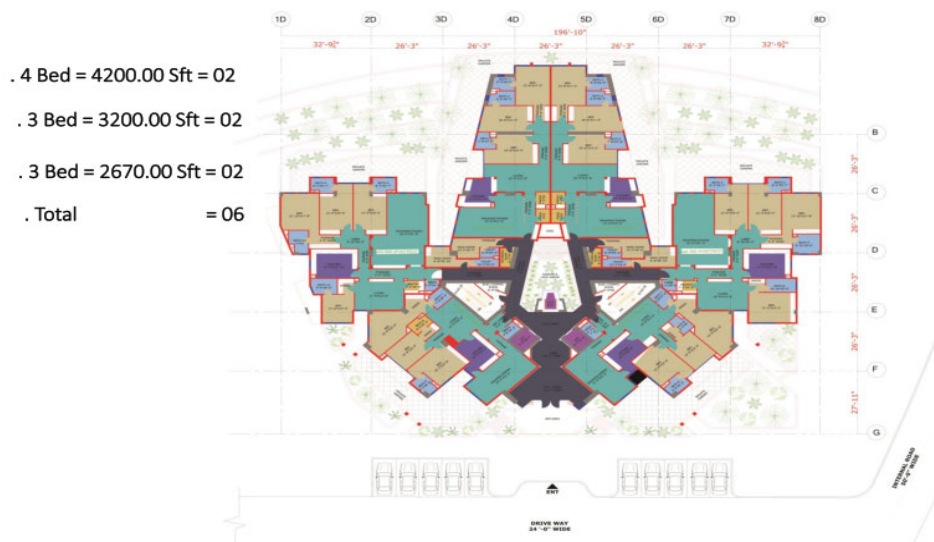


FIGURE 3-6: GROUND TO 5 TYPICAL RESIDENTIAL FLOORS

### Typical Residential Floors:

The upper floors consist of residential apartments of varying sizes, including 2-bedroom, 3-bedroom, and 4-bedroom units. The floor plans have been designed to optimize space utilization, natural lighting, and cross-ventilation. Each floor is served by dedicated lift cores and staircases to ensure efficient vertical circulation and compliance with fire and safety standards. The arrangement of apartments ensures privacy for residents while maintaining functional connectivity to shared facilities.

|                            |      |
|----------------------------|------|
| . 2 Bed = 1870.00 Sft = 02 |      |
| . 2 Bed = 1562.00 Sft = 02 |      |
| . 2 Bed = 1943.00 Sft = 02 |      |
| . 3 Bed = 2095.00 Sft = 01 |      |
| . Total                    | = 07 |

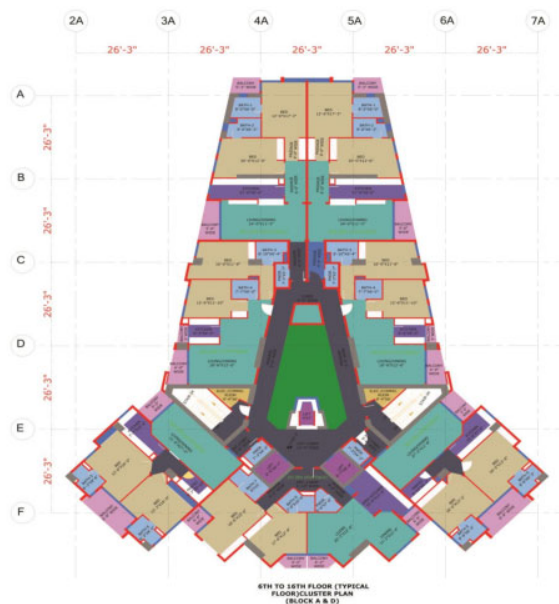


FIGURE 3-7: TYPICAL FLOOR PLAN (BLOCK A & D 2 BED ROOM CLUSTER - 01)

### Upper Floors and Roof Level:

The uppermost floors follow the same design principles as the typical residential levels, with structural and architectural features aligned to ensure uniformity and safety. The roof level accommodates essential building services such as overhead water tanks, lift machine rooms, and other mechanical installations. These elements have been carefully integrated into the design to minimize visual impact and ensure operational efficiency.

Overall, the floor-wise planning of Karakoram Greens reflects a well-balanced approach to residential development, combining efficient space planning, safety considerations, and architectural coherence. The design complies with the applicable Building Control Regulations and has been structured to support long-term functionality, resident comfort, and sustainable operation of the development.

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### **3.7. INFRASTRUCTURE AND UTILITIES**

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The project will be supported by a comprehensive infrastructure network, including:

- ✎ **Water Supply:** Provision through approved municipal sources and supplementary storage facilities.
- ✎ **Sewerage and Wastewater Management:** Connection to the approved sewerage system with appropriate internal drainage and disposal mechanisms.
- ✎ **Solid Waste Management:** Organized waste collection system with segregation and disposal through authorized service providers.
- ✎ **Electricity Supply:** Grid-based power supply supported by standby generators for uninterrupted services.
- ✎ **Stormwater Drainage:** Properly designed drainage system to manage surface runoff and prevent flooding or erosion.
- ✎ **Fire Safety:** Firefighting systems installed in accordance with building safety codes, including fire alarms, hydrants, and emergency exits.

### **3.8. ROADS AND CIRCULATIONS**

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The road network and circulation system for the Karakoram Greens project have been planned to ensure safe, efficient, and uninterrupted movement of vehicles and pedestrians within the site, while maintaining connectivity with the surrounding road infrastructure of Gulberg Greens. The internal circulation layout has been designed in accordance with approved planning standards and aims to facilitate smooth traffic flow, minimize congestion, and ensure emergency accessibility throughout the project area.

Access to the project site is provided through the existing road network of Gulberg Greens, which is directly connected to the Islamabad Expressway. The primary access points have been designed to accommodate both resident and service traffic, with clearly defined entry and exit routes to reduce conflicts and ensure controlled movement. Internal roads have been planned with adequate carriageway widths, turning radii, and gradients to safely accommodate light vehicles, service vehicles, and emergency response units.

The circulation system within the project has been segregated into vehicular and pedestrian zones to enhance safety and ease of movement. Dedicated pedestrian walkways and landscaped pathways have been incorporated to promote walkability and reduce vehicular–pedestrian conflicts. Basement parking facilities have been

provided to minimize surface traffic and reduce visual clutter, while designated surface parking areas cater to visitors and short-term parking needs.

Special consideration has been given to emergency access and service circulation. All residential blocks are accessible through looped internal roads, ensuring uninterrupted movement of fire tenders, ambulances, and maintenance vehicles. Turning spaces and access widths comply with applicable building and fire safety regulations. The internal road network is also integrated with the stormwater drainage system to prevent water accumulation and ensure safe movement during rainfall events.

Traffic movement during the construction phase will be managed through a traffic management plan, which will include designated entry and exit routes for construction vehicles, restricted working hours for heavy transport, and appropriate signage to minimize disruption to surrounding areas. During the operational phase, traffic volumes are expected to remain within manageable limits due to the planned parking provision and controlled access system.

Overall, the road and circulation design of Karakoram Greens has been developed to support safe, efficient, and environmentally responsible mobility while aligning with the overall master planning concept and infrastructure capacity of Gulberg Greens.

### **3.9. ORIENTATION OF THE BUILDING**

The orientation of the buildings within the Karakoram Greens development has been carefully planned to optimize environmental performance, user comfort, and overall site efficiency. The residential blocks have been positioned in accordance with the approved master plan to maximize exposure to natural daylight and promote effective cross-ventilation, thereby reducing reliance on artificial lighting and mechanical cooling systems. Building orientation has been aligned to take advantage of prevailing wind directions and to minimize excessive heat gain, particularly during the summer months, contributing to improved indoor thermal comfort.

The layout also ensures appropriate spacing between blocks to prevent overshadowing and to maintain visual privacy while allowing adequate air circulation throughout the site. Key façades and openings are oriented to enhance natural lighting while minimizing direct exposure to harsh sunlight. Additionally, the orientation supports efficient internal circulation, clear access to entrances, and smooth integration with the internal road network and open spaces.

Special consideration has been given to the surrounding landscape and natural features, including views toward open green areas and the broader Gulberg Greens development. The building placement complements the overall site topography and allows for effective stormwater drainage and environmental management. Overall, the orientation of the buildings reflects a climate-responsive and environmentally conscious design approach consistent with sustainable development principles and applicable planning regulations.

### **3.10. POPULATION DENSITY**

Density plays a vital role in allocation of various land uses and provision of different amenities and infrastructure.

**TABLE 3-4: PROJECT PARAMETERS USED FOR CALCULATION**

| <b>Parameter</b>        | <b>Value</b>                                        |
|-------------------------|-----------------------------------------------------|
| Total Project Area      | Approx. 25 acres                                    |
| Total Residential Units | 781 apartments                                      |
| Average Household Size  | 5 persons per household (standard urban assumption) |
| Project Type            | High-rise residential development                   |

#### **Estimated Residential Population**

$$\begin{aligned}\text{Total Population} &= \text{No. of Units} \times \text{Average Household Size} \\ &= 781 \times 5 = 3,905 \text{ persons}\end{aligned}$$

**Estimated Resident Population: ~3,900 persons**

#### **Population Density Calculation**

$$\begin{aligned}\text{POPULATION DENSITY} &= \frac{\text{TOTAL POPULATION}}{\text{TOTAL AREA (ACRES)}} \\ &= \frac{3,905}{25} = 156.2 \text{ PERSONS PER ACRE}\end{aligned}$$

TABLE 3-5: POPULATION DENSITY SUMMARY

| Indicator            | Value                                   |
|----------------------|-----------------------------------------|
| Total Site Area      | ~25 acres                               |
| Estimated Population | ~3,900 persons                          |
| Population Density   | ~156 persons/acre                       |
| Development Type     | Medium-to-high density vertical housing |

### Interpretation

The calculated population density of approximately 156 persons per acre falls within the acceptable range for high-rise residential developments in Islamabad, particularly for planned housing schemes such as Gulberg Greens. This density is consistent with modern urban planning practices and is supported by:

- ✎ Adequate open and landscaped areas (approximately 75% of site)
- ✎ Basement parking reducing surface congestion
- ✎ Planned internal circulation and services
- ✎ Availability of supporting infrastructure and utilities

The population density is not expected to place excessive pressure on local infrastructure, provided that the proposed water supply, wastewater management, traffic circulation, and solid waste systems are implemented as per approved designs.

### **3.11. POPULATION AND INFRASTRUCTURE DEMAND ASSESSMENT**

This section presents an assessment of the projected population and corresponding infrastructure requirements associated with the Karakoram Greens development. The analysis has been carried out to estimate the anticipated residential population and to evaluate the resulting demand on key infrastructure components including water supply, wastewater generation, solid waste management, electricity, and traffic circulation. The assessment is based on the approved project layout, number of residential units, prevailing occupancy patterns, and applicable planning standards prescribed by the Capital Development Authority (CDA). The purpose of this assessment is to ensure that the proposed infrastructure provisions are adequate to support the projected population while maintaining environmental sustainability and compliance with regulatory requirements.

TABLE 3-6: POPULATION DENSITY

| Parameter                     | Value          |
|-------------------------------|----------------|
| Total Site Area               | ~25 acres      |
| Total Residential Units       | 781            |
| Average Household Size        | 5 persons/unit |
| Estimated Resident Population | ~3,900 persons |

### **3.12. EXTERNAL ELECTRIFICATION**

Karakoram Greens will get the electricity supply from Gulberg Greens. Gulberg Greens has taken approval from IESCO for the supply of electricity. The primary distribution system HT shall be 3 phase, 11 KV 50 Hz supply; whereas the secondary LT distribution system shall be 415 volt 3 phase 4 wire or 220 volts 1-phase 50 Hz supply including street light. Diesel GENSETs will be provided for secondary source of electricity. Appropriate protective devices against over voltage, fluctuation, transients and harmonics, loss of one or more phases and any unforeseen interruptions will be catered for in the design.

### **3.13. GAS DISTRIBUTION NETWORK**

Karakoram Greens will get the sui gas supply from Gulberg Greens. Sui gas installation will be done by Sui Northern Gas pipeline ltd department on payment by the society. The gas network system shall be designed by the department itself on payment of demand note to the department for installation of gas supply network in the scheme area. The main Sui gas pipe line already passes to the eastern part of site

### **3.14. GEO-TECHNICAL SURVEY REPORT**

A detailed geotechnical investigation was carried out for the Karakoram Greens project to assess subsurface conditions and determine the suitability of the site for the proposed high-rise residential development. The study included field investigations, borehole drilling, standard penetration tests (SPT), laboratory testing of soil samples, and evaluation of engineering properties relevant to foundation design and structural stability.

The project area is located within the Potohar Plateau and is characterized by generally stable geological conditions. The subsurface profile consists of layered soil strata comprising silty clay, lean clay, silty sand, gravelly sand, and occasional sandstone formations at greater depths. The upper soil layers include localized fill material in some areas, underlain by dense to very dense natural soil strata capable of supporting structural loads. The soil profile exhibits adequate bearing capacity for multi-storey construction, subject to appropriate foundation design.

Groundwater was not encountered at shallow depths during drilling; however, perched water conditions were observed at certain locations between approximately 25 to 40 feet below ground level. Chemical analysis of soil and groundwater samples indicated no aggressive properties, with chloride and sulphate concentrations within permissible limits, confirming suitability for conventional concrete construction.

Standard Penetration Test (SPT) results indicated medium to dense soil conditions across the site, with increasing strength at depth. Laboratory testing, including grain size analysis, Atterberg limits, compaction tests, and shear strength analysis, confirmed favorable engineering properties. The allowable bearing capacity derived from the test results supports the proposed building loads with appropriate safety factors.

The site falls within Seismic Zone 2B, and seismic parameters have been incorporated into the foundation and structural design in accordance with applicable building codes. The study recommends raft or pile foundation systems, depending on structural load requirements and localized soil conditions.

Overall, the geotechnical investigation concludes that the site is suitable for the proposed development, provided that recommended foundation designs, excavation practices, drainage controls, and construction methodologies are strictly followed. The findings of the study form a reliable basis for safe structural design and long-term stability of the Karakoram Greens project.

### **3.15. WATER SUPPLY**

The project site is located in the area where ground water potential is available. Resistivity survey of the site has been conducted to establish water availability within the project site. According to the findings of the resistivity survey, water is available where resistivity survey has been conducted.

### 3.15.1. AVERAGE DAY WATER DEMAND

The average daily water demand for the Karakoram Greens project has been estimated based on the projected resident population, applicable CDA water consumption standards, and the nature of the proposed residential development. In accordance with CDA guidelines, a per capita water demand of approximately 150 gallons per person per day has been adopted for residential use. Based on an estimated population of around 3,900 residents, the total average daily water requirement for the project is calculated to be approximately 585,000 gallons per day. This demand includes domestic consumption for drinking, cooking, bathing, cleaning, and other household uses, as well as water required for common facilities, landscaping, and operational needs. Provision for adequate underground and overhead water storage tanks has been incorporated into the project design to ensure uninterrupted supply and to cater for peak demand conditions. Water-efficient fixtures and conservation measures will also be promoted to optimize usage and reduce wastage. The proposed water demand is considered manageable and in line with the available infrastructure and planning standards for high-density residential developments in Gulberg Greens.

TABLE 3-7: WATER STORAGE, FIRE SAFETY & AREA DETAILS

| Parameter                                    | Specification       |
|----------------------------------------------|---------------------|
| Firefighting Tank Capacity (Cluster-01)      | 70,000 Gallons      |
| Firefighting Tank Capacity (Block-E)         | 26,000 Gallons      |
| Underground Water Tank Capacity (Cluster-01) | 225,000 Gallons     |
| Underground Water Tank Capacity (Block-E)    | 42,250 Gallons      |
| Overhead Water Tank Capacity (Cluster-01)    | 174,720 Gallons     |
| Overhead Water Tank Capacity (Block-E)       | 26,000 Gallons      |
| Ramp Gradient                                | 1 : 9               |
| Covered Area (Cluster-01)                    | 1,010,452.52 sq. ft |
| Covered Area (Block-E)                       | 127,756.11 sq. ft   |
| Covered Area (Semi-Commercial)               | 12,367.00 sq. ft    |

### 3.16. WATER SUPPLY NETWORK

For the water supply network, the society shall use PVC pipe. These pipes are easy to lay, non-corrosive and long life when compared with G.I. and MS pipe. Sluice valve, double air valve & washout shall be installed at appropriate location in the network system. The loop system shall be designed in shape of network resembling a gridiron

connected at interval to avoid dead ends. Water will be supplied from more than one direction for its circulation throughout the system.

### **3.17. WATER CONSERVATION STRATEGY**

Water conservation and efficient resource utilization form an integral part of the design and operational philosophy of the Karakoram Greens project. The development incorporates a range of water-saving measures aimed at reducing overall consumption and minimizing pressure on municipal water supplies. Low-flow sanitary fixtures, water-efficient taps, and dual-flush systems will be installed in residential units to reduce per capita water use. Landscaped areas will be designed using native and drought-resistant plant species to limit irrigation demand, and efficient irrigation practices such as controlled watering schedules will be adopted.

In addition, provisions have been made for the reuse of treated wastewater for non-potable purposes such as landscape irrigation, cleaning of common areas, and other utility applications, subject to compliance with applicable environmental standards. Rainwater harvesting and controlled stormwater management systems will also be incorporated to capture surface runoff and enhance groundwater recharge where feasible. These measures collectively contribute to sustainable water management, reduced freshwater dependency, and improved environmental performance of the project in line with CDA guidelines and best practices for urban residential developments.

### **3.18. RAINWATER HARVESTING CALCULATIONS**

Rainwater harvesting has been proposed for Karakoram Greens to reduce pressure on freshwater sources, support landscape irrigation, improve stormwater management, and contribute to groundwater recharge. The calculation has been based on the proposed rooftop catchment area equivalent to the building ground coverage of **87,391 sq. ft**, which is equal to approximately **8,118.89 m<sup>2</sup>**.

The following standard formula has been used:

$$\text{Rainwater Yield} = \text{Catchment Area} \times \text{Rainfall Depth} \times \text{Runoff Coefficient}$$

Where:

$$\text{Catchment Area} = 8,118.89 \text{ m}^2$$

$$\text{Runoff Coefficient for rooftop surface} = 0.85$$

$$\text{Annual rainfall assumed for Islamabad} = 1,100 \text{ mm/year, or } 1.10 \text{ m/year}$$

Therefore:

$$\text{Annual Harvestable Rainwater} = 8,118.89 \times 1.10 \times 0.85$$

$$= 7,591.16 \text{ m}^3/\text{year}$$

Converting into gallons:

$$7,591.16 \text{ m}^3 \times 264.172 = 2,005,372 \text{ gallons/year}$$

Thus, the project can potentially harvest approximately **2.0 million gallons of rainwater annually** from rooftop areas alone, subject to rainfall variability, collection efficiency, and storage availability.

For storm event-based storage design, the following runoff volumes are estimated:

| Rainfall Event  | Rooftop Runoff Volume | Equivalent Volume |
|-----------------|-----------------------|-------------------|
| 25 mm rainfall  | 172.53 m <sup>3</sup> | 45,577 gallons    |
| 50 mm rainfall  | 345.05 m <sup>3</sup> | 91,153 gallons    |
| 75 mm rainfall  | 517.58 m <sup>3</sup> | 136,730 gallons   |
| 100 mm rainfall | 690.11 m <sup>3</sup> | 182,307 gallons   |

Based on the above calculations, a minimum rainwater harvesting storage capacity of **100,000 gallons** is recommended to capture runoff from a moderate 50 mm rainfall event. However, considering extreme rainfall events, operational flexibility, irrigation demand, and overflow management, a storage capacity of **150,000 to 180,000 gallons** is recommended for phased implementation. Any additional runoff beyond storage capacity should be safely conveyed to recharge wells, infiltration trenches, or the stormwater drainage system.

A first-flush diversion system shall also be installed to remove initial roof runoff containing dust, bird droppings, and other surface contaminants. Assuming a first flush depth of 1 mm over the rooftop catchment:

$$\text{First Flush Volume} = 8,118.89 \times 0.001 \times 0.85 = 6.90 \text{ m}^3$$

$$= \text{approximately } 1,823 \text{ gallons}$$

Accordingly, a first-flush diversion capacity of approximately **2,000 gallons** should be provided before water enters the main storage tank.

The harvested rainwater shall be filtered through screen chambers, silt traps, and sedimentation units before storage. The collected water may be reused for landscape

irrigation, cleaning of common areas, firefighting reserve supplementation where technically permissible, and groundwater recharge. It shall not be used for drinking purposes unless treated through an approved potable water treatment system.

In addition to rooftop harvesting, runoff from paved areas, roads, and hardstanding surfaces may be directed toward recharge pits, vegetated swales, and infiltration trenches after sediment removal. This will reduce stormwater discharge, minimize erosion, and improve groundwater recharge potential within the project area.

Overall, the proposed rainwater harvesting system will provide a practical water conservation measure for Karakoram Greens and will also contribute to flood risk reduction, reduced runoff load on external drains, and sustainable water resource management.

### **3.19. SEWAGE & SEWERAGE DISPOSAL.**

The Karakoram Greens project has been planned with a comprehensive and environmentally sound sewage and sewerage management system to ensure safe collection, treatment, and disposal of wastewater generated from residential and associated facilities. The estimated wastewater generation is based on approximately 80–85 percent of the total daily water consumption, in line with standard engineering practice and CDA guidelines.

All residential blocks will be connected to an internal sewerage network designed to collect wastewater through gravity flow and convey it to a centralized disposal system. The sewerage infrastructure will consist of underground pipelines, inspection chambers, and manholes designed in accordance with approved engineering standards to prevent leakage, blockage, or contamination of surrounding soil and groundwater. Proper slopes and pipe sizing will be ensured to maintain smooth flow and avoid backflow conditions.

Wastewater generated from the project will be treated through an approved sewerage disposal system, either by connection to the designated municipal sewer network or through an on-site treatment arrangement, as approved by the relevant authorities. Treated effluent will be disposed of in accordance with NEQS standards, and where feasible, reused for non-potable purposes such as landscape irrigation and cleaning of common areas, thereby reducing freshwater demand.

Adequate provisions have been incorporated to prevent environmental pollution, including sealed sewer lines, regular maintenance schedules, and inspection protocols. The system has been designed to ensure that no untreated sewage is

discharged into open drains, surface water bodies, or surrounding land. During construction, temporary sanitation facilities will be provided for workers, and wastewater will be managed through septic tanks or approved disposal mechanisms.

Overall, the sewage and sewerage disposal system for Karakoram Greens has been designed to ensure environmental protection, public health safety, and compliance with CDA and EPA requirements, supporting the long-term sustainability of the development

**TABLE 3-8: WASTEWATER GENERATION CALCULATION**

| Parameter                            | Unit                      | Value           | Basis/Assumption                                               |
|--------------------------------------|---------------------------|-----------------|----------------------------------------------------------------|
| Total residential units              | No.                       | 781             | Project planning basis                                         |
| Average household size               | persons/unit              | 5               | Standard urban occupancy assumption                            |
| Estimated resident population        | persons                   | 3,905           | $781 \times 5$                                                 |
| Per capita water demand              | gallons/person/day (gpcd) | 150             | CDA planning standard typically applied for residential demand |
| Average daily water demand (ADD)     | gallons/day               | 585,750         | $3,905 \times 150$                                             |
| Wastewater generation factor (low)   | % of ADD                  | 80%             | Standard design range                                          |
| Estimated wastewater (80%)           | gallons/day               | 468,600         | $585,750 \times 0.80$                                          |
| Wastewater generation factor (high)  | % of ADD                  | 85%             | Standard design range                                          |
| Estimated wastewater (85%)           | gallons/day               | 497,888         | $585,750 \times 0.85$                                          |
| Design wastewater flow (recommended) | gallons/day               | <b>~500,000</b> | Rounded conservative value for sizing/impact assessment        |

Wastewater generated from the Karakoram Greens development will be managed through a properly designed internal sewerage network and disposed through an approved disposal route, either by connection to the designated municipal sewer system or through an on-site wastewater treatment arrangement as approved by relevant authorities. Under all operating conditions, no untreated sewage will be discharged to open drains, surface water bodies, or surrounding land. Any effluent discharged outside the site boundary will meet the National Environmental Quality Standards (NEQS) for Municipal and Liquid Industrial Effluents, including limits for key parameters such as pH, BOD, COD, Total Suspended Solids (TSS), oil and grease, and other regulated pollutants. Routine monitoring will be undertaken at the outlet point (or treatment plant discharge, as applicable) to verify compliance, supported by recordkeeping and corrective actions in the Environmental Management and Monitoring Plan (EMMP). Sludge, if generated from on-site treatment, will be handled as per approved procedures and disposed through authorized facilities to prevent secondary contamination.

#### **3.19.1. SEWAGE COLLECTION SYSTEM**

The sewage collection system for the Karakoram Greens project has been designed to ensure the safe, efficient, and hygienic conveyance of wastewater generated from residential and associated facilities. The system comprises a network of underground sewer lines laid on appropriate gradients to allow gravity-based flow wherever feasible. All residential blocks, common areas, and service facilities will be connected to this internal sewerage network through properly designed lateral connections and inspection chambers.

The sewer lines will be constructed using approved materials and jointing methods to prevent leakage, infiltration, and exfiltration, thereby safeguarding soil and groundwater quality. Manholes will be provided at regular intervals and at changes in direction or gradient to facilitate inspection, cleaning, and maintenance. The entire network will be designed in accordance with CDA engineering standards and relevant plumbing codes to ensure adequate hydraulic capacity and long-term operational reliability.

Wastewater collected through the internal sewerage system will be conveyed to the designated disposal or treatment facility approved by the concerned authorities. The system has been designed to prevent overflows, backflow, and blockages, even during peak flow conditions. Proper ventilation, access points, and maintenance

provisions will be incorporated to ensure smooth operation and to minimize odor-related issues.

During the construction phase, temporary sanitation facilities will be provided for workers, and wastewater will be managed through septic tanks or approved containment systems to prevent environmental contamination. Overall, the sewage collection system has been planned to ensure environmental protection, public health safety, and full compliance with applicable environmental regulations and urban development standards.

### **3.19.2. SEWERAGE NETWORK**

The sewerage network for the Karakoram Greens project has been designed as a closed, gravity-based system to ensure safe and efficient conveyance of wastewater generated from residential and associated facilities. The internal sewer network consists of underground sewer lines laid at appropriate gradients, connected through manholes and inspection chambers to facilitate smooth flow, routine maintenance, and monitoring. All sewer lines will be constructed using approved materials and jointing methods to prevent leakage, infiltration, or exfiltration, thereby protecting soil and groundwater quality.

Each residential block and common facility will be connected to the internal sewerage system through properly designed lateral connections. The network has been sized to accommodate peak wastewater flows based on projected population and water consumption rates, ensuring adequate hydraulic capacity under both normal and peak operating conditions. Manholes will be provided at regular intervals and at changes in alignment or slope to allow for inspection, cleaning, and emergency access.

The collected wastewater from the project will ultimately be conveyed to the **Gulberg Greens Sewage Treatment Plant (STP)** for final treatment and disposal. The STP is designed to treat municipal wastewater in accordance with applicable environmental standards, ensuring that treated effluent meets the National Environmental Quality Standards (NEQS) prior to discharge or reuse. This centralized treatment approach ensures environmentally sound disposal and minimizes the risk of pollution to surrounding land and water resources.

The sewerage system has been planned in line with CDA engineering guidelines and environmental best practices, ensuring long-term operational reliability, protection of

public health, and compliance with regulatory requirements throughout the life of the project.

### **3.20. FLOOD AND DAMAGE ASSESSMENT**

The Karakoram Greens project site is located within Gulberg Greens, Islamabad, on gently undulating terrain with a natural slope generally draining toward the lower side of the site and the nearby Korang River tributary corridor. The total plot area is approximately **506,355.93 sq. ft**, equivalent to **11.62 acres**, while the proposed ground coverage is approximately **87,391 sq. ft**, equivalent to **2.01 acres**. The remaining area consists of internal circulation, landscaped areas, open spaces, and utility corridors.

The proposed development will alter the existing surface runoff pattern due to the introduction of rooftops, paved roads, walkways, parking areas, and other impervious surfaces. If not properly managed, increased runoff could contribute to localized water accumulation, erosion near drainage edges, and increased load on downstream drainage systems. Therefore, stormwater management has been assessed using conservative runoff assumptions to ensure safe collection, conveyance, detention, and disposal of runoff generated from the project site.

For preliminary drainage assessment, the Rational Method has been applied:

$$Q = C \times I \times A$$

Where:

**Q** = peak runoff discharge

**C** = weighted runoff coefficient

**I** = rainfall intensity

**A** = catchment area

For the site, the following runoff coefficients have been adopted:

| Surface Type                        | Approximate Area           | Runoff Coefficient |
|-------------------------------------|----------------------------|--------------------|
| Rooftop / building footprint        | 87,391 sq. ft / 2.01 acres | 0.85               |
| Roads, paved areas and hardstanding | Approx. 2.91 acres         | 0.75               |
| Landscaped and open areas           | Approx. 6.71 acres         | 0.25               |
| Weighted site runoff coefficient    | <b>11.62 acres</b>         | <b>0.48</b>        |

Based on the weighted runoff coefficient of **0.48**, estimated stormwater runoff volumes for selected rainfall events are as follows:

| Rainfall Event        | Estimated Runoff Volume | Equivalent Volume |
|-----------------------|-------------------------|-------------------|
| <b>25 mm rainfall</b> | 562.8 m <sup>3</sup>    | 148,677 gallons   |
| <b>50 mm rainfall</b> | 1,125.6 m <sup>3</sup>  | 297,353 gallons   |

|                        |                        |                 |
|------------------------|------------------------|-----------------|
| <b>75 mm rainfall</b>  | 1,688.4 m <sup>3</sup> | 446,030 gallons |
| <b>100 mm rainfall</b> | 2,251.2 m <sup>3</sup> | 594,706 gallons |
| <b>150 mm rainfall</b> | 3,376.8 m <sup>3</sup> | 892,059 gallons |

For peak discharge estimation, different rainfall intensities have been considered to represent moderate to extreme rainfall conditions:

| Rainfall Intensity   | Estimated Peak Runoff                 |
|----------------------|---------------------------------------|
| <b>1 inch/hour</b>   | 5.56 cusecs / 0.16 m <sup>3</sup> /s  |
| <b>2 inches/hour</b> | 11.13 cusecs / 0.32 m <sup>3</sup> /s |
| <b>3 inches/hour</b> | 16.69 cusecs / 0.47 m <sup>3</sup> /s |
| <b>4 inches/hour</b> | 22.25 cusecs / 0.63 m <sup>3</sup> /s |

The above calculations indicate that the site drainage system should be designed to safely manage at least the runoff generated from a **100 mm rainfall event**, with additional freeboard and overflow capacity for higher-intensity storms. The drainage design should include adequately sized stormwater drains, catch basins, silt traps, recharge pits, and controlled discharge points. Surface grading should direct stormwater away from building foundations, basement ramps, electrical rooms, and other sensitive infrastructure.

Basement areas require particular attention due to the risk of runoff entry during intense rainfall. Basement ramp entrances should be protected through raised thresholds, trench drains, sump pits, non-return valves, and pumping arrangements. Drainage channels at ramp approaches should be designed to intercept runoff before it enters basement levels. Emergency pumping capacity should also be provided to manage any accidental water accumulation.

To reduce downstream drainage pressure, the project should integrate rainwater harvesting and stormwater detention measures. Rooftop runoff should be collected separately and diverted to rainwater storage tanks, recharge wells, or landscaping reuse systems. Paved runoff should pass through silt traps and oil/grit chambers before entering the main stormwater system. Landscaped areas should be used as infiltration zones wherever feasible to improve groundwater recharge and reduce peak discharge.

The project's stormwater system should be connected to the approved Gulberg Greens drainage network only after internal flow attenuation and sediment control. No direct discharge of sediment-laden runoff, construction wastewater, oil-contaminated water, or solid waste should be allowed into natural drainage channels or downstream receiving systems.

During construction, temporary drainage arrangements shall be provided to prevent flooding, erosion, and sediment transport. These shall include diversion drains, temporary bunds, sediment traps, covered material storage, and regular desilting of drainage paths. Excavated areas and foundation works should be protected from rainwater inflow, and construction activities near drainage edges should be avoided during heavy rainfall.

Overall, the flood and drainage risk for Karakoram Greens is considered manageable, provided that the proposed stormwater drainage system is designed with sufficient capacity, regular maintenance, sediment control, rainwater harvesting, and emergency overflow provisions. With these measures, the project is not expected to cause significant off-site flooding or adverse impacts on downstream drainage infrastructure.

### **3.21. LANDSCAPING**

Landscaping forms an integral component of the Karakoram Greens development and has been planned to enhance environmental quality, visual aesthetics, and overall livability of the project area. The landscape design has been developed in harmony with the project's master plan, with a strong emphasis on green cover, ecological balance, and sustainable land use. Approximately seventy-five percent of the project area has been allocated for open spaces, landscaped zones, circulation corridors, and recreational areas, ensuring a healthy built-to-open space ratio.

### **3.22. PLANTATION OBJECTIVE**

The landscaping scheme incorporates a combination of soft and hard landscape elements, including lawns, trees, shrubs, pedestrian walkways, and buffer zones along internal roads and building peripheries. Native and climate-resilient plant species have been prioritized to minimize water demand, enhance survival rates, and support local biodiversity. Tree plantation along internal roads, open areas, and boundary zones has been designed to provide shade, reduce dust levels, improve microclimatic conditions, and enhance the overall visual appeal of the development.

The proposed plantation program aims to:

- ✎ Compensate for any vegetation removed during site development.
- ✎ Improve ambient air quality through dust and pollutant filtration.
- ✎ Reduce urban heat island effects and improve thermal comfort.
- ✎ Enhance biodiversity by providing habitat and food sources for birds and pollinators.
- ✎ Stabilize soil and reduce erosion in landscaped and open areas.

- ✂ Improve visual aesthetics and landscape quality.
- ✂ Create green buffers around project boundaries and sensitive receptors.
- ✂ Increase carbon sequestration and contribute to climate resilience.

### **3.23. PLANTATION STRATEGY**

The plantation scheme will be implemented in phases corresponding to project development activities. Priority will be given to planting along project boundaries, internal roads, parking areas, open spaces, recreational zones, and utility corridors.

The plantation program will follow a minimum compensatory ratio of 5:1, whereby at least five saplings will be planted for every tree removed during project implementation. Additional plantation will be undertaken wherever space permits to maximize green cover.

### **3.24. PROPOSED PLANTATION AREAS**

The following areas have been identified for plantation and landscaping:

| Plantation Area           | Proposed Plantation Type                               |
|---------------------------|--------------------------------------------------------|
| Project boundary          | Dense green belt and screening plantation              |
| Internal roads            | Avenue plantation                                      |
| Open spaces and parks     | Shade trees, ornamental trees, shrubs and ground cover |
| Parking areas             | Shade trees and landscape islands                      |
| Building setbacks         | Ornamental trees and shrubs                            |
| Utility and service areas | Screening vegetation                                   |
| Recreational areas        | Native trees, flowering plants and lawns               |

### **3.25. RECOMMENDED PLANT SPECIES**

Preference will be given to indigenous, drought-tolerant, pollution-resistant, and low-maintenance species suitable for Islamabad's climatic conditions.

TABLE 3-9: PLANTATION PLAN

| Planting Category                | Location / Area                            | Proposed Species (Indicative)       | Purpose / Function                       | Remarks                                                |
|----------------------------------|--------------------------------------------|-------------------------------------|------------------------------------------|--------------------------------------------------------|
| Avenue Trees                     | Along internal roads and main access roads | Neem, Amaltas, Jacaranda, Kachnar   | Shade, dust control, visual enhancement  | Native and fast-growing species preferred              |
| Boundary Plantation              | Periphery of the project site              | Arjun, Sheesham, Conocarpus         | Noise attenuation, screening, wind break | Helps define project boundary and improve microclimate |
| Landscape Trees                  | Open spaces, parks, and courtyards         | Neem, Gulmohar, Bottle Brush        | Aesthetic enhancement, shade             | Planted in clusters to enhance visual appeal           |
| Shrubs and Hedges                | Along walkways and building edges          | Bougainvillea, Hibiscus, Duranta    | Landscaping, dust filtering              | Low maintenance species                                |
| Ground Cover / Lawns             | Open green areas and common spaces         | Bermuda grass, local turf varieties | Soil stabilization, recreational use     | Helps control erosion and dust                         |
| Ornamental Plants                | Entrances, plazas, and community areas     | Palms, seasonal flowers             | Aesthetic and visual character           | Periodic replacement planned                           |
| Drainage / Embankment Plantation | Along stormwater drains and slopes         | Vetiver grass, local shrubs         | Erosion control, slope stability         | Supports stormwater management                         |
| Buffer Plantation                | Between built-up areas and roads           | Mixed native species                | Noise and air pollution mitigation       | Acts as green buffer                                   |

Special attention has been given to slope stabilization and soil protection through plantation along embankments and drainage corridors to reduce erosion and surface runoff. Landscaped areas will also function as natural buffers between built-up zones and circulation areas, contributing to noise attenuation and improved environmental comfort for residents.

Irrigation of landscaped areas will be carried out through efficient water management practices, including controlled watering schedules and potential reuse of treated wastewater where feasible. The landscape design also incorporates provisions for long-term maintenance, ensuring sustainability and preservation of green spaces throughout the project lifecycle.

Overall, the landscaping plan for Karakoram Greens has been developed in accordance with CDA guidelines and environmental best practices, contributing significantly to ecological enhancement, aesthetic value, and improved quality of life within the residential community.

### **3.26. PLANTATION SPECIFICATIONS**

- ✎ Tree saplings shall be healthy, disease-free, and preferably 4–6 feet in height at the time of planting.

- ✕ Planting pits shall generally be 1 m × 1 m × 1 m for trees and appropriately sized for shrubs.
- ✕ Pits shall be filled with a mixture of topsoil, compost, and organic manure.
- ✕ Tree guards shall be installed where necessary to protect young plants.
- ✕ Mulching shall be applied around saplings to conserve moisture and suppress weeds.

### **3.27. IRRIGATION AND MAINTENANCE PLAN**

A dedicated maintenance program shall be implemented for a minimum period of three years after planting.

- ✕ Maintenance activities will include:
  - ✕ Regular watering, particularly during summer months.
  - ✕ Replacement of dead or damaged saplings.
  - ✕ Weeding and soil loosening.
  - ✕ Application of organic fertilizers and compost.
  - ✕ Pest and disease monitoring and treatment.
  - ✕ Pruning and shaping of trees and shrubs.
  - ✕ Inspection of tree guards and support structures.

### **3.28. SURVIVAL RATE AND MONITORING**

The project will maintain a minimum plantation survival rate of 80%. Monitoring will be conducted quarterly during the first year and biannually thereafter. Monitoring records will include:

- ✕ Number of saplings planted.
- ✕ Species-wise plantation details.
- ✕ Survival and mortality rates.
- ✕ Replacement plantation undertaken.
- ✕ Maintenance activities completed.

Any saplings that fail to survive shall be replaced during the next planting season to maintain the targeted plantation density and compensatory ratio.

### **3.29. IMPLEMENTATION SCHEDULE**

| Activity                        | Timeline                        |
|---------------------------------|---------------------------------|
| Site preparation                | Prior to plantation season      |
| Procurement of saplings         | Before planting campaign        |
| Plantation along boundaries     | Early construction phase        |
| Avenue and landscape plantation | During construction phase       |
| Park and open space plantation  | Prior to project completion     |
| Maintenance and monitoring      | Continuous for at least 3 years |

The proposed plantation plan will significantly enhance the environmental performance of the project by increasing green cover, improving ecological value, reducing dust and noise impacts, and creating a sustainable and aesthetically pleasing landscape for residents and visitors.

### **3.30. TIME SCHEDULE**

The development work of project will start after necessary approvals from CDA and environmental clearance from Pak EPA. The estimated time of development is three years.

### **3.31. CONSTRUCTION ASPECTS**

Various construction phase activities are briefed in the following sections.

#### **3.31.1. SITE PREPARATION**

Site preparation for the housing scheme will be carried out in a planned and systematic manner to create a stable and suitable base for subsequent development works. This will involve clearing of surface vegetation within the development footprint, removal of roots, organic matter, and unsuitable material from areas designated for roads, buildings, and utility corridors. Any isolated rocks, debris, or obstructions encountered on site will be removed, and resulting voids will be filled and compacted with suitable material to achieve the required ground stability. Earthworks will be undertaken to level the site in accordance with the approved layout plan, ensuring proper grading and formation levels. Adequate drainage arrangements will be provided during site preparation to safely manage storm water runoff, prevent waterlogging and erosion, and protect adjacent areas. Where

feasible, stripped topsoil will be stockpiled for later reuse in landscaping and green areas, thereby minimizing environmental disturbance and supporting sustainable site development.

### **3.31.2. CONTRACTOR'S ARRANGEMENTS**

As the Project is being considered as a state of art, so it is expected that Contractor will be selected through international contract bidding (ICB) and having the experience of construction of such type of quality and sophisticated projects.

### **3.31.3. LIST OF EQUIPMENTS**

Following equipment will be used during the project construction period.

**Table 3-10: List Of Equipment**

| <b>Equipment</b>      | <b>No.</b> | <b>Type</b> |
|-----------------------|------------|-------------|
| Plain Roller          | 2          | Mobile      |
| Grader                | 2          | Mobile      |
| Excavator/Jackhammer  | 3          | Mobile      |
| Dumper                | 6          | Mobile      |
| Water Bowzer          | 2          | Mobile      |
| Tractor with Blade    | 2          | Mobile      |
| Tractor with Trolley  | 2          | Mobile      |
| Generator 30 KV       | 3          | Stationary  |
| Block Factory         | 1          | Stationary  |
| Pipe Factory          | 1          | Stationary  |
| Concrete Plant        | 1          | Stationary  |
| Loader                | 1          | Mobile      |
| Transit Mixer         | 2          | Stationary  |
| Mixer Machine         | 4          | Stationary  |
| Bolan/Pickup/ Car     | 6          | Mobile      |
| Air Compressor        | 2          | Stationary  |
| Diesel Tank with Unit | 1          | Stationary  |
| Welding Plant         | 1          | Stationary  |
| Motorcycle            | 1          | Mobile      |

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*Note: The contractor shall be bound under the contract to employ the above equipment in order to ensure that the target completion date is met. The type and numbers of equipment or machinery could change or increase/decrease, subject to need.*

#### **3.31.4. CONSTRUCTION CAMPS**

Camp sites will be located keeping in view the availability of an adequate area for establishing camps, including parking areas for machinery, stores and workshops, access to communication and local markets, and an appropriate distance from the sensitive areas in the vicinity. Final locations will be selected by the contractor with the approval of site Engineer's in-charge. While deciding the site for location of camp, all the measures will be kept in mind.

#### **3.31.5. WORK FORCE**

The Project involves many construction activities like excavation, construction of roads, general amenities, waste treatment plants, storm water drainage system, and other miscellaneous infrastructure. It is expected that project will involve a large number of professional, technical, skilled, semi-skilled and unskilled manpower directly and indirectly.

The total number of crew, skilled and unskilled labor to be employed will depend on the Contractor's activity schedule at the time when the contract is awarded. The Contractor will be advised to hire the skilled and unskilled labor from the local communities.

#### **3.31.6. CONSTRUCTION MATERIAL**

Large quantities of construction materials will be required for the phased development of Gulberg Greens, as construction activities will be spread over an extended period. To support uninterrupted progress, a steady and reliable supply of construction materials will be ensured through locally available and established sources. The sourcing strategy has been planned to minimize transportation distances, reduce environmental disturbance, and utilize existing supply chains wherever possible.

Earth material will be required primarily for road embankments, leveling, and other filling works. Suitable earth fill material is available in the vicinity of the project area. As officially designated borrow areas are limited, contractors are expected to obtain earth material through short-term leasing of nearby private land. Prior to borrowing,

the topsoil layer will be carefully stripped and stockpiled. Upon completion of borrowing activities, the stockpiled topsoil will be reapplied to restore the land for agricultural or original use, thereby minimizing long-term environmental impacts.

Fine and coarse aggregates will be required for concrete works across the project. These materials will be sourced from existing and approved quarry sites, including well-established quarries located in Sargodha, Chiniot, and the Margalla Hills near Taxila. Contractors will procure aggregates through licensed sub-contractors who hold leases for these quarry areas. As these quarry sites are already operational and accessible via existing road networks, no new haul roads will be required, thereby avoiding additional land disturbance.

Cement will be used extensively for building construction and structural works. Adequate supplies are readily available from cement manufacturing plants located in Rawalpindi and Attock, ensuring timely procurement without logistical constraints. Similarly, steel required for reinforcement and structural components will be sourced from major suppliers and manufacturing units located in Islamabad, where availability is sufficient to meet project demands.

### **3.32. DECOMMISSIONING OF THE PROJECT**

The Karakoram Greens project is a long-term residential development designed to provide modern housing, commercial facilities, recreational spaces, and supporting infrastructure. Although the project is intended for long-term occupancy and operation, it is considered good environmental practice to establish a conceptual framework for eventual closure, redevelopment, or decommissioning. This framework outlines the environmental, social, health, and safety considerations that would be addressed should the project, or any of its components, reach the end of its operational life.

The objective of the Closure and Decommissioning Framework is to ensure that future decommissioning activities are conducted in a safe, environmentally responsible, and socially acceptable manner. The framework seeks to minimize adverse impacts on surrounding communities, natural resources, and public infrastructure while ensuring compliance with applicable environmental regulations and best management practices. By planning for closure at an early stage, the project can facilitate efficient resource recovery, proper waste management, and effective site restoration whenever decommissioning becomes necessary.

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### **3.32.1. OBJECTIVES OF DECOMMISSIONING**

The primary objective of decommissioning is to ensure that all closure-related activities are undertaken in a manner that protects public health, worker safety, and the surrounding environment. The process will aim to prevent environmental contamination, manage demolition activities responsibly, and reduce potential risks associated with dismantling structures and infrastructure.

Another important objective is to maximize the recovery and recycling of reusable materials while minimizing waste generation. Through proper planning and implementation, valuable construction materials can be salvaged and diverted from disposal facilities. The decommissioning process will also seek to restore the site to a safe, stable, and environmentally acceptable condition suitable for future redevelopment or alternative land use. Effective stakeholder engagement and communication will remain an integral component throughout the closure process to ensure transparency and address community concerns.

### **3.32.2. POTENTIAL TRIGGERS FOR DECOMMISSIONING**

Although Karakoram Greens is intended to operate over the long term, certain circumstances may necessitate partial or complete decommissioning of project facilities. Such circumstances may include the end of the structural design life of buildings, major redevelopment initiatives, changes in land-use planning requirements, or the need to replace aging infrastructure.

Decommissioning may also become necessary due to structural instability resulting from natural disasters such as earthquakes, floods, or other unforeseen events. Regulatory requirements, planning revisions, economic considerations, or permanent closure of specific facilities may further trigger demolition and reconstruction activities. In such cases, a detailed assessment would be conducted to determine the most appropriate closure strategy.

### **3.32.3. DECOMMISSIONING ACTIVITIES**

The decommissioning process would involve a series of carefully planned activities designed to ensure safe dismantling of structures and proper management of environmental and social impacts. These activities would be implemented in accordance with applicable regulations and industry best practices.

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### **3.33. PRELIMINARY ASSESSMENT**

Prior to the commencement of any decommissioning activities, a comprehensive site assessment would be undertaken to evaluate the structural condition of buildings, identify hazardous materials, locate utility connections and underground services, assess environmental liabilities, estimate waste quantities, and identify any potential contamination hotspots. This assessment would provide the basis for planning demolition activities and determining appropriate mitigation measures.

Based on the findings of the assessment, a site-specific Decommissioning Management Plan would be prepared. The plan would define demolition methodologies, waste management procedures, environmental controls, health and safety requirements, emergency response arrangements, and monitoring protocols to be followed throughout the closure process.

#### **3.33.1. UTILITY DISCONNECTION**

Before demolition activities begin, all utility services connected to the project facilities would be safely isolated and disconnected. These services may include electricity supply systems, water distribution networks, sewerage and drainage connections, telecommunication infrastructure, gas systems where applicable, and emergency power generation equipment.

The disconnection process would be coordinated with relevant utility providers and regulatory authorities to ensure that services are terminated safely and without disruption to neighboring developments. Proper verification procedures would be implemented to confirm that all systems have been isolated before demolition work commences.

#### **3.33.2. BUILDING DEMOLITION**

Building demolition would be carried out using approved techniques that minimize risks to workers, nearby residents, adjacent properties, and the environment. Depending on site conditions and future redevelopment requirements, demolition may involve mechanical methods, controlled dismantling, or selective demolition aimed at maximizing material recovery and reuse.

Throughout demolition activities, appropriate environmental controls would be implemented to manage dust, noise, vibration, and debris generation. Particular emphasis would be placed on maintaining safe working conditions and preventing

off-site impacts through the use of protective barriers, dust suppression systems, and controlled demolition procedures.

### **3.33.3. WASTE MANAGEMENT DURING DECOMMISSIONING**

Decommissioning activities are expected to generate substantial quantities of construction and demolition waste. Effective waste management will therefore be a critical component of the closure process. A comprehensive Waste Management Plan would be implemented to ensure that waste materials are properly identified, segregated, stored, transported, recycled, or disposed of in accordance with regulatory requirements.

Expected waste streams may include concrete and masonry debris, reinforcement steel, structural steel components, glass, timber products, plastics, electrical equipment, plumbing fixtures, insulation materials, packaging waste, excavated soil, and landscaping residues. Waste segregation at source would be encouraged to maximize recycling opportunities and reduce the volume of material requiring final disposal.

### **3.33.4. WASTE HIERARCHY**

Waste management activities would follow the internationally recognized waste hierarchy, prioritizing prevention, reuse, recycling, recovery, and disposal in that order. Wherever technically and economically feasible, reusable construction materials would be salvaged and redirected for future use. Recycling opportunities would be explored for metals, concrete, glass, plastics, and other recoverable materials to minimize environmental impacts and conserve natural resources.

### **3.33.5. HAZARDOUS MATERIALS MANAGEMENT**

Prior to demolition, a detailed hazardous materials survey would be conducted to identify substances that may pose risks to human health or the environment. Potential hazardous materials may include waste oils, lubricants, batteries, paint residues, chemical containers, cleaning agents, fuel storage residues, electronic waste, and electrical equipment containing hazardous substances.

Once identified, hazardous materials would be carefully removed, segregated, packaged, and stored in designated areas before transportation to licensed treatment, recycling, or disposal facilities. All handling procedures would comply with

applicable environmental regulations and occupational health and safety requirements to prevent accidental releases and exposure.

### **3.34. ENVIRONMENTAL IMPACT MANAGEMENT DURING CLOSURE**

Environmental management measures would be implemented throughout the decommissioning process to minimize adverse impacts on air quality, noise levels, water resources, soil quality, and surrounding communities.

#### **3.34.1. AIR QUALITY MANAGEMENT**

Demolition, excavation, and material handling activities have the potential to generate dust emissions that may affect nearby residents and workers. To control dust generation, water spraying systems would be used on demolition areas, access roads, and debris stockpiles. Stockpiled materials would be covered where necessary, and transportation vehicles carrying loose materials would be appropriately covered.

Additional measures may include limiting demolition activities during periods of high wind, implementing wheel-washing facilities at site exits, and conducting regular inspections to ensure the effectiveness of dust control measures.

#### **3.34.2. NOISE MANAGEMENT**

Demolition activities may result in elevated noise levels due to the operation of heavy machinery and equipment. To minimize disturbance to nearby communities, well-maintained equipment would be utilized and noisy activities would be restricted to designated daytime working hours wherever possible.

Temporary noise barriers may be installed in sensitive locations, and advance notification would be provided to nearby residents regarding major demolition activities. Continuous monitoring may also be undertaken to ensure compliance with applicable noise standards.

#### **3.34.3. WASTEWATER MANAGEMENT**

Temporary wastewater generated during decommissioning activities would be managed through approved drainage and sewerage systems. Appropriate controls would be implemented to prevent contamination of surface water and groundwater resources.

Under no circumstances would untreated wastewater be discharged onto open land, stormwater drains, or natural water bodies. Any wastewater requiring treatment would be managed in accordance with regulatory requirements before disposal.

#### **3.34.4. SOIL AND GROUNDWATER PROTECTION**

Measures would be implemented to prevent contamination of soil and groundwater from fuels, oils, chemicals, and demolition-related materials. Designated fueling and maintenance areas would be established where necessary, and secondary containment systems would be provided for fuel and chemical storage.

Spill response kits would be maintained on-site at all times, and personnel would be trained in spill prevention and emergency response procedures. Any accidental spills would be promptly contained, cleaned, and reported in accordance with established protocols.

#### **3.34.5. OCCUPATIONAL HEALTH AND SAFETY DURING DECOMMISSIONING**

A comprehensive Occupational Health and Safety (OHS) Plan would be developed and implemented to protect workers involved in closure and demolition activities. The plan would address potential hazards associated with demolition operations, material handling, equipment use, confined spaces, working at heights, and exposure to hazardous substances.

Key safety measures would include the mandatory use of personal protective equipment, implementation of demolition safety procedures, traffic management controls, emergency response arrangements, fall protection systems, and routine inspection and certification of equipment. All personnel would receive appropriate safety induction training and task-specific instruction before commencing work.

#### **3.34.6. COMMUNITY HEALTH AND SAFETY**

Protecting the health and safety of surrounding communities would remain a priority throughout the decommissioning process. Appropriate measures would be implemented to prevent unauthorized access to demolition areas and minimize risks associated with construction traffic, dust, noise, and debris.

These measures may include installation of secure site fencing, warning signage, controlled access points, traffic management plans, dust suppression systems, and

public communication programs. Stakeholders and nearby residents would be informed in advance regarding demolition schedules, expected disruptions, and available channels for submitting concerns or complaints.

### **3.35. SITE RESTORATION**

Upon completion of decommissioning activities, the site would be restored to a safe, stable, and environmentally acceptable condition. Restoration efforts would focus on removing all demolition debris, rehabilitating disturbed areas, and preparing the site for future use.

Site restoration activities may include grading and stabilization of land surfaces, rehabilitation of affected soils, reinstatement of drainage systems, landscaping, plantation of vegetation, and implementation of erosion control measures where necessary. The final restoration approach would depend on the intended future land use and applicable planning requirements.

### **3.36. FINANCIAL PROVISION AND RESPONSIBILITIES**

Adequate financial resources would be allocated prior to commencement of decommissioning activities to cover demolition costs, waste management, environmental monitoring, worker safety measures, hazardous material handling, and site restoration requirements. Proper budgeting would help ensure that closure activities can be completed effectively without compromising environmental or safety standards.

Responsibility for implementing decommissioning activities would rest with the property owner, management entity, or future developer, depending on ownership arrangements at the time of closure. The responsible party would be required to prepare a detailed Decommissioning Management Plan, obtain all necessary approvals, and ensure compliance with applicable legal and environmental obligations.

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## 4. DESCRIPTION OF BASELINE ENVIRONMENT

### **4.1. GENERAL**

This chapter presents the baseline environmental conditions of the Karakoram Greens project area, covering the existing physical, ecological, and socio-economic setting of both the Project Area and its surrounding zone of influence. The baseline profile has been developed through a combination of desk-based review of available secondary data, site reconnaissance visits to the project location in Gulberg Greens, and consultations with relevant government departments and local agencies. The information compiled provides an understanding of existing environmental conditions against which the potential impacts of the proposed development can be assessed.

### **4.2. PHYSICAL ENVIRONMENT**

Topography, geology, soil, water resources and climate have been included in physical environment as detailed below:

#### **4.2.1. TOPOGRAPHY**

The project site at Karakoram Greens is situated within the gently undulating terrain of the Potohar Plateau, a region characterized by natural variations in elevation and rolling topography. The site is generally flat to mildly sloping, with a gradual gradient descending toward the rear side where an old tributary of the Korang River is located. This natural slope facilitates surface drainage but also necessitates careful grading and leveling for development. Portions of the site have undergone cut-and-fill operations to achieve a buildable platform, resulting in localized variations in ground levels and soil consistency. The overall terrain is stable and suitable for high-rise development, with no abrupt escarpments or steep inclines, while the presence of low-lying areas near the tributary has been factored into the planning of drainage, landscaping, and foundation design. The topography, combined with open surroundings and visual access toward the river corridor, supports the project's planning concept of a spacious, green, and well-integrated residential environment.

#### **4.2.2. GEOLOGY**

Islamabad is located at the southern foothills of Margalla hill range. Geologically, the rocks in the Islamabad, range in age from Jurassic to Paleocene and are of sedimentary origin and comprises of sandstone, limestone and shale.

In the project area minor rocks fall on the escarpment side take place due to erosion of underlying shale beds. This phenomenon is prominent along the central ridge where the overlying sandstone beds dip at shallow angles. Project area is underlain by sedimentary rocks comprising limestone, sandstone, conglomerate, siltstone and clay of sedimentary origin, ranging in age from Miocene to Recent. Bedrock belonging to Murree formation of Miocene age and is exposed partly in the project area. The remaining area is mostly covered with alluvial soils generally comprising silty / lean clay. The thickness of the alluvial soils near rock outcrop is between 1-2 meters, while the soil deposits near streams are expected to be up to 6 meters thick. Sandstones represent deposits of levees, crevasse channels and splays, floodplain channels, and large sheet floods.

#### **4.2.3. SOIL**

The soil conditions at the Karakoram Greens site are characteristic of alluvial deposits typical of the Potohar Plateau. The subsurface profile consists of layered strata comprising silty clay, lean clay, silty sand, gravelly sand, and occasional sandstone bands at greater depths. The upper layers generally consist of silty clay and clayey soils with varying plasticity, underlain by dense to very dense sandy and gravelly strata that provide good bearing support. In several locations, fill material was observed near the surface, consisting of mixed soil with construction debris and variable compaction, particularly along the rear side near the old tributary. Below this, the natural soil strata become more competent, with stiff to hard clays and dense sand layers exhibiting favorable engineering properties. The soil profile reflects non-uniformity both vertically and laterally, which is typical of fluvial deposits, and has been confirmed through extensive borehole drilling and laboratory testing. Overall, the subsurface conditions are suitable for high-rise development, subject to appropriate foundation design and ground improvement measures where required.

#### **4.2.4. SEISMICITY**

The Karakoram Greens project area lies within Seismic Zone 2B, which represents a region of moderate seismic activity as defined under national and international seismic zoning classifications. The site is located within the broader tectonic setting

of the Potohar Plateau, influenced by the Main Boundary Thrust system that separates the Himalayan and Sub-Himalayan geological provinces. Geotechnical investigations conducted for the project confirm that the area is subject to moderate ground shaking potential, with a seismic zone factor (Z) of 0.20 and soil profile classified as Type SD. This soil condition indicates medium-stiff ground, which can amplify seismic waves to a certain extent but remains suitable for engineered construction when appropriate design measures are applied. Based on the site-specific geotechnical assessment, the seismic response parameters have been incorporated into the structural design to ensure compliance with applicable building codes, including provisions for lateral load resistance and foundation stability. Overall, while the area is not located in a high-risk seismic zone, earthquake-resistant design considerations are essential and have been duly integrated into the planning and engineering of the Karakoram Greens development.

### **4.3. WATER RESOURCES**

#### **4.3.1. SURFACE WATER**

The surface water regime of the Karakoram Greens project area is primarily influenced by the presence of an old tributary of the Korang River located along the rear boundary of the site. This tributary is largely non-perennial in nature and remains dry for most of the year, carrying surface runoff only during periods of intense rainfall or monsoon events. No permanent surface water bodies, streams, or natural drains exist within the core project footprint. Field observations indicate that surface drainage across the site generally follows the natural topographic gradient, gently sloping toward the tributary corridor. At present, there is no evidence of active flooding or sustained surface water accumulation; however, localized erosion has been observed along the banks of the tributary due to seasonal runoff. The absence of standing surface water reduces the risk of waterlogging, although appropriate drainage management has been incorporated into the project design to safely convey stormwater and prevent erosion during heavy rainfall events. Overall, surface water conditions at the site are typical of the Gulberg Greens area and are considered manageable with standard engineering and drainage controls.

#### **4.3.2. GROUNDWATER**

The groundwater conditions at the Karakoram Greens project site are typical of the Gulberg Greens and Potohar Plateau region. Groundwater is not encountered at

shallow depths; however, perched water tables were observed at certain locations during geotechnical investigations, particularly between depths of approximately 25 to 40 feet. This perched groundwater is mainly attributed to localized seepage and the presence of less permeable soil layers that restrict vertical percolation. No continuous or pressurized aquifer was encountered during drilling activities, and free-standing water was not observed during borehole excavation, although minor seepage appeared after completion of drilling in some locations. Seasonal variation in groundwater levels is expected, particularly during the monsoon period, when temporary rise in moisture content may occur. Laboratory analysis of groundwater samples indicates that the water quality is non-aggressive, with low chloride and sulphate concentrations, making it suitable for construction purposes. Overall, groundwater conditions do not pose a constraint to development, provided that appropriate drainage, dewatering provisions, and foundation design measures are incorporated to manage seasonal fluctuations and localized seepage.

In the project area the groundwater samples were collected and analysed by Green Crescent Islamabad. [See Annexure-A](#) for detail laboratory results. The water sample tested for different parameters and the sample was safe for drinking.

#### **4.4. CLIMATIC CONDITIONS**

The climate of the region is characterized by four distinct seasons: the summer season from April to June; the monsoon season from July to mid-September; the post-monsoon season from mid-September to November; and the winter season from December to March. June is typically the hottest month, while January is the coldest.

##### **Temperature:**

Meteorological data from the Islamabad Airport climate station indicates that mean monthly temperatures in the project area range from approximately 14.1°C in January to 28.6°C in June. During the winter months, particularly in December and January, minimum temperatures occasionally fall below the freezing point. Historically, the highest maximum temperature recorded in Islamabad is 46.1°C (June), while the lowest temperature recorded is -4°C (December-January).

##### **Humidity and Rainfall:**

The area experiences two major rainfall periods: the monsoon season (July to September) and the winter precipitation period (December to April). The majority of monsoon rainfall occurs in July and August, with long-term average values of 267

mm and 309 mm respectively. The highest monthly rainfall ever recorded in the region is 743 mm in July, while the maximum annual precipitation reported for Islamabad is 1,735 mm. Relative humidity levels remain fairly high throughout the year, particularly during the monsoon months.

#### **Wind Direction and Speed:**

Wind behavior across Islamabad shows no single prevailing direction during morning hours, with flow patterns distributed relatively evenly throughout the year. Westerly and north-westerly winds dominate during winter and spring, whereas southerly and south-easterly winds prevail in summer and monsoon months. Estate planning incorporates these wind patterns to promote optimum natural ventilation and fresh air circulation. Wind speeds are generally low during winter, gradually intensifying in spring and reaching their peak during the summer months. The maximum wind speed recorded in June is 90 knots. Seasonal variations show that May, June, and July tend to be the windiest months, while autumn and early winter experience calmer wind conditions.

### **4.5. EXISTING BASELINE ENVIRONMENTAL CONDITION**

Baseline environmental quality monitoring for the Karakoram Greens, Gulberg Green, Islamabad was undertaken to establish existing conditions prior to commencement of project activities. The environmental analysis was conducted during 14-19 December 2025, comprising groundwater sampling, 24-hour ambient air quality monitoring, and day- and night-time noise level measurements at representative locations within the project area. Laboratory analysis of groundwater samples was subsequently completed and reported on 19 December 2025. The monitoring and analytical work was carried out in accordance with recognized APHA methods and assessed against the National Environmental Quality Standards (NEQS) to provide a reliable and compliant baseline for the Environmental Impact Assessment and Environmental Management Plan.

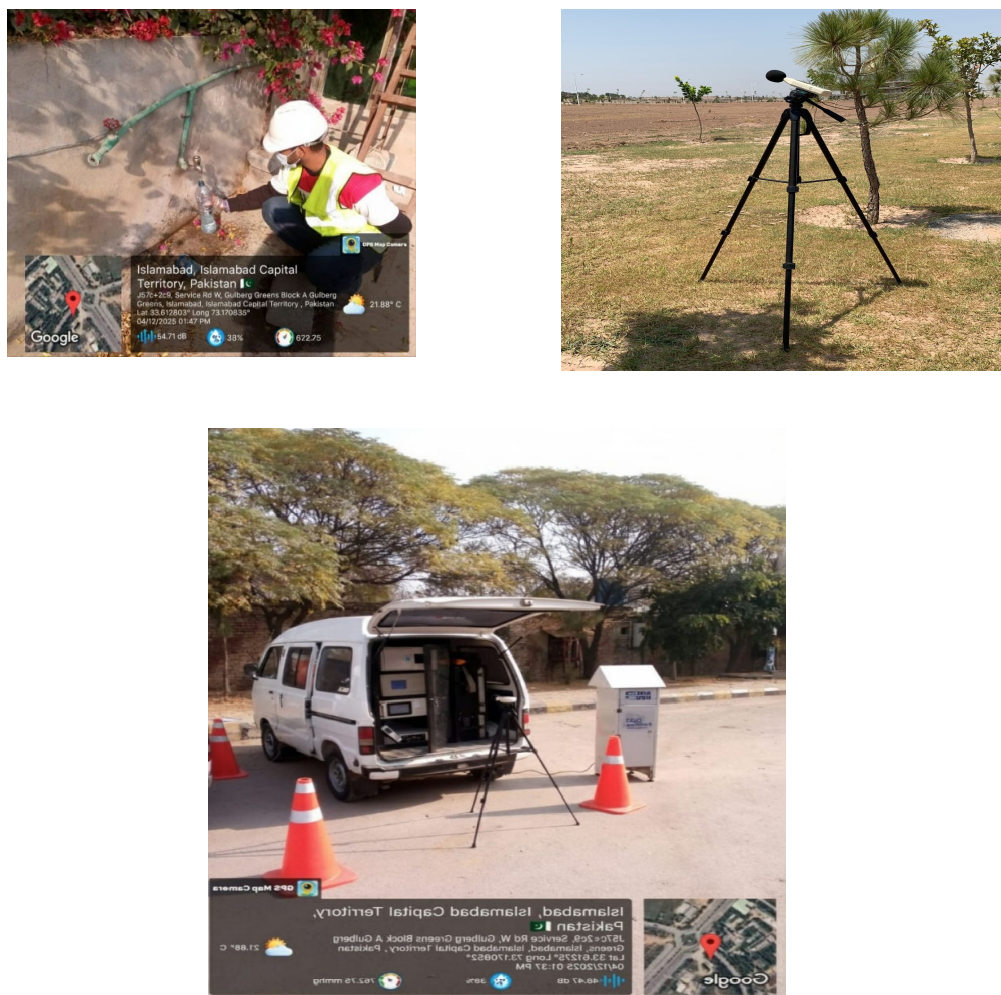
#### **4.5.1. WATER QUALITY**

Groundwater quality at the Karakoram Greens project site was assessed through laboratory analysis carried out by Green Crescent Environmental Consultants as part of the environmental monitoring program. The results indicate that the groundwater

is generally of good quality and falls within the permissible limits prescribed under the National Environmental Quality Standards (NEQS). The measured pH value of 7.29 reflects neutral to slightly alkaline conditions, which is acceptable for both domestic and construction use. Total Dissolved Solids (TDS) were recorded at 512 mg/L, remaining well below the permissible limit of 1,000 mg/L, indicating low salinity and good overall water quality. Major ions such as chlorides (56.37 mg/L), sulphates (20.02 mg/L), nitrates (0.01 mg/L), and fluorides (<0.01 mg/L) were all within acceptable limits, confirming the absence of chemical contamination. Heavy metals including lead, chromium, cadmium, nickel, arsenic, and mercury were either below detection limits or present in negligible concentrations, posing no environmental or health concern. Microbiological analysis further confirmed the absence of total coliforms and *E. coli*, indicating that the groundwater is free from biological contamination. Overall, the groundwater quality at the site is suitable for construction activities and general use, with no indication of pollution or chemical aggressiveness that could affect structural integrity or public health.

#### **4.5.2. AMBIENT AIR QUALITY**

Ambient air quality monitoring was conducted at the Karakoram Greens project site to assess baseline air conditions prior to development activities. The monitoring results indicate that ambient air quality in the area is generally within the permissible limits prescribed under the National Environmental Quality Standards (NEQS). Concentrations of key pollutants, including particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), nitrogen dioxide (NO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), sulphur dioxide (SO<sub>2</sub>), carbon monoxide (CO), and ozone (O<sub>3</sub>), were measured over a 24-hour period. The recorded average values for PM<sub>10</sub> and PM<sub>2.5</sub> were 188.91 µg/m<sup>3</sup> and 136.09 µg/m<sup>3</sup> respectively, which, although elevated due to prevailing construction activity and vehicular movement in the area, remained within the allowable limits for urban environments. Gaseous pollutants such as SO<sub>2</sub> (18.62 µg/m<sup>3</sup>), NO<sub>2</sub> (23.83 µg/m<sup>3</sup>), and CO (2.46 mg/m<sup>3</sup>) were well below NEQS thresholds, indicating no significant combustion-related air quality concerns. Overall, the ambient air quality of the project area reflects typical conditions of a developing urban zone and does not pose any immediate environmental or public health risk, provided that standard dust suppression and emission control measures are implemented during construction.



**Figure 4-1: Recording of Environmental Baseline**

#### **4.5.3. NOISE LEVEL**

Noise level monitoring was carried out at the Karakoram Greens project site to establish baseline acoustic conditions. Measurements were conducted over a 24-hour period covering both daytime and nighttime hours. The recorded nighttime noise levels ranged between 40.3 dB(A) and 53.0 dB(A), with an average value of approximately 46.35 dB(A), which falls within the NEQS permissible limit of 45 dB(A) for residential areas. Daytime noise levels ranged from 50.6 dB(A) to 61.4 dB(A), with an average value of 57.81 dB(A), slightly above the prescribed residential limit of 55 dB(A). The elevated daytime levels are attributed to routine vehicular movement, nearby construction activity, and general urban activity in the Gulberg Greens area. Overall, the noise environment reflects typical conditions of a developing residential zone and does not indicate excessive or abnormal noise exposure. With appropriate construction management measures such as controlled

working hours, equipment maintenance, and noise barriers where required, noise impacts during project implementation can be effectively managed.

#### **4.6. ECOLOGICAL ENVIRONMENT**

In this section, the baseline environmental conditions pertaining to biological environment have been described on the basis of primary and the secondary data. An initial reconnaissance of the project area was carried out followed by a detailed biological survey by ecological experts.

##### **4.6.1. FLORA**

The project area and its surroundings are devoid of any significant flora. The common vegetation includes kao (Wild olive), phulai (Acacia modesta), Sanatha (Dodonaea viscosa), Shisham (Dalbergia sissoo), toot (Morus Alba) and paper mulberry.



FIGURE 4-2: ACCACIA NOLITICA



FIGURE 4-3: PARATHENIUM



FIGURE 4-4: CALOTROPIS PROCERA



FIGURE 4-5: CANNABIS SATIVA

There are a number of species of shrubs and grasses are common in the area including *Cenchrus Cilliris* (Dhaman), *Cannabis Sativa* (Hemp), *P. Julifora* (Meskeet) and *Parathenium*.

#### 4.6.2. **FAUNA**

Islamabad and the surrounding Margalla Hills support a rich diversity of wildlife due to their varied natural habitats, including dry subtropical forests, rocky slopes, grasslands, and seasonal streams. These ecosystems provide shelter for numerous mammals, birds, reptiles, and smaller fauna, making the region an important ecological corridor in the Potohar Plateau.

Mammals commonly found in the area include the Indian Pangolin (*Manis crassicaudata*), Golden Jackal (*Canis aureus*), Wild Boar (*Sus scrofa*), Porcupine (*Hystrix indica*), Fox (*Vulpes vulpes*), and different mongoose species. Rhesus Macaques (*Macaca mulatta*) are frequently seen around recreational sites, while the Common Leopard (*Panthera pardus*) is occasionally reported from deeper forested zones of the Margalla Hills.



FIGURE 4-6 DOMESTIC CAT



FIGURE 4-7: LOCAL DOG

Avifauna is one of the most prominent features of Islamabad's biodiversity. The area hosts a wide range of resident and migratory bird species such as Peafowl (*Pavo cristatus*), Bulbuls (*Pycnonotus leucotis*), kites, doves, and woodpeckers. Seasonal migrants traveling along the Indus Flyway significantly increase bird diversity during winter, particularly around Rawal Lake, nurseries, and riparian green belts.

**FIGURE 4-8: HAWK****FIGURE 4-9: MOUNTAIN CROW****FIGURE 4-10: BULBUL****FIGURE 4-11: MYNA****FIGURE 4-12: HOUSE SPARROW****FIGURE 4-13: WHITE CHEEKED BULBUL**

Reptiles such as lizards, geckos, cobras and vipers, as well as amphibians thriving in monsoon-fed water bodies, contribute to ecosystem balance by supporting pest control and maintaining the natural food chain. Freshwater turtles, native fish, and water birds inhabit the Nullahs and wetlands, benefiting from reed-covered stream banks and marshy zones.

However, habitat fragmentation, urban expansion, pollution, and increasing recreational pressure are posing threats to native fauna. Conservation efforts led by the Islamabad Wildlife Management Board and protected status of the Margalla Hills National Park are vital for maintaining biodiversity and ensuring sustainable coexistence between wildlife and human communities in the capita

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#### **4.7. SOCIO-ECONOMIC AND CULTURAL ENVIRONMENT**

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This section describes the socio-economic and cultural environment of the project area. It presents information on the pertinent socio-economic parameters of the area and includes inter alia its location, major settlements, religious and cultural heritage sites, and economy and lifestyle of the people residing within and in the close proximity of the project sites. The baseline environmental conditions pertaining to socio-economic and cultural environment have been described using the secondary and the primary data. The secondary data were obtained either from published sources or from various departments while the primary data were obtained through surveys conducted in the project area. The information was collected with the purpose of obtaining a clear and complete understanding of the socio-economic conditions of the local residents, assess the vulnerability of the local communities and identify the concerns of local residents regarding the proposed project activities. These baseline environmental conditions have subsequently been used to identify the potential impacts on socio-economic environment that are likely to arise from the project activities. In addition, the mitigation measures that need to be adopted to reduce or minimize these impacts have also been spelled out.

#### **4.8. HISTORY AND BACKGROUND**

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Islamabad was developed during the 1960's as the new federal capital of the country in place of Karachi. The Site Selection Commission was formed in February 1959 and in June 1959 the Government accepted the recommendations of the commission. In September 1959, the Federal Capital commission was formed to produce a master plan. The master plan was prepared in October 1960 which demarcated the site for successive stages of development, in relation with the surrounding areas, and division into various sectors. On May 24, 1960 preliminary master programme and master plan designed by the consultant were presented to the Government. After a meeting of the federal cabinet on Shakar-parian Hills, formal approval of the plan was accorded. Capital Development Authority (CDA) came into being on June 14, 1960 under the CDA Ordinance 1960 and ground breaking finally took place in October, 1961.

Since its inception, Islamabad has undergone phenomenal development. During the early years, it was a small, quiet city with minimal commercial or business activity. However in the recent years, business activities have significantly increased and today Islamabad, apart from being the federal capital, is a city active economically, commercially as well as industrially.

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#### **4.8.1. POPULATION AND DEMOGRAPHICS**

Islamabad has a rapidly growing and diverse population that includes government officials, business professionals, expatriates, diplomats, and internal migrants from all parts of Pakistan. As the seat of federal institutions, the city attracts a highly educated and skilled workforce. Literacy rates are significantly higher than national averages, and a large portion of the population is engaged in formal sector employment.

#### **4.8.2. ECONOMY AND LIVELIHOODS**

The city's economy is driven primarily by the public sector, with a large number of people employed in federal ministries, national organizations, development agencies, and foreign missions. Alongside government employment, private sector activities have expanded considerably, including banking, real estate development, information technology, education, hospitality, and retail businesses. Small-scale commercial enterprises and service-based professions contribute to local livelihoods, while nearby rural peripheries maintain segments of the workforce engaged in agriculture, livestock rearing, and small-scale trading.

Islamabad-Rawalpindi together form a major economic hub, where Islamabad provides the formal administrative structure and Rawalpindi complements it through trade, industrial production, defense services, and labor markets. Institutional Facilities

#### **4.8.3. EDUCATION, HEALTH, AND SOCIAL SERVICES**

Islamabad has a well-developed network of educational institutions, including top-tier universities, research centers, schools, and training academies. The city also hosts a range of advanced public and private healthcare facilities, placing it among the best serviced regions of Pakistan in terms of medical infrastructure.

Access to basic amenities clean drinking water, electricity, sanitation, transportation, and telecommunication is generally better relative to other parts of the country, although challenges persist in informal settlements and suburban areas.

#### **4.8.4. CULTURAL AND SOCIAL CHARACTERISTICS**

Culturally, Islamabad is a cosmopolitan city influenced by diverse ethnic groups residing here Punjabi, Pashtun, Kashmiri, Hazara, Sindhi, Baloch, and others. The

city maintains a relatively peaceful social environment, characterized by law-abiding communities, strong administrative oversight, and a high priority on public safety due to its political significance.

Islamabad celebrates national cultural values through museums, art galleries, literary events, and theaters, while also reflecting contemporary and global lifestyles. Despite its modern character, traditional norms rooted in religion and local customs remain strong and influence community life, family structure, and social behavior.

#### **4.8.5. HOUSING, URBAN DEVELOPMENT, AND LIFESTYLE**

Urban development in Islamabad follows a sector-based planning model with organized residential, commercial, and green spaces. The city is known for its aesthetically designed avenues, parks, and recreational areas, such as Daman-e-Koh, Rawal Lake, Shakarparian, and the Margalla Trails, which contribute to a high quality of life.

However, rapid urbanization has also led to rising property prices, expansion of informal settlements, and increased social disparities between high-income residents and low-income communities, including migrant laborers and domestic workers.

#### **4.8.6. HERITAGE AND TOURISM**

Islamabad is a city with a lot of green and open spaces. Green belts and buffer zones are provided along the main arteries. The city is filled with parks, botanical and flower gardens. These factors make the city one the greenest cities of the world.

## 5. PUBLIC CONSULTATION

### **5.1. GENERAL**

Public consultation is a systematic process which provides an opportunity for citizens, planners, managers and elected representatives to share their experience, knowledge and concerns and perceptions about the proposed Project. The objectives of the public consultation are as follows:

- ✎ Share information with stakeholders on proposed improvement works and expected impact on the socio-economic environment of the Project Area.
- ✎ Understand stakeholders concerns regarding various aspects of the Project, including the existing condition of the Project Area, upgrade requirements, and the likely impact of construction related activities and operation of the Project.

In order to meet the above mentioned objectives, at different locations, consultations including scoping sessions and focus group discussions were held. During consultations with the local community, main contents of the project were shared with community; they expressed their apprehensions about the Project in detail.

### **5.2. CONSULTATION WITH STAKEHOLDERS**

The consultations were also held with Pak-EPA, Administration, ICT, Forest Department, Tourism Department, and Health Department, Contracts, Project designers/Developers (UPDL), Project Proponent (IBECHS) etc.

#### **5.2.1. CAPITAL DEVELOPMENT AUTHORITY (CDA) OFFICIALS**

Consultative meetings were held with relevant stakeholders to review the proposed Karakoram Greens development, its design features, construction activities, and the potential environmental and social implications associated with the project. These discussions provided an important platform for sharing project information, receiving technical input, and identifying key concerns that needed to be addressed through the Environmental Impact Assessment (EIA) and subsequent management measures.

During the consultations, stakeholders emphasized that environmental protection should remain a central consideration throughout all phases of project implementation. Particular concern was raised regarding the management of solid and liquid waste, as existing disposal practices in the surrounding area are already placing pressure on

land and water resources. Stakeholders stressed the need for a comprehensive Waste Management Plan encompassing waste segregation, collection, treatment, and safe disposal to prevent soil and groundwater contamination during both construction and operational stages.

The importance of a well-designed Plantation and Landscape Plan was also highlighted. Stakeholders recommended the use of native and climate-appropriate plant species to enhance green cover, minimize soil erosion, and support local biodiversity. Landscaping was viewed not only as an aesthetic requirement but also as a key environmental safeguard contributing to long-term ecological sustainability.

In addition, stakeholders strongly supported the integration of gender-inclusive practices within the project. They recommended meaningful involvement of women from nearby communities in employment opportunities related to plantation activities, landscaping, site maintenance, and community engagement. Such measures were considered important for promoting local livelihoods, social inclusion, and equitable benefit sharing.

All feedback received through these stakeholder consultations has been incorporated into the project planning process, and the relevant mitigation and enhancement measures have been reflected in the Environmental Management Plan (EMP) to ensure environmentally responsible and socially responsive implementation of the Karakoram Greens project.

### **5.3. CONSULTATION WITH COMMUNITY**

Consultations were held with community representatives from the neighboring villages of Moza Darwala, Moza Koral, Pagh, Bora Bangial, and Gora Sardar to understand local perceptions and gather feedback on the proposed Karakoram Greens development. Overall, the community members expressed a positive outlook toward the project and acknowledged its potential to improve the area; however, they also highlighted several concerns that need to be addressed during project implementation.

The community noted that noise generated from construction machinery and increased vehicular movement could cause disturbance, particularly during peak construction periods. Concerns were also raised regarding restricted mobility and access for local residents due to construction activities and traffic diversions. Residents expressed apprehension about potential security issues, including theft and unauthorized access, during the construction phase. Dust generation was identified as a major health

concern, especially for vulnerable groups such as children and the elderly. Additionally, the community emphasized the need for proper solid waste management to avoid environmental degradation. They further recommended that the developer incorporate rainwater harvesting measures to promote sustainable water use and ensure plantation of trees along drainage channels and embankments to control soil erosion and enhance the local environment.

### **5.3.1. MAJOR FINDINGS OF PUBLIC CONSULTATIONS:**

During stakeholder interactions, local residents shared a balanced set of concerns and expectations regarding the ongoing development activities. A primary issue repeatedly highlighted by the community was dust pollution arising from excavation, earth movement, and vehicle traffic. Residents mentioned that they had already communicated this concern to Gulberg authorities and urged the project team to implement effective dust-control measures to safeguard public health.

On the positive side, the community acknowledged that no significant loss of natural vegetation had occurred since the area was largely barren. This was perceived as a favorable environmental outcome, reducing concerns related to deforestation or habitat disturbance. Residents also expressed optimism regarding the employment opportunities generated during the construction phase. Large numbers of local people were hired for skilled, semi-skilled, and unskilled labor roles, and the community is hopeful that additional jobs will be available during future expansion and operational phases, including more stable long-term employment.

Overall, the community response reflects a mix of practical concerns and strong support for the project's socioeconomic benefits. Their feedback has been incorporated into the Environmental Management Plan (EMP) to ensure that local wellbeing, safety, and environmental quality remain key priorities throughout the project lifecycle

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## 6. SCREENING OF POTENTIAL ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

### **6.1. GENERAL**

This chapter identifies the potential impacts due to the implementation of the proposed project on the physical, ecological and socio-cultural environment of the Project Area. The chapter also identifies measures that will help to mitigate the Project's adverse environmental effects and enhance the positive impacts.

### **6.2. APPROACH ADOPTED FOR IMPACT IDENTIFICATION**

This section presents a systematic screening of the potential environmental and social impacts associated with the construction and operation of the Karakoram Greens development. The assessment has been carried out in accordance with the Pakistan Environmental Protection Act (PEPA) 1997, Pakistan Environmental Protection Agency (Review of IEE & EIA) Regulations, and standard environmental impact assessment practices.

The screening process evaluates potential impacts on the **physical, biological, and socio-economic environment**, considering the nature, scale, and duration of project activities during both construction and operational phases. Appropriate mitigation measures have been identified to avoid, minimize, or manage adverse impacts and to enhance positive outcomes. These measures will be further detailed in the Environmental Management Plan (EMP).

### **6.3. IMPACTS DURING PROJECT DESIGN & PRE CONSTRUCTION PHASE**

#### **6.3.1. PHYSICAL ENVIRONMENT**

Following is the description of the impacts envisaged during the design & pre-construction phase of the project:

##### **6.3.1.1. TOPOGRAPHY**

- ✎ Topography of the area will change, due to the construction of the Project related infrastructure, such as roads, sewerage network and infrastructure. Generally, slopes in the area are mild.
- ✎ The sites selected for the development of the Karakoram Greens are mostly flat pieces of land available in the area. However, slight trimming of the land may be required during development and cut and fill procedure will be followed. Therefore, there will not be any significant adverse impact on the topography of the area.

### **Mitigation Measures**

- ✎ To minimize adverse impacts on the natural terrain, the development should be designed to follow existing land contours wherever feasible. This can be achieved by adopting suitable layout planning, selecting appropriate road alignments, and limiting excessive excavation or filling. Where land modification becomes unavoidable, the extent of leveling and cutting should be reduced, and engineered slopes should be stabilized using retaining structures, turfing, and vegetation cover to prevent erosion and visual scarring of the landscape.
- ✎ Furthermore, maintaining the **natural drainage pattern** of the area is essential to avoid disruptions to surface runoff and groundwater recharge. The design of stormwater channels, culverts, and embankments should ensure that natural water flow paths are preserved or appropriately diverted without causing stagnation, flooding, or erosion. Silt traps and sedimentation ponds may be installed during construction to prevent soil from washing into streams or depressions. Regular monitoring during construction will help ensure that drainage systems remain functional and free from blockage.
- ✎ By applying these measures throughout the planning and implementation stages, the project will help safeguard landform integrity, reduce environmental risks, and maintain the aesthetic quality of the area's landscape.

### **6.3.2. ECOLOGICAL ENVIRONMENT**

Project Area particularly along roads contains good vegetative cover. Provision of new facilities may require clearing of vegetative cover that are present in spaces and this will cause an adverse environmental impact on the existing vegetation.

### **Mitigation Measures**

To offset the loss of vegetation during site development, a comprehensive and well-planned tree plantation and landscaping program will be implemented

alongside construction activities. Native and drought-resistant species should be prioritized to ensure better survival rates and support local biodiversity. Plantation will be carried out within designated green spaces such as proposed parks, along both existing and planned road corridors, and on the embankments of drainage channels (nullahs), where vegetation will also help stabilize soil and reduce erosion.

Prior to site clearing, vegetation surveys will be conducted to identify and retain mature or ecologically valuable trees wherever possible. Any unavoidable removal of trees will be compensated through a defined replacement ratio, ensuring that the total green cover is enhanced rather than reduced. Plantation schedules should align with suitable climatic conditions preferably during the monsoon season to maximize healthy establishment. Post-plantation care, including watering, mulching, and protection from grazing, must be ensured through a structured maintenance plan.

### **6.3.3. SOCIO-CULTURAL ENVIRONMENT**

One of the key environmental and social considerations associated with the siting of the proposed project facilities, to be addressed at the design stage prior to commencement of construction activities, relates to land acquisition.

Based on the assessment of the proposed project footprint and layout, it is anticipated that no existing physical infrastructure, including roads, utilities, or public service facilities, will be disrupted as a result of the proposed development activities.

Furthermore, the proposed project activities are not expected to affect any religious or culturally significant properties within or adjacent to the project area. No mosques, graveyards, shrines, or other sites of religious or cultural importance have been identified within the project footprint, and therefore, no adverse impacts on religious assets are anticipated during the design, construction, or operational phases of the project.

#### **Mitigation Measures**

Utmost efforts shall be made to minimize land acquisition through appropriate design optimization and efficient land-use planning. Where land acquisition is unavoidable, fair and timely compensation shall be provided to the affected landowners at prevailing market rates, in accordance with applicable laws and

regulatory requirements. For this purpose, a Land Acquisition Committee shall be constituted in consultation with potential Project Affected Persons (PAPs) to ensure transparency, stakeholder participation, and equitable decision-making throughout the acquisition and compensation process.

## **6.4. IMPACTS DURING CONSTRUCTION PHASE**

### **6.4.1. CONTRACTING ARRANGEMENTS**

The success of a construction project depends to a very large degree on selection of an experienced construction contractor who possesses the necessary expertise, has machinery and equipment, and has access to sufficient financial resources, in addition to a reliable, experienced workforce.

#### **Mitigation Measures**

- ✗ The contractor was selected by the proponent through a rigorous screening process, in accordance with relevant government procurement procedures.
- ✗ The selection criteria ensured the contractor has a strong track record, relevant technical experience, and the capacity to deliver the project within the required timeframe while adhering to environmental safeguards.
- ✗ Any additional contractors required for future phases of construction will be hired using the same transparent and compliant procedure.
- ✗ At peak construction activity, an estimated workforce of around 500 personnel will be engaged at the project site.
- ✗ Skilled and semi-skilled staff will include:
  - ✓ Project Management & Supervisory Staff: Project Manager, Engineers, Quantity Surveyor, Surveyors
  - ✓ Technical Staff: AutoCAD Operator, Lab Technician, Machinery Operators
  - ✓ Administrative & Support Staff: Accountant, Storekeepers, Drivers, Security Guards, Cooks
  - ✓ Construction Crew: Masons, Carpenters, Steel Fixers, General Labourers, Helpers
- ✗ The contractor has been instructed to hire maximum local labour to enhance livelihood opportunities for surrounding communities, while also providing them with on-the-job training and technical skills development.

- ✕ As the majority of workers are from nearby areas, no construction camp has been established at the project site to date, minimizing associated land-use and environmental impacts.

#### **6.4.2. CONSTRUCTION MATERIALS**

Procurement of construction materials and knowing beforehand about the sources and quantities required is another major factor vital for the success of a construction project.

##### **Mitigation Measures**

- ✕ Construction materials (cement, sand, aggregates/crush, bricks, steel bars, paints, asphalt, tar, glass, etc.) will be transported to the site only on a need-basis to reduce stockpiling, wastage, and dust.
- ✕ Preference will be given to environment-friendly and fire-resistant materials, in alignment with green building standards, where such products are available and cost-effective.
- ✕ Quarry materials that meet the required quality and technical specifications will be sourced from the nearest licensed quarry to minimize transportation costs and reduce vehicle emissions.
- ✕ Cement and other bulk materials will be procured directly from certified manufacturers or authorised agents to ensure authenticity and compliance with standards.
- ✕ All construction materials will be tested before use and will require prior approval from the Project Manager to maintain quality assurance.
- ✕ Noise-absorbent materials will be considered for use in relevant locations, subject to market availability and cost-effectiveness.
- ✕ Sourcing materials from the nearest vendors will help lower environmental footprint, reduce travel distances, and minimize disturbance to local communities.

#### **6.4.3. OTHER SUPPLIES**

Projects do not require construction materials alone and acquisition of other supplies well in time is as important as procuring sand and cement.

##### **Mitigation Measures**

- ✕ The primary resources required during construction include water, fuel, electricity, and standard construction consumables.

- ✂ Water demand will vary with the pace of construction activities; peak usage is estimated at approximately 5,000 gallons per hour.
- ✂ Recent hydrogeological studies show that Islamabad's groundwater resources are under increasing stress. According to a 2023 assessment by PCRWR, while aquifer recharge potential remains present, rising demand and drawdown have caused notable lowering of the water table over recent decades.
- ✂ Moreover, a 2025 water-quality study highlighted spatial variability in drinking-water quality and localized contamination risks, suggesting that groundwater availability and safety cannot be taken for granted across the board.
- ✂ Diesel and petroleum fuels for machinery and vehicles will be sourced from nearby fuel stations, with peak consumption expected at around 5000 liters per day.
- ✂ A temporary grid electricity connection has been secured from the local utility company and will be supplemented by diesel generators to ensure uninterrupted power supply.
- ✂ Construction management will ensure timely procurement and consistent availability of all required supplies to prevent work delays and avoid inconvenience to the workforce.

#### **6.4.4. VEHICLES AND EQUIPMENT**

Vehicles and equipment deployed at a project must be in good condition and not become detrimental to the local environment in terms of noise and emissions. These must also be of good quality to ensure there are no breakdowns that can disrupt the process of project implementation.

##### **Mitigation Measures**

The contractor has been directed by the proponents to take all possible measures to see that works do not impinge on the environment. Construction vehicles and equipment at the project site. The exact number of vehicles and equipment in use at the site at any given time will vary according to work schedules and work momentum, and shall be bound by traffic regimes within the city. The contractor shall be advised to use new vehicles, machinery and equipment to maintain emissions and noise at lowest possible levels. During early phase of construction, two or three truckloads of different types of construction material shall be delivered to project site per day, increasing to about five to eight at peak of construction activity. Arrival timing of such equipment and construction materials will not be concurrent and shall take place when there is minimal disturbance for local population. In any case, Islamabad

Capital Territory's commercial traffic regime forbids entry of trucks during daylight hours on working days without a permit, more recently due to security concerns.

#### **6.4.5. EMISSIONS AND DISCHARGES**

Construction equipment and vehicles can discharge exhaust emissions containing CO<sub>2</sub>, CO, NO<sub>x</sub>, SO<sub>2</sub>, and particulate matter and generate dust emissions from earthwork. The primary source of emissions to air during construction activities will be diesel engine-driven generator exhaust. Other emission sources include construction machinery and project vehicles. Dust from construction activities and movement of vehicles could be another main source of air emissions.

##### **Mitigation Measures**

Since vehicles and equipment in use shall be in good working condition and under due maintenance, as per instructions to construction contractor from the proponents, emissions shall be within acceptable limits, as is evident from environmental testing carried out at the project site at a time when work was in progress. The proponents shall monitor pollution levels regularly and instruct contractors to cover the perimeter with cordons to minimise dust pollution and sprinkle the grounds frequently to prevent dispersal of dust. Results of laboratory tests for ambient area whilst excavation was in progress indicate that the local area has not been impaired in terms of air quality due to dust dispersal.

#### **6.4.6. NOISE**

Unwanted noise can likewise be generated by machinery and equipment deployed during construction, causing annoyance and discomfort for users and neighbours.

##### **Mitigation Measures**

Noise levels were tested on 14-19 December 2025 while some works were being carried out and machinery was under deployment. Noise readings indicate that no excessive noise is being created from machinery, primarily because the equipment was new and under good maintenance. The construction crew assured that all machinery to be used during construction would be of high quality and thus prevent creation of excessive noise. Vehicles especially will be of recent vintage and fitted with silencers that reduces noise during operation.

#### **6.4.7. WASTE STREAMS**

Waste generated at site can be liquid as well as solid waste. Liquid waste consists of oils and oily water from maintenance of equipment and vehicles, accidental leakage or spillage from vehicles, equipment or storage, wastewater from construction activities and domestic sewerage from the project office and construction camp.

### **Mitigation Measures**

No vehicles and equipment shall be repaired at the project site, thus eliminating spillage of oils or oily water that can damage sub-soil. The contractor has issued instructions to foremen and workers that any leaks from machines and equipment during use must be scooped up immediately and placed in dedicated bins. Alternatively, grey water will be sprinkled on unpaved sections within the construction site. Sieved substances, which will be dumped at municipal waste disposal sites, will not be of character injurious for the environment. Solid waste will consist of excavated earth, excess or used or rejected construction materials, scrap, warehouse waste, workshop waste and domestic solid waste from the project office and construction camp.

It will be ensured that liquid and solid waste is minimised and that all form of waste is carried away from the project site and disposed in a manner whereby it does not impinge on local environment. All solid waste will be collected at the site at designated spots from where it shall be removed to municipal skips on a regular basis by the waste management contractor. Excavated earth will be used for landscaping or sold for reuse. No excavated earth shall be dumped either on adjoining properties. Complaints from neighbours, if any, regarding inappropriate disposal of solid waste shall be attended to on top priority. Recycling or reuse of waste material shall be the preferred option but when not practical, solid waste will be treated and disposed of appropriately.

#### **6.4.8. WASTE MANAGEMENT CONTRACTOR**

Construction projects involving estate development create a great deal of liquid as well as solid waste that can impair local environment. Steps thus need to be taken to ensure appropriate collection and disposal of all forms of waste.

### **Mitigation Measures**

A waste management contractor shall be prearranged to carry away all forms of waste from the project site for disposal in an environment-friendly manner at the nearest garbage disposal sites, identified by municipal authorities.

#### **6.4.9. GENERATION OF EMPLOYMENT**

The implementation and operation of the Karakoram Greens project are expected to generate substantial employment opportunities at both the construction and operational stages, contributing positively to the local economy. During the initial phase, a dedicated project implementation team comprising skilled and semi-skilled personnel will be engaged to manage planning and execution activities. As construction progresses, a significantly larger workforce will be mobilized, with peak construction activities involving over one hundred and fifty workers, including engineers, supervisors, technicians, and general labor. Upon completion, the operational phase of the project will create a range of permanent employment opportunities, including administrative, maintenance, security, and facility management staff.

Given the scale of the residential development, which comprises approximately 781 housing units, a substantial number of indirect employment opportunities are also expected to be generated. Based on prevailing household patterns, each residential unit is anticipated to engage one to two domestic workers on a full-time or part-time basis, resulting in an estimated 1,100 to 1,200 domestic employment opportunities. In addition, the commercial components of the project, including retail outlets, are expected to generate further employment, with each retail unit engaging one or more staff members. While employment numbers associated with ancillary facilities such as educational and recreational amenities will be finalized at a later stage, these are also expected to contribute meaningfully to local job creation. Overall, the project is anticipated to generate approximately 1,250 direct and indirect employment opportunities, in addition to stimulating economic activity for suppliers, service providers, and maintenance personnel associated with the project's long-term operation.

### **6.5. ENVIRONMENTAL IMPACTS DURING PROJECT OPERATION PHASE**

#### **6.5.1. PHYSICAL ENVIRONMENT**

- ✎ The Project operation will result into generation of substantial quantities of solid waste from the residential and commercial activities. This waste may have significant impact

on soil if a proper arrangement for its disposal is not made. In addition it will enhance aesthetic pollution and unhygienic conditions. In order to assess the impacts and proper designing of disposal system, it is imperative to quantify the solid waste generation, to assess its characterization and preparation of waste management plan. Similarly, unmanaged disposal of liquid waste will also cause the contamination of land resources.

- ✖ On account of increased population (both local as well as visitors), there will be a significant increase in the sewage. It shall lead to further pollution of the available surface water resources.
- ✖ With the establishment of new neighborhood centers, new schools, colleges, hospitals and recreation centers, there will be an increased stress on the already scarce drinking water resources.
- ✖ Surface run-off from the impervious surface of the carriageway or hillside slopes can aggravate the flooding of embankment during the operation stage.
- ✖ Increased traffic load as a result of project operation will result in the emission of exhaust gases. This will in turn rise to some extent, the level of particulates and gaseous pollutants in the ambient air.
- ✖ The noise pollution will be lesser than the construction phase. However, it will definitely be more than pre-construction stage on account of increase in traffic on the newly constructed and widened roads there will be an increased noise. However, it is expected that resultant sound level will remain well within the NEQS limits.

### **Mitigation Measures**

- ✖ To cater the existing and future solid waste management of the town, a separate solid waste management system needs to be developed and implemented.
- ✖ Proper monitoring of the soil erosion and landslide prone areas should be carried out during operation phase and soil conservation measures (if needed) will be carried out like provision of physical structures e.g. retaining walls, etc.
- ✖ Central wastewater treatment plant should be provided having the capacity for treatment of sewage of entire town and industrial estate.
- ✖ To reduce noise levels, if deemed necessary, provision of thick tree plantation, noise barriers and double glazed windows will be assessed as per site conditions.

### **6.5.2. ECOLOGICAL ENVIRONMENT**

- ✖ There will be no further damage to the vegetation of the tract during operation stage.

- ✎ As the flora and fauna are interdependent, improvement of the flora through plantation shall be a source of attraction for the fauna, especially the avifauna or the birds. The birds, who were scared away during the construction stage, shall return to the Project Area during this stage.

#### **Mitigation Measures**

- ✎ In order to rectify the loss of habitat due to cutting/removal of trees, extensive planting shall be carried out along the both sides of existing and proposed roads, in the compounds of buildings, play grounds, parks and recreation centers, along nullahs and in all other available open spaces
- ✎ Fauna depends upon flora of a place. With the improvement of flora the fauna and especially the avi-fauna shall be attracted again to the site and negative impacts on fauna shall be mitigated to a great extent.

### **6.5.3. SOCIO-CULTURAL ENVIRONMENT**

- ✎ Increased number of people will be a positive impact regarding the local business of the shopkeepers, hotels and food stalls. However, this increased number of visitors may become a threat to the available natural resources including water, fire wood, etc. This will also create uneasiness to the locals.
- ✎ There may be some cultural conflicts due to the visit of the Project Area by the outsiders particularly foreigners.

#### **Mitigation Measures**

- ✎ Provision of water supply and other resources should be made by assessing the potential visitors at operation stage.
- ✎ To protect the forest and other plantation of the Project Area, it is recommended that gas cylinders should be provided by the town management at subsidized rates.

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## 7. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

The goal of the Environmental Management and Monitoring Plan (EMMP) is to ensure that all the necessary corrective actions are carried out to counter any adverse environmental impacts and that enhancement measures are used where feasible and practical. One of the aims of the monitoring program is to actually observe and analyze these impacts, thereby providing the information to help in the modification of mitigation measures to reduce the risks, hazards and associated with this development Projects.

### **7.1. GENERAL**

For the effective implementation and management of the proposed mitigation measures, it is necessary to develop an EMMP which basically provides a delivery mechanism to address the potential impacts of the Project activities and to develop a monitoring program in order to minimize the potential impacts during the construction and operational stages of the Project. The EMP has been prepared with an objective of:

- ✎ Outlining the mitigation measures required for avoiding or minimizing the potential impacts assessed by EIA.
- ✎ Developing a monitoring mechanisms and identifying the requisite monitoring parameters to confirm effectiveness of the mitigation measures recommended in the EIA.
- ✎ Defining roles and responsibilities of the Project proponent for the implementation of EMP and identifying areas where these roles and responsibilities can be shared with other parties involved in the execution and monitoring of the Project.
- ✎ Defining the requirements necessary for documenting compliance with the EMP and communicating it to all the concerned regulatory agencies.
- ✎ Prescribing the mechanisms with which consultation with stakeholders during the Project will be maintained.

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## **7.2. STRUCTURE OF EMMP**

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The Environmental Management and Monitoring Plan (EMMP) is designed to ensure that all environmental safeguards are properly implemented throughout the planning, construction, and operational phases of the project. The EMMP comprises several key components. It begins with a review of the applicable environmental legislation, regulatory guidelines, and national standards to ensure full compliance with all statutory requirements. An organizational structure is then defined, clearly outlining the roles and responsibilities of the project proponent, contractor, supervising consultants, and relevant authorities for effective environmental oversight.

A Mitigation Management Matrix (MMM) is developed to identify all potential environmental impacts along with corresponding mitigation measures, responsible parties, performance criteria, and timelines. This matrix serves as the core tool for managing environmental risks during project execution. In parallel, an environmental monitoring program establishes parameters to be monitored, methods of measurement, monitoring frequency, reporting formats, and corrective action procedures, ensuring that environmental performance remains within acceptable limits.

Effective communication and documentation protocols are included to maintain transparent information flow, proper record-keeping, and timely reporting to regulatory bodies. A change management plan is incorporated to address any unforeseen modifications in project scope or environmental conditions, enabling responsive and adaptive environmental control. Additionally, a training program is integrated into the EMMP to build the capacity of personnel involved in the project, ensuring they are fully aware of environmental obligations and are capable of carrying out all required mitigation and monitoring measures.

## **7.3. LEGISLATION, GUIDELINES AND ENVIRONMENTAL STANDARDS**

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The project will be implemented in full compliance with the environmental regulatory framework of Pakistan. Key legal instruments applicable to the project include the Pakistan Environmental Protection Act (PEPA), 1997, the Land Acquisition Act (LAA), 1894, the Forest Regulations, 1930, and the Wildlife Protection, Preservation, Conservation and Management Act, 1975. These laws collectively provide the basis for environmental protection, land use regulation, biodiversity conservation, and

responsible project development. All project activities will adhere to the requirements stipulated by federal and local authorities to ensure that the environment and surrounding communities remain protected throughout the project life cycle.

To verify compliance with legal and environmental obligations, relevant standards and guidelines from the National Environmental Quality Standards (NEQS) of Pakistan and international best practices (where applicable) will be applied across various environmental components. The following standards will be particularly adopted during the construction and operational phases.

### **7.3.1. EFFLUENTS**

The NEQS of Pakistan will be used for effluents. The NEQS for municipal effluents define the maximum allowable concentration of pollutants in effluents released into different types of receiving bodies. This standard will apply to all effluents from Project facilities. [Annexure-B for NEQS](#)

### **7.3.2. AMBIENT AIR QUALITY**

Project operations must ensure that ambient air quality remains within the limits prescribed under the NEQS. These standards regulate levels of particulate matter, nitrogen oxides, sulfur oxides, carbon monoxide, and other pollutants to protect public health and environmental quality. Standards are attached at [Annexure-B for NEQS](#)

### **7.3.3. NOISE**

Vehicle movement, construction machinery and equipment may generate noise. NEQS-prescribed limits for ambient noise and vehicle-generated noise will be applied. Necessary mitigation such as silencers, scheduling noisy activities during daytime and equipment maintenance will be implemented. Reference values are provided in [Annexure-B for NEQS](#)

### **7.3.4. DRINKING WATER**

Water supplied for labor camps and workers' consumption must meet safety criteria. The World Health Organization (WHO) drinking water guidelines will be adopted as reference standards to ensure safe water quality. Relevant parameters are listed in [Annexure-B](#)

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## **7.4. ROLES AND RESPONSIBILITIES**

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The following organizations would be involved in the implementation of the proposed Project: District Heads of various departments, such as CDA, Highways, Buildings, Public Health Engineering, who will be the executors of the EMMP, through the Project Contractors.

- ✎ Supervisory Consultants at Execution Stage as the monitor of the EMMP.
- ✎ Contractor (s) responsible for implementation of the EMMP.

### **7.4.1. KARAKORAM GREENS**

Karakoram Greens is a planned high-end residential development located within Gulberg Greens, Islamabad, designed to offer modern, sustainable, and well-integrated urban living. The project comprises multi-storey residential units supported by commercial, recreational, and community facilities, with a strong emphasis on environmental sustainability, efficient land use, and enhanced quality of life.

The Project Proponent for Karakoram Greens will bear primary responsibility for the effective implementation of the Environmental Management and Monitoring Plan (EMMP) throughout the planning, construction, and operational phases of the project. During construction, all contractors engaged under various work packages will be required to comply fully with the provisions of the EMMP and applicable national environmental regulations. To ensure effective on-ground implementation, it is recommended that a dedicated Environmental Officer (EO) be appointed by the Project Proponent to oversee environmental compliance, monitor mitigation measures, and coordinate reporting throughout the construction period.

During the operational phase, responsibility for implementing environmental mitigation measures will rest with the respective management and operations teams. Continuous oversight, monitoring, and compliance verification will be carried out through the designated Environmental Officer to ensure adherence to approved environmental standards and good international practices. The allocation of roles and responsibilities across different project stages has been defined to ensure systematic environmental management and long-term sustainability of the Karakoram Greens development.

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#### **7.4.1.1. PLANNING AND DESIGN STAGE**

- ✗ Setting up systems for environmental management.
- ✗ Ensuring that the terms of reference for each Project contractor adequately cover environmental and social issues and participate in short listing where appropriate.
- ✗ Ensuring that the Contractors develop and carry out environmental implementation plans that are consistent with the EMMP.
- ✗ Supervising environmental assessments, and providing substantial inputs and guidance.

#### **7.4.1.2. PRE-CONSTRUCTION PHASE**

- ✗ Identifying any problems due to restricted access during construction and verifying whether ramps/diversions have been provided where required.
- ✗ Establishing a grievance readdressal committee to ensure fairness and transparency during the resettlement process.
- ✗ Ensuring that the Contractor has prepared video of constructions sites as well as areas selected for establishing construction camp and other facilities like asphalt plant, etc. and copies of the same duly received.

#### **7.4.1.3. CONSTRUCTION PHASE**

- ✗ Liaising between Project staff of different departments including Capital Development Authority, Highway Department, Public Health Department, etc. and the Supervision Consultant's staff to monitor environmental compliance during construction.
- ✗ Supervising and providing technical support to Project and operations staff to help ensure compliance with the EMP.

#### **7.4.1.4. OPERATION STAGE**

- ✗ Coordinating with the operations staff working under the different departments including Health, Education, Forest and other relevant departments to monitor environmental compliance during operation of Project facilities.
- ✗ Reporting on the progress of environmental compliance to the Environmental Officer, EPA.
- ✗ Assessing the long-term environmental impact of operation of the Project facilities.

#### **7.4.2. SUPERVISORY CONSULTANTS**

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Supervisory Consultant (SC) will be responsible for following activities:

- ✎ Supervising the Project's Contractors and ensuring that all contractual obligations related to design and construction, as well as environmental and social compliance are met.
- ✎ Ensuring that day-to-day construction activities are carried out in an environmentally sound and sustainable manner.
- ✎ Assisting the Project management for coordinating with officials, community groups, government departments, etc. on environmental issues and obtaining the necessary clearances from the regulatory authorities.
- ✎ Monitoring of the environmental aspects of Projects during construction to ensure that the environmental requirements of the contract and the mitigation measures proposed in the EMP are implemented.
- ✎ Supervising contractors and preparing environmental input to the quarterly progress report.
- ✎ Developing guidelines and a code of good practice describing low-cost environmental measures that can be implemented in the construction and maintenance programs.
- ✎ Developing and conducting environmental training activities for contractors and the supervision consultant staff.
- ✎ Ensure that asphalt plants, construction camps and other facilities are properly sited and installed in accordance with the contract.
- ✎ Determine the timing and exact locations of both baseline and routine air, noise and vibration, and water quality monitoring in accordance with the contract provisions (if any).
- ✎ Undertake critically important routine visual monitoring of construction, waste disposal and overall environmental management practices by the Contractors. Effective environmental management during construction will require frequent site visits and observation skills.
- ✎ Devise solutions to environmental issues as they arise. Developmental Projects inevitably give rise to problems of excessive dust, noise levels and other impacts that are in some instances unavoidable. Good construction supervision requires that every effort be made to minimize these impacts. A team approach is essential. Environmental issues are entwined with those of safety, traffic management and community relations. Circumstances will arise that will require creative solutions based on circumstances as

they are encountered.

- ✎ Check that the Contractor backfills, compacts, and leaves the ground in the original condition after excavation of pits for subsurface investigations/borrow pits.
- ✎ Keep checks and controls so that the pollution of land and water resources due to the spills of lubricants, fuel, chemicals, and other wastes does not take place.
- ✎ To see that the Contractor keeps the damages to the minimum while making tracks for accessibility and that the damage is rectified properly.
- ✎ Monitor that the Contractor uses such working methodology so as not to cause disturbance to the communities by fugitive dust, noise, fumes, etc.
- ✎ Monitor that the Contractor adjusts his working hours during the construction activities in such a manner that it causes least inconvenience to the local population.
- ✎ To keep the working site/camps tidy so as to avoid unhealthy impacts on the work force.

#### **7.4.3. CONTRACTOR**

As referred earlier, implementation of the EMP will be the sole responsibility of the Contractor. All the environmental measures related with construction activities will be implemented by the contractors.

### **7.5. ENVIRONMENTAL MITIGATION MANAGEMENT MATRIX**

The environmental protection and enhancement are achieved in various ways. These approaches should begin right at the embryonic stage, i.e. i) Project location, ii) Design, specifications, iii) Construction activities and iv) Post completion activities i.e. operation and maintenance stage. Appropriate environmental management measures are required to be exercised in a cascade order by the Project proponent at each stage of the Project.

In this way, it is envisaged that the Project will achieve maximum ongoing cost-effectiveness, environmental sustainability and social soundness, far beyond the end of implementation of the Project. All the stages of the Project have to be managed by adopting the proposed environmental mitigation measures, where, besides engineering aspects, due importance is to be accorded to mitigation measures which make a perfect blending with the surrounding ecosystem.

The key environmental and social issues, which have already been discussed, are as under:

- 
- ✗ Contamination of air, water and soil during the construction and operation stages
  - ✗ Soil erosion and soil contamination at construction and operation stages.
  - ✗ Impact of noise generated by vehicles, machinery and equipment during the construction activities
  - ✗ Impact on community and work force safety as a result of accident hazards during the construction and operation of the project
  - ✗ Gender Issues.

MMM is provided below, which establishes the linkages between the environmental and social impacts, mitigation strategy and the agencies responsible for execution. The MMM identify:

- ✗ The required mitigation measures recommended in EIA.
- ✗ The person/organization directly responsible for adhering to or executing the required mitigation measures.
- ✗ The person/organization responsible for ensuring and monitoring adherence to the mitigation measures.
- ✗ The parameters which will be monitored to ensure compliance with the mitigation measures.
- ✗ The timing at which the mitigation or monitoring has to be carried out.

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                  | <b>Project Component or Impact</b>       | <b>Target</b>                                                                                        | <b>Action</b>                                                                                                | <b>Responsibility/<br/>Action taken, if any</b>                                                                                                                                                         |
|-----------------------------|------------------------------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A. PRE-PROJECT STAGE</b> |                                          |                                                                                                      |                                                                                                              |                                                                                                                                                                                                         |
| 1.                          | Selection of a project                   | To construct a apartment Buildings                                                                   | Construction of a apartments                                                                                 | Proponents                                                                                                                                                                                              |
| 2.                          | Site selection                           | To find a site suitable site to meet the proponents' objectives                                      | Identification of a suitable site at a reasonable location, preferably away from congested parts of the city | Proponents:<br><br>The proponents viewed a number of sites around the city and selected a site in Gulberg Greens with a rural setting                                                                   |
| 3.                          | Arrangement of financing for the project | To launch and implement the project without possibility of delays in execution due to funding issues | Line up finances for the project beforehand                                                                  | Proponents<br><br>Funds are available with the proponents from advance sale of residential plots, which would be sufficient for completion of the project within the expected time-frame of the project |
| 4.                          | Acquisition of land                      | To arrange land for the proposed project                                                             | Alternate sites should be considered                                                                         | Proponents<br><br>Project site has been found as feasible. All other sites viewed by the proponents were not                                                                                            |

|    |                                         |                                                                                                           |                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                |
|----|-----------------------------------------|-----------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    |                                         |                                                                                                           |                                                                                                                                                                                                                                              | considered viable for a variety of reasons, mainly congestion and high cost of land and development. There has not been any adverse environmental impact on the local environment as a result of project location and there has not been any dislocation of previous owners of the project site. No important land-use or economic activity has been lost as a result of siting of the project |
| 7. | Selection of a designer for the project | To design the project in a fully environment friendly manner                                              | Selection of a project designer with sufficient expertise to design environment-friendly projects                                                                                                                                            | Proponents<br><br>The proponents have in-house capability to design the project                                                                                                                                                                                                                                                                                                                |
| 8. | Selection of Contractor                 | To execute development works at the site without damaging the environment                                 | Selection of a Contractor with sufficient experience, equipment and workforce to execute the project within the target date                                                                                                                  | Proponents<br><br>Selection of the Contractor has been carried out after careful screening and abiding by government procedures.                                                                                                                                                                                                                                                               |
| 9. | Surveys and investigations              | To conduct surveys and investigations to ensure that project activities do not impinge on the environment | Surveys and investigations be carried out to determine existing conditions relating to waste generation, quality of air, water, noise, soil, soil erosion and collect data relating to climate of the project area, wind speed and direction | Environmental Consultants/Project Designer<br><br>Investigations have been carried out in respect of soil, ambient air, groundwater quality, traffic load and noise at the project site. No aberration has been found during environmental testing. Soil tests indicate that the project site is suitable for                                                                                  |

|     |                                |                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                  |
|-----|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                |                                                                                                                                        |                                                                                                                                                                                                                                                                                                                    | construction of roads and bridges, and the overhead water tanks                                                                                                                                                                                  |
| 10. | Social impact of the project   | To find out whether any social impacts would result from locating the proposed project at the selected site                            | A survey be carried out to assess what sort of social impacts can take place as a result of development works                                                                                                                                                                                                      | Proponents<br><br>This environmental study has indicated that there shall not be any adverse social impact from project activities. On the contrary, it shall have a horde of benefits for the city as explained at various places in the report |
| 11. | Measures for surrounding areas | To identify any measures that must be taken as mitigation for adverse effects resulting from locating the project at the proposed site | A study should be conducted to suggest measures that should be taken to compensate local population or environment in case the proposed project alters the environment. If considered expedient, the proponents should make contributions towards socio-economic uplift of the project area to the extent possible | Proponents<br><br>This environmental study concludes that no specific measures are necessary for surrounding areas                                                                                                                               |
| 12. | Environmental study            | To preserve the existing environment at the project site                                                                               | Commission a study for environmental examination by experienced environmental consultants                                                                                                                                                                                                                          | Proponents<br><br>An environmental study has been prepared by experienced environmental consultants. The study has been completed in consonance with prescribed guidelines and after consultation with stakeholders                              |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>             | <b>Project Component or Impact</b>                                  | <b>Target</b>                                                                                                           | <b>Action</b>                                                                                                                                       | <b>Responsibility/<br/>Action taken</b>                                                                                                                                                                 |
|------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>B. DESIGN STAGE</b> |                                                                     |                                                                                                                         |                                                                                                                                                     |                                                                                                                                                                                                         |
| 13.                    | Designing of the proposed project                                   | To design the proposed project in such a manner that the existing environment is disturbed to the least possible extent | Engage a team of professional architectural firm having experience of developing environment-friendly buildings                                     | Project Designer<br><br>Designing has been completed. Modifications in the designs shall be carried out on need basis with prior approval of the competent authority                                    |
| 14.                    | Intrusions on the privacy of residents surrounding the project site | To ensure privacy of the residents in the vicinity of the project site                                                  | There should be no intrusion on privacy of adjoining areas                                                                                          | Project Designer<br><br>The design has preserved privacy of nearby properties in line with the relevant building regulations                                                                            |
| 15.                    | Soil Tests                                                          | To test the soil for sustainability of structures                                                                       | A soil survey should be carried out by qualified consultants to determine soil characteristics and suggest foundations for large structures, if any | Proponents<br><br>Soil testing has been carried out. The soil has the requisite bearing capacity to sustain load of the proposed structure. The geo-technical consultants and structural engineers have |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>             | <b>Project Component or Impact</b>           | <b>Target</b>                             | <b>Action</b>                                                                                                                                                                                           | <b>Responsibility/<br/>Action taken</b>                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|----------------------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>B. DESIGN STAGE</b> |                                              |                                           |                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                           |
|                        |                                              |                                           |                                                                                                                                                                                                         | accordingly proposed a suitable design for all foundations                                                                                                                                                                                                                                                                                                                                |
| 16.                    | Seismic hazard Analysis                      | To protect structures from seismic hazard | The roads, bridges and public buildings should be designed to withstand seismic hazards                                                                                                                 | Project Designer<br><br>The structures have been designed to withstand seismic activity typical of the project area                                                                                                                                                                                                                                                                       |
| 17.                    | Traffic congestion and disturbance to people | To mitigate the traffic problem           | A traffic count be taken to be aware of measures that need to be taken due to additional traffic load<br><br>There should be ample parking space to cater for vehicles of residents as well as visitors | Environmental Consultants<br><br>Traffic counts carried out by the Environmental Consultants shows that there is low traffic on local roads. Impact of additional traffic on these roads during design phase was virtually zero. Impact of traffic during construction shall be negligible whereas impact when the estate comes into operation shall be less than one percent at the most |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>             | <b>Project Component or Impact</b> | <b>Target</b> | <b>Action</b>                                                                                                               | <b>Responsibility/<br/>Action taken</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|------------------------|------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>B. DESIGN STAGE</b> |                                    |               |                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                        |                                    |               | Traffic emerging from the estate should meet traffic in an orderly manner by constructing proper on ramps and wide entrance | <p>Project Designer</p> <p>There shall be sufficient parking spaces at all public facilities. All houses shall be built in line with building regulations so that residents' vehicles and those of visitors are parked inside dwelling units</p> <p>Project Designer<br/>/Proponents</p> <p>Project Designer has designed a wide entrance with a main gate, and wide access roads to Park Road and Kurri Road. Proponents shall post security guards to regulate movement of traffic into and out of the compound</p> |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>             | <b>Project Component or Impact</b> | <b>Target</b>                                                | <b>Action</b>                                                                                                                             | <b>Responsibility/<br/>Action taken</b>                                                                                                                                                                                                                                                                                                 |
|------------------------|------------------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>B. DESIGN STAGE</b> |                                    |                                                              |                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                         |
| 18.                    | Safety measures                    | To ensure safety of the premises                             | Project design must incorporate all possible measures to ensure safety of the premises, including fire-fighting and security arrangements | Project Designer<br><br>Adequate arrangements have been made for security, including perimeter fence, and fire-fighting in compliance of the town planning regulations and as described in this report                                                                                                                                  |
| 19.                    | Flora and Fauna                    | To protect the fauna and flora of the Project Site           | Trees and plants should be added to the site to enhance the environmental value of the area                                               | Proponents<br><br>The proponents intend to plant a sufficient number of trees towards completion of development works. Suitable plantation, including 6,750 trees of different varieties, 28,250 shrubs of various species, and 500,000 square feet of Dhaka grass around the colony will more than compensate for losses in vegetation |
| 20.                    | Services                           | To ensure that all applications are made for connections for | Applications and arrangements for all utility connections and services, such as water, electricity, wastewater disposal, natural gas      | Proponents                                                                                                                                                                                                                                                                                                                              |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>             | <b>Project Component or Impact</b> | <b>Target</b>                                                      | <b>Action</b>                                                                                                                                | <b>Responsibility/<br/>Action taken</b>                                                                                                                                                                                                                                                                                                                                                                                             |
|------------------------|------------------------------------|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>B. DESIGN STAGE</b> |                                    |                                                                    |                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                        |                                    | services required during construction and operation of the project | and solid waste disposal should be made well in time                                                                                         | Most of the services are to be extended by the proponents themselves. Applications for utility connections shall be made at the appropriate time in consultation with the project designers to avoid delays in project implementation and project operation                                                                                                                                                                         |
| 21                     | Reflection                         | To minimise reflections from all structures                        | Public buildings should be so designed that there is minimal reflection and that it does not cause inconvenience for residents or neighbours | Project Designers<br><br>The building designs shall be in conformity with parameters laid down in the building regulations and by-laws relating to reflection and privacy of neighbours. Accordingly, all windows shall be placed where there is minimal intrusion for neighbouring properties. Moreover, it shall be ensured that the glass used does not create reflections that can cause a nuisance for neighbouring properties |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>             | <b>Project Component or Impact</b> | <b>Target</b>                                                                                       | <b>Action</b>                                                                                                                                                      | <b>Responsibility/<br/>Action taken</b>                                                                                                                                                                      |
|------------------------|------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>B. DESIGN STAGE</b> |                                    |                                                                                                     |                                                                                                                                                                    |                                                                                                                                                                                                              |
| 22.                    | Heat                               | To adopt innovative techniques introduced under the Green Building and Sustainable Building regimen | Adoption of as many features of Green Building and Sustainable Building concepts to absorb heat during winter and protect buildings against heat during the summer | Project Designer<br><br>As many features of the Green Building and Sustainable Building have been incorporated into the design as was possible keeping availability of green materials and resources in view |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>                                      | <b>Action</b>                                                                                                 | <b>Responsibility<br/>/Action Taken</b> |
|------------------------------|------------------------------------|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                                                    |                                                                                                               |                                         |
| 23.                          | Employment of labour               | Offer employment opportunities to local population | Maximum efforts should be made to ensure that ample employment opportunities are offered to the local workers | Contractor /Project Manager             |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b>                     | <b>Target</b>                                    | <b>Action</b>                                                                                                                                                                                                  | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------------------------|--------------------------------------------------------|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                                        |                                                  |                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|                              |                                                        |                                                  |                                                                                                                                                                                                                | The contractor shall engage local labour to the maximum possible extent                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 24.                          | Traffic congestion and disturbance to the local people | To mitigate traffic problems during construction | <p>Traffic count be taken to find the impact of construction-related vehicles on local roads</p> <p>Transportation of raw material and heavy machinery will be done at times convenient to local residents</p> | <p>Environmental Consultants</p> <p>Traffic count shows that there is low traffic on local roads. The upper limit of additional traffic on these road during construction will be insignificant. Moreover, the contractor is bound the terms of his awarded contract to ensure that there is no interference with local traffic patterns. Moreover, vehicles are not being parked on the main roads</p> <p>Contractor</p> <p>All deliveries of equipment and materials are being during off-peak hours and never at night</p> |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b> | <b>Action</b>                                                                                                                                                                                                                                                                                                                     | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------|------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |               |                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                              |                                    |               | <p>As much as possible, raw material and equipment shall be brought to project site through main roads</p> <p>Construction vehicles should not blow horns at the project site</p> <p>Vehicles to be used at the project site should be in good working condition, if not new, to minimise noise pollution and smoke emissions</p> | <p>Contractor</p> <p>Only main roads are being used and heavy project traffic is not passing through any residential area unless unavoidable</p> <p>Contractor</p> <p>Contractor has issued strong instructions to concerned drivers to abide by traffic laws and rules and to observe road courtesies</p> <p>Contractor</p> <p>Contractor is using vehicles, machinery and equipment that are in good condition</p> |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b>            | <b>Target</b>                                                                            | <b>Action</b>                                                                                                                                      | <b>Responsibility /Action Taken</b>                                                                                                                                                  |
|------------------------------|-----------------------------------------------|------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                               |                                                                                          |                                                                                                                                                    |                                                                                                                                                                                      |
| 25.                          | Transportation of Construction material       | To ensure that transportation of material does not cause inconvenience                   | The contractor should transport construction material, as much as possible, without obstructing local traffic                                      | Contractor<br><br>Contractor is ensuring that local traffic is not put into inconvenience due to movement of project vehicles and is using routes that bypass local traffic          |
| 26.                          | Stocks of Construction material               | To avoid soil erosion and pollution by an unnecessary stockpile of construction material | It should be ensured that construction materials are ordered subject to need only so that surplus material does not create an environmental hazard | Contractor<br><br>Contractor is ordering construction materials strictly on need basis and these are not being unnecessarily piled up at the project site or on adjoining properties |
| 27.                          | Health and safety of workers and local public | To minimise health and safety related negative impacts on the project                    | Construction labour be trained in safety procedures for all relevant aspects of construction                                                       | Contractor<br><br>Contractor has imparted requisite training to foremen and workers                                                                                                  |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b> | <b>Action</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------|------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                              |
|                              |                                    |               | <p>Hard hats be worn by workers at all time of work and everywhere on the project site</p> <p>Regular checks be made so that the contractor follows safe working procedures and practices</p> <p>Formal emergency procedures must be developed for construction site in case of an accident. First aid kits and other necessary equipment should be kept available at the project site along with a list of emergency phone numbers to be contacted in case of any emergency or accident. Arrangements be made with the local clinics for help in the event of an urgent need</p> | <p>Contractor</p> <p>Hard hats are being worn at all times by the workers</p> <p>Contractor/Project Manager</p> <p>The contractor's work is being monitored on a regular basis to ensure that healthy and occupational safety standards are being enforced at all times</p> <p>Contractor/Project Manager</p> <p>All such arrangements have been made by the Contractor under supervision of the Project</p> |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>                                                                             | <b>Action</b>                                                                                                                                                                                                                                            | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                                                            |
|------------------------------|------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                                                                                           |                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                |
|                              |                                    |                                                                                           |                                                                                                                                                                                                                                                          | Manager through regular monitoring of the work executed                                                                                                                                                                                                                                                                                                        |
| 28.                          | Disturbance to the local people    | To minimise disturbance to everyday life of local people, especially immediate neighbours | <p>Residents of the area be informed about the detail of work, likely disturbances and their duration and to whom they should report complaints</p> <p>The local population to be advised on safety hazards posed by encroaching at the project site</p> | <p>Contractor/Project Manager</p> <p>A sign has been posted at the project site for information of the public of project activities. The proponents have been advised by the Environmental Consultants through this Environmental study to institute a Complaints Redressal Mechanism, preferably through their website</p> <p>Contractor/ Project Manager</p> |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b>     | <b>Target</b>                                                                                    | <b>Action</b>                                                                                                                                                                              | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                         |
|------------------------------|----------------------------------------|--------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                        |                                                                                                  |                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                             |
|                              |                                        |                                                                                                  | Good community relationship be established so that any disruption can be resolved with due consideration for and involvement of local community                                            | Public is not allowed entry to project site as a safety measure<br><br>Contractor/Project Manager<br><br>The Project Manager is available to entertain public objections, if any, about project activities. No complaints whatsoever have so far been received regarding project activities |
| 29.                          | Surface and ground water contamination | To prevent surface and ground water contamination from oil based products and construction waste | Proper arrangement to be made for collection and disposal of oil-based products and construction waste<br><br>Surface and groundwater quality be monitored every month during construction | Contractor/ Project Manager<br><br>A sub-contractor has been engaged for disposal of all forms of waste and eventual disposal in an environment-friendly manner at the municipal garbage disposal site<br><br>Contractor/Project Manager                                                    |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>                                                                                         | <b>Action</b>                                                   | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                                 |
|------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                                                                                                       |                                                                 |                                                                                                                                                                                                                                                                                                                                     |
|                              |                                    |                                                                                                       |                                                                 | Groundwater samples have been taken and tested. Further tests shall be carried out in due course to find out whether project implementation is in any way impacting on characteristics and quality of ground water. There is no surface water in the near vicinity of the project site that is under threat from project activities |
| 30.                          | Wastewater discharges              | To minimise wastewater discharges at worker's camps and prevent pollution from sanitary waste at site | Proper drainage of wastewater                                   | Contractor/Project Manager<br><br>Wastewater is being drained into the Nullah after appropriate sieving and the residue is being disposed separately through the sub-contractor. Portable toilets have been arranged for workers' camp                                                                                              |
| 31.                          | Disposal of mucking material       | To dispose of excavated material in an                                                                | Transportation of mucking material be done in closed containers | Contractor/Project Manager                                                                                                                                                                                                                                                                                                          |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>                                   | <b>Action</b>                                                                                                                                                                                                                    | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                       |
|------------------------------|------------------------------------|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                                                 |                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                           |
|                              |                                    | environmentally friendly manner                 | <p>Mucking material be filled in layers and properly rolled and sprinkled to avoid any negative environmental or visual impacts</p> <p>Utilisation of mucking material be done for construction of temporary access passages</p> | <p>Excavated earth is being re-used at the site for landscaping and roads</p> <p>Contractor/Project Manager</p> <p>All mucking material is being covered and sprinkled with water to minimise dust dispersal</p> <p>Contractor/Project Manager</p> <p>Excavated material is being re-used at the site for landscaping</p> |
| 32.                          | Dust                               | To avoid problems resulting from dust pollution | Excavation work be sprayed with water                                                                                                                                                                                            | <p>Contractor/Project Manager</p> <p>The Contractor/Project Manager have ensured that there has been regular spraying of water on excavated materials</p>                                                                                                                                                                 |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>                                  | <b>Action</b>                                                                                                                                  | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                   |
|------------------------------|------------------------------------|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                                                |                                                                                                                                                |                                                                                                                                                                                                                                                                       |
|                              |                                    |                                                | <p>Stockpiles of excavated material be covered with tarpaulins</p> <p>Construction workers be provided with masks and trained in their use</p> | <p>Contractor/Project Manager</p> <p>All excavated material was well covered before disposal or re-use</p> <p>Contractor/Project Manager</p> <p>Dust masks are available at the site for use by workers whenever required or whenever the nature of work warrants</p> |
| 33.                          | Air Pollution                      | To minimise degradation of ambient air quality | Solid waste from the contraction camp and project site should not be burnt on site                                                             | <p>Contractor/Project Manager</p> <p>Solid waste is not being burnt at the site and is being carried away for appropriate disposal by a waste contractor</p> <p>Contractor/Project Manager</p>                                                                        |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>            | <b>Action</b>                                                                                                                                                                                                                                                     | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------|------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                          |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                           |
|                              |                                    |                          | <p>Appropriate measures to minimise exhaust emissions from construction machinery, vehicles and generators</p> <p>Air quality monitoring to be carried out on a monthly basis to assess if project implementation activities are impinging on the environment</p> | <p>Use of good quality equipment, machinery and vehicles has ensured that there are minimal emissions and noise</p> <p>Contractor/Project Manager</p> <p>Environmental testing for ambient air has shown that there is no alarm for concern in this behalf in respect of project activities. Air monitoring shall be repeated at suitable intervals throughout project implementation</p> |
| 34.                          | Noise                              | To avoid noise pollution | Selection of new plants, machines, equipment and hand tools to be used for containing noise levels                                                                                                                                                                | <p>Contractor/Project Manager</p> <p>The contractor is using good quality equipment and machinery that create minimal noise</p> <p>Contractor/Project Manager</p>                                                                                                                                                                                                                         |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>                                         | <b>Action</b>                                                                                                                                                                                      | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                                                                                                                              |
|------------------------------|------------------------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                                                       |                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                              |                                    |                                                       | <p>Noisy work be confined to normal daylight hours</p> <p>Suitable hearing protection and training be provided to construction workers</p> <p>Noise monitoring will be carried out every month</p> | <p>No noisy work is being undertaken after normal working hours. In fact, noise from the project activities are well within acceptable limits</p> <p>Contractor</p> <p>Ear-muffs are available for workers if demanded</p> <p>Contractor/Project Manager</p> <p>Noise monitoring has been carried through the environmental consultants and shall be repeated whenever deemed necessary or should there be public complaints</p> |
| 35.                          | Solid waste                        | To remove solid waste from site before it damages the | Measures to be taken to ensure that solid waste does not remain at the project site and that it does not mar either the soil or the surface environment                                            | <p>Contractor/Project Manager</p> <p>Solid waste is being removed regularly through</p>                                                                                                                                                                                                                                                                                                                                          |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>                                                        | <b>Action</b>                                                                                                                                                                                                            | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                                                                                                               |
|------------------------------|------------------------------------|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                                                                      |                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                   |
|                              |                                    | environment                                                          |                                                                                                                                                                                                                          | arrangements with a sub-contractor for disposal in an appropriate manner.<br>No complaints have so far been received about inappropriate disposal of solid waste                                                                                                                                                                  |
| 36.                          | Liquid effluents                   | To dispose of all liquid effluents in an environment friendly manner | It must be made sure that there are no liquid effluents on account of leakages from equipment and vehicles or the construction camp and that all such effluents are removed from the site before seeping into the ground | Contractor/Project Manager<br><br>There have not been any such leakages, mainly because no repairs are being undertaken at the project site. Use of good quality machines and vehicles has reduced the possibility of such leakages. Liquid waste from the construction camp is being sieved and disposed of in the <i>Nullah</i> |
| 37.                          | Working hours                      | To avoid over-work                                                   | Construction workers should not be coerced to work beyond normal daylight hours                                                                                                                                          | Contractor/Project Manager<br><br>The contractor is required to observe all labour laws regarding wages and working hours. Any                                                                                                                                                                                                    |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b> | <b>Target</b>                                                        | <b>Action</b>                                                                                      | <b>Responsibility /Action Taken</b>                                                                                                                                                                                          |
|------------------------------|------------------------------------|----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                    |                                                                      |                                                                                                    |                                                                                                                                                                                                                              |
|                              |                                    |                                                                      |                                                                                                    | work beyond normal working hours shall be voluntary and subject to payment of overtime as per rates specified under the relevant labour laws                                                                                 |
| 38.                          | Gender issues                      | To avoid any gender issues created by influx of construction workers | Construction workers should not be allowed to enter adjoining areas unless absolutely necessary    | Contractor/Project Manager<br><br>Workers have been advised not to loiter in adjoining residential areas without sufficient cause. However, freedom of movement of the workers cannot be restrained beyond reasonable limits |
| 39.                          | Flora and Fauna                    | To protect the fauna and flora of the Project Site                   | Trees and plants be planted to enhance the environment                                             | Proponents<br><br>Plantation shall be carried out after major development works have been completed so that there is no damage to fresh plantation                                                                           |
| 40.                          | Vibrations                         | To reduce vibrations, if any, from use of                            | It should be ensured that there are minimum vibrations from construction work so that no damage or | Construction Contactor/Project Manager                                                                                                                                                                                       |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr.</b>                   | <b>Project Component or Impact</b>                                  | <b>Target</b>                                 | <b>Action</b>                                                                                                                                                  | <b>Responsibility /Action Taken</b>                                                                                                                                                                                                        |
|------------------------------|---------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>C. CONSTRUCTION STAGE</b> |                                                                     |                                               |                                                                                                                                                                |                                                                                                                                                                                                                                            |
|                              |                                                                     | machinery                                     | inconvenience is caused to adjoining properties                                                                                                                | The Project Manager proponent is monitoring the work of the contractor regularly. There have not been any complaints about vibrations resulting from project activities                                                                    |
| 41.                          | Environment-friendly building construction materials                | To maximise use of green materials            | Maximum efforts should be made to use Green Materials during construction and to use environment-friendly construction materials, such as lead-free paint etc. | Proponents<br><br>Use of Green Materials shall be subject to availability and cost-effectiveness. Environment friendly materials, such as lead-free paint etc., shall be used to the extent possible subject to availability in the market |
| 42.                          | Visual and physical impact of electric sub station and transformers | To preserve visual impact in the project area | It should be ensured that the electric sub-station and transformer(s ) are constructed/installed in an environment-friendly manner                             | Proponents<br><br>It shall be ensured that all electric installations are erected in compliance of all safety and environmental standards and IESCO stipulations.                                                                          |



**ENVIRONMENTAL MANAGEMENT PLAN**

| Sr. No.                   | Project Component or Impact   | Target                                                                                             | Action                                                                                                                                                      | Responsibility                                                                                                                                                                                                                                                                                                                                                                                      |
|---------------------------|-------------------------------|----------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D. OPERATION STAGE</b> |                               |                                                                                                    |                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                     |
| 43.                       | Overall Environmental impacts | To reduce overall negative impact of the project on the environment and conserve natural resources | The proponents should take all possible measures to ensure that operation of the estate does not harm the local environment                                 | Proponents<br><br>The project is located in a rural area. There will thus be an adverse impact in terms of loss of green area. However, development of parks and other green areas and massive plantation shall compensate for the change in the nature of the project site The proponents shall ensure that local residents are not inconvenienced in any manner as a result of project operations |
| 44.                       | Water Conservation            | To conserve water                                                                                  | Obtain access to piped water supply from municipal sources<br><br>Residents be regularly advised on important of water conservation so as to preserve water | Project Manager<br><br>It is planned to install tube-wells to mine groundwater as piped water is presently not available in the project area<br><br>Proponents<br><br>All residents shall be duly informed of the importance of water conservation through                                                                                                                                          |

**ENVIRONMENTAL MANAGEMENT PLAN**

| Sr. No.                   | Project Component or Impact | Target                                                       | Action                                                                                                                                                            | Responsibility                                                                                                                                                                                                                            |
|---------------------------|-----------------------------|--------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D. OPERATION STAGE</b> |                             |                                                              |                                                                                                                                                                   |                                                                                                                                                                                                                                           |
|                           |                             |                                                              |                                                                                                                                                                   | circulars on a regular basis                                                                                                                                                                                                              |
| 45.                       | Air Quality                 | To ensure that the pollution levels do not exceed the limits | <p>No waste should be burnt at the site</p> <p>Residents be advised to keep their vehicles and machines in good working order to minimise noise and emissions</p> | <p>Proponents</p> <p>No solid waste whatsoever shall be burnt at the estate. All solid waste shall be carried away by municipal services</p> <p>Proponents</p> <p>Residents shall be advised in this behalf through regular circulars</p> |
| 46.                       | Noise                       | To minimise noise levels                                     | Residents be advised to keep all forms of noise levels down                                                                                                       | <p>Proponents</p> <p>Residents shall be advised in this behalf through regular circulars</p>                                                                                                                                              |
| 47.                       | Traffic congestion          | To mitigate traffic congestion problems                      | There should be prohibition on roadside parking                                                                                                                   | Proponents                                                                                                                                                                                                                                |

**ENVIRONMENTAL MANAGEMENT PLAN**

| Sr. No.                   | Project Component or Impact | Target                                                              | Action                                                                                                                                          | Responsibility                                                                                                                                                                                                                                                                                                                            |
|---------------------------|-----------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D. OPERATION STAGE</b> |                             |                                                                     |                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                           |
|                           |                             |                                                                     | Parking space to be provided at all public buildings                                                                                            | Residents shall be advised in this behalf through regular circulars. Security guards shall ensure that there is no long-term roadside parking and that all vehicles are parked inside compounds<br><br>Proponents<br><br>There shall be ample parking spaces at all public places, such as parks and shops, and near the public buildings |
| 48.                       | Vibrations                  | To reduce vibrations from equipment installed in public buildings   | Measures be put in place to control vibrations from equipment installed inside public buildings, such as tube-wells, motor pumps and generators | Proponents<br><br>The equipment shall be properly clamped and under regular maintenance to eliminate possibilities of vibrations                                                                                                                                                                                                          |
| 49.                       | Energy Conservation         | To conserve energy and use of environmental-friendly energy sources | Efforts should be made to ensure that energy is conserved and that environment-friendly techniques are adopted                                  | Proponents<br><br>Maximum number of energy-savers shall be installed at public buildings and street lights.                                                                                                                                                                                                                               |

**ENVIRONMENTAL MANAGEMENT PLAN**

| Sr. No.                   | Project Component<br>or Impact | Target                                             | Action                                                                                                                                                                | Responsibility                                                                                                                                                                                                                                                  |
|---------------------------|--------------------------------|----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D. OPERATION STAGE</b> |                                |                                                    |                                                                                                                                                                       |                                                                                                                                                                                                                                                                 |
|                           |                                |                                                    |                                                                                                                                                                       | Secondly, colour schemes that require lighting shall be avoided. Residents shall be encouraged to use maximum amount of sunlight to reduce dependence on lights                                                                                                 |
| 50.                       | Air Pollution                  | To minimise degradation of ambient air quality     | Solid waste from the estate should not be allowed to pile up at the temporary storage site before it is ultimately removed through arrangements with the municipality | Proponents<br><br>Proponents shall make necessary arrangements for quick disposal of solid waste                                                                                                                                                                |
| 51.                       | Flora and Fauna                | To protect the fauna and flora of the project site | Trees and plants will be planted to enhance the environment                                                                                                           | Proponents<br><br>The proponents intend to plant a sufficient number of trees at the site after completion of structures. Plantation shall include 6,750 trees of different varieties, 28,250 shrubs of various species, and 500,000 square feet of Dhaka grass |

**ENVIRONMENTAL MANAGEMENT PLAN**

| <b>Sr. No.</b>            | <b>Project Component<br/>or Impact</b> | <b>Target</b>                                                                                                                                                                         | <b>Action</b>                                                                                           | <b>Responsibility</b>                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>D. OPERATION STAGE</b> |                                        |                                                                                                                                                                                       |                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 52.                       | Environmental Monitoring               | To ensure that periodic reports on environment at the building are furnished to the Pakistan Environmental Protection Agency in pursuance of conditions of the environmental approval | A mechanism should be employed for Environmental Monitoring at the project when it comes into operation | Proponents<br><br>While the proponents shall be responsible for implementing this Environmental Management Plan, the environmental approval to be issued by the Pakistan Environmental Protection Agency invariably requires environmental monitoring when the project comes into operation. Accordingly the proponents shall entrust the responsibility for environmental monitoring in line with instructions of the Pakistan Environmental Protection Agency. |

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## **7.6. ENVIRONMENTAL MONITORING PROGRAM**

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For the Karakoram Greens, Islamabad, the Environmental Management Plan (EMP) serves as a vital strategic tool to ensure that all development activities are executed in an environmentally responsible and sustainable manner. It provides a framework for continuously evaluating the effectiveness of proposed mitigation measures and enables timely corrective actions wherever required. This adaptive approach is essential to maintaining environmental integrity throughout the advancement of the project.

To support this, a well-structured environmental monitoring program has been included, through which the performance of mitigation measures will be regularly assessed against prescribed environmental standards. Effective monitoring is crucial to confirm that environmental quality is maintained and that no unacceptable impacts arise due to construction or operation of project facilities. Without such monitoring, the effectiveness of environmental safeguards cannot be validated.

Therefore, the EMP for Karakoram Greens, Islamabad must be integrated into every phase of the project planning, detailed design, construction, and operation. Its continued application will ensure regulatory compliance, protect natural and community resources, and help achieve long-term sustainability objectives envisioned for this development..

### **7.6.1. OBJECTIVES**

The objective of environmental monitoring during the operation will be as follows:

- ✎ To check compliance with the requirements of the EMP by monitoring activities of the Project Contractors on a daily basis. This will be called Activity Monitoring.
- ✎ To monitor actual impacts of the Project Activities on physical, biological and socio-economic receptors of the Project Area so that any impacts not anticipated in the EIA or impacts which exceed the levels anticipated in the EIA can be identified and appropriate mitigation measures can be adopted in time. This objective will be achieved through effects monitoring.
- ✎ To ascertain residual impacts of the operation. This will be achieved by post-Project monitoring.

To achieve these objectives the following monitoring program will be implemented.

### **7.6.2. ACTIVITY MONITORING**

Responsibility for activity monitoring will be shared among all institutions involved in project implementation and oversight, including the regulatory authority, supervising consultants, and construction contractors. Monitoring will be performed at three levels:

- ✎ **Level 1: Monitoring by Pak-EPA:** Pak-EPA will conduct regular field inspections during the construction phase through its designated Environmental Officer(s). These visits will ensure that the project meets regulatory requirements and approved environmental conditions..
- ✎ **Level 2: Monitoring by the Supervising Consultant (SC)** Full-time environmental supervision will be maintained. Any non-conformities identified by the SC will be recorded using standardized non-compliance forms and addressed in scheduled environmental review meetings.
- ✎ **Level 3: Monitoring by the Contractor** Contractor's environmental officers will conduct routine inspections and ensure implementation of mitigation measures as prescribed in the Mitigation Management Matrix (MMM). Compliance records will be submitted to the Supervising Consultant and the regulatory authority for verification.

The detailed compliance monitoring protocol for physical environmental parameters is provided in **Table 7.1**. This multi-tiered monitoring approach ensures continuous tracking, timely reporting, and corrective action for all environmental issues encountered during project execution.

### **7.6.3. EFFECTS MONITORING**

For Effects Monitoring, Capital Development Authority, Islamabad will be responsible to monitor the effects as described in monitoring requirements. Outline monitoring requirements have been recommended in the EMMP; however, a detailed monitoring program will be prepared by the EO of Capital Development Authority, Islamabad to be deployed. The monitoring program will describe in detail the resources and methodology that will be adopted for the purpose of Effects Monitoring.

#### **7.6.3.1. PHYSICAL ENVIRONMENT**

The environmental monitoring program will focus on assessing and tracking the potential impacts of the project on key environmental components, including soil, water, and air quality. Monitoring activities will be designed to identify any changes arising from construction and operational activities and to ensure that mitigation measures are effectively implemented. The specific parameters, frequency, and responsibilities for monitoring these environmental components are outlined in the Effects Monitoring Protocol presented in TABLE 7-2

#### **7.6.3.2. BIOLOGICAL ENVIRONMENT**

Effects on biological environment will be monitored by Capital Development Authority, Islamabad along with the help of forest department, who will conduct quarterly survey during construction and subsequently during the operation of the Project. For the monitoring purpose, wildlife and flora surveys will be conducted to determine the effects of different project activities on wildlife and flora. A compliance register will also be maintained for the effects and compliance monitoring.

#### **7.6.3.3. SOCIOECONOMIC ENVIRONMENT**

Effects on the socio-economic environment will be monitored by conducting quarterly survey during construction and a final post Project survey by EO. The surveys will be structured to ascertain the level of impacts during the course of the project and the implementation of mitigation measures prescribed in the EIA such as hiring of local employment, payments of land compensation, health and safety of communities, mobility of local women etc. The EO will also verify the maintenance of a Social Complaints Register by SC.

#### **7.6.4. POST-PROJECT MONITORING**

After completion of the construction, Post-Project monitoring will be carried out. The objective of this monitoring will be to determine the level of residual impacts of the Project on physical, biological and socio-economic receptors of the Project Area. The monitoring may be carried out within one month after the end of all activities in the Project Area. The Post-Project survey report will be submitted within two weeks after completion of the survey.

As part of the Post-Project monitoring field monitors will also check restoration of sites restored at that time according to the requirements of the EIA.

TABLE 7-1 MONITORING PROTOCOL FOR PHYSICAL, BIOLOGICAL AND SOCIAL ENVIRONMENT

| Receptor                      | Location                                                                                                                                                                                                                                                                                                                                                                                                                                        | Monitoring Mechanism                                                                              | Monitoring and Reporting Frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water Quality                 | Points where control of effluents can be easily implemented<br>Surface drainage channels<br>Concrete preparation plants<br>Workers camp sewage treatment facility<br>Disposal areas of earth fill or solid waste<br>Fuel (Petrol. Oil and Grease) products storages<br>Vehicle and machine repairing and servicing yards<br>Discharge points from commercial establishment, hotels and restaurants.<br>Discharge points from residential areas. | Discrete grab sampling and laboratory testing of water samples.                                   | Sampling and laboratory testing should be done on 6 month basis during the construction and monthly during operational time. Discharges from construction sites should be tested for temperature, pH, electrical conductivity, dissolved oxygen. Treated effluent discharges from workers camp to be tested for faecal coliforms, total coliforms, Ammonia, Biochemical Oxygen Demand (BOD5). Concrete production effluents to be tested for pH and temperature. Outlet and drains from mechanical repair units. include testing for pH, turbidity, lead, hydrocarbons, and oils. |
| Dust Emissions                | Tracks along the earth roads.<br>At communities close to the access roads.                                                                                                                                                                                                                                                                                                                                                                      | Visual checks                                                                                     | Weekly during routine monitoring by activity monitors and reported on a monthly basis during the construction period                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Noise Levels                  | Camp sites,<br>Selected locations along the access tracks<br>Construction sites of health, education and commercial buildings.<br>Sensitive receptors like schools, hospitals and community centers along roads and commercial buildings during operation stage                                                                                                                                                                                 | Noise meter                                                                                       | Once prior to the start of construction and then on a monthly basis throughout the construction period. Quarterly Once during the operational stage.                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Fumes and gases               | Ambient air (w.r.t. proposed land use plan of Master Plan), Silencers of heavy machinery, trucks and other vehicles.                                                                                                                                                                                                                                                                                                                            | LANCOM-III emissions monitoring system.<br>Monitoring of ambient air quality in ppb.              | Monthly monitoring of air pollution parameters including the NOX, SOX, COX, Lead, Hydrocarbons during construction period and quarterly during operation stage.                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>Biological Environment</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Hunting of animals and birds  | In all Project Area generally and at construction sites particularly.                                                                                                                                                                                                                                                                                                                                                                           | Periodic visits of Project Area and in consultation with community to get feed back on hunting by | Monthly during routine monitoring and reported monthly basis during the construction period and                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

| Receptor                                        | Location                                                                                       | Monitoring Mechanism                                                                                                                  | Monitoring and Reporting Frequency                                                       |
|-------------------------------------------------|------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
|                                                 |                                                                                                | Contractor as well as outsiders                                                                                                       | quarterly monitoring and reporting during operation period.                              |
| <b>Socio-cultural Environment</b>               |                                                                                                |                                                                                                                                       |                                                                                          |
| Relocation of private and public infrastructure | In all Project Area generally and roads at particularly before construction activities started | Consultations with PAPs                                                                                                               | Monthly during relocation of infrastructure and reporting on monthly basis.              |
| Inconvenience to community                      | All around the Project Area at near by communities                                             | Consultations with community to get feed back for inconvenience due to construction activities to perform their daily routine matters | Monthly during construction period and monthly reporting only during construction period |

TABLE 7-2 RECOMMENDED EFFECTS MONITORING PROTOCOL

| Receptor                                          | Location                                                                                                                                           | Monitoring Mechanism                                                               | Monitoring and Reporting Frequency                                                                                        |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Water Quality                                     | Sampling from points located at a greater distance from the construction sites to ensure they show the influence on wider range of receiving body. | Sampling and laboratory testing of water samples from the receiving body.          | Sampling and laboratory testing should be done on quarterly basis. Parameters to be monitored should be as per standards. |
| Air Quality                                       | Hotels premises, residential colonies, schools, hospitals, etc. along roadsides                                                                    | Ambient air quality monitoring in ppb.                                             | Quarterly air quality monitoring for NOX, SOX, COX and Hydrocarbons.                                                      |
| Tree Cutting                                      | Construction sites and near camp site at construction stage and plantation sites during operation stage                                            | Visual checking and consultations with locals<br>Generation rate of new plantation | Monthly during construction and quarterly during operation stage.                                                         |
| Compensation, resettlement and dispute resolution | Construction sites and restoration of borrow areas                                                                                                 | Consultation with affected persons and owners of the land                          | Monthly during construction                                                                                               |

## 7.7. COMMUNICATION AND DOCUMENTATION PLAN

Effective communication, transparent reporting, and proper documentation are essential to ensure that environmental requirements of the Karakoram Greens, Islamabad are fully complied with during construction and operation. This plan outlines

how environmental information will be shared between the Supervising Consultant (SC), the Contractor, and Pak-EPA

#### **7.7.1. KICK-OFF MEETING**

One kick off meeting will take place at the main camp of the respective Contractor before the start of construction. The purpose of the kick off meeting will be to demonstrate to the regulator and monitors that all requirements prior to the start of the individual Project activities have been met and the Capital Development Authority, Islamabad EO and concerned department, SC, and contractors are ready to start the Project as per the requirements of the EIA/EMP.

#### **7.7.2. MEETINGS AND REPORTS**

Monthly environmental review meetings will be convened at the construction site throughout the construction period. These meetings will provide a forum to:

- ✎ Review progress of construction activities
- ✎ Discuss environmental performance and any non-compliances identified by SC
- ✎ Plan corrective or preventive measures

The SC will prepare Monthly Environmental Reports (MERs) documenting key discussion points and environmental performance during the preceding month. Minimum MER contents:

- ✎ Summary of construction progress
- ✎ Record of SC and Contractor environmental personnel on site
- ✎ Summary of monitoring undertaken
- ✎ List of non-compliances and corrective actions

Meetings will be chaired by the SC's Environmental Officer and attended by the Contractor's representatives.

#### **7.7.3. MONTHLY ENVIRONMENTAL REPORT**

A MER will be prepared by SC summarizing the Project activities and results of activity and effects monitoring. The MER as a minimum will include the following:

- ✎ Summary of Project Activities
- ✎ Schedule of SC activity monitoring and effects monitoring team

- ✕ Summary of activity and effects monitoring activities
- ✕ Statistical record of non-compliances observed during the month
- ✕ Summary of the results of Effects Monitoring
- ✕ Record of mitigation measures taken or pending
- ✕ Record of social complaints
- ✕ Record of change managements
- ✕ Record of water consumption
- ✕ Record of fuel consumption

MERs will be submitted to concerned departments and will feed into Quarterly Environmental Reports submitted to Pak-EPA. Hard copies will be kept on file at the Project Management Office.

#### **7.7.4. SOCIAL COMPLAINTS REGISTER**

To ensure that local community concerns are addressed promptly, SC will maintain a grievance register recording:

- ✕ Nature of complaints
- ✕ Location and date
- ✕ Actions taken to resolve concerns

Status of complaints will be reviewed during monthly meetings and included in quarterly submissions to Pak-EPA.

#### **7.7.5. CHANGE RECORD REGISTER**

Any changes in project design or environmental commitments will be documented in a Change Management Register, in accordance with the EMP Change Management Plan. Approval from relevant authorities will be sought, where required.

#### **7.7.6. NON-COMPLIANCE RECORD REGISTER**

SC will maintain a Non-Compliance Register to document all instances where environmental requirements are not met. Each observation will include:

- ✕ Description of non-compliance
- ✕ Root cause analysis
- ✕ Corrective and preventive actions

✍ Closure status

A copy of this register will be appended to every MER.

#### **7.7.7. FINAL MONITORING REPORT**

Upon completion of construction works, SC will prepare a Final Environmental Monitoring Report, covering:

- ✍ Overview of environmental monitoring program
- ✍ Natural resource usage (water, fuel, materials)
- ✍ Summary and analysis of non-compliances
- ✍ Documented environmental effects on communities, wildlife, and physical resources
- ✍ Lessons learned and recommendations for future development phases

This report will be submitted to Pak-EPA as a record of environmental performance..

#### **7.7.8. PHOTOGRAPHIC RECORD**

SC will maintain a comprehensive photographic record of all environmentally significant locations, including:

- ✍ Pre-construction conditions
- ✍ Relocation/compensation areas
- ✍ Camp sites and access roads
- ✍ Monitoring activities and mitigation installations
- ✍ Progressive rehabilitation works

These images will serve as visual evidence for compliance assessment and reporting.

### **7.8. CHANGE MANAGEMENT PLAN**

The EIA for the Karakoram Greens, Islamabad recognizes that certain modifications may become necessary during project implementation and operation. These changes may arise from new site-specific information, monitoring results, regulatory requirements, or evolving environmental conditions. To ensure that any such adjustments are handled in a controlled and responsible manner, a formal Change Management Plan has been established. The plan addresses both:

- (i) additions to the EMP, and
- (ii) modifications to project activities or operational practices that may trigger updates to the EMP.

#### **7.8.1. ADDITIONS TO THE EMP**

The EIA and the EMP have been developed based on the best possible information available at the time of the EIA study. However, it is possible that during the conduct of the proposed Project, additional mitigation measures based on the findings of environmental monitoring during construction and operation may have to be included in the EMP. In such cases following actions will be taken:

- ✎ A meeting will be held between Capital Development Authority, Islamabad, SC and the concerned Contractor. During the meeting the proposed addition to the EMP will be discussed and agreed upon by all parties.
- ✎ Based on the discussion during the meeting, a change report will be produced collectively, which will include the additional EMP clause and the reasons for the addition.
- ✎ The report will be signed by all parties and will be final at the site office. A copy of the report will be sent to Capital Development Authority, Islamabad, Contractor and SC head offices. Prior to start of activities as per changes made in EMP, approval will have to be taken from Punjab-EPA.
- ✎ All relevant Project personnel will be given information of the addition. These additions will be reported in the MER by SC.

#### **7.8.2. CHANGES TO THE OPERATION**

To ensure that such modifications are screened, evaluated, documented, and approved at the appropriate level before implementation, so that environmental compliance is maintained at all times.

The Change Management Plan classifies modifications into three categories depending on their potential to alter environmental impacts:

##### **7.8.2.1. FIRST ORDER**

First Order Changes refer to any modification that causes a significant deviation from the project description or environmental impacts originally assessed in the EIA. These changes may result in new or increased environmental risks and therefore require formal reassessment and approval by Pak-EPA prior to implementation.

- ✎ Under these circumstances, the SC, along with Pak-EPA's designated Environmental Officer, will reassess the potential environmental impacts of the proposed change and submit an updated impact assessment to Pak-EPA for review and approval.

**Examples include:**

- ✎ Any modification in waste handling or disposal that could lead to soil or water contamination, particularly in sensitive environmental zones.
- ✎ Failure to meet minimum requirements for Effects Monitoring as stipulated in the EMP.
- ✎ Significant alteration to the reporting or stakeholder communication process that compromises the ability to demonstrate environmental compliance

**7.8.2.2. SECOND ORDER**

Second Order Changes are those that do not substantially alter the original project scope or create significant impacts beyond those assessed in the EIA. These changes may require additional mitigation or precautionary measures but do not necessitate a revised environmental approval.

In such cases, the SC's Environmental Officer will review the proposed modification, assess its potential environmental effects, recommend mitigation (if required), and provide a notification to the concerned department and Pak-EPA as part of routine documentation.

**Examples include:**

- ✎ Adjustment of location for facilities such as parks, schools, or commercial areas without altering the scale of development or environmental assessment outcomes.
- ✎ A moderate increase in resource consumption (e.g., water use) that does not negatively affect community supply or environmental flows.
- ✎ Minor extension of camp sites or access tracks that does not worsen impacts on vegetation, wildlife, or communities.

- ✎ Changes in waste handling procedures that remain within permissible limits and do not risk contamination.

### **7.8.2.3. THIRD ORDER**

Third Order Changes involve minor on-site adjustments made purely to reduce environmental impacts and remain fully within the EIA-assessed limits. These adjustments do not create any additional environmental effect, and no further approval is required.

The only requirement is that such changes are properly logged in the Change Record Register for traceability.

#### **Examples include:**

- ✎ Small realignment of a road segment to avoid trees or sensitive vegetation.
- ✎ Relocation of temporary construction facilities to minimize land clearing or disturbance..

## **7.9. TRAINING PROGRAM**

Environmental training will form part of the environmental management system. The training will be directed towards all personnel for general environmental awareness.

### **7.9.1. OBJECTIVES**

The key objective of training program is to ensure that the requirements of the EMP are clearly understood and followed throughout the Project. The trainings to the staff will help in communicating environmental related restrictions specified in the EIA and EMP.

### **7.9.2. ROLES AND RESPONSIBILITIES**

EO will primarily be responsible for arranging environmental training to all Project personnel on potential environmental issues of the Project. Contractors will be responsible to arrange trainings and ensure the presence of targeted staff. EO will prepare a Project specific training manual for this purpose. Contractors on their part will be required to provide induction training/briefing to all their staff before the start of any activity in the Project Area. This will be followed by trainings arranged by EO to all the targeted staff.

### 7.9.3. **TRAINING LOG**

A training log shall be maintained by the Environmental Officer to document all capacity-building and awareness activities conducted under the project. The log will include details of the training topic, date, time and venue, name of the trainer or resource person, and a record of participants attending each session. This documentation will serve as a reference for monitoring compliance and evaluating the effectiveness of environmental training initiatives.

### 7.9.4. **TRAINING NEEDS ASSESSMENT**

In addition to the training specified in the training log special/ additional trainings will be provided during the Project activity. The criteria to assess the need of training will be based on the following:

- ✗ When a specified percentage of staff is newly inducted in the Project.
- ✗ When any non-compliance is repeatedly reported refresher training will be provided regarding that issue.
- ✗ When any incident/accident of minor or major nature occurs.
- ✗ Arrival of new contractor/sub-contractor
- ✗ Start of any new process/activity

### 7.9.5. **TRAINING MATERIAL**

EO will develop and prepare training material regarding environmental awareness, sensitivity of the area, EIA, EMP and restrictions to be followed during the Project. Separate training material will be prepared for each targeted staff.

**TABLE 7-3 TRAINING PROGRAM**

| Staff                                                                                                  | Contents                                                                                                                                                                                                                 | Timing                                           |
|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Selected management staff of CDA concerned departments, SC staff and the construction Contractor staff | Environmental sensitivity of the Project area<br>Wildlife, vegetation issues and related mitigation<br>EMP communication, documentation and monitoring requirements<br>Air and noise pollution control<br>Waste disposal | Prior to the start of any major Project activity |
| Construction supervisors and survey crew                                                               | Environmental sensitivity of the Project Area                                                                                                                                                                            | Before the start of construction activities,     |

| Staff                                  | Contents                                                                                                                                                                                                                                                    | Timing                               |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
|                                        | Wildlife, vegetation & community issues and related mitigation<br>EMP communication, documentation and monitoring requirements.<br>Good construction practices<br>Preservation of flora and fauna<br>Community relations<br>Air and noise pollution control | daily during tool box meeting        |
| Drilling supervisors                   | Drilling waste disposal<br>Landfill site operation<br>Air and noise pollution control during the drilling operation                                                                                                                                         | Prior to start of drilling operation |
| Drivers                                | Road safety<br>Road restrictions<br>Vehicle restrictions<br>Waste disposal<br>Defensive driving                                                                                                                                                             | Prior to start of drilling operation |
| Mechanics and Vehicle Repair Personnel | Environmental control of vehicles and equipment<br>Waste disposal                                                                                                                                                                                           | Prior to start of the operation      |
| Camp Staff                             | Camp operation<br>Waste disposal<br>Water consumption<br>House keeping                                                                                                                                                                                      | Prior to start of the operation      |
| Restoration and Clean-up team          | Restoration requirements                                                                                                                                                                                                                                    | Prior start of restoration activity  |

## **7.10. ENVIRONMENTAL MANAGEMENT AND MONITORING COST**

### **7.10.1. ENVIRONMENTAL MANAGEMENT COST**

Environmental management cost related with the mitigation measures of environmental parameters related to the location of camp site facilities, construction activities, borrow material, etc. will be the sole responsibility of the Contractor and he will take care of cost implications as it will be the part of his contract agreement.

The Project's environmental management cost related with the construction of environmental mitigation infrastructure like waste water treatment plant, solid waste management, storm water drainage, etc. are being carried out separately will be the part of Project estimate.

Operation and Maintenance cost of the environmental mitigation infrastructure will be borne by the CDA as well as concerned departments responsible for operation and maintenance of the concerned facilities.

### 7.10.2. ENVIRONMENTAL MONITORING COST

The environmental monitoring at pre-construction stage and other in-house monitoring to be carried out by the Contractor(s) will be a part of his contract agreement. Similarly, the environmental monitoring to be carried out during the construction stage by the SC will be the part of their contract agreement. The environmental monitoring cost for the complete project will be PKR 1.2 Million.

### 7.10.3. TRAINING COST

The Project training will be imparted at different stages and different staff levels. The cost has been incurred in the budget.

TABLE 7-4: ESTIMATED BUDGET COST FOR THE IMPLEMENTATION OF EMMP OF THE PROJECT

| Investment and Recurrent Cost                                | Units/ No. of Samples | Unit Cost specification                    | Cost (Rs)        |
|--------------------------------------------------------------|-----------------------|--------------------------------------------|------------------|
| A – Institutional Setup Cost                                 |                       |                                            |                  |
| Environment Officer @ 30,000 pm                              | 12months              | Monthly investment and operation cost      | 360,000          |
| Equipment for field inspection                               | Lump sum              | 1 Digital Camera, 1 laptop and accessories | 200,000          |
| Recurrent cost                                               | Lump sum              | O&M for vehicle, telephone and printing    | 150,000          |
| Sub Total A                                                  |                       |                                            | 710,000          |
| B - Environmental Monitoring Activities (Base Line Sampling) |                       |                                            |                  |
| Ambient Air Quality Monitoring                               | -                     | Lump sum                                   | 100,000          |
| Ambient Water Quality Monitoring                             | -                     | Lump sum                                   | 100,000          |
| Noise Levels                                                 | -                     | Lump sum                                   | 10,000           |
| Sub Total B                                                  |                       |                                            | 210,000          |
| C. External Monitoring                                       | 2                     | @ 150,000                                  | 300,000          |
| D. Environmental Training                                    | 2                     | @ 50,000                                   | 100,000          |
| E. Tree Plantation Cost                                      | 3,000                 | @ 150 per Plant                            | 450,000          |
| <b>Sub Total (B-E)</b>                                       |                       |                                            | <b>1,000,000</b> |
| <b>Grand Total (A-E) Rs.</b>                                 |                       |                                            | <b>1,920,000</b> |

## 8. ENVIRONMENTAL PLANS

### 8.1. SOLID WASTE MANAGEMENT PLAN

Domestic and commercial solid waste at Karakoram Greens will comprise all non-gaseous and non-liquid wastes generated from residential, commercial, and associated community activities within the project area. Effective management of solid waste is essential from both environmental and public health perspectives, as improper handling, storage, or disposal can result in serious health hazards, environmental degradation, and deterioration of aesthetic quality.

The quantity and composition of solid waste generated within a residential development are closely linked to socio-economic conditions, lifestyle patterns, and consumption trends. With urbanization and changing living standards, per capita waste generation has been steadily increasing. In Pakistan, municipal solid waste typically consists of a mixture of biodegradable and non-biodegradable materials, including food waste, plastics, paper, cardboard, metals, textiles, glass, garden waste, and inert materials.

### 8.2. BASIS OF SOLID WASTE CALCULATION

The solid waste generation estimate has been prepared using the projected residential population and standard municipal waste generation rates applicable to urban residential developments.

#### 8.2.1. PROJECT POPULATION ASSUMPTIONS

The estimation of solid waste generation for Karakoram Greens is based on the projected residential population of the development and standard urban waste generation rates commonly applied in Pakistan for residential communities. The key population assumptions used for the calculations are presented below.

**Table 8-1: Project Population Assumptions**

| <i>Parameter</i>                        | <i>Value</i>       |
|-----------------------------------------|--------------------|
| <i>Total Residential Units</i>          | 781 apartments     |
| <i>Average Household Size</i>           | 5 persons per unit |
| <i>Estimated Residential Population</i> | 3,905 persons      |

|                                    |                       |
|------------------------------------|-----------------------|
| <i>Solid Waste Generation Rate</i> | 0.6–0.7 kg/person/day |
| <i>Recommended Design Rate</i>     | 0.7 kg/person/day     |

### 8.2.2. ESTIMATED DAILY SOLID WASTE GENERATION

Using the conservative design rate of 0.7 kg/person/day, the estimated municipal solid waste generation is calculated as follows:

$$\text{Total Solid Waste} = \text{Population} \times \text{Waste Generation Rate}$$

$$\text{Total Solid Waste} = 3,905 \text{ persons} \times 0.7 \text{ kg/person/day}$$

$$\text{Total Solid Waste} = 2,733.5 \text{ kg/day}$$

Therefore, the project is expected to generate approximately:

$$2.73 \text{ tonnes/day of municipal solid waste}$$

### 8.2.3. ANNUAL SOLID WASTE GENERATION

$$\text{Annual Waste} = 2,733.5 \text{ kg/day} \times 365 \text{ days}$$

$$\text{Annual Waste} = 997,727.5 \text{ kg/year}$$

Therefore, the annual solid waste generation is estimated at approximately:

$$998 \text{ tonnes/year}$$

### 8.2.4. SOURCE-WISE SOLID WASTE GENERATION

The majority of solid waste will be generated from residential apartments, while the remaining portion will originate from semi-commercial areas, common facilities, maintenance areas, landscaping activities, and administrative operations.

**Table 8-2: Source-wise Estimated Solid Waste Generation for Karakoram Greens**

| <i>Waste Source</i>                 | <i>Share of Total Waste</i> | <i>Estimated Waste kg/day</i> | <i>Estimated Waste tonnes/year</i> |
|-------------------------------------|-----------------------------|-------------------------------|------------------------------------|
| <i>Residential apartments</i>       | 90%                         | 2,460 kg/day                  | 898 tonnes/year                    |
| <i>Commercial/common facilities</i> | 10%                         | 273 kg/day                    | 100 tonnes/year                    |
| <b>Total</b>                        | <b>100%</b>                 | <b>2,734 kg/day</b>           | <b>998 tonnes/year</b>             |

### 8.2.5. EXPECTED WASTE COMPOSITION

The waste generated during the operational phase is expected to be predominantly non-hazardous municipal solid waste. The likely composition is presented below.

**Table 8-3: Expected Composition of Municipal Solid Waste Generated During Project Operation**

| <i>Waste Category</i>              | <i>Estimated Share</i> | <i>Estimated Quantity kg/day</i> | <i>Management Option</i>         |
|------------------------------------|------------------------|----------------------------------|----------------------------------|
| <i>Organic / food waste</i>        | 45%                    | 1,230 kg/day                     | Composting or municipal disposal |
| <i>Paper and cardboard</i>         | 15%                    | 410 kg/day                       | Recycling                        |
| <i>Plastics</i>                    | 15%                    | 410 kg/day                       | Recycling / authorized disposal  |
| <i>Glass</i>                       | 5%                     | 137 kg/day                       | Recycling                        |
| <i>Metals</i>                      | 3%                     | 82 kg/day                        | Recycling                        |
| <i>Textiles, rubber, leather</i>   | 5%                     | 137 kg/day                       | Reuse / disposal                 |
| <i>Garden waste</i>                | 5%                     | 137 kg/day                       | Composting / mulching            |
| <i>Sanitary and residual waste</i> | 7%                     | 191 kg/day                       | Safe municipal disposal          |
| <b>Total</b>                       | <b>100%</b>            | <b>2,734 kg/day</b>              |                                  |

### 8.3. WASTE SEGREGATION STRATEGY

Waste segregation shall be implemented at source to reduce mixed waste generation and improve recycling efficiency. Residents, commercial units, and facility management staff shall be required to segregate waste into clearly marked categories.

**Table 8-4: Proposed Segregation Categories for Solid Waste Management**

| <i>Bin Color / Category</i> | <i>Waste Type</i>         | <i>Examples</i>                                              |
|-----------------------------|---------------------------|--------------------------------------------------------------|
| <i>Green Bin</i>            | Organic Waste             | Food waste, vegetable peels, tea waste, garden waste         |
| <i>Blue Bin</i>             | Recyclables               | Paper, cardboard, plastic bottles, cans, glass               |
| <i>Black / Grey Bin</i>     | Residual Waste            | Sweeping waste, contaminated packaging, non-recyclable waste |
| <i>Red / Yellow Bin</i>     | Hazardous / Special Waste | Batteries, bulbs, chemicals, paint containers, e-waste       |

#### 8.3.1. SEGREGATION AT SOURCE

Each residential block shall be provided with designated waste collection points. Residents shall be encouraged to segregate waste at household level before disposal into floor-level or block-level collection bins. Commercial units shall maintain separate bins for organic waste, recyclables, and residual waste. Facility management shall ensure that:

- ☞ All bins are clearly labeled.

- ✍ Segregation instructions are displayed in common areas.
- ✍ Waste collection staff are trained in safe handling and segregation.
- ✍ Hazardous and special waste is not mixed with municipal waste.
- ✍ Waste collection points are cleaned regularly.
- ✍ Awareness material is shared with residents.

### 8.3.2. **TEMPORARY STORAGE REQUIREMENTS**

A centralized temporary waste storage area shall be established within the project site. The storage area shall be designed to safely accommodate at least one day of total waste generation, with additional contingency capacity.

### 8.3.3. **STORAGE REQUIREMENT**

*Daily waste generation = 2.73 tonnes/day*

*Recommended storage capacity = 1.5 days*

*Required storage capacity =  $2.73 \times 1.5 = 4.10$  tonnes*

Therefore, the project should provide temporary storage capacity for at least:

**4.0–4.5 tonnes of solid waste**

The waste storage area shall include:

- ✍ Impervious flooring.
- ✍ Covered structure.
- ✍ Proper ventilation.
- ✍ Drainage connection for wash water.
- ✍ Washable surfaces.
- ✍ Pest control arrangements.
- ✍ Fire safety equipment.
- ✍ Separate sections for recyclables, organic waste, residual waste, and hazardous/special waste.

### 8.3.4. **COLLECTION AND TRANSPORTATION**

Solid waste shall be collected daily from residential blocks, commercial areas, and common facilities by designated waste management staff. Internal collection shall be carried out using covered carts, bins, or small collection vehicles to prevent littering and odor nuisance.

Final collection and transportation shall be carried out through an authorized municipal or private waste management contractor. Waste shall not be dumped in open areas, natural drains, vacant plots, or roadside locations.

### 8.3.5. **COLLECTION FREQUENCY**

An efficient waste collection schedule is essential to maintain hygiene, prevent odor and pest-related issues, and ensure the timely removal of different waste streams generated within the Karakoram Greens project.

**Table 8-5: Recommended Collection Frequency for Different Waste Categories**

| <i>Waste Type</i>              | <i>Collection Frequency</i>               |
|--------------------------------|-------------------------------------------|
| <i>Organic waste</i>           | Daily                                     |
| <i>Residual waste</i>          | Daily                                     |
| <i>Recyclables</i>             | 2–3 times per week or as required         |
| <i>Garden waste</i>            | Weekly or as generated                    |
| <i>Hazardous/special waste</i> | As required through authorized contractor |

### 8.3.6. **RECYCLING AND RESOURCE RECOVERY**

The project shall promote recycling and resource recovery to reduce the quantity of waste requiring final disposal. Recyclable materials such as paper, cardboard, plastic bottles, metals, and glass shall be collected separately and handed over to approved recycling vendors. Potential recyclable fraction is estimated at approximately:

*Paper and cardboard = 410 kg/day*

*Plastics = 410 kg/day*

*Glass = 137 kg/day*

*Metals = 82 kg/day*

Total recyclable potential = 1,039 kg/day, equivalent to approximately 38% of total waste generation.

The project shall target recycling of at least 25–30% of total generated waste during the initial operational stage, with progressive improvement through resident awareness and improved segregation systems.

### **8.3.7. ORGANIC WASTE MANAGEMENT**

Organic waste is expected to form the largest fraction of the waste stream, estimated at approximately 1,230 kg/day. Where feasible, organic waste may be diverted for composting or managed through municipal collection. Garden waste generated from landscaping activities shall be separately collected and may be reused as mulch or compost after proper processing.

Organic waste management measures include:

- ✍ Separate collection of food waste.
- ✍ Covered bins to control odor.
- ✍ Daily removal to prevent pest breeding.
- ✍ Composting of garden waste where feasible.
- ✍ Avoidance of mixed disposal with recyclables.

### **8.3.8. HAZARDOUS AND SPECIAL WASTE MANAGEMENT**

Although the project is primarily residential, small quantities of hazardous or special waste may be generated during operation. These may include:

- ✍ Batteries.
- ✍ Used bulbs and tube lights.
- ✍ Paint containers.
- ✍ Cleaning chemical containers.
- ✍ Used oil from generators.
- ✍ Electronic waste.
- ✍ Expired household chemicals.

Such waste shall be collected separately and stored in a designated hazardous waste corner within the waste storage area. It shall be labeled, contained, and handed over to authorized waste handlers or recyclers. Hazardous waste shall not be mixed with municipal solid waste.

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### **8.3.9. CONSTRUCTION PHASE WASTE**

During construction, waste may include excavated material, concrete debris, steel scrap, wood, packaging materials, cement bags, tiles, glass, plastic sheets, paint containers, oil-contaminated rags, and general domestic waste from workers. Construction waste management shall include:

- ✕ Reuse of excavated material where technically feasible.
- ✕ Segregation of steel, wood, cardboard, and plastic.
- ✕ Sale or transfer of recyclable materials to authorized recyclers.
- ✕ Safe disposal of non-recyclable debris at approved locations.
- ✕ Separate handling of hazardous construction waste.
- ✕ Prohibition of open burning of waste.

### **8.4. INSTITUTIONAL RESPONSIBILITIES**

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The successful implementation of the solid waste management strategy for Karakoram Greens will require coordinated efforts from all stakeholders involved in the project. The Project Proponent will be responsible for the overall implementation and oversight of the solid waste management system, ensuring that adequate resources, infrastructure, and operational arrangements are in place. Facility Management will oversee the day-to-day collection, segregation, temporary storage, and coordination with waste collection contractors to ensure efficient waste handling throughout the project. The Environmental Officer will be responsible for monitoring waste management activities, maintaining records, conducting inspections, and verifying compliance with environmental requirements and project commitments.

Residents will play a critical role by segregating waste at the household level and disposing of it in designated bins according to the prescribed waste categories. Commercial units operating within the development will be responsible for segregating and safely storing their waste prior to collection. Authorized waste contractors will undertake the collection, transportation, and disposal of waste at approved facilities in accordance with applicable regulations. Recycling vendors will support resource recovery efforts by collecting and processing segregated recyclable materials such as paper, plastics, metals, and glass, thereby reducing the quantity of waste requiring final disposal. Through clearly defined responsibilities and effective coordination among all parties, the project will be able to maintain an efficient and environmentally sound solid waste management system.

## 8.5. MONITORING INDICATORS

To ensure effective implementation of the Solid Waste Management Plan and continuous compliance with environmental requirements, the following monitoring indicators shall be tracked throughout the operational phase of the project.

**Table 8-6: Solid Waste Management Monitoring Indicators**

| <i>Indicator</i>                     | <i>Target / Threshold</i>                       | <i>Frequency</i> |
|--------------------------------------|-------------------------------------------------|------------------|
| <i>Daily waste generation record</i> | Maintained daily                                | Daily            |
| <i>Segregation compliance</i>        | Minimum 80% in first year, improving thereafter | Weekly           |
| <i>Waste collection frequency</i>    | Daily collection of organic and residual waste  | Daily            |
| <i>Recycling rate</i>                | Minimum 25–30% of total waste                   | Monthly          |
| <i>Unauthorized dumping</i>          | Zero incidents                                  | Continuous       |
| <i>Hazardous waste mixing</i>        | Zero mixing with municipal waste                | Weekly           |
| <i>Waste storage cleanliness</i>     | No odor, leachate, or pest nuisance             | Daily            |
| <i>Waste contractor records</i>      | 100% disposal documentation                     | Monthly          |

## 8.6. CORRECTIVE ACTIONS

Corrective actions shall be initiated if:

- ✗ Waste is found mixed despite segregation arrangements.
- ✗ Waste storage area is overloaded.
- ✗ Odor, flies, rodents, or leachate are observed.
- ✗ Waste is not collected on schedule.
- ✗ Unauthorized dumping occurs.
- ✗ Hazardous waste is mixed with municipal waste.
- ✗ Community complaints are received.

Corrective measures may include additional bins, improved signage, resident awareness campaigns, increased collection frequency, replacement of waste

contractor, cleaning and disinfection of storage areas, and enforcement of penalties for repeated non-compliance.

## **8.7. HEALTH AND OCCUPATIONAL SAFETY**

Given the scale and nature of the Karakoram Greens residential development, the project area may be exposed to potential emergency situations such as fire incidents, natural hazards, or other unforeseen events. Fire hazards may arise due to accidental ignition, electrical faults, negligence, or external causes such as the ignition of nearby vegetation. In addition, other emergency scenarios may include earthquakes, localized flooding, health emergencies, or security-related incidents.

Although the size of the project does not necessitate the establishment of a dedicated on-site fire brigade, adequate preventive and response measures have been incorporated into the project design to ensure effective emergency management. Comprehensive emergency preparedness protocols will be implemented to minimize risks, safeguard residents, and ensure timely response during any emergency situation.

### **8.7.1. OHS MANAGEMENT STRUCTURE AND RESPONSIBILITIES**

An effective Occupational Health and Safety (OHS) management structure is essential to ensure the successful implementation of health and safety policies, compliance with regulatory requirements, and the protection of workers, contractors, visitors, and surrounding communities throughout the project lifecycle.

**Table 8-7: OHS Management Structure and Key Responsibilities**

| <i>Position</i>                        | <i>Responsibilities</i>                                            |
|----------------------------------------|--------------------------------------------------------------------|
| <i>Project Proponent</i>               | Overall OHS oversight, resources allocation, regulatory compliance |
| <i>Project Manager</i>                 | Implementation and enforcement of OHS requirements                 |
| <i>Environmental Officer (EO)</i>      | Monitoring compliance, reporting incidents, inspections            |
| <i>OHS Officer / Safety Supervisor</i> | Daily supervision, toolbox talks, hazard identification            |
| <i>Contractors</i>                     | Compliance with project safety procedures                          |
| <i>Workers</i>                         | Follow safety instructions and use PPE                             |
| <i>Security Staff</i>                  | Emergency response support and evacuation assistance               |

A dedicated full-time OHS Officer shall be appointed throughout the construction period.

### **8.7.2. SAFE WORK PROCEDURES**

Safe work procedures shall be implemented for all construction activities to minimize occupational risks and ensure worker safety. Specific procedures shall be followed for high-risk activities including excavation works, working at heights, lifting operations, electrical works, and confined space entry.

For excavation safety, all excavation edges shall be properly barricaded to prevent accidental falls and unauthorized access. Excavation walls shall be inspected daily to identify signs of instability or collapse risks. Safe access ladders shall be provided at intervals not exceeding 7.5 meters to facilitate safe entry and exit. Existing underground utilities shall be identified and marked before excavation activities commence, and appropriate dewatering arrangements shall be established where groundwater accumulation may affect excavation stability.

For activities involving work at height, the use of full-body harnesses shall be mandatory for work conducted above 1.8 meters. Guard rails and toe boards shall be installed wherever feasible to prevent falls. All scaffolding structures shall be inspected and certified before use, and appropriate fall arrest systems shall be installed and maintained throughout the duration of elevated work activities.

Crane and lifting operations shall only be conducted by certified and trained operators. Detailed lifting plans shall be prepared for major lifting activities to ensure safe execution. Exclusion zones shall be established around lifting areas to restrict unauthorized access, and all lifting equipment shall undergo load testing and routine inspections to verify operational safety.

Electrical safety procedures shall include implementation of lock-out/tag-out systems during maintenance and repair activities to prevent accidental energization. Proper grounding of electrical systems and equipment shall be ensured at all times. Insulated cables and tools shall be used where required, and regular inspections shall be conducted to identify damaged wiring, faulty equipment, or unsafe conditions.

Confined space entry activities shall be controlled through a permit-to-work system to ensure proper authorization and hazard assessment before entry. Atmospheric gas testing shall be conducted prior to entry and continuously monitored where necessary. Adequate ventilation shall be provided to maintain safe working conditions, and rescue equipment along with trained rescue personnel shall remain readily available during confined space operations.

### **8.7.3. OCCUPATIONAL HEALTH MANAGEMENT**

Occupational health management for the Karakoram Greens project shall focus on protecting workers from occupational illnesses and maintaining a healthy working environment throughout construction and operational activities. The project management shall implement preventive measures, regular health monitoring, and workplace controls to minimize exposure to physical, chemical, and environmental hazards.

Worker medical screening shall be conducted to ensure that personnel are medically fit for assigned tasks and capable of performing their duties safely. Pre-employment medical assessments shall be carried out before deployment, followed by periodic health examinations to monitor worker health conditions and identify any occupational illnesses at an early stage. Fitness-to-work assessments shall also be conducted for workers engaged in high-risk activities or returning after prolonged illness or injury.

Heat stress management measures shall be implemented, particularly during summer months when temperatures in Islamabad can become extreme. Adequate drinking water stations shall be established throughout the site to prevent dehydration, while shaded rest shelters shall be provided for recovery during breaks. Work rotation practices shall be adopted to reduce prolonged exposure to heat, and work schedules may be modified to avoid strenuous activities during peak temperature periods.

Dust exposure control measures shall be implemented to minimize respiratory risks associated with excavation, material handling, and construction activities. Water sprinkling shall be carried out regularly on exposed surfaces and access roads to suppress dust emissions. Construction materials and stockpiles shall be covered where feasible to reduce wind-blown dust, while workers operating in dusty environments shall be provided with appropriate dust masks. Vehicle speed limits within the project site shall also be enforced to minimize dust generation.

Noise exposure management shall focus on reducing worker exposure to excessive noise generated by machinery, equipment, and construction activities. Regular maintenance of equipment shall be undertaken to minimize unnecessary noise emissions. Workers operating in high-noise areas shall be provided with hearing protection devices such as earplugs or earmuffs, and rotational work practices shall be adopted to limit prolonged exposure to elevated noise levels.

#### **8.7.4. EMERGENCY PREPAREDNESS AND RESPONSE**

The project shall establish a comprehensive Emergency Preparedness and Response system to effectively manage potential emergencies that may arise during construction and operational activities. The objective of this system is to minimize risks to workers, visitors, nearby communities, property, and the environment through timely response, clear communication, and coordinated emergency actions.

Potential emergency situations associated with the project include fire outbreaks, structural failures, excavation collapses, earthquakes, medical emergencies, flooding, chemical spills, and electrical shocks. Risk assessments shall be conducted periodically to identify emergency scenarios and ensure that appropriate response measures are in place for each identified hazard.

To ensure readiness, a dedicated site emergency response team shall be established and trained to handle emergency situations. Emergency contact information, including details of nearby hospitals, ambulance services, fire brigades, police authorities, and utility providers, shall be prominently displayed at strategic locations throughout the site. Adequate emergency equipment, including fire extinguishers, first aid kits, rescue equipment, and communication devices, shall be maintained and regularly inspected to ensure operational effectiveness.

Clearly marked evacuation routes, emergency exits, assembly points, and evacuation maps shall be provided throughout the project site. Workers, contractors, and visitors shall be informed of emergency procedures during site induction and periodic awareness sessions. Arrangements shall also be made with nearby medical facilities and ambulance services to ensure prompt medical assistance in the event of injuries or health emergencies.

Emergency drills covering various scenarios such as fire incidents, evacuation procedures, and medical emergencies shall be conducted on a quarterly basis. The outcomes of these drills shall be documented and reviewed to identify gaps and improve emergency preparedness and response capabilities.

## **8.8. TRAFFIC IMPACT ASSESSMENT AND LEVEL OF SERVICE ANALYSIS**

### **8.8.1. INTRODUCTION**

A Traffic Impact Assessment has been prepared for the Karakoram Greens project to evaluate the likely traffic generation, parking demand, access requirements, internal circulation efficiency, and potential impacts on the adjoining road network of Gulberg Greens, Islamabad. The purpose of this assessment is to ensure that traffic

generated by the proposed residential development can be safely accommodated through the planned internal roads, access points, parking areas, and external road connections without causing significant congestion, safety risks, or disruption to surrounding land uses.

The project is located within Gulberg Greens, Islamabad, with access through the existing internal road network of the housing scheme and onward connectivity to Islamabad Expressway. The development comprises high-rise residential towers, basement parking, semi-commercial facilities, common areas, service areas, and internal circulation routes.

### 8.8.2. **PROJECT TRAFFIC CONTEXT**

Karakoram Greens is a vertical residential development comprising residential apartments, semi-commercial space, basement parking, visitor parking, internal access roads, pedestrian walkways, and service circulation routes. The project will generate traffic from residents, visitors, service vehicles, delivery vehicles, waste collection vehicles, emergency vehicles, and facility management operations.

The project design includes covered parking facilities in the basement levels to reduce surface congestion and minimize roadside parking. Internal circulation has been planned to allow controlled access, safe vehicular movement, pedestrian connectivity, and emergency vehicle access.

### 8.8.3. **BASIS OF TRAFFIC ASSESSMENT**

The traffic assessment has been developed using project-specific planning data and standard trip-generation assumptions for high-rise residential developments.

**Table 8-8: Project Parameters**

| <i><b>Parameter</b></i>                                          | <i><b>Value</b></i> |
|------------------------------------------------------------------|---------------------|
| <i>Residential apartments, Cluster-01</i>                        | 432 units           |
| <i>Residential apartments, Block-E</i>                           | 64 units            |
| <i>Total residential units considered for traffic assessment</i> | 496 units           |
| <i>Required parking, Cluster-01</i>                              | 780 cars            |

|                                             |                                             |
|---------------------------------------------|---------------------------------------------|
| <i>Provided covered parking, Cluster-01</i> | <b>789 cars</b>                             |
| <i>Required parking, Block-E</i>            | 96 cars                                     |
| <i>Provided covered parking, Block-E</i>    | <b>130 cars</b>                             |
| <i>Total required parking</i>               | 876 cars                                    |
| <i>Total provided covered parking</i>       | <b>919 cars</b>                             |
| <i>Semi-commercial area</i>                 | 12,367 sq. ft                               |
| <i>Primary access</i>                       | <b>Gulberg Greens internal road network</b> |
| <i>External connectivity</i>                | Islamabad Expressway corridor               |

#### **8.8.4. TRAFFIC GENERATION ASSUMPTIONS**

Traffic generation has been estimated using conservative assumptions suitable for an EIA-level assessment. For high-rise residential apartments, trip generation varies depending on occupancy, car ownership, household income, availability of public transport, and travel behavior.

For this assessment, the following trip rates have been adopted:

| <i>Land Use</i>               | <i>Daily Trip Rate</i>            | <i>Peak Hour Trip Rate</i>             |
|-------------------------------|-----------------------------------|----------------------------------------|
| <i>Residential apartments</i> | 5 vehicle trips/unit/day          | 0.60 vehicle trips/unit/hour           |
| <i>Semi-commercial area</i>   | 30 vehicle trips/1,000 sq. ft/day | 3 vehicle trips/1,000 sq. ft/peak hour |

A vehicle trip means one entry or one exit movement.

### **8.9. ESTIMATED DAILY TRAFFIC GENERATION**

#### **8.9.1. RESIDENTIAL TRAFFIC**

Residential daily traffic:

$$496 \text{ units} \times 5 \text{ trips/unit/day} = 2,480 \text{ vehicle trips/day}$$

#### **8.9.2. SEMI-COMMERCIAL TRAFFIC**

Semi-commercial area:

$$12,367 \text{ sq. ft} \div 1,000 = 12.367 \text{ units of } 1,000 \text{ sq. ft}$$

Daily semi-commercial trips:

$$12.367 \times 30 = 371 \text{ vehicle trips/day}$$

### 8.9.3. TOTAL DAILY TRAFFIC

| Source                               | Estimated Daily Trips  |
|--------------------------------------|------------------------|
| Residential apartments               | 2,480 trips/day        |
| Semi-commercial area                 | 371 trips/day          |
| Service and maintenance traffic      | 100 trips/day          |
| <b>Total Estimated Daily Traffic</b> | <b>2,951 trips/day</b> |

The project is therefore expected to generate approximately **2,950 vehicle trips per day** during full operation.

## 8.10. PEAK HOUR TRAFFIC GENERATION

### 8.10.1. RESIDENTIAL PEAK HOUR TRAFFIC

Residential peak hour traffic:

$$496 \text{ units} \times 0.60 \text{ trips/unit/hour} = 298 \text{ trips/hour}$$

### 8.10.2. SEMI-COMMERCIAL PEAK HOUR TRAFFIC

Semi-commercial peak hour traffic:

$$12.367 \times 3 = 37 \text{ trips/hour}$$

### 8.10.3. SERVICE TRAFFIC

Service and facility-related peak traffic:

$$\text{Estimated} = 15 \text{ trips/hour}$$

### 8.10.4. TOTAL PEAK HOUR TRAFFIC

| SOURCE                          | ESTIMATED PEAK HOUR TRIPS |
|---------------------------------|---------------------------|
| RESIDENTIAL APARTMENTS          | 298 trips/hour            |
| SEMI-COMMERCIAL AREA            | 37 trips/hour             |
| SERVICE AND MAINTENANCE TRAFFIC | 15 trips/hour             |
| TOTAL PEAK HOUR TRAFFIC         | 350 trips/hour            |

The development is expected to generate approximately **350 peak hour vehicle trips** during full occupancy.

#### **8.10.5. DIRECTIONAL DISTRIBUTION OF PEAK HOUR TRAFFIC**

For residential developments, morning peak traffic is generally outbound-dominant, while evening peak traffic is inbound-dominant.

##### **8.10.5.1. MORNING PEAK DISTRIBUTION**

| Movement | Share | Trips/hour |
|----------|-------|------------|
| Outbound | 70%   | 245        |
| Inbound  | 30%   | 105        |
| Total    | 100%  | 350        |

##### **8.10.5.2. EVENING PEAK DISTRIBUTION**

| MOVEMENT | SHARE | TRIPS/HOUR |
|----------|-------|------------|
| INBOUND  | 70%   | 245        |
| OUTBOUND | 30%   | 105        |
| TOTAL    | 100%  | 350        |

#### **8.10.6. PARKING ASSESSMENT**

The project provides covered parking exceeding the required parking provision.

#### **8.10.7. PARKING COMPLIANCE**

| PARKING CATEGORY | REQUIRED PARKING | PROVIDED PARKING | SURPLUS         |
|------------------|------------------|------------------|-----------------|
| CLUSTER-01       | 780 cars         | 789 cars         | +9 cars         |
| BLOCK-E          | 96 cars          | 130 cars         | +34 cars        |
| <b>TOTAL</b>     | <b>876 cars</b>  | <b>919 cars</b>  | <b>+43 cars</b> |

The proposed parking supply is adequate for the development and exceeds the required provision by approximately **43 parking spaces**. The provision of basement parking will reduce pressure on internal roads and prevent spillover parking along access roads.

#### **8.10.8. INTERNAL CIRCULATION ASSESSMENT**

The internal circulation system has been designed to support safe and efficient movement of residents, visitors, service vehicles, and emergency vehicles. The circulation network should include clearly defined entry and exit points, traffic signage, road markings, speed limits, pedestrian crossings, and designated loading/unloading areas.

Key internal circulation requirements include:

- ✎ Controlled entry and exit points.
- ✎ Separate access management for residents, visitors, and service vehicles where feasible.
- ✎ Adequate turning radius for fire tenders and emergency vehicles.
- ✎ Basement ramp traffic control.
- ✎ Pedestrian walkways separated from vehicular movement.
- ✎ Speed limit of 15–20 km/hr within the project.
- ✎ No parking zones along emergency access routes.
- ✎ Dedicated waste collection and service vehicle timing.

#### **8.10.9. LEVEL OF SERVICE METHODOLOGY**

Level of Service is used to evaluate operating conditions of roadways and intersections. LOS ranges from A to F, where LOS A represents free-flow traffic conditions and LOS F represents severe congestion and unstable flow.

#### 8.10.9.1. LOS CLASSIFICATION

| LOS   | OPERATING CONDITION  | GENERAL INTERPRETATION                            |
|-------|----------------------|---------------------------------------------------|
| LOS A | Free flow            | Very low delay, excellent operating conditions    |
| LOS B | Stable flow          | Minor delay, very good conditions                 |
| LOS C | Stable flow          | Acceptable delay, good conditions                 |
| LOS D | Approaching unstable | Noticeable delay, still acceptable in urban areas |
| LOS E | At capacity          | High delay, limited maneuverability               |
| LOS F | Oversaturated        | Congestion, excessive delay                       |

For EIA-level screening, LOS has been assessed based on estimated peak hour traffic volume relative to typical urban road capacity.

#### 8.10.9.2. LOS SCREENING ANALYSIS

The project peak hour traffic is estimated at approximately **350 trips/hour**. This traffic will be distributed through the internal road network of Gulberg Greens and further connected to the Islamabad Expressway corridor.

For screening purposes, the following road capacity assumptions are applied:

| ROAD TYPE                             | TYPICAL CAPACITY                            |
|---------------------------------------|---------------------------------------------|
| TWO-LANE LOCAL/INTERNAL ROAD          | 1,000–1,200 vehicles/hour, both directions  |
| COLLECTOR ROAD                        | 1,500–2,000 vehicles/hour                   |
| ARTERIAL / EXPRESSWAY ACCESS CORRIDOR | More than 2,000 vehicles/hour per direction |

- **Internal Access Road LOS**

Assuming the project traffic uses a two-lane internal access road with a conservative capacity of **1,000 vehicles/hour**, the volume-to-capacity ratio is:

$$\text{V/C Ratio} = 350 \div 1,000 = 0.35$$

At V/C ratio of 0.35, the expected operating condition is:

- **LOS B to LOS C**

This indicates stable traffic flow with manageable delay.

- **Collector Road LOS**

If the project traffic merges with a collector road having capacity of **1,500 vehicles/hour**, then:

$$\text{V/C Ratio} = 350 \div 1,500 = 0.23$$

Expected operating condition:

- **LOS A to LOS B**

This indicates free to stable flow conditions.

## **8.11. CONSTRUCTION PHASE TRAFFIC IMPACTS**

During construction, temporary traffic impacts may arise due to movement of construction machinery, delivery trucks, concrete mixers, dumpers, material transport vehicles, and worker transport. These impacts are expected to be temporary and manageable if proper traffic controls are implemented.

Potential construction traffic impacts include:

- ✗ Short-term congestion near site access.
- ✗ Increased dust from haulage movement.
- ✗ Road safety risks for pedestrians and nearby residents.
- ✗ Damage to internal roads from heavy vehicles.
- ✗ Noise from construction vehicles.
- ✗ Conflict between construction vehicles and resident traffic.

### **8.11.1.1. CONSTRUCTION TRAFFIC MANAGEMENT MEASURES**

- ✗ Designate separate construction entry and exit points where feasible.
- ✗ Restrict heavy vehicle movement during peak traffic hours.
- ✗ Provide flagmen at site entry and exit points.
- ✗ Use covered trucks for loose materials.
- ✗ Enforce site vehicle speed limits.
- ✗ Provide wheel washing at exit points.

- ✕ Maintain haul roads and access roads.
- ✕ Avoid roadside parking of construction vehicles.
- ✕ Schedule material deliveries during off-peak periods.
- ✕ Install warning signage and reflective barriers.

#### **8.11.1.2. OPERATIONAL PHASE TRAFFIC IMPACTS**

During operation, the main traffic impacts will arise from resident vehicles, visitors, deliveries, waste collection, maintenance vehicles, and semi-commercial activities. Based on the estimated peak hour traffic, the project is not expected to significantly reduce the operating performance of surrounding roads, provided that access control, parking management, and internal circulation are properly implemented.

Operational traffic impacts may include:

- ✕ Peak-hour entry and exit queues.
- ✕ Conflict between residents and service vehicles.
- ✕ Visitor parking overflow if not managed.
- ✕ Pedestrian-vehicle conflict.
- ✕ Increased traffic at nearby junctions.
- ✕ Basement ramp congestion during peak periods.

#### **8.11.1.3. OPERATIONAL TRAFFIC MANAGEMENT MEASURES**

- ✕ Maintain controlled access gates.
- ✕ Provide separate lanes for entry and exit where feasible.
- ✕ Use security staff to manage peak-hour flow.
- ✕ Mark internal roads and pedestrian crossings.
- ✕ Enforce no-parking zones along access routes.
- ✕ Provide visitor parking management.
- ✕ Schedule waste collection and deliveries outside peak hours.
- ✕ Maintain adequate lighting in parking and circulation areas.
- ✕ Install directional signage.
- ✕ Ensure emergency vehicle access remains unobstructed.

#### 8.11.1.4. PEDESTRIAN SAFETY AND ACCESSIBILITY

Pedestrian safety is an important design requirement for residential developments. The project should provide safe and accessible pedestrian pathways connecting residential blocks, parking areas, landscaped spaces, commercial facilities, and common amenities.

Recommended pedestrian measures include:

- ✕ Dedicated pedestrian walkways.
- ✕ Zebra crossings at internal road crossings.
- ✕ Speed calming measures.
- ✕ Universal access ramps.
- ✕ Lighting along walkways.
- ✕ Clear wayfinding signage.
- ✕ Separation between pedestrian and service vehicle routes.
- ✕ Barrier-free access for elderly persons, children, and persons with disabilities.

#### 8.11.1.5. EMERGENCY VEHICLE ACCESS

Emergency access must be maintained at all times for fire tenders, ambulances, rescue vehicles, and maintenance vehicles. Internal road widths, turning radii, ramp access, and building frontage routes should allow emergency vehicles to reach all residential blocks.

Emergency access measures include:

- ✕ Unobstructed emergency access routes.
- ✕ No-parking enforcement along fire lanes.
- ✕ Clearly marked emergency routes.
- ✕ Adequate turning radius for fire tenders.
- ✕ Access to fire hydrants and firefighting tanks.
- ✕ Emergency access monitoring by security staff.

#### 8.11.2. TRAFFIC MANAGEMENT INDICATORS

| INDICATOR | TARGET / THRESHOLD | FREQUENCY |
|-----------|--------------------|-----------|
| <hr/>     |                    |           |

|                                        |                                           |            |
|----------------------------------------|-------------------------------------------|------------|
| <b>INTERNAL VEHICLE SPEED</b>          | Maximum 20 km/hr                          | Continuous |
| <b>PARKING OCCUPANCY</b>               | Not more than 90% under normal conditions | Monthly    |
| <b>ILLEGAL PARKING ON ACCESS ROADS</b> | Zero tolerance                            | Daily      |
| <b>PEAK-HOUR GATE QUEUE</b>            | Not exceeding 5 minutes delay             | Monthly    |
| <b>EMERGENCY ACCESS OBSTRUCTION</b>    | Zero incidents                            | Daily      |
| <b>CONSTRUCTION VEHICLE COMPLIANCE</b> | 100% route compliance                     | Daily      |
| <b>PEDESTRIAN ACCIDENT</b>             | Zero major incidents                      | Continuous |
| <b>TRAFFIC COMPLAINTS</b>              | Investigate within 48 hours               | Continuous |

Traffic and vehicle movement during the construction phase shall be managed through a comprehensive traffic safety program designed to minimize risks to workers, visitors, and the surrounding community. Dedicated entry and exit points shall be established to regulate the movement of construction vehicles and prevent congestion within and around the project site. Clear traffic signage and directional markings shall be installed to guide drivers and pedestrians safely.

All vehicles operating within the project premises shall adhere to a maximum speed limit of 20 km/hr. Construction vehicles shall be equipped with functional reversing alarms to alert nearby personnel during maneuvering. Trained flagmen shall be deployed at critical locations, including site entrances, exits, and areas with high vehicle activity, to assist in traffic control and ensure safe movement of vehicles and pedestrians.

Separate pedestrian pathways shall be designated and clearly marked to reduce the risk of vehicle-pedestrian interactions. Parking areas for construction equipment, staff vehicles, and delivery trucks shall be properly identified and managed to avoid obstruction of access routes and emergency pathways. Regular monitoring and enforcement of traffic safety measures shall be undertaken by the site management team to maintain a safe working environment throughout the project duration.

## 8.12. FIRE-FIGHTING ARRANGEMENTS

In compliance with the Capital Development Authority (CDA) Building and Planning Regulations, the Karakoram Greens project has been designed with appropriate fire prevention and firefighting systems. Firefighting infrastructure includes strategically located fire hydrants within the project area to ensure effective coverage and accessibility for fire tenders. These hydrants will be connected to dedicated underground and overhead water storage tanks to ensure sufficient water availability during emergency situations.



FIGURE 8-1: FIRE FIGHTING SYSTEM

A centralized fire alarm and alert system will be installed to immediately notify residents and management staff in case of a fire. Firefighting equipment, including extinguishers and protective gear, will be placed at designated locations such as maintenance rooms, security offices, and common areas. Trained security and maintenance staff will be responsible for initial response and coordination until external emergency services arrive.

The nearest fire brigade facility, located in the vicinity of Zero Point, Islamabad, will be contacted immediately in case of a major fire incident. Access routes within the project have been designed to allow smooth movement of emergency vehicles, ensuring rapid response and effective firefighting operations.

## 8.13. EVACUATION PLAN

At full occupancy, Karakoram Greens is expected to accommodate a substantial resident population; therefore, a structured evacuation plan is essential. The project will implement a well-defined evacuation protocol supported by clear signage,

emergency exits, and assembly points. CCTV surveillance and internal communication systems will assist in monitoring and managing evacuation during emergencies.

Security personnel will be trained in emergency response procedures, including evacuation management, crowd control, and first-response actions. In the event of an emergency, alarms and sirens will be activated to alert residents, and security staff will guide occupants safely toward designated assembly areas. Fire-resistant protective equipment will be available for staff involved in emergency response.

Coordination mechanisms will be established with local hospitals, rescue services, and law enforcement agencies to ensure immediate external support when required.

#### **8.14. CONTRACTOR MANAGEMENT**

All contractors engaged in the project shall be required to comply fully with the Occupational Health and Safety (OHS) requirements established for Karakoram Greens. Prior to commencing work, each contractor shall submit a contractor-specific OHS plan outlining the hazards associated with their activities, proposed mitigation measures, emergency response arrangements, and responsibilities of supervisory personnel. Contractors shall ensure that all workers receive appropriate safety induction and participate in regular toolbox talks to reinforce safe work practices and communicate site-specific risks.

Contractors shall be responsible for providing suitable personal protective equipment (PPE) to their workforce and ensuring its proper use at all times. They shall also promptly report all incidents, accidents, unsafe conditions, and near misses to the Project Management and OHS Officer. Participation in routine inspections, audits, safety meetings, and corrective action programs shall be mandatory. Failure to comply with project OHS requirements may result in corrective actions, suspension of work activities, or work stoppage until compliance is achieved.

#### **8.15. INCIDENT REPORTING AND INVESTIGATION**

All incidents, including accidents, injuries, occupational illnesses, property damage events, and near misses, shall be reported immediately to the designated OHS Officer. Timely reporting is essential to ensure appropriate response measures, prevent recurrence, and maintain accurate records of workplace safety performance. Workers and contractors shall be encouraged to report incidents without fear of reprisal, thereby promoting a proactive safety culture across the project.

Incidents shall be categorized according to their severity and nature, including fatalities, Lost Time Injuries (LTI), Medical Treatment Cases, Near Misses, and Property Damage incidents. Each reported event shall be investigated to determine its root causes, contributing factors, and necessary corrective and preventive actions. Investigations shall be conducted by competent personnel in coordination with project management and relevant contractors. All incident investigations shall be completed within 24 hours of occurrence, and findings shall be documented and communicated to concerned personnel to prevent similar incidents in the future.

#### **8.16. DOCUMENTATION AND RECORD KEEPING**

Comprehensive documentation and record keeping shall be maintained throughout the construction and operational phases of the project to ensure compliance with occupational health and safety requirements and to facilitate effective monitoring and continuous improvement. Accurate records will support regulatory reporting, incident investigations, performance evaluations, and corrective action tracking.

The project management team shall maintain records of all incidents and near misses, training and induction activities, workplace inspections, medical examinations, PPE issuance, permit-to-work systems, and internal or external audits. These records shall be securely stored, regularly updated, and made available for review by relevant authorities and project management personnel when required.

#### **8.17. OHS BUDGET REQUIREMENTS**

Adequate financial resources shall be allocated to ensure effective implementation of the Occupational Health and Safety Management Plan. The OHS budget shall cover all necessary expenditures associated with maintaining a safe working environment and complying with applicable health and safety standards.

Budget provisions shall include procurement and replacement of personal protective equipment, salaries and training of safety personnel, worker awareness and capacity-building programs, medical facilities and first aid arrangements, emergency response equipment, safety signage, monitoring and inspection equipment, and insurance coverage. Contingency funds shall also be reserved to address unforeseen safety requirements and emergency situations that may arise during project execution.

##### **8.17.1. OTHER EMERGENCIES**

In addition to fire hazards, the project may face other emergency situations such as earthquakes, disease outbreaks, pest infestations, or security-related incidents. To

address such scenarios, the project management will prepare a comprehensive Emergency Response and Management Plan outlining preventive measures, response actions, and evacuation procedures for each potential risk.

Regular training and awareness sessions will be conducted for security staff and facility management personnel to ensure preparedness and effective response. Emergency communication systems, including alarms and public address systems, will be utilized to guide residents during critical situations. Periodic drills will be carried out to test the effectiveness of response mechanisms and improve preparedness.

Through the implementation of these measures, Karakoram Greens aims to ensure a safe, resilient, and well-managed residential environment, minimizing risks to life, property, and the surrounding environment.

#### **8.18. ESG AND SUSTAINABILITY INTEGRATION PLAN**

Environmental, Social, and Governance (ESG) principles are increasingly recognized as an essential component of sustainable urban development. Karakoram Greens has been conceived as a modern residential development that integrates environmental stewardship, social responsibility, and transparent governance into its planning, construction, and operational phases. The ESG and Sustainability Integration Plan establishes a framework through which the project will minimize environmental impacts, enhance social benefits, strengthen governance mechanisms, and contribute to long-term resilience and sustainability.

The objective of this plan is to ensure that the project not only complies with national environmental regulations but also aligns with internationally recognized sustainability principles, including the United Nations Sustainable Development Goals (SDGs), IFC Environmental and Social Performance Standards, World Bank Environmental, Health and Safety Guidelines, and emerging ESG best practices applicable to the real estate and infrastructure sectors.

#### **8.19. ESG VISION AND SUSTAINABILITY OBJECTIVES**

The ESG vision for Karakoram Greens is to create a resource-efficient, environmentally responsible, socially inclusive, and climate-resilient residential community that delivers long-term value to residents, stakeholders, and the surrounding environment. To achieve this vision, the project will focus on minimizing

its environmental footprint throughout the project lifecycle while promoting the efficient use of water, energy, and natural resources. It will also seek to enhance climate resilience and adaptive capacity, protect public health and environmental quality, generate local employment and economic opportunities, and promote gender inclusion and equitable access to opportunities.

In addition, the project is committed to ensuring transparency, accountability, and meaningful stakeholder participation in decision-making processes. Long-term environmental governance and monitoring mechanisms will be established to support continuous improvement and sustainable project performance.

## **8.20. ALIGNMENT WITH SUSTAINABLE DEVELOPMENT GOALS (SDGS)**

The Karakoram Greens project contributes directly and indirectly to several Sustainable Development Goals (SDGs). By providing improved housing quality, implementing effective environmental management measures, and maintaining emergency preparedness systems, the project supports SDG 3 (Good Health and Well-being). Through equal employment opportunities and inclusive participation, it contributes to SDG 5 (Gender Equality).

The project further advances SDG 6 (Clean Water and Sanitation) through water conservation initiatives, wastewater treatment, and rainwater harvesting systems. Energy-efficient building designs and the integration of renewable energy sources support SDG 7 (Affordable and Clean Energy). Employment generation during both construction and operational phases contributes to SDG 8 (Decent Work and Economic Growth).

By promoting sustainable urban development and resilient infrastructure, the project aligns with SDG 11 (Sustainable Cities and Communities). Waste minimization and recycling initiatives support SDG 12 (Responsible Consumption and Production), while climate resilience measures and carbon footprint management contribute to SDG 13 (Climate Action). Landscaping, plantation activities, and biodiversity enhancement measures further support SDG 15 (Life on Land).

## **8.21. ENVIRONMENTAL SUSTAINABILITY FRAMEWORK**

### **8.21.1. CLIMATE CHANGE AND CARBON MANAGEMENT**

The project recognizes the importance of reducing greenhouse gas emissions and enhancing climate resilience. To achieve these objectives, Karakoram Greens will incorporate energy-efficient building envelope designs, double-glazed windows to reduce cooling loads, optimized natural ventilation systems, high-efficiency HVAC equipment, and LED lighting throughout the development. Where feasible, solar photovoltaic systems will be integrated to supplement energy requirements and reduce dependence on conventional energy sources.

Climate-resilient landscaping will be incorporated to mitigate urban heat effects and improve environmental quality. In addition, carbon footprint monitoring will be undertaken during both construction and operational phases to assess emissions and identify opportunities for further reductions. The project aims to reduce electricity consumption by approximately 15–20 percent compared to conventional buildings, ensure that renewable energy contributes at least 10 percent of common-area energy demand, maintain a tree plantation survival rate exceeding 85 percent, and achieve full compliance with annual carbon inventory reporting requirements.

#### **8.21.2. WATER SUSTAINABILITY**

Water resource management is a major sustainability priority for the project. Karakoram Greens will implement rainwater harvesting systems and groundwater recharge structures to enhance water conservation and improve resource efficiency. Water-efficient fixtures, leak detection systems, and smart water metering technologies will be installed to reduce unnecessary consumption and improve monitoring.

The project also plans to reuse treated wastewater for landscaping purposes wherever feasible and will promote public awareness regarding responsible water use. Through these measures, the project seeks to reduce potable water demand by approximately 20 percent compared to conventional developments, reuse treated wastewater for at least 30 percent of landscaping requirements, maximize rainwater capture and utilization, and maintain water leakage losses below 5 percent.

#### **8.21.3. WASTE MANAGEMENT AND CIRCULAR ECONOMY**

Karakoram Greens will adopt circular economy principles to minimize waste generation and maximize resource recovery. Waste management strategies will emphasize source segregation, recycling, and material recovery to reduce the volume of waste sent to disposal facilities. Organic waste may be composted where

practical, while construction waste minimization measures will be implemented throughout the development process.

Appropriate protocols will be established for the handling, storage, transportation, and disposal of hazardous waste, and arrangements will be made for the collection and management of electronic waste. The project aims to achieve complete compliance with waste segregation requirements, recycle at least 50 percent of construction waste, divert a minimum of 30 percent of organic waste from disposal streams, and maintain full tracking and documentation of hazardous waste management activities.

#### **8.21.4. BIODIVERSITY AND GREEN INFRASTRUCTURE**

Although the project site is located within an urban development area, biodiversity enhancement remains an important component of the sustainability strategy. Native plant species will be prioritized in landscaping plans to support local ecological conditions and reduce maintenance requirements. Significant green open spaces will be maintained throughout the development to improve environmental quality and provide recreational opportunities for residents.

Additional measures will include soil erosion control, pollinator-friendly landscaping, and the creation of green corridors and shaded pedestrian routes. The project intends to maintain a compensatory plantation ratio of at least 5:1, preserve planned green coverage areas, ensure that at least 70 percent of planted species are native, and maintain a tree survival rate exceeding 85 percent.

#### **8.22. SHADOW ASSESSMENT FOR HIGH-RISE BUILDING IMPACTS**

The proposed Karakoram Greens development comprises high-rise residential towers within Gulberg Greens, Islamabad. Due to the height and scale of the proposed structures, a shadow assessment has been undertaken to evaluate the potential impacts of building shadows on adjacent buildings, roads, open spaces, landscaping, recreational areas, parking facilities, and neighboring properties.

The objective of the assessment is to determine whether the proposed towers could create significant adverse shading effects that may reduce daylight availability, affect outdoor comfort, influence landscaping performance, or impact surrounding developments. The assessment also identifies design measures that can minimize potential shadow-related impacts while maintaining acceptable levels of solar access.

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## **8.23. ASSESSMENT METHODOLOGY**

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The shadow assessment has been undertaken using the following considerations:

- ✎ Geographic location of the project.
- ✎ Building orientation and configuration.
- ✎ Approximate tower heights.
- ✎ Seasonal variation in solar angle.
- ✎ Daily movement of the sun.
- ✎ Relationship of proposed towers with adjacent structures.
- ✎ Availability of open spaces within the development.

Islamabad is located at approximately **33.7° North Latitude**, where the solar path varies considerably between summer and winter seasons. As a result, shadow lengths are shortest during summer and longest during winter months.

For preliminary EIA assessment purposes, the analysis considers:

- ✎ Summer Solstice (21 June)
- ✎ Winter Solstice (21 December)
- ✎ Equinox Conditions (March and September)

Critical assessment times include:

- ✎ 9:00 AM
- ✎ 12:00 Noon
- ✎ 3:00 PM

These periods represent typical morning, midday, and afternoon shadow conditions.

### **8.23.1. EXISTING SHADOW ENVIRONMENT**

The project site is located within a rapidly developing urban environment characterized by residential and mixed-use developments. Existing shading conditions are primarily influenced by:

- ✎ Existing residential buildings.
- ✎ Boundary walls.
- ✎ Trees and landscaped areas.

- ✎ Local topography.
- ✎ Neighboring high-rise developments within Gulberg Greens.

Given the relatively open character of the surrounding area, existing permanent shading effects are generally limited.

### **8.23.2. PROJECT CHARACTERISTICS RELEVANT TO SHADOW ASSESSMENT**

The proposed development consists of multiple residential towers arranged to maximize views, ventilation, and daylight penetration while maintaining appropriate spacing between structures. Key design features influencing shadow generation include:

| PARAMETER            | DESCRIPTION                                 |
|----------------------|---------------------------------------------|
| DEVELOPMENT TYPE     | High-rise residential towers                |
| SITE AREA            | Approximately 11.62 acres                   |
| BUILDING FOOTPRINT   | Approximately 2.01 acres                    |
| OPEN SPACE AREA      | More than 80% of total site area            |
| BUILDING ORIENTATION | Optimized for daylight and ventilation      |
| TOWER CONFIGURATION  | Multiple towers with spacing between blocks |
| LANDSCAPE AREAS      | Extensive open and landscaped areas         |

The relatively low ground coverage and large proportion of open space significantly reduce the potential for continuous shadowing across the site.

### **8.23.3. SEASONAL SHADOW ANALYSIS**

#### **8.23.3.1. SUMMER CONDITIONS (JUNE)**

During summer months, the sun reaches a high altitude angle resulting in shorter shadow lengths.

Expected conditions include:

- ✎ Minimal shadowing during midday.
- ✎ Temporary morning and afternoon shadows extending east and west of towers.
- ✎ Majority of landscaped areas receiving direct sunlight.
- ✎ Limited impact on adjacent properties.

- ✎ Good daylight availability across open spaces.
- ✎ Under summer conditions, shadow impacts are considered negligible to low.

#### **8.23.4. WINTER CONDITIONS (DECEMBER)**

Winter represents the worst-case shadow scenario because the sun remains at a lower angle throughout the day.

Expected conditions include:

- ✎ Longer shadows extending toward the north.
- ✎ Increased duration of shading during morning and afternoon periods.
- ✎ Temporary shadowing of open spaces adjacent to towers.
- ✎ Reduced solar access in some localized areas.

Although shadow lengths increase significantly during winter months, the spacing between towers and availability of open areas reduce the likelihood of permanent overshadowing.

Winter shadow impacts are therefore considered moderate but acceptable for a high-rise residential development.

#### **8.23.5. EQUINOX CONDITIONS**

During spring and autumn, solar angles are intermediate between summer and winter conditions.

Expected impacts include:

- ✎ Balanced sunlight distribution.
- ✎ Moderate shadow lengths.
- ✎ Adequate daylight penetration into open areas.
- ✎ Good solar access for residential units.

Overall shadow impacts during equinox periods are considered low.

#### **8.23.6. IMPACT ON ADJACENT PROPERTIES**

The assessment indicates that shadows generated by the proposed towers will primarily remain within the project boundary for most of the year. Temporary shadow

extension beyond site boundaries may occur during early morning and late afternoon hours, particularly during winter months.

Potential impacts on neighboring properties include:

- ✎ Temporary reduction in sunlight exposure.
- ✎ Short-duration shading of boundary areas.
- ✎ Minor reduction in solar access during winter mornings.

Given the scale of surrounding development and urban context of Gulberg Greens, these impacts are not expected to be significant. The project is not anticipated to cause permanent or severe overshadowing of neighboring residential properties.

#### **8.23.7. IMPACT ON INTERNAL OPEN SPACES**

Internal open spaces include:

- ✎ Landscaped areas.
- ✎ Pedestrian pathways.
- ✎ Recreational areas.
- ✎ Community gathering spaces.
- ✎ Parking areas.

Because the development occupies only a relatively small proportion of the site footprint, significant portions of the site remain exposed to sunlight throughout the day.

Benefits of partial shading include:

- ✎ Improved thermal comfort during summer.
- ✎ Reduced urban heat island effects.
- ✎ Enhanced usability of outdoor spaces during hot periods.
- ✎ Reduced surface temperatures around pedestrian areas.

Some seasonal shading of landscaped areas is expected but is not anticipated to adversely affect their functionality.

#### **8.23.8. IMPACT ON LANDSCAPING AND VEGETATION**

Shadow conditions influence plant growth and landscape performance.

Potential impacts include:

- ✎ Reduced sunlight availability in localized areas.
- ✎ Variable growth rates of sun-loving species.
- ✎ Increased moisture retention in shaded areas.

To address these conditions, the landscaping plan shall incorporate:

- ✎ Shade-tolerant native species.
- ✎ Mixed vegetation layers.
- ✎ Strategic tree placement.
- ✎ Drought-resistant landscaping.
- ✎ Seasonal planting considerations.

With appropriate species selection, shadow impacts on landscaping are expected to be minimal.

#### **8.23.9. IMPACT ON RESIDENTIAL UNITS**

The project has been designed to maximize:

- ✎ Natural daylight penetration.
- ✎ Cross ventilation.
- ✎ Visual connectivity.
- ✎ Solar access.

Building spacing and orientation reduce the likelihood of excessive self-shadowing between towers.

Expected impacts include:

- ✎ Good daylight availability for most units.
- ✎ Temporary seasonal shadowing of lower floors.
- ✎ Reduced direct solar gain during peak summer periods.

The resulting reduction in solar heat gain may provide energy efficiency benefits by lowering cooling requirements during warmer months.

#### **Impact on Energy Consumption**

Shadowing can influence building energy demand.

**Positive Effects**

- ✎ Reduced cooling load during summer.
- ✎ Reduced indoor heat gain.
- ✎ Improved thermal comfort.
- ✎ Lower air-conditioning demand.

**Potential Negative Effects**

- ✎ Slight increase in winter heating demand.
- ✎ Reduced passive solar heating for some units.

Overall, the energy impacts of shading are expected to be positive, particularly given Islamabad's long cooling season.

**8.24. SOCIAL SUSTAINABILITY FRAMEWORK****8.24.1. EMPLOYMENT AND LOCAL ECONOMIC DEVELOPMENT**

The project will generate employment opportunities during both construction and operational phases, contributing to local economic development. Preference will be given to local labor where feasible, and recruitment practices will be conducted fairly and transparently. Skills development and training programs will be implemented to enhance workforce capabilities and improve employment prospects.

Equal opportunity employment principles will be applied, and contractor compliance with labor and social requirements will be monitored regularly. The project aims to achieve local workforce participation of at least 30 percent, encourage increased female participation in suitable roles, ensure full worker training coverage, and provide occupational health and safety training to all personnel.

**8.24.2. GENDER INCLUSION**

Karakoram Greens is committed to promoting gender-inclusive development and ensuring equitable access to opportunities and facilities. Equal employment opportunities will be provided without discrimination, and separate sanitation facilities will be made available where required. Anti-harassment policies will be implemented and enforced to maintain a safe and respectful working environment.

The project will also ensure equal access to community facilities and incorporate gender-sensitive consultation processes to encourage meaningful participation by

women and other underrepresented groups in project-related discussions and decision-making.

#### **8.24.3. COMMUNITY HEALTH AND SAFETY**

The project places significant emphasis on protecting neighboring communities and future residents from potential risks associated with construction and operation. Traffic management plans will be implemented to reduce congestion and improve road safety, while dust and noise control measures will minimize disturbances to surrounding areas.

Emergency preparedness systems, fire safety infrastructure, and security management arrangements will be established to safeguard people and property. A grievance redress mechanism will also be maintained to address community concerns promptly and effectively. The project aims to resolve more than 90 percent of community complaints, conduct emergency drills on a quarterly basis, achieve zero major traffic incidents, and maintain full compliance with fire safety requirements.

#### **8.24.4. STAKEHOLDER ENGAGEMENT**

Meaningful stakeholder engagement will continue throughout the project lifecycle to ensure transparency and responsiveness. Key stakeholders include residents, local communities, regulatory authorities, utility providers, contractors, and employees. Regular communication and consultation activities will be undertaken to keep stakeholders informed and to gather feedback on project performance and concerns.

A formal Grievance Redress Mechanism (GRM) will be maintained to receive, document, investigate, and resolve complaints in a timely and transparent manner. This mechanism will support constructive dialogue and help strengthen trust between the project and its stakeholders.

### **8.25. GOVERNANCE FRAMEWORK**

#### **8.25.1. ESG GOVERNANCE STRUCTURE**

A structured governance framework will be established to oversee ESG implementation and ensure accountability across all project activities. The Project Proponent will provide strategic oversight and direction, while the Project Director will lead ESG implementation efforts. Environmental Officers will be responsible for

environmental compliance, Occupational Health and Safety Officers will oversee worker safety requirements, and Community Liaison Officers will manage stakeholder engagement activities.

Contractors and subcontractors will also play a critical role in implementing ESG requirements and ensuring compliance with project commitments and regulatory obligations.

#### **8.25.2. COMPLIANCE AND ACCOUNTABILITY**

The project will maintain compliance with all applicable legal and regulatory requirements, including the Pakistan Environmental Protection Act, 1997, IEE/EIA Regulations, 2000, ICT and CDA requirements, National Environmental Quality Standards (NEQS), labor regulations, occupational safety requirements, and relevant building codes.

To ensure accountability and continuous improvement, annual compliance reviews will be conducted to assess performance, identify gaps, and implement corrective actions where necessary.

#### **8.25.3. ESG MONITORING AND REPORTING**

An ESG monitoring framework will be implemented to track environmental, social, and governance performance throughout the project lifecycle. Air quality monitoring will be conducted quarterly, while water consumption, waste generation, energy consumption, and occupational health and safety performance will be monitored on a monthly basis. Stakeholder grievances will be tracked continuously, plantation survival rates will be assessed semi-annually, and carbon emissions will be evaluated annually.

The findings of these monitoring activities will be documented in annual ESG performance reports, which will be reviewed by project management to support informed decision-making and continuous improvement.

#### **8.25.4. CLIMATE RESILIENCE INTEGRATION**

The project incorporates climate adaptation measures to address future climate risks and enhance long-term resilience. Enhanced stormwater drainage systems will be developed to manage intense rainfall events and reduce flood risks. Rainwater harvesting systems and water conservation measures will help address potential

water scarcity challenges, while landscaping initiatives will contribute to urban heat reduction.

Climate-resilient construction materials and emergency preparedness measures for extreme weather events will further strengthen the project's adaptive capacity. Key climate risks considered during planning include extreme rainfall events, urban flooding, heat stress, water scarcity, and rising temperatures.

#### **8.25.5. ESG BUDGET AND RESOURCE ALLOCATION**

Adequate financial and human resources will be allocated to support the implementation of ESG commitments throughout both construction and operational phases. Budget allocations will cover environmental monitoring, plantation and landscaping activities, training and capacity-building programs, community engagement initiatives, waste management systems, energy efficiency measures, water conservation projects, and carbon monitoring and reporting activities.

Separate annual ESG budgets will be maintained to ensure that sustainability commitments are adequately funded and effectively implemented over the life of the project.

#### **8.26. ENERGY DEMAND ESTIMATES AND ENERGY EFFICIENCY MEASURES**

Energy consumption represents one of the principal operational resource requirements of the Karakoram Greens project. The proposed development comprises residential apartments, semi-commercial facilities, common areas, parking facilities, elevators, water supply systems, firefighting systems, lighting infrastructure, and other utility services, all of which will contribute to the overall electricity demand of the project. This section provides estimated energy demand calculations together with proposed energy efficiency and conservation measures aimed at reducing energy consumption, greenhouse gas emissions, and operational costs while improving the overall sustainability performance of the development.

The project has been designed to incorporate modern energy-efficient building features including double-glazed windows, optimized building orientation, natural ventilation, efficient lighting systems, and provisions for renewable energy integration. These measures are intended to reduce energy demand while maintaining occupant comfort and operational efficiency.

## **8.27. BASIS OF ENERGY DEMAND ESTIMATION**

The energy demand assessment has been prepared using the projected residential population, total built-up area, number of residential units, and typical electricity consumption patterns observed in comparable apartment developments within Islamabad.

**Table 8-9: Project Characteristics**

| PARAMETER               | VALUE                                                 |
|-------------------------|-------------------------------------------------------|
| TOTAL RESIDENTIAL UNITS | 496 Apartments                                        |
| ESTIMATED POPULATION    | 3,905 Persons                                         |
| TOTAL FAR AREA          | 1,150,576 sq. ft                                      |
| SEMI-COMMERCIAL AREA    | 12,367 sq. ft                                         |
| BUILDING CONFIGURATION  | High-rise residential towers                          |
| COMMON FACILITIES       | Elevators, pumps, lighting, parking, security systems |

For planning purposes, an average electricity demand of approximately **12–15 kWh per apartment per day** has been considered for residential consumption, excluding common facilities.

## **8.28. ESTIMATED RESIDENTIAL ENERGY DEMAND**

### **8.28.1. RESIDENTIAL DEMAND CALCULATION**

Assuming an average consumption of **14 kWh/unit/day**:

$$\begin{aligned}\text{Daily Residential Demand} &= 496 \text{ Apartments} \times 14 \text{ kWh/day} \\ &= 6,944 \text{ kWh/day}\end{aligned}$$

### **8.28.2. ANNUAL RESIDENTIAL DEMAND**

$$\begin{aligned}\text{Annual Residential Demand} &= 6,944 \times 365 \\ &= 2,534,560 \text{ kWh/year}\end{aligned}$$

Therefore, residential units are expected to consume approximately:

$$\mathbf{2.53 \text{ GWh per year}}$$

## **8.29. COMMON AREA ENERGY DEMAND**

In addition to apartment consumption, electricity will be required for:

- ✕ Elevators and lifts
- ✕ Water supply pumps
- ✕ Firefighting pumps
- ✕ Basement ventilation systems
- ✕ Common area lighting
- ✕ Security systems and CCTV
- ✕ Administration offices
- ✕ Landscape lighting
- ✕ Access control systems

**Table 8-10: Common Area Energy Demand**

| COMPONENT                       | ESTIMATED DAILY DEMAND (KWH/DAY) |
|---------------------------------|----------------------------------|
| ELEVATORS                       | 600                              |
| WATER PUMPS                     | 350                              |
| FIRE PUMPS (STANDBY TESTING)    | 50                               |
| COMMON LIGHTING                 | 800                              |
| BASEMENT VENTILATION            | 300                              |
| SECURITY & CCTV SYSTEMS         | 100                              |
| ADMINISTRATION FACILITIES       | 100                              |
| LANDSCAPE LIGHTING              | 150                              |
| MISCELLANEOUS SERVICES          | 250                              |
| <b>TOTAL COMMON AREA DEMAND</b> | <b>2,700 kWh/day</b>             |

Annual Common Area Demand

$$2,700 \times 365$$

$$= 985,500 \text{ kWh/year}$$

### **8.30. TOTAL ESTIMATED PROJECT ELECTRICITY DEMAND**

The overall electricity demand for Karakoram Greens has been estimated by combining the projected consumption of residential units, common-area facilities, and semi-commercial spaces. These estimates provide an indication of the anticipated operational energy requirements of the development and serve as a basis for utility planning, infrastructure sizing, and the implementation of energy efficiency measures. The summary of the estimated electricity demand is presented in Table 5.1 below.

**Table 8-11: Summary of Estimated Project Electricity Demand**

| CATEGORY                   | DAILY DEMAND (KWH/DAY) | ANNUAL DEMAND (KWH/YEAR)  |
|----------------------------|------------------------|---------------------------|
| RESIDENTIAL UNITS          | 6,944                  | 2,534,560                 |
| COMMON AREAS               | 2,700                  | 985,500                   |
| SEMI-COMMERCIAL FACILITIES | 400                    | 146,000                   |
| TOTAL ESTIMATED DEMAND     | <b>10,044 kWh/day</b>  | <b>3,666,060 kWh/year</b> |

The total operational electricity demand of Karakoram Greens is therefore estimated at approximately:

10 MWh/day

3.67 GWh/year

### **8.31. PEAK LOAD ESTIMATION**

Based on diversity factors applicable to residential developments, the estimated peak electrical load is calculated as follows:

Average daily demand = 10,044 kWh/day

Average hourly demand:

$10,044 \div 24 = 418.5 \text{ kW}$

Applying a peak factor of 2.5:

Peak Load =  $418.5 \times 2.5$

**= 1,046 kW**

Accordingly, the project should plan for an electrical demand of approximately:

1.0–1.2 MW Peak Load. This estimate shall be confirmed during detailed electrical design and utility connection planning.

### **8.32. BACKUP POWER REQUIREMENTS**

Backup power systems shall be provided to ensure continuity of critical services during power outages.

Critical systems include:

- ✕ Firefighting pumps
- ✕ Emergency lighting

- ✕ Elevators
- ✕ Security systems
- ✕ CCTV
- ✕ Water supply pumps
- ✕ Access control systems

The estimated emergency backup requirement is expected to range between:

**350–500 kVA**

depending on final equipment selection and operational requirements.

### **8.33. ENERGY EFFICIENCY MEASURES**

#### **8.33.1. BUILDING ENVELOPE EFFICIENCY**

The project incorporates energy-efficient architectural features designed to reduce cooling and heating loads. Measures include:

- ✕ Double-glazed windows.
- ✕ External shading elements.
- ✕ Reflective roofing materials.
- ✕ Thermal insulation where feasible.
- ✕ Reduced solar heat gain.
- ✕ Optimized building orientation.

These measures are expected to reduce cooling energy demand by approximately 10–15%.

#### **8.33.2. NATURAL VENTILATION AND DAYLIGHTING**

Building orientation has been optimized to maximize natural lighting and airflow.

Benefits include:

- ✕ Reduced artificial lighting demand.
- ✕ Reduced air-conditioning loads.

- ✎ Improved indoor comfort.
- ✎ Lower electricity consumption.

Common areas shall be designed to maximize daylight penetration wherever feasible.

### **8.33.3. ENERGY-EFFICIENT LIGHTING**

All common-area lighting shall utilize LED technology. Measures include:

- ✎ LED fixtures throughout common areas.
- ✎ Motion sensors in selected locations.
- ✎ Automatic lighting controls.
- ✎ Daylight sensors.
- ✎ Timer-controlled landscape lighting.

These measures can reduce lighting energy consumption by approximately 40–60% compared with conventional lighting systems.

### **8.33.4. HIGH-EFFICIENCY HVAC SYSTEMS**

Residents shall be encouraged to install inverter-based air conditioning systems and energy-efficient appliances. Recommended measures include:

- ✎ Inverter technology air conditioners.
- ✎ Energy-efficient fans.
- ✎ Efficient refrigeration systems.
- ✎ Programmable thermostats.
- ✎ Regular maintenance.

These measures can reduce household energy consumption by approximately 15–25%.

### **8.33.5. WATER PUMPING EFFICIENCY**

Water supply and firefighting pumps shall be selected based on high-efficiency performance criteria. Measures include:

- ✎ Variable Frequency Drives (VFDs).

- ✎ Efficient pump motors.
- ✎ Leak reduction measures.
- ✎ Smart controls and monitoring.

Expected savings: 15–20% reduction in pumping energy consumption.

### **8.33.6. ELEVATOR EFFICIENCY**

Energy-efficient elevator systems shall be installed. Features may include:

- ✎ Regenerative drives.
- ✎ LED cabin lighting.
- ✎ Standby power mode.
- ✎ Intelligent dispatch systems.

Expected savings: 20–30% reduction in elevator energy consumption.

### **8.34. RENEWABLE ENERGY INTEGRATION**

To support sustainable energy objectives, Karakoram Greens shall evaluate rooftop solar photovoltaic (PV) systems for common-area electricity requirements.

#### **Potential Solar PV Capacity**

Assuming utilization of available rooftop space:

Potential Solar Capacity = 250–400 kW

Annual generation potential:

Approximately 400,000–650,000 kWh/year

This could offset approximately:

11–18% of total common-area electricity demand and significantly reduce greenhouse gas emissions associated with grid electricity consumption.

### **8.35. GREENHOUSE GAS REDUCTION BENEFITS**

Implementation of energy-efficiency measures and solar energy integration will contribute to reducing indirect greenhouse gas emissions associated with electricity consumption. Potential benefits include:

- ✎ Reduced electricity demand.

- ✎ Reduced fossil fuel-based electricity consumption.
- ✎ Lower operational costs.
- ✎ Improved climate resilience.
- ✎ Reduced carbon footprint.
- ✎ Enhanced ESG performance.

The project shall maintain annual records of electricity consumption and renewable energy generation to support future carbon accounting and sustainability reporting.

### **8.36. ENERGY PERFORMANCE INDICATORS**

To ensure that the energy efficiency objectives of Karakoram Greens are achieved and maintained throughout the operational phase, a comprehensive energy monitoring and management framework will be implemented. Regular tracking of electricity consumption, renewable energy generation, and the performance of energy-efficient systems will enable the project management team to identify opportunities for improvement, optimize resource utilization, and verify the effectiveness of conservation measures. The following key performance indicators will be monitored to assess energy performance and support continuous improvement in sustainability outcomes. The following indicators shall be monitored during operation:

**Table 8-12: Energy Performance Indicators and Monitoring Targets**

| INDICATOR                                      | TARGET                            |
|------------------------------------------------|-----------------------------------|
| TOTAL ELECTRICITY CONSUMPTION                  | Monthly monitoring                |
| COMMON AREA ELECTRICITY CONSUMPTION            | Monthly monitoring                |
| RENEWABLE ENERGY GENERATION                    | Monthly monitoring                |
| ENERGY INTENSITY (KWH/SQ.FT/YEAR)              | Annual assessment                 |
| LED LIGHTING COVERAGE                          | 100% common areas                 |
| ENERGY-EFFICIENT PUMPS                         | 100% installed                    |
| SOLAR PV CONTRIBUTION                          | Minimum 10% of common-area demand |
| ELECTRICITY REDUCTION FROM EFFICIENCY MEASURES | 15–20%                            |

### **8.37. EMERGENCY RESPONSE MATRIX**

To ensure a coordinated and effective response to potential emergency situations, an Emergency Response Matrix has been developed for the Karakoram Greens project. The matrix defines the roles and responsibilities of key personnel, outlines communication and reporting channels, and identifies the actions required during

different types of emergencies. By clearly assigning responsibilities and establishing response procedures, the matrix facilitates timely decision-making, efficient resource deployment, and effective coordination with external emergency services. It serves as a practical tool for managing incidents, minimizing risks to human health and safety, protecting property and the environment, and supporting rapid recovery following an emergency event.

**Table 8-13: Monitoring and Performance Indicators**

| INDICATOR                        | PERFORMANCE<br>TARGET          | MONITORING<br>FREQUENCY | RESPONSIBLE<br>PERSON        |
|----------------------------------|--------------------------------|-------------------------|------------------------------|
| EMERGENCY DRILL<br>COMPLETION    | Minimum 4 drills/year          | Quarterly               | Facility Manager             |
| FIRE EQUIPMENT<br>FUNCTIONALITY  | 100% operational               | Monthly                 | Maintenance<br>Manager       |
| EMERGENCY EXIT<br>ACCESSIBILITY  | 100% accessible                | Monthly                 | Security Supervisor          |
| FIRST AID KIT<br>AVAILABILITY    | 100% stocked                   | Monthly                 | Medical Response<br>Team     |
| STAFF TRAINING<br>COVERAGE       | 100% relevant staff trained    | Annually                | OHS Officer                  |
| EMERGENCY RESPONSE<br>TIME       | Less than 5 minutes            | After each incident     | Facility Manager             |
| INCIDENT REPORTING<br>COMPLETION | Within 24 hours                | After each incident     | Environmental/OHS<br>Officer |
| CORRECTIVE ACTION<br>CLOSURE     | Within prescribed<br>timeframe | Monthly Review          | Project Director             |

**Table 8-14: Emergency Response and Responsibility Matrix**

| <b>EMERGENCY<br/>SCENARIO</b>           | <b>INITIAL RESPONSE<br/>ACTIONS</b>                                 | <b>RESPONSIBLE<br/>PERSONNEL</b>           | <b>EXTERNAL AGENCIES</b>               | <b>EVACUATION<br/>REQUIRED</b> | <b>KEY EQUIPMENT/RESOURCES</b>                 |
|-----------------------------------------|---------------------------------------------------------------------|--------------------------------------------|----------------------------------------|--------------------------------|------------------------------------------------|
| <b>FIRE AND EXPLOSION</b>               | Activate alarm, isolate area, use extinguishers if safe, notify ERT | Facility Manager, Security Supervisor, ERT | Fire Brigade, Rescue 1122              | Yes                            | Fire extinguishers, hydrants, alarms, PPE      |
| <b>EARTHQUAKE</b>                       | Drop, cover and hold, assess damage after shaking stops             | Facility Manager, Security Supervisor      | Rescue 1122, ICT Administration        | If structural damage exists    | Emergency communication system, first aid kits |
| <b>URBAN FLOODING</b>                   | Activate drainage system, secure utilities, restrict access         | Maintenance Manager, Facility Manager      | ICT Administration, Rescue 1122        | If flooding threatens safety   | Pumps, sandbags, emergency generators          |
| <b>MEDICAL EMERGENCY</b>                | Provide first aid, stabilize casualty, call ambulance               | Medical Response Team, OHS Officer         | Hospitals, Rescue 1122                 | No (unless area unsafe)        | First aid kits, stretchers, wheelchairs        |
| <b>ELECTRICAL FAILURE</b>               | Isolate affected circuits, activate backup systems                  | Maintenance Manager                        | Electricity Utility Provider           | Generally No                   | Emergency generators, communication devices    |
| <b>GENERATOR FIRE</b>                   | Shut down generator, activate fire response procedures              | Maintenance Manager, ERT                   | Fire Brigade, Rescue 1122              | If fire spreads                | Fire extinguishers, PPE                        |
| <b>HAZARDOUS<br/>MATERIAL<br/>SPILL</b> | Stop leak, contain spill, prevent drain contamination               | Environmental Officer, Maintenance Manager | EPA (if significant), Waste Contractor | If exposure risk exists        | Spill kits, PPE, containment materials         |

|                              |                                                       |                                       |                                   |                                |                                             |
|------------------------------|-------------------------------------------------------|---------------------------------------|-----------------------------------|--------------------------------|---------------------------------------------|
| <b>STRUCTURAL FAILURE</b>    | Restrict access, evacuate area, assess stability      | Project Director, Facility Manager    | Rescue 1122, Structural Engineers | Yes                            | Barricades, communication equipment         |
| <b>SECURITY INCIDENT</b>     | Secure area, notify authorities, control access       | Security Supervisor                   | Police Department                 | Depending on threat level      | CCTV, communication devices                 |
| <b>EXTREME WEATHER EVENT</b> | Issue warnings, secure facilities, monitor conditions | Facility Manager, Security Supervisor | ICT Administration, Rescue 1122   | If conditions become hazardous | Emergency generators, communication systems |

**Table 8-15: Communication and Notification Matrix**

| INCIDENT LEVEL            | DESCRIPTION                                                                     | INTERNAL NOTIFICATION                        | EXTERNAL NOTIFICATION                                | RESPONSE TIME     |
|---------------------------|---------------------------------------------------------------------------------|----------------------------------------------|------------------------------------------------------|-------------------|
| <b>LEVEL 1 – MINOR</b>    | Localized incident with no serious injury or environmental impact               | Facility Manager, OHS Officer                | Not normally required                                | Immediate         |
| <b>LEVEL 2 – MODERATE</b> | Incident requiring coordinated response and limited evacuation                  | Emergency Response Team, Project Director    | Rescue 1122 or relevant authority                    | Within 15 minutes |
| <b>LEVEL 3 – MAJOR</b>    | Significant emergency involving injuries, major damage, or environmental impact | Full Emergency Response Team                 | Fire Brigade, Police, Hospitals, EPA (if applicable) | Immediate         |
| <b>LEVEL 4 – CRITICAL</b> | Large-scale emergency affecting multiple buildings or occupants                 | Project Director and all emergency personnel | All relevant emergency agencies and authorities      | Immediate         |

**Table 8-16: Training and Preparedness Matrix**

| TRAINING/DRILL ACTIVITY          | TARGET PARTICIPANTS                 | FREQUENCY     | RESPONSIBLE DEPARTMENT |
|----------------------------------|-------------------------------------|---------------|------------------------|
| FIRE SAFETY TRAINING             | All staff and facility personnel    | Quarterly     | OHS Officer            |
| FIRE EVACUATION DRILL            | Residents and staff                 | Quarterly     | Facility Manager       |
| FIRST AID TRAINING               | Emergency Response Team             | Semi-Annually | Medical Response Team  |
| SPILL RESPONSE TRAINING          | Maintenance and environmental staff | Annually      | Environmental Officer  |
| EARTHQUAKE DRILL                 | Residents and staff                 | Annually      | Facility Manager       |
| EMERGENCY COMMUNICATION EXERCISE | Management and security personnel   | Annually      | Security Supervisor    |
| SECURITY INCIDENT DRILL          | Security personnel                  | Annually      | Security Supervisor    |

## 9. Climate Vulnerability Assessment

### 9.1. INTRODUCTION

This Climate Vulnerability Assessment has been prepared for the Karakoram Greens project to identify climate-related risks that may affect the development during construction and operation. The assessment considers the project's location in Gulberg Greens, Islamabad, its high-rise residential nature, projected population, infrastructure demand, stormwater requirements, water supply needs, energy demand, and long-term exposure to climate variability.

The assessment follows a risk-based approach, considering three key elements: climate exposure, project sensitivity, and adaptive capacity. Climate-related hazards assessed include extreme rainfall, urban flooding, heat stress, water scarcity, drought conditions, windstorms, lightning, slope erosion, and potential disruption to utilities and access routes. The objective is to ensure that climate risks are properly addressed through design, construction management, operational controls, and emergency preparedness.

Pakistan is highly exposed to climate variability, including extreme rainfall, floods, droughts, rising temperatures, heatwaves, and water stress. Climate projections for Pakistan indicate increasing temperatures and greater variability in rainfall and runoff regimes, with uncertainty around future precipitation but rising risks from extreme climate events. Islamabad also faces increasing urban flood risks linked to intense rainfall, changing drainage conditions, and expansion of built-up areas.

### 9.2. PROJECT CONTEXT RELEVANT TO CLIMATE VULNERABILITY

Karakoram Greens is a planned high-rise residential development located within Gulberg Greens, Islamabad. The project comprises residential towers, basement parking, internal circulation, landscaped areas, utilities, water storage, sewerage network, stormwater drainage, fire safety systems, and common facilities. The project will accommodate an estimated population of approximately 3,900 persons and will require reliable water supply, wastewater management, electricity, solid waste collection, and emergency access.

The project site is located within the Potohar Plateau landscape and is characterized by gently undulating terrain. The site generally drains toward lower areas and nearby

drainage corridors associated with the Korang River tributary system. The project includes basement levels, which require special attention due to risks from stormwater inflow, surface runoff, seepage, and pump failure during extreme rainfall events.

### **9.3. CLIMATE HAZARDS CONSIDERED**

The key climate hazards relevant to the project are summarized below.

| Climate Hazard                    | Relevance to Project                                                                     |
|-----------------------------------|------------------------------------------------------------------------------------------|
| Extreme rainfall                  | Can increase stormwater runoff, basement flooding, erosion, and drainage system pressure |
| Urban flooding                    | May affect access roads, basement ramps, utilities, and low-lying areas                  |
| Heatwaves and rising temperatures | Can increase cooling demand, heat stress, energy use, and outdoor discomfort             |
| Drought and water scarcity        | Can affect groundwater availability and increase stress on water supply                  |
| Windstorms and dust storms        | Can affect construction safety, façade elements, trees, and outdoor air quality          |
| Lightning and thunderstorms       | Can affect electrical systems, residents, workers, and exposed infrastructure            |
| Slope erosion and runoff          | Can affect landscaped slopes, drainage edges, embankments, and exposed soil              |
| Utility disruption                | Can affect water pumping, elevators, lighting, security systems, and emergency services  |

### **9.4. METHODOLOGY**

The vulnerability assessment uses the following risk evaluation framework:

$$\text{Climate Risk} = \text{Exposure} \times \text{Sensitivity} \div \text{Adaptive Capacity}$$

Where:

**Exposure** refers to the extent to which the project is exposed to climate hazards.

**Sensitivity** refers to the degree to which project assets, residents, workers, or services may be affected.

**Adaptive Capacity** refers to the ability of design, infrastructure, management systems, and emergency measures to reduce climate impacts.

Risk levels have been rated as Low, Moderate, High, or Very High based on the likelihood of occurrence and potential severity of impact.

### **9.5. CLIMATE RISK SCREENING MATRIX**

| Climate Risk     | Exposure         | Sensitivity | Adaptive Capacity | Overall Risk |
|------------------|------------------|-------------|-------------------|--------------|
| Extreme rainfall | High             | High        | Moderate          | High         |
| Urban flooding   | Moderate to High | High        | Moderate          | High         |

|                                  |                  |                  |          |                  |
|----------------------------------|------------------|------------------|----------|------------------|
| <i>Basement flooding</i>         | High             | High             | Moderate | High             |
| <i>Heat stress</i>               | High             | Moderate to High | Moderate | High             |
| <i>Water scarcity</i>            | Moderate to High | High             | Moderate | High             |
| <i>Increased energy demand</i>   | High             | High             | Moderate | High             |
| <i>Drainage erosion</i>          | Moderate         | Moderate         | Moderate | Moderate         |
| <i>Windstorms / dust storms</i>  | Moderate         | Moderate         | Moderate | Moderate         |
| <i>Lightning</i>                 | Moderate         | Moderate         | Moderate | Moderate         |
| <i>Utility disruption</i>        | Moderate         | High             | Moderate | Moderate to High |
| <i>Vector-borne disease risk</i> | Moderate         | Moderate         | Moderate | Moderate         |

## **9.6. DETAILED CLIMATE VULNERABILITY ASSESSMENT**

### **9.6.1. EXTREME RAINFALL AND STORMWATER RUNOFF**

Extreme rainfall is one of the most important climate risks for the Karakoram Greens project. Islamabad has a history of intense rainfall events, and climate change is expected to increase the frequency and intensity of extreme weather in many parts of Pakistan. Intense rainfall can produce large volumes of runoff over short periods, particularly from rooftops, paved areas, internal roads, parking areas, and other hard surfaces.

For Karakoram Greens, the key vulnerability arises from increased stormwater runoff and potential overload of internal and external drainage systems. Basement parking areas and ramp entrances are particularly sensitive because stormwater may enter basement levels if runoff is not intercepted and safely diverted. Poor drainage maintenance may also result in waterlogging, erosion, sedimentation, and damage to utilities.

Adaptation measures shall include adequately sized stormwater drains, raised basement ramp thresholds, trench drains at basement entrances, sump pumps with backup power, silt traps, recharge pits, rainwater harvesting, and routine pre-monsoon desilting. Stormwater design should be checked against high-intensity rainfall scenarios, including at least a 100 mm event with sufficient freeboard for more severe storms.

## **9.7. URBAN FLOODING**

Urban flooding risk is linked to intense rainfall, expansion of impervious surfaces, insufficient drainage capacity, blocked drains, and uncontrolled runoff from surrounding developments. The project site lies within a developing urban zone where

cumulative runoff from multiple schemes can increase pressure on the Gulberg Greens drainage network.

The project may be affected by water accumulation on access roads, temporary blockage of storm drains, overflow from drainage channels, and runoff entering low-lying areas. Flooding could disrupt resident movement, emergency access, basement operations, electricity supply, and waste collection.

Adaptation measures shall include internal stormwater detention, controlled discharge to the approved drainage network, raised utility rooms, flood-resistant design for basement entries, regular cleaning of drains, and emergency pumping arrangements. No direct discharge of sediment-laden or contaminated runoff shall be allowed into natural drainage channels.

## **9.8. HEAT STRESS AND RISING TEMPERATURES**

Rising temperatures and more frequent heatwaves can affect resident comfort, worker health, energy demand, and public health. High-rise residential developments are sensitive to heat stress due to solar heat gain, cooling demand, hard surfaces, and reduced airflow in built-up areas.

During construction, workers may face heat exhaustion, dehydration, and reduced productivity, particularly during summer months. During operation, residents may experience increased cooling needs, resulting in higher electricity demand and higher indirect emissions.

Adaptation measures include climate-responsive building orientation, double-glazed windows, shaded pedestrian walkways, reflective roof surfaces, heat-resistant materials, natural ventilation, high-efficiency cooling systems, green landscaping, and shaded outdoor spaces. Construction-phase heat stress controls should include drinking water stations, shaded rest areas, modified work hours, and heat illness awareness.

## **9.9. WATER SCARCITY AND DROUGHT CONDITIONS**

Water scarcity is a significant climate-related concern for Islamabad and surrounding urban developments. Rising temperatures, increasing demand, groundwater stress, variable rainfall, and urban expansion can reduce the reliability of water supplies.

Karakoram Greens is expected to have a considerable daily water demand due to residential occupancy, landscaping, cleaning, and common facility operations.

Water-related vulnerability is considered high because the project depends on reliable water supply for residents, firefighting, sanitation, landscaping, and building operations. Reduced water availability may affect resident services, sanitation, and green area maintenance.

Adaptation measures include low-flow fixtures, dual-flush systems, smart water metering, leakage detection, reuse of treated wastewater for landscaping, rainwater harvesting, groundwater recharge structures, drought-tolerant plantation, and water conservation awareness programs. The project should monitor monthly water consumption and investigate any abnormal increase in demand.

#### **9.10. ENERGY DEMAND AND POWER SUPPLY VULNERABILITY**

Climate change is expected to increase cooling demand during hotter summers. Higher temperatures can increase electricity consumption for air conditioning, ventilation, elevators, pumps, and common-area cooling. Power disruptions during heatwaves or storms can affect elevators, lighting, water supply pumps, fire safety systems, security systems, and emergency services.

The project is sensitive to energy disruption due to its high-rise form and dependence on vertical circulation, pumping systems, and centralized services. Backup power systems must therefore be designed to support critical services during grid interruptions.

Adaptation measures include energy-efficient lighting, high-efficiency pumps, inverter-based cooling systems, solar photovoltaic systems for common-area loads, emergency generators, battery-backed emergency lighting, and regular maintenance of electrical infrastructure. Critical systems such as fire pumps, sump pumps, emergency lights, security systems, and communication systems should remain functional during outages.

#### **9.11. WINDSTORMS, DUST STORMS, AND THUNDERSTORMS**

Windstorms and dust storms can affect construction safety, air quality, façade components, temporary structures, scaffolding, signage, trees, and exposed materials. Dust storms may increase respiratory risks for workers and residents, while high winds can cause falling objects and damage to unsecured materials.

During construction, scaffolding, cranes, loose sheets, and temporary installations are sensitive to wind hazards. During operation, façade elements, landscaping, rooftop installations, solar panels, and signage require secure design.

Adaptation measures include wind-resistant design for façade and rooftop structures, secure anchoring of temporary materials, suspension of high-risk lifting during strong winds, dust suppression, proper storage of loose materials, and tree species selection suitable for local wind conditions.

### **9.12. EROSION AND DRAINAGE CHANNEL STABILITY**

The project site has gently sloping terrain with drainage movement toward lower areas. Intense rainfall can increase runoff velocity, causing soil erosion near exposed slopes, landscaped edges, embankments, and drainage corridors. Erosion may also increase sediment load entering stormwater drains.

Adaptation measures include surface stabilization, vegetation cover, embankment plantation, silt traps, erosion control mats where needed, check drains, and regular inspection after rainfall events. Exposed soil should be minimized during construction, and temporary drainage should be provided around excavation areas.

### **9.13. PUBLIC HEALTH AND VECTOR-BORNE DISEASE RISKS**

Climate-related changes in rainfall and temperature may increase the risk of vector breeding where stagnant water accumulates. Poorly maintained drains, waterlogged areas, and uncovered storage containers can support mosquito breeding and increase public health risks.

Adaptation measures include proper drainage maintenance, elimination of standing water, covered water storage, routine cleaning of storm drains, solid waste control, pest management, and awareness campaigns for residents and facility staff.

### **9.14. CLIMATE ADAPTATION MEASURES**

| <i>Climate Risk</i>      | <i>Adaptation Measures</i>                                                         |
|--------------------------|------------------------------------------------------------------------------------|
| <i>Extreme rainfall</i>  | Stormwater drains, detention, silt traps, recharge pits, rainwater harvesting      |
| <i>Basement flooding</i> | Raised ramps, trench drains, sump pumps, backup power, non-return valves           |
| <i>Urban flooding</i>    | Controlled discharge, drainage maintenance, emergency pumping                      |
| <i>Heat stress</i>       | Shading, ventilation, green spaces, reflective materials, heat-safe work schedules |
| <i>Water scarcity</i>    | Low-flow fixtures, treated wastewater reuse, rainwater harvesting, smart metering  |
| <i>Energy stress</i>     | LED lighting, efficient pumps, solar PV, backup power, demand monitoring           |
| <i>Windstorms</i>        | Secure rooftop systems, safe lifting controls, wind-resistant installation         |

|                           |                                                                              |
|---------------------------|------------------------------------------------------------------------------|
| <i>Soil erosion</i>       | Vegetation, slope stabilization, silt traps, erosion control structures      |
| <i>Utility disruption</i> | Backup systems, emergency response, preventive maintenance                   |
| <i>Public health</i>      | Drain cleaning, pest control, waste management, prevention of standing water |

### 9.15. CLIMATE RISK MANAGEMENT RESPONSIBILITIES

| <i>Entity</i>                | <i>Responsibility</i>                                          |
|------------------------------|----------------------------------------------------------------|
| <i>Project Proponent</i>     | Overall climate risk management and resource allocation        |
| <i>Design Consultant</i>     | Incorporation of climate-resilient design features             |
| <i>Contractor</i>            | Construction-phase climate risk controls                       |
| <i>Environmental Officer</i> | Monitoring, reporting, compliance verification                 |
| <i>Facility Manager</i>      | Operational maintenance and climate risk preparedness          |
| <i>OHS Officer</i>           | Worker heat stress and emergency safety management             |
| <i>Residents / Occupants</i> | Compliance with water, energy, waste, and emergency procedures |

### 9.16. CLIMATE RESILIENCE MONITORING INDICATORS

| <i>Indicator</i>                          | <i>Target / Threshold</i>      | <i>Frequency</i>           |
|-------------------------------------------|--------------------------------|----------------------------|
| <i>Drain cleaning before monsoon</i>      | 100% completed                 | Pre-monsoon                |
| <i>Basement pump functionality</i>        | 100% operational               | Monthly and before monsoon |
| <i>Water consumption</i>                  | Within design demand           | Monthly                    |
| <i>Leakage rate</i>                       | Less than 5%                   | Monthly                    |
| <i>Rainwater harvesting functionality</i> | 100% functional before monsoon | Pre-monsoon                |
| <i>Tree survival rate</i>                 | More than 85%                  | Quarterly                  |
| <i>Heat stress incidents</i>              | Zero severe cases              | Continuous during summer   |
| <i>Emergency drills</i>                   | Minimum 4 per year             | Quarterly                  |
| <i>Stormwater blockage incidents</i>      | Zero unresolved cases          | Continuous                 |
| <i>Power backup functionality</i>         | 100% critical systems covered  | Monthly                    |

### 9.17. RESIDUAL CLIMATE RISK

With implementation of the proposed adaptation measures, most climate risks can be reduced to manageable levels. However, residual risk will remain for extreme rainfall events exceeding design assumptions, prolonged heatwaves, severe regional water shortages, and major utility failures. These risks shall be managed through emergency preparedness, adaptive management, routine monitoring, and periodic review of infrastructure performance.

The project should update its climate risk assessment every five years or after any major flood, heatwave, earthquake, or infrastructure failure event.

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### **9.18. CARBON FOOTPRINT ASSESSMENT (SCOPE 1, SCOPE 2 AND SCOPE 3)**

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The Karakoram Greens project has the potential to generate greenhouse gas (GHG) emissions during both the construction and operational phases through energy consumption, fuel combustion, waste generation, wastewater management, and transportation activities. As climate change continues to be a significant global environmental concern, assessment of the project's carbon footprint has been undertaken to identify major emission sources, quantify greenhouse gas emissions, and recommend practical measures to minimize emissions throughout the project lifecycle. This assessment establishes a baseline carbon inventory and supports the integration of low-carbon design principles into the proposed development.

### **9.19. ORGANIZATIONAL AND OPERATIONAL BOUNDARY**

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The greenhouse gas inventory has been prepared by defining clear organizational and operational boundaries for the project. The organizational boundary includes all activities under the operational control of the Project Proponent, while the operational boundary encompasses emission sources associated with construction activities, building operation, utility consumption, waste management, and supporting infrastructure. Emissions have been classified according to the internationally recognized Scope 1, Scope 2, and Scope 3 framework to ensure comprehensive accounting of both direct and indirect greenhouse gas emissions.

### **9.20. GREENHOUSE GASES CONSIDERED**

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The carbon footprint assessment considers the principal greenhouse gases associated with building construction and operation, namely carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). These gases contribute differently to global warming and are therefore converted into a common unit known as carbon dioxide equivalent (CO<sub>2</sub>e) using their respective Global Warming Potentials (GWPs). Expressing emissions in CO<sub>2</sub>e enables direct comparison between different emission sources and provides a standardized basis for reporting total project emissions.

#### **9.20.1. METHODOLOGY**

Greenhouse gas emissions have been quantified using the activity-based approach recommended by the Intergovernmental Panel on Climate Change (IPCC) and the Greenhouse Gas Protocol. Under this methodology, emissions are calculated by multiplying activity data, such as electricity consumption, diesel use, waste generation, and wastewater production, by appropriate emission factors. This

approach provides a transparent and internationally accepted method for estimating emissions and allows future inventories to be updated as actual operational data become available.

### **9.20.2. ACTIVITY DATA**

Activity data represent the measurable parameters that generate greenhouse gas emissions during the construction and operational phases of the project. These include electricity consumption, diesel fuel usage, municipal solid waste generation, wastewater production, construction material quantities, and building occupancy. The activity data used in this assessment are based on the proposed project design, estimated occupancy levels, engineering calculations, and utility demand projections developed as part of the Environmental Impact Assessment.

#### **9.20.2.1. OPERATIONAL PHASE**

The operational phase activity data represent the expected annual resource consumption after full occupancy of the residential development. Electricity consumption, diesel generator operation, solid waste generation, wastewater production, and population estimates form the basis for calculating recurring annual greenhouse gas emissions associated with building operation.

#### **9.20.2.2. CONSTRUCTION PHASE**

Construction phase activity data include fuel consumption by construction machinery, equipment, transport vehicles, and the embodied carbon associated with major construction materials such as concrete and steel. These emissions are temporary in nature but constitute a significant portion of the project's overall lifecycle carbon footprint.

### **9.20.3. EMISSION FACTORS**

Emission factors convert activity data into greenhouse gas emissions by representing the quantity of emissions released per unit of activity. The emission factors adopted in this assessment are based primarily on the IPCC 2006 Guidelines, the 2019 Refinement, and nationally applicable electricity grid emission factors. Where project-specific emission factors are unavailable, internationally accepted default values have been applied to ensure consistency and transparency.

### **9.20.4. FUEL COMBUSTION**

Diesel fuel consumed during construction activities and emergency generator operation produces carbon dioxide, methane, and nitrous oxide emissions. These emissions have been estimated using IPCC default emission factors for stationary and mobile combustion sources.

#### **9.20.5. ELECTRICITY**

Indirect emissions associated with purchased electricity have been calculated using the applicable emission factor for Pakistan's national electricity grid. Since the project relies primarily on grid electricity for residential and common-area operations, electricity consumption represents the largest operational source of greenhouse gas emissions.

#### **9.20.6. SOLID WASTE**

Municipal solid waste disposed of at landfill sites generates methane emissions through anaerobic decomposition of organic material. Emissions from solid waste have been estimated using an appropriate emission factor representing mixed municipal waste under typical disposal conditions.

#### **9.20.7. WASTEWATER**

Domestic wastewater contains biodegradable organic matter that generates methane and nitrous oxide during treatment and disposal. Wastewater emissions have been estimated using standard emission factors applicable to municipal wastewater systems.

### **9.21. SCOPE 1 EMISSIONS**

Scope 1 emissions represent direct greenhouse gas emissions arising from sources owned or controlled by the Project Proponent. For Karakoram Greens, these emissions primarily result from diesel combustion in construction machinery during the construction phase and backup diesel generators during the operational phase. Although Scope 1 emissions represent a relatively small proportion of the overall operational carbon footprint, they remain an important component of the project's greenhouse gas inventory.

#### **9.21.1. CONSTRUCTION EQUIPMENT**

Construction activities require the use of excavators, cranes, loaders, dump trucks, generators, compressors, and other diesel-powered equipment. Fuel combustion from these sources releases carbon dioxide, methane, and nitrous oxide directly into the atmosphere. The associated greenhouse gas emissions have been estimated using projected diesel consumption over the construction period.

#### **9.21.2. OPERATIONAL DIESEL GENERATOR**

Emergency diesel generators will be installed to provide uninterrupted power to critical building services during electricity outages, including firefighting systems, elevators, emergency lighting, security systems, and water pumps. Although generator operation is expected to be intermittent, fuel consumption has been included in the greenhouse gas inventory to account for direct operational emissions.

#### **9.22. SCOPE 2 EMISSIONS**

Scope 2 emissions comprise indirect greenhouse gas emissions associated with purchased electricity consumed by the project. Electricity is required for residential apartments, elevators, water supply pumps, lighting systems, security equipment, basement ventilation, and other common facilities. As electricity is supplied through Pakistan's national grid, the associated greenhouse gas emissions occur at power generation facilities but are attributed to the project based on its electricity consumption.

#### **9.23. SCOPE 3 EMISSIONS**

Scope 3 emissions include indirect emissions resulting from project activities that occur outside the operational control of the Project Proponent. These emissions include embodied carbon in construction materials, municipal solid waste disposal, wastewater treatment, transportation of construction materials, employee commuting, resident transportation, and other upstream and downstream activities. Although more difficult to quantify accurately, Scope 3 emissions often represent a significant proportion of the overall lifecycle carbon footprint of large residential developments.

##### **9.23.1. MUNICIPAL SOLID WASTE**

During operation, the project will generate municipal solid waste consisting primarily of domestic refuse, recyclable materials, packaging waste, and commercial waste from common facilities. Disposal of biodegradable waste at landfill sites generates methane, a greenhouse gas with a significantly higher global warming potential than

carbon dioxide. The emissions associated with waste disposal have therefore been included within Scope 3.

### **9.23.2. WASTEWATER**

Domestic wastewater generated by the project will be conveyed to the Gulberg Greens Sewage Treatment Plant for treatment and disposal. Organic matter present in wastewater generates greenhouse gases during treatment processes. These indirect emissions have been estimated using wastewater generation rates and standard emission factors.

### **9.23.3. CONSTRUCTION MATERIALS**

The manufacture of construction materials such as cement, concrete, reinforcing steel, glass, aluminum, bricks, and finishing products requires substantial amounts of energy and results in significant greenhouse gas emissions before these materials arrive at the project site. These embodied emissions typically represent the largest contributor to the lifecycle carbon footprint of high-rise residential developments and have therefore been included as Scope 3 emissions.

### **9.23.4. TRANSPORTATION**

Transportation-related emissions arise from the movement of construction materials, construction workers, operational staff, residents, visitors, waste collection vehicles, and service providers. Although detailed transport activity data are unavailable at this stage, these emissions are recognized as an indirect source of greenhouse gases and should be quantified during project operation using actual transportation records.

## **9.24. CARBON INTENSITY INDICATORS**

Carbon intensity indicators express greenhouse gas emissions relative to key project metrics such as population, residential units, and built-up area. These indicators facilitate benchmarking against similar developments and provide measurable performance metrics for future sustainability reporting and environmental management.

## **9.25. CARBON REDUCTION OPPORTUNITIES**

Several practical measures have been identified to reduce greenhouse gas emissions throughout the project lifecycle. These include improvements in energy efficiency,

renewable energy integration, water conservation, waste minimization, sustainable construction practices, and environmentally responsible operation and maintenance. Implementation of these measures will contribute to lower operating costs while enhancing the project's overall environmental performance.

#### **9.26. GHG MONITORING PLAN**

An ongoing greenhouse gas monitoring program should be implemented throughout the operational life of the project. The monitoring plan will track electricity consumption, fuel usage, waste generation, wastewater production, renewable energy generation, and overall greenhouse gas emissions on a regular basis. Periodic monitoring will enable the Project Proponent to evaluate environmental performance, identify opportunities for further emission reductions, and demonstrate compliance with sustainability objectives.

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# 10. CONCLUSIONS AND RECOMMENDATIONS

## **10.1. CONCLUSIONS**

The Environmental Impact Assessment conducted for the proposed Karakoram Greens Residential Development concludes that the project is environmentally viable and can be implemented in a sustainable manner, provided that the recommended mitigation and management measures are effectively executed. The project has been planned in accordance with applicable environmental legislation, including the Pakistan Environmental Protection Act (PEPA), 1997, and the relevant guidelines issued by the Pakistan Environmental Protection Agency (Pak-EPA) and the Capital Development Authority (CDA).

Baseline environmental studies indicate that the project site does not fall within any ecologically sensitive or protected area and is already designated for urban development under the approved master plan of Gulberg Greens. The physical environment, including topography, soil conditions, and seismic characteristics, is suitable for the proposed construction. No significant adverse impacts on natural habitats, surface water bodies, or groundwater resources are anticipated, provided that construction and operational activities adhere strictly to the prescribed environmental safeguards.

Potential environmental impacts identified during the assessment such as dust emissions, noise generation, solid waste production, wastewater discharge, and traffic movement are typical of large-scale residential developments and are considered manageable in nature. Effective mitigation measures, supported by a comprehensive Environmental Management and Monitoring Plan (EMMP), have been proposed to control these impacts during both construction and operational phases.

The project is expected to generate positive socio-economic benefits, including employment opportunities, improved housing infrastructure, and enhanced urban amenities. The incorporation of green spaces, water conservation measures, fire safety systems, and sustainable design elements further strengthens the project's environmental performance.

Overall, the assessment confirms that the Karakoram Greens project does not pose any significant or irreversible environmental risks and is compatible with the surrounding urban environment, subject to strict implementation of the proposed mitigation and monitoring measures.

## **10.2. RECOMMENDATIONS**

To ensure environmentally sound implementation and long-term sustainability of the Karakoram Greens project, a comprehensive set of environmental management and operational measures is recommended.

The Environmental Management Plan (EMP) shall be strictly implemented throughout all phases of the project, with clearly defined responsibilities assigned to project management, contractors, and a designated Environmental Officer responsible for oversight and compliance. Construction activities must be carefully managed through dust suppression measures, controlled working hours, and proper maintenance of machinery to minimize air and noise pollution.

A structured solid waste management system should be established, emphasizing waste segregation, safe storage, recycling where feasible, and disposal through authorized service providers.

All wastewater generated from the project shall be conveyed through the internal sewerage network and treated at the Gulberg Greens Sewage Treatment Plant in accordance with National Environmental Quality Standards prior to disposal or reuse.

Water conservation measures, including the installation of water-efficient fixtures, rainwater harvesting, and reuse of treated wastewater for landscaping, should be actively promoted to reduce freshwater demand.

Fire safety and emergency preparedness must be ensured through installation and maintenance of firefighting systems, alarms, emergency exits, and regular emergency drills in line with CDA and national safety requirements.

Landscaping should prioritize native and drought-resistant species, with proper maintenance to enhance environmental quality and control soil erosion. Occupational health and safety measures, including provision of personal protective equipment, worker training, and first-aid facilities, shall be strictly enforced during construction and operation.

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Regular environmental monitoring of air quality, noise, wastewater, and solid waste management shall be carried out, with documentation and reporting submitted to the relevant authorities as required.

With effective implementation of these measures, the Karakoram Greens project can be developed in an environmentally responsible and socially sustainable manner, fully aligned with national environmental regulations and urban development objectives, and is therefore recommended for approval subject to compliance with the Environmental Management and Monitoring Plan.

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## 11. REFERENCES

- Asian Development Bank, ADB Environmental Assessment Guidelines, 2003
- Ali, S.I. and Ali E, eds., Botany Department, University of Karachi, Mirnosaceae, Flora of Pakistan, 1973
- Corfield, D.M., Asian Study Group, Islamabad, Birds of Islamabad, Pakistan and the Murree Hills, 1983
- Enercon/UNDP/World Bank, Lighting Efficiency Improvements Programme, Phase 1: Commercial Building, 1994
- Government of Pakistan, National Drinking Water Policy
- Hafiz-ur-Rehman and Fehmida, I., A Revised Checklist of the Reptiles of Pakistan, Records of the Zoological Survey of Pakistan, Volume XIII, 1997
- Institution of Lighting Engineers, U.K., Guidance Notes for the Reduction of Obtrusive Light
- International Union for the Conservation of Nature, Environmental Profile of Pakistan, 1998
- Ministry of Finance, Government of Pakistan, Islamabad, Economic Survey of Pakistan 2013-14
- Ministry of Housing and Works, Government of Pakistan, Islamabad, Building Code of Pakistan, 1986
- Ministry of Housing and Works, Government of Pakistan, Islamabad, Building Code of Pakistan Seismic Provisions 2007
- National Geographic Website, Geology of Pakistan
- Pakistan Council of Research in Water Resources, Government of Pakistan, Islamabad, Report of the National Water Quality Management Programme, Phase I
- Pakistan Council of Research in Water Resources, Government of Pakistan, Islamabad, Report of the National Water Quality Management Programme, Phase II

- 
- Pakistan Council of Research in Water Resources, Government of Pakistan, Islamabad, Report of the National Water Quality Management Programme, Phase III
  - Pakistan Environmental Protection Agency, Government of Pakistan, Islamabad, Pak-EPA and JICA Study, Air and Water Quality in Rawalpindi, Islamabad and Lahore
  - Pakistan Environmental Protection Agency, Government of Pakistan, Islamabad, Position Paper, Air Pollution
  - Pakistan Environmental Protection Agency, Government of Pakistan, Islamabad, Brief on Water Pollution
  - Pakistan Environmental Protection Agency, Government of Pakistan, Islamabad and the Japanese International Cooperation Agency, Guidelines for Solid Waste Management
  - Pakistan Environmental Protection Agency, Government of Pakistan, Islamabad, Measurement of Noise Levels at Different Locations of Rawalpindi and Islamabad
  - Pakistan Environmental Protection Agency, Government of Pakistan, Islamabad, Pakistan Clean Air Programme
  - Pakistan Environmental Protection Agency, Government of Pakistan, Islamabad, Waste Amount Survey in Islamabad
  - Population Census Organisation, Government of Pakistan, Islamabad, Population Census for District Islamabad, 1999
  - Pakistan Meteorological Department, Government of Pakistan, Islamabad, Published Data
  - Soil Survey of Pakistan, Government of Pakistan, Lahore, Notes of Geomorphology, Land Use, Soils and Landforms of District Rawalpindi
  - Wathern, Paul, Initial Environmental Examination: Theory and Practice
  - Zulifkar H. Lodhi, Pakistan Environmental Protection Agency, Government of Pakistan, Islamabad, Ambient Air Quality in Pakistan

## 12. ANNEXURES

## **ANNEXURE A**

### **ENVIRONMENTAL TESTING RESULTS**

## **ANNEXURE B**

### **NATIONAL ENVIRONMENTAL QUALITY STANDARDS**

**ANNEXURE C**  
**EXTERNAL ELECTRIFICATION/  
IESCO APPROVAL**

**ISLAMABAD****Electric Supply Company Limited**

www.iesco.com.pk

Head Office, Street No.40, Sector G-7/4, Islamabad

No. 615-19 /CEO/IESCO/CE(P&E)/HS-258Date: 22/02/2011

Secretary  
Intelligence Bureau  
Employees Cooperative  
Housing Society Gulberg Phase-1  
Islamabad.

Subject: **TENTATIVE DEMAND NOTICE FOR DESIGN VETTING FEE / APPROVAL AND INSPECTION / SUPERVISION CHARGES AGAINST EXTERNAL ELECTRIFICATION WORK (SELF EXECUTION) THROUGH SPONSOR IN RESPECT OF INTELLIGENCE BUREAU EMPLOYEES COOPERATIVE HOUSING SOCIETY (IBECHS) FOR FOR GULBERG PHASE-1 ZONE-V ISLAMABAD**

The Chief Executive Officer IESCO has been pleased to accord the approval for provision of electricity infrastructure / external electrification work in the above subject scheme as requested by you.

You are therefore required to deposit the following amounts with Finance Director IESCO F-8 Markaz Islamabad through Bank Draft / Pay order in the name of Chief Executive Officer IESCO Islamabad within 30 days positively from the issue date of this Demand Notice / letter under intimation to this office and other concerned as well.

| S. No. | Name of Work                                                                                                            | Estd. Amount   | Remarks                                                               |
|--------|-------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------------------------------|
| 1.     | 1.5% design vetting fee against the total cost of External Electrification work                                         | Rs.34,39,815/- | These payments should be made through Separate pay order / Bank draft |
| 2.     | 1.5% inspection / supervision charges against the cost of self execution work                                           | Rs.33,15,731/- |                                                                       |
| 3.     | Installation charges of 05 No. Outgoing panel for proposed 05 No. feeders at proposed Grid station inside the H/scheme. | Rs.82,72,218/- |                                                                       |

Further, it is being issued subject to the terms & conditions as noted below: 1,50,27,764/-

- The execution of external electrification work inside the subject housing scheme shall be carried out by the sponsor themselves at their own cost through WAPDA / IESCO approved contractor according to approved / vetted design and as per terms and conditions of approval for self execution work.
- The sponsor will furnish bank guarantee within 30 days positively from the issue date of this demand notice equivalent to 25% of the total electrification cost of self execution work (Rs.5,52,62,188/-) valid for the entire period upto completion of full electrification work / energization of housing scheme.

Chief Engineer (P&E)  
IESCO Islamabad

Copy to:

- Finance Director IESCO F-8 Markaz Islamabad. He is requested to intimate this office as and when the above mentioned amounts received from the sponsor.
  - Project Director (CO) IESCO Islamabad.
  - SE (E) IESCO Islamabad Circle.
  - M/s Power Consulting Engineers Islamabad.
  - Master File (HS)
- } for information & n/a please.

Intelligence Bureau Gulberg HS-258 self execution 2011



**ANNEXURE D**  
**SNGPL APPROVAL LETTER**

87/c



**SUI NORTHERN GAS PIPELINES LIMITED**  
Plot No. 28-30, Industrial Area, I-9 Islamabad (Pakistan)

Telephones : 092-51-8257710-19  
Cable : "SUNORTH"  
Fax No. : 092-51-8257770-

**REF. NO.** IS/L-42  
**DATE** 20.05.2014

Mr. A. R Nasir  
Joint Secretary  
I.B Employees Co-operative Housing Society Limited  
**ISLAMABAD.**

**SUPPLY OF GAS TO**  
**INTELLIGENCE BUREAU EMPLOYEES CO-OPERATIVE HOUSING**  
**SOCIETY GULBERG ISLAMABAD.**

We refer our letter # SGMD-(N)-14 dated 13.01.2014, regarding the subject and wish to advise you as follows:-  
Our gas distribution network does not exist in the vicinity of above premises. In order to provide gas to the subject premises, the following network of gas mains are required to be laid at an estimated cost of **Rs. 60864515/- (Sixty Million Eight Lac Sixty Four Thousands Five Hundred and Fifteen Rupees Only)** (E. & O. E) subject to revision if prices of materials escalate).

| PIPE DIA       | METERAGE | UNIT RATE (Rs.)    | COST (Rs.)  |
|----------------|----------|--------------------|-------------|
| 8" dia         | 7.9 KM   | 6401.71            | 50573509.00 |
| TBS's (300mcf) | 01 Nos   | 2352156.00         | 2352156.00  |
|                |          | Escalation Charges | 7938849.75  |
|                |          | Total              | 60864514.75 |

Please be advised that after receipt of full amount, it normally takes us a minimum period of 18 to 24 months for the procurement of materials and allied fittings after receipt of which the execution of the job is taken in hand. All costs of Road Cross/Road Cuttings/boring will have to be borne by you. You will also be required to obtain prior permission for Road Cross/Cutting/boring from the competent authorities. The reinstatement of roads, pavements, sand filling inside the colonies and Nullah crossing would be carried out by your own arrangements.

Please also note that the security amount and service line cost sharing charges/cost of meter station will have to be deposited by you in addition to the above cost, and will be intimated to you after the successful laying/commissioning of the proposed gas main.

The proposed laying of the gas mains can be considered on 100% cost recovery basis. Proprietary rights of the Gas Network and its maintenance will rest with Sui Northern Gas Pipelines Limited and the Company will have the right to supply gas through the system to any other applicants. Therefore, should you agree to our above offer, you are requested to remit us the cost estimates along with the 'draft agreement' (specimen attached) duly filled in/signed on a **Rs.100/- non-judicial stamp paper**. This offer is valid up to **20.06.2014**.

Assuring you of our best services at all times.

*Sui Northern Gas Pipelines Limited*

  
 (Engr. Ahmed Chaudhary)  
**GENERAL MANAGER (ISLD)**

Note: This refers to SGMD-(N)-14 dated 15.05.2014

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**ANNEXURE E**  
**NO OBJECTION CERTIFICATES**