ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

Atrium Hills – Residential Apartment Complex

Major Road, Sector B, Zaraj Housing Scheme, Islamabad

Atrium Hills

May, 2026

Capital Environmental Consultants Pvt. Ltd.
info@capitalenv.com.pk cecpak92@gmail.com
0312-5810143
www.capitalenv.com.pk
66, Street 119, G-13/4, Islamabad

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Consultants Pvt. Ltd.

ABBREVIATIONS

Acronym	Title
BOD	Biochemical Oxygen Demand
CDA	Capital Development Authority
CEC	Capital Environmental Consultants Pvt. Ltd.
COD	Chemical Oxygen Demand
dB(A)	A-weighted decibels
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
EMMP	Environmental Management & Monitoring Plan
EPA	Environmental Protection Agency
ERP	Emergency Response Plan
GT Road	Grand Trunk Road
ICT	Islamabad Capital Territory
IEE	Initial Environmental Examination
IESCO	Islamabad Electric Supply Company
kVA	Kilovolt-Ampere
LPG	Liquefied petroleum gas
NCCP	Pakistan's National Climate Change Policy
NEQS	National Environmental Quality Standards
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
OHS	Occupational Health and Safety
PAK-EPA	Pakistan Environmental Protection Agency
PEPA 1997	Pakistan Environmental Protection Act, 1997
PKR	Pakistani Rupees
PM	Particulate Matter
$PM_{2.5}$	Particulate Matter ≤2.5 microns
PM_{10}	Particulate Matter ≤10 microns
PPE	Personal Protective Equipment
SOP	Standard Operating Procedure
SPM	Suspended Particulate Matter

EXECUTIVE SUMMARY

Project Title:	Atrium Hills – Residential Apartment Complex
Project Location:	Major Road, Sector B, Zaraj Housing Scheme, Islamabad
Proponent:	Mr. Zia-ur-Rehman
Environmental Consultant:	Capital Environmental Consultants Pvt. Ltd.

The Environmental Impact Assessment (EIA) has been prepared for the proposed Atrium Hills Residential Apartment Complex by M/s Atrium Hills through Mr. Zia-ur-Rehman. The EIA has been prepared in accordance with the Pakistan Environmental Protection Act, 1997 and the Pak-EPA (Review of IEE and EIA) Regulations, 2000. The purpose of the assessment is to review the existing environmental and social conditions of the project area, identify potential impacts during construction and operation, and recommend practical mitigation, monitoring and management measures for environmentally sound implementation of the project.

The proposed project is located at Major Road, Sector B, Zaraj Housing Scheme, Zone-V, Islamabad Capital Territory. The site lies within an approved private housing scheme near Main GT Road (N-5), opposite DHA Phase-II and Giga Mall. The geographical coordinates of the project site are 33°30'45.8"N and 73°09'18.2"E. The plot has been designated for residential apartment complex development as per the approved Layout Plan of Zaraj Housing Scheme. The proposed land use is therefore compatible with the approved planning framework and the existing urban residential and mixed-use character of the surrounding area.

Atrium Hills is planned as a G+20-storey residential apartment complex on a plot measuring 16.35 Kanals, equivalent to 9,891.75 sq. yd. / 89,025.75 sq. ft. The project will have a total covered area of 681,361 sq. ft., building height of 264'-9", and 348 apartments comprising 1-bed, 2-bed and 3-bed units. The project provides parking for 526 cars and 57 motorcycles. The ground floor will mainly contain amenities, the 1st and 2nd floors will contain apartments, the 3rd to 7th floors will be used for parking, the 8th to 19th floors will contain apartments, while the 20th floor/mumty will accommodate rooftop services. The main amenities include a mosque, grand atrium, community hall, business lounge, day care center, clinic, post office, swimming pool, steam/sauna, gymnasium, EV charging points at each parking floor, rooftop BBQ area and gated security.

The project incorporates several environmental design and resource efficiency measures. These include rainwater harvesting, rainwater recharge well, rooftop solar system, passive ventilation/cooling through atrium design, and provision of EV charging infrastructure. An approximately 8-kanal L-shaped green/open area is located in the neighborhood on the western side of the project site, between the proposed project and the existing service path. This green area is not part of the project plot; however, the client has obtained permission from Zaraj Housing Scheme to develop and maintain this area as a neighborhood green park. The proposed park will be developed through planned landscaping, tree plantation, grass cover and suitable ornamental planting, subject to discussion and approval of Zaraj Housing Scheme management. It will improve the visual and aesthetic character of the surroundings, enhance streetscape value, reduce exposed barren surfaces, support dust control, contribute to local cooling, and provide environmental and social benefits for the nearby community.

As part of the project's cleaner mobility and energy efficiency measures, EV charging points have been incorporated in the building design in accordance with the Energy Conservation Building Code, 2023 (ECBC-2023) and NEECA guidelines. ECBC-2023 requires provision of 5% to 10% EV charging points for high-rise residential parking facilities. Accordingly, EV charging points equivalent to 5% of the total parking provision have been provided in the

building design. The project power drawings show EV charging points on the parking floors from the 3rd floor to the 7th floor. A total of 29 EV charging points have been provided to support the future use of electric vehicles by residents and visitors, promote cleaner mobility, reduce dependence on conventional fuel-based vehicles over time, and align the project with national energy conservation and sustainable transport objectives.

The project also includes comprehensive fire and life safety provisions, including fire hose cabinets, sprinkler system, fire extinguishers, fire pumps, fire water tanks, fire detection and alarm system, fire lifts, smoke extraction, staircase pressurization and fire-rated doors. Apartments have been classified as Light Hazard, while parking/commercial areas have been classified as Ordinary Hazard in the fire-fighting design.

The project site has a terraced/level-based building arrangement due to variation in natural ground levels. The lower/front side of the plot is toward the north/northeast near the Major Road and adjacent stormwater drain, while the western side and service path are at a higher level. Accordingly, excavation, cutting, grading and slope stabilization will be important construction-stage activities. The normal operational access will be from the north-side Major Road. The west-side service path will not be used for routine access and will only be used for emergency evacuation, where required. A nullah/stormwater drain is located along the eastern side of the plot, with Aghosh Society located beyond it.

Baseline environmental and social assessment shows that the project area is mainly urban in character. The immediate surroundings include Major Road and an open plot toward the north, a nullah/stormwater drain and Aghosh Society toward the east, a green area/linear park and service path followed by residential houses toward the west, and a green area toward the south. The broader surroundings include residential houses, apartment and mixed-use developments, commercial areas, schools, healthcare facilities, internal roads and utility infrastructure within Zaraj Housing Scheme and nearby areas such as DHA Phase-II, Giga Mall, Aghosh Society, Bahria Town Phase-7 and other Zone-V developments.

No protected area, wildlife sanctuary, national park, Ramsar site or ecologically sensitive habitat is located within the direct or indirect area of influence of the project. The site is presently undeveloped and contains natural vegetation and mature Dalbergia sissoo (Shisham) trees, with scattered pine trees and common herbs/shrubs in the vicinity. No rare, endangered, threatened or protected floral or faunal species were observed during the ecological survey. Common urban and peri-urban fauna such as house sparrow, common myna, rock pigeon, house crow, small reptiles, insects and domestic/stray animals were observed or expected in the area.

Baseline ambient air quality and noise monitoring was conducted at the project site. Most analyzed ambient air quality parameters were within applicable NEQS limits; however, PM2.5 was found exceeding the prescribed limit, which is likely linked with existing urban background conditions, traffic movement, exposed soil surfaces and ongoing development activities in the surrounding area. Noise monitoring showed average daytime noise level of approximately 64 dBA and average nighttime noise level of approximately 50 dBA. Groundwater and surface water samples were also analyzed, and the groundwater sample was found in compliance with applicable drinking water quality standards for the tested parameters. Wastewater quality from the society's wastewater treatment plant was also reported compliant with applicable NEQS for the tested parameters.

A project-specific geotechnical investigation was conducted by AJK Engineers (Pvt.) Ltd. The investigation included five boreholes up to 150 ft below existing ground level, Standard Penetration Tests, groundwater observations and laboratory testing of selected soil samples.

The subsurface generally comprises lean clay, gravelly lean clay, sandy silty clay, silty gravel with sand, and underlying bedrock consisting mainly of shale, sandstone and mudstone. Localized seepage/perched water was observed in selected boreholes. The geotechnical report identifies the project area within Seismic Zone 2B, recommends consideration of horizontal peak ground acceleration of 0.16g to 0.24g, and indicates Site Class C: Very Dense Soil and Soft Rock. The report recommends that raft foundation and/or pile foundation may be considered, subject to detailed structural and geotechnical design.

A project-specific Traffic Impact Study was also conducted. Traffic count surveys were carried out at key locations influencing movement toward the project area, including Talha Road, Talha Road × Zaraj Road Roundabout, and Potohar Avenue (GT Road). The study found that the surrounding road network is presently operating under favorable conditions, with Level of Service A under existing conditions. The Traffic Impact Study concluded that the road network has sufficient capacity to accommodate the projected traffic from the proposed project, subject to proper access and parking management. The project provides adequate car parking, while motorcycle parking will require proper internal management and demarcation.

Stakeholder consultation was carried out with both primary and secondary stakeholders during April 2026. Primary stakeholders included Zaraj Housing Scheme Management Committee, Rania Residency Management Committee, nearby residents of Sector B and other community members. The Zaraj Housing Scheme Management Committee confirmed that the project site is designated for apartment complex development and raised no objection, subject to compliance with society bylaws, CDA requirements and applicable environmental conditions. Rania Residency Management Committee also raised no objection, but recommended implementation of EPA guidelines, noise control and avoidance of nighttime construction.

Most nearby residents did not object to the project if it is implemented in accordance with approvals and society/CDA requirements. However, some residents, particularly on the western side/service path side, raised concerns regarding slope stability, possible damage to adjoining properties, rainwater drainage, soil subsidence, privacy during construction and operation, workers sitting in green areas near houses, obstruction of scenic view, cross ventilation, water supply and construction disturbance. These concerns have been considered in the impact assessment and mitigation planning.

Secondary stakeholder consultation was conducted with Pak-EPA, CDA Environment Wing and academic stakeholders from the Department of Environmental Science, International Islamic University Islamabad. Pak-EPA emphasized that stakeholder consultation, baseline monitoring, mitigation measures and environmental management requirements should be properly covered in the EIA, and that construction should not commence before obtaining environmental approval. CDA Environment Wing emphasized green building concepts, rainwater harvesting, groundwater recharge, tree protection/compensatory plantation and proper waste management. Academic stakeholders highlighted Islamabad's water shortage issues and recommended that the project should not affect existing society water resources and should implement rainwater harvesting, recharge, plantation and sustainable design measures.

The project response includes use of tanker water supply during construction and operation, with no project bore well and no use of the society water supply system meant for individual houses. Wastewater will be connected to the existing sewerage system of Zaraj Housing Scheme leading to the society's wastewater treatment plant. Solid waste will be managed internally by Atrium Hills/Building Management Committee and handed over at the main collection point for collection by the society's waste contractor. The project will also implement slope stabilization through properly designed RCC retaining walls/slope stabilization walls,

stormwater control, protection of the adjacent nullah/stormwater drain, privacy-sensitive construction management, controlled worker movement, dust and noise control, and grievance handling.

During construction, a large residential labour camp will not be required because the project is located within a developed urban area and most workers will commute from Rawalpindi, Islamabad and nearby localities. Only limited essential staff, such as security guards, watchmen, site supervisors and other necessary personnel, may stay at the site as per construction requirements. A temporary site office/limited camp and material storage area will be established in front of the project site along the Major Road, where sufficient open space is available. This area will be managed through access control, signage, barricading, proper housekeeping, covered waste bins, sanitation facilities, septic tank arrangement and safe storage of construction materials, cement, chemicals, paints, oils and fuel, where required.

During the construction phase, the main potential impacts are expected to be temporary and localized. Key construction-stage impacts include site clearance and possible vegetation/tree removal, excavation, cutting, grading and slope stability risks, generation of excavated material, construction waste, dust and exhaust emissions, noise and vibration, construction traffic and access disturbance, soil erosion and silt-laden runoff toward the adjacent nullah/stormwater drain, construction water consumption, wastewater generation from workers and site activities, occupational health and safety risks, community health and safety concerns, and fire/emergency risks. Positive impacts during construction include temporary employment and local business opportunities.

The recommended construction-phase mitigation measures include avoiding tree cutting as far as possible, preparing a tree inventory, compensatory plantation where tree removal is unavoidable, controlled excavation as per approved engineering design, incorporation of geotechnical recommendations, RCC retaining walls/slope stabilization walls, temporary shoring/benching/bracing/soil nailing/shotcrete support where required, reuse or approved disposal of excavated material, segregation and proper disposal of construction waste, water sprinkling and covering of stockpiles, use of ready-mix concrete, maintenance of vehicles and machinery, restriction of high-noise activities to daytime as far as possible, controlled construction traffic using designated routes, protection of the adjacent nullah/stormwater drain, provision of sanitation facilities, use of PPE, site barricading, toolbox talks, worker training, first aid and emergency preparedness.

Construction-stage climate change impacts will mainly be associated with embodied carbon in construction materials, use of diesel-based construction machinery, transportation of construction materials, removal of excavated material and construction waste, temporary electricity use and possible use of diesel generators. At this stage, detailed BOQ-based material quantities and construction fuel consumption data are not available; therefore, a precise construction-stage carbon footprint has not been calculated. However, considering the scale of the high-rise residential apartment complex, construction-related GHG emissions are expected to be moderate to high during the construction period, but temporary and limited to the active construction phase. Efficient material planning, use of ready-mix concrete where feasible, optimized transport trips, regular machinery maintenance, avoidance of unnecessary idling, reuse of excavated material and recycling/minimization of construction waste will help reduce these emissions.

During the operational phase, the main potential impacts will relate to long-term water consumption, wastewater generation, municipal solid waste generation, electricity demand, air emissions and noise from backup generators, fire and life safety risks, stormwater runoff and

protection of the adjacent nullah/drainage system, community health, safety and privacy concerns, visual/aesthetic impacts, traffic movement, access and parking demand, shadow impact on nearby receptors, and climate change-related impacts. Positive operational impacts include provision of planned housing, amenities, local services, green/open area and resource efficiency measures.

The total operational water demand of the project is estimated as 328.12 m3/day. Based on the standard assumption that approximately 80% of total water consumption converts into wastewater, the estimated wastewater generation from the project will be approximately 262.50 m3/day, or 262,500 liters/day. Wastewater from Atrium Hills will be connected to the existing sewerage system of Zaraj Housing Scheme, which leads to the society's wastewater treatment plant. No untreated wastewater will be discharged into the adjacent nullah/stormwater drain.

During operation, municipal solid waste will be generated from apartments, common areas, amenities, offices, cleaning activities and visitors. Based on a waste generation rate of 0.89 kg/capita/day and an estimated residential population of 1,170 persons, the project is expected to generate approximately 1,041 kg/day, or 1.04 tons/day, of municipal solid waste during the operation phase. The annual solid waste generation is estimated at approximately 380 tons/year. Internal waste collection will be managed by the Building Management Committee, while waste will be transferred to a designated main collection point for collection by the society's waste contractor. Color-coded covered bins, segregation of recyclables where feasible, housekeeping, pest control and prohibition of dumping/burning will be required.

Operational mitigation measures include tanker-based water supply, no project bore well, efficient water use, regular inspection of water storage and distribution systems, use of harvested rainwater for suitable non-potable purposes where feasible, wastewater connection to the society sewerage system/WWTP, regular maintenance of sewer lines and manholes, internal solid waste collection and handover to the society waste contractor, energy-efficient lighting and equipment in common areas where feasible, maintenance of rooftop solar system, proper operation and maintenance of backup generators with acoustic control and suitable stack arrangement, diesel storage with secondary containment, maintenance of fire and life safety systems, periodic fire drills, stormwater system maintenance, clear parking demarcation, access control, complaint handling, landscaping and routine building maintenance.

A Tier-1 operational carbon footprint estimate has also been prepared. The estimate indicates that grid electricity will be the dominant source of operational greenhouse gas emissions. Estimated annual emissions are approximately 5,007 tCO2e/year without natural gas use and approximately 5,511 tCO2e/year if piped natural gas is used for kitchens. This estimate does not include embodied carbon of construction materials, residents' vehicles, water tanker fuel use, solid waste disposal emissions or other Scope 3 sources due to lack of actual operational data at this stage. The project's rooftop solar, passive ventilation/cooling, rainwater harvesting, green/open area and efficient building management will help reduce resource use and climate-related impacts to some extent.

An Environmental Management and Monitoring Plan (EMMP) has been prepared to ensure implementation of the proposed mitigation measures during pre-construction, construction and operation. The EMMP defines the applicable legal framework, institutional responsibilities, mitigation measures, monitoring requirements, emergency preparedness and reporting/ documentation arrangements. The Project Proponent will have overall responsibility for environmental compliance. The Construction Contractor will be responsible for day-to-day implementation of construction-phase mitigation measures, while the Building Management Committee will be responsible for operational-phase environmental management after

completion of construction. Pak-EPA will provide regulatory oversight through review, inspection and enforcement of environmental approval conditions, where required.

The EMMP also includes a tree plantation and landscaping plan. Existing mature trees will be protected as far as possible, and any unavoidable tree removal will be compensated through plantation in coordination with Zaraj Housing Scheme management and relevant authorities, where required. The approximately 8-kanal neighborhood green/open area on the western side will be developed and maintained as a green park through planned landscaping, boundary plantation, grass cover and suitable ornamental planting, subject to discussion and approval of Zaraj Housing Scheme management. Additional plantation may also be carried out along the Major Road and other suitable green/open areas, subject to approval. The plantation plan will support visual improvement, dust control, local cooling, limited carbon sequestration and enhancement of neighborhood greenery.

The monitoring plan includes daily visual inspections and quarterly instrumental monitoring for construction-stage ambient air quality/dust and noise through an EPA-approved laboratory. Excavation and slope stability, nullah/stormwater drain protection, construction waste, wastewater/sanitation, occupational health and safety, traffic/access, tree protection, complaints and emergency preparedness will also be monitored during construction. During operation, monitoring will cover water supply and conservation, wastewater disposal, solid waste management, generator emissions and noise, fire and life safety systems, energy efficiency and climate-related records, and community complaints/safety. Monitoring records, complaints, incidents, trainings, inspections and corrective actions will be maintained by the responsible parties.

Based on the findings of the EIA, the proposed Atrium Hills Residential Apartment Complex is considered environmentally manageable, provided that all mitigation measures, monitoring requirements and EMMP commitments are fully implemented. The project is located within a planned and approved housing scheme, on a plot designated for residential apartment development. The main impacts are expected during construction and are generally temporary and site-specific. Operational impacts are long-term but manageable through proper building management, water and wastewater control, solid waste management, traffic and parking management, generator maintenance, fire and life safety systems, stormwater control and routine environmental monitoring. The project also offers positive outcomes through planned housing, amenities, green/open space, rainwater harvesting, recharge well, rooftop solar, passive ventilation/cooling and EV charging points at each parking floor. Subject to compliance with Pak-EPA approval conditions, CDA/society requirements and the EMMP, the project may be implemented in an environmentally sound manner.

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1 INTRODUCTION

1.1 General

M/s Atrium Hills through Mr. Zia-ur-Rehman (the Proponent) intends to develop Atrium Hills – a Residential Apartment Complex at Major Road, Sector B, Zaraj Housing Scheme, Islamabad.

In accordance with Section 12 of the Pakistan Environmental Protection Act, 1997 (PEP-Act, 1997), every proponent is required to obtain environmental approval from the Pakistan Environmental Protection Agency (Pak-EPA) prior to commencement of construction or operation of a project. As per the applicable environmental regulatory requirements, the proposed apartment complex falls under projects requiring an Environmental Impact Assessment (EIA).

For this purpose, the Proponent has engaged Capital Environmental Consultants Pvt. Ltd. (CEC) as the environmental consultant to conduct the Environmental Impact Assessment (EIA) study for the proposed project. This EIA report has been prepared in accordance with the requirements of the Pakistan Environmental Protection Act, 1997 and the Pak-EPA (Review of IEE and EIA) Regulations, 2000. The study evaluates the existing environmental conditions of the project area, identifies the potential environmental impacts associated with the proposed development activities, and recommends appropriate mitigation and environmental management measures for minimizing adverse impacts and enhancing positive environmental aspects during the construction and operational phases of the project.

1.2 Project Proponent

M/s Atrium Hills

Contact Details:
Mr. Zia ur Rehman
Tel. # 0515427277
Email: atriumhills@gmail.com
Office # 2, P-1 Floor, The Atrium Plaza, Zaraj Housing Scheme, Islamabad.

1.3 Environmental Consultant

Capital Environmental Consultants Pvt. Ltd.

Contact Details:
Shahbaz Ahmed
Chief Executive Officer
Mobile: +92-312-5810143
E-mail: shahbaz@capitalenv.com.pk
40, Street 62, G-13/2, Islamabad.

1.4 Project Background and Justification

Islamabad is one of the fastest growing urban centers of Pakistan and continues to attract people from different parts of the country due to its planned city character, comparatively better safety and security conditions, improved civic infrastructure, and availability of better living standards. The city also offers better opportunities in education, healthcare, employment, business, services and livelihood, which has increased the preference of people to live in Islamabad and its surrounding planned residential areas.

The population of Islamabad Capital Territory has increased over the years, creating additional pressure on housing, services and urban infrastructure. According to the Population and Housing Census 2023, the population of Islamabad Capital Territory was recorded as 2.36 million, showing an increase from the 2017 census population. This growth indicates increasing demand for planned residential accommodation and associated urban facilities in the capital region[1].

At the policy level, the need for efficient land utilization and compact urban development is also being recognized. The National Housing Policy 2025 promotes compact, mixed-use and medium- to high-rise vertical development as a means to improve land efficiency and reduce unplanned urban expansion. This is important for cities like Islamabad, where demand for housing is increasing while serviced urban land remains limited[2].

The Capital Development Authority (CDA), through its Planning and Design Wing, is responsible for planning the urban and rural areas of Islamabad within the framework of the Master Plan. CDA also analyses the housing needs of the growing city and responds according to market trends. In addition, Zone-2 and Zone-5 of Islamabad have been earmarked for planning and development of housing schemes by the private sector, including cooperative and private housing schemes.

In this context, apartment-based residential development within an already planned housing scheme provides a more efficient housing option as compared to low-density horizontal expansion. The proposed Atrium Hills project is planned within Zaraj Housing Scheme, Islamabad, which is located in Zone-V of Islamabad. The project will utilize an allotted residential apartment complex plot for providing residential apartments with associated amenities, parking, utilities and building services. The project is therefore consistent with the growing demand for planned residential accommodation and supports efficient use of urban land within a regulated housing scheme.

1.5 Project Brief

M/s Atrium Hills through Mr. Zia-ur-Rehman proposes to develop Atrium Hills – a Residential Apartment Complex at Major Road, Sector B, Zaraj Housing Scheme, Islamabad. The project site is located in Zone-V of Islamabad Capital Territory, within Zaraj Housing Scheme, near Main GT Road (N-5), opposite DHA Phase-II and Giga Mall. The geographical coordinates of the project site are 33°30'45.8"N and 73°09'18.2"E.

The project plot measures 16.35 Kanals, equivalent to 9,891.75 sq. yd. / 89,025.75 sq. ft. The proposed development includes a G+20-storey residential apartment complex with associated amenities, parking areas, utilities, fire and life safety systems, water storage, internal circulation and other building services. The building will have a total covered area of 681,361 sq. ft., height of 264’-9”, and 348 residential apartments. Parking provision has been planned for 526 cars and 57 motorcycles.

1.6 Scope of EIA

The scope of this Environmental Impact Assessment (EIA) covers the assessment of likely environmental impacts that may arise during the construction and operational phases of the proposed Atrium Hills Residential Apartment Complex. The study has been carried out to

[1] https://www.pbs.gov.pk/wp-content/uploads/2020/07/District-Census-Report-2023-Islamabad.pdf

[2] https://mohw.gov.pk/SiteImage/Misc/files/NATIONAL%20HOUSING%20POLICY%202025.pdf

examine the project activities in relation to the existing site conditions, surrounding land use, natural drainage, access arrangements and environmental sensitivities of the area.

The EIA specifically considers environmental aspects associated with site preparation, excavation, cutting and grading, construction works, management of excavated material, slope stabilization, water demand, energy use, wastewater generation, solid waste management, traffic movement, dust and noise emissions, occupational health and safety, fire and life safety, and operation of the residential apartment complex. Particular attention has also been given to the terraced/level-based building arrangement of the project site and the need for proper stabilization of excavation faces and cut slopes through engineered retaining structures.

The study includes review of available project documents, architectural drawings, site layout, building configuration, utility requirements, water demand calculations, wastewater disposal arrangements, access and parking provisions, fire-fighting and life safety systems, and proposed environmental management measures. Existing environmental conditions of the project area have been assessed through site inspection, review of available secondary information, surrounding area observation, and consultations with relevant stakeholders.

The EIA also includes review of applicable environmental legislation, regulatory requirements and relevant guidelines, with particular reference to the Pakistan Environmental Protection Act, 1997 and the Pak-EPA (Review of IEE and EIA) Regulations, 2000. Based on the identified impacts, the report provides suitable mitigation measures and an Environmental Management and Monitoring Plan (EMMP), including monitoring requirements, implementation responsibilities and reporting arrangements for the construction and operational phases of the project.

1.7 Objectives of the EIA Study

The main objectives of the EIA study are to:

- Ensure compliance of the proposed project with the Pakistan Environmental Protection Act, 1997, Pak-EPA (Review of IEE and EIA) Regulations, 2000, and other applicable environmental requirements.
- Identify potential environmental impacts associated with site preparation, excavation, construction and operation of the proposed residential apartment complex.
- Assess the nature, extent and significance of identified impacts and recommend appropriate mitigation measures to minimize adverse environmental effects.
- Review project-related environmental aspects including land use, site levels, excavation and slope stabilization, traffic, water demand, wastewater disposal, solid waste management, energy use, air emissions, noise, and occupational health and safety.
- Develop an Environmental Management and Monitoring Plan (EMMP) outlining mitigation measures, monitoring requirements, institutional responsibilities and reporting mechanisms.
- Facilitate informed decision-making by the Pakistan Environmental Protection Agency regarding environmental approval of the proposed project.
- Promote environmentally sound construction practices, safe operation, efficient resource use, and compliance with applicable environmental and safety requirements throughout the project lifecycle.

1.8 Overview of EIA Methodology

The following methodology has been adopted for the preparation of the Environmental Impact Assessment (EIA) of the proposed Atrium Hills Residential Apartment Complex. The methodology has been designed to meet the requirements of the Pakistan Environmental Protection Act, 1997 and the Pak-EPA (Review of IEE and EIA) Regulations, 2000. The study approach included review of project documents and drawings, site inspections, baseline environmental monitoring, surrounding area assessment, stakeholder consultations, analysis of alternatives, impact assessment, and preparation of an Environmental Management and Monitoring Plan (EMMP).

1.8.1 Developing Project Understanding

At the initial stage, project-specific information was obtained through discussions with the Proponent, review of project documents, completed data forms, architectural drawings, layout plans, contour plans, utility drawings, water demand calculations, fire-fighting drawings, power drawings, allotment/possession documents and other available technical information.

Meetings and discussions were held with the project representatives to understand the nature and scale of the proposed development, site conditions, building configuration, construction requirements, utilities demand, access arrangements, parking provision, water and wastewater arrangements, fire and life safety provisions, and proposed operational management arrangements. This helped in developing a clear understanding of the project before undertaking detailed environmental assessment.

1.8.2 Preliminary Site Visit

A preliminary site visit was conducted on 29 January 2026 to observe the existing condition of the project site and its surrounding environment. During the visit, the project location, access roads, adjoining land uses, nearby receptors, existing infrastructure, natural drainage features, site levels and surrounding development pattern were reviewed.

Special attention was given to the terraced/level-based site condition, adjoining Major Road, nearby nullah/stormwater drain, surrounding residential developments, and the relationship of the plot with the higher-level western service path and lower-level northern/eastern frontage. Discussions were also held with the project representatives to verify site conditions and understand the proposed construction and operational arrangements.

1.8.3 Screening

Screening was carried out to determine the applicable environmental assessment requirement for the proposed project under Section 12 of the Pakistan Environmental Protection Act, 1997, which states that:

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

Under the Pak-EPA (Review of IEE and EIA) Regulations, 2000, housing schemes are included in Schedule-I and generally require filing of an Initial Environmental Examination (IEE). However, multi-storey apartment buildings are not specifically listed as a separate category in the schedules. Considering the nature and scale of the proposed Atrium Hills project, its high-rise building configuration, substantial covered area, excavation and slope stabilization

requirements, water demand, wastewater generation, traffic movement, parking provision and fire/life safety considerations, the project has been considered under Schedule-II for preparation of an EIA.

Accordingly, the proposed project is covered under:

Schedule II, *Category J. Other Projects*

Sub Category 1. Any other project for which filing of an EIA is required by the Federal Agency under sub-regulation (2) of Regulation 5.

Therefore, an Environmental Impact Assessment (EIA) has been conducted for the proposed project to fulfil the applicable regulatory requirement and to support informed decision-making by Pak-EPA.

1.8.4 Scoping

Scoping was undertaken to identify the key environmental aspects associated with the proposed project and to define the main focus areas of the EIA study. The scoping exercise was based on review of project documents, architectural drawings, contour/site plans, utility drawings, baseline assessment requirements, site observations, and discussions with the Proponent and project representatives.

The proposed project involves construction and operation of a G+20-storey residential apartment complex within Zaraj Housing Scheme, Islamabad. The project site has a terraced/level-based building arrangement due to variation in natural ground levels. Therefore, site preparation, excavation, cutting and grading, slope stabilization, management of excavated material, construction traffic, resource use, wastewater disposal, solid waste management, fire and life safety, and operational building management were identified as important aspects requiring detailed assessment.

During the scoping process, the following key environmental issues were identified for further assessment in the EIA:

- **Site preparation, excavation and slope stabilization:** The project will require excavation, cutting and grading to develop suitable construction levels. Therefore, potential impacts related to slope stability, excavation safety, erosion, exposed soil surfaces, runoff control and stabilization of excavation faces were identified as important construction-phase issues.
- **Management of excavated material and construction waste:** The project is expected to generate excavated soil, construction debris, packaging waste and other construction-related waste. Proper handling, temporary storage, transportation and disposal of excavated material and construction waste were identified as key issues for assessment.
- **Air quality impacts during construction:** Dust emissions may arise from excavation, earthworks, material handling, stockpiles, vehicle movement and construction machinery. Exhaust emissions from construction equipment, vehicles and temporary diesel generators were also identified as relevant air quality aspects.
- **Noise and vibration impacts:** Construction machinery, excavation equipment, concrete works, material loading/unloading and vehicle movement may generate noise and vibration. The assessment therefore considers possible disturbance to nearby residential receptors and surrounding land uses.
- **Traffic and access management:** Construction traffic, delivery vehicles, worker movement and operational traffic may affect the internal road network of Zaraj Housing

Scheme and the project access area. The north-side Major Road will be used as the normal operational access road, while the west-side service path will remain restricted for emergency evacuation only. Therefore, traffic circulation, parking, access safety and emergency movement were included in the EIA scope.

- **Stormwater drainage and protection of nearby nullah:** A nullah / stormwater drain is located adjacent to the east side of the plot, with Aghosh Society beyond it. Therefore, control of surface runoff, prevention of silt-laden discharge, protection of drainage flow, and avoidance of dumping into the nullah were identified as important environmental management issues.
- **Water demand and supply arrangements:** The project will require water during both construction and operation. Therefore, construction water requirement, operational water demand, water storage, supply arrangements and efficient water use were included in the scope of assessment.
- **Wastewater generation and disposal:** During operation, domestic wastewater will be generated from apartments and common facilities. The EIA therefore considers wastewater collection, conveyance and disposal/treatment arrangements through the society's wastewater management system.
- **Solid waste management during operation:** The residential apartment complex will generate municipal solid waste during operation. Waste collection, segregation, internal handling, temporary storage and final disposal arrangements were identified as important operational-phase issues.
- **Occupational health and safety:** Construction activities, excavation works, working at height, lifting operations, electrical works, confined spaces, material handling and operation of construction machinery may pose occupational health and safety risks. These aspects were therefore included in the assessment and mitigation planning.
- **Community health and safety:** Potential community health and safety issues include construction traffic movement, access control, dust, noise, falling objects, open excavations, interaction with nearby residents, and emergency response. These were identified as relevant issues for construction-stage management.
- **Energy use and backup power generation:** During operation, electricity demand, use of backup diesel generators, generator emissions, fuel storage and energy efficiency measures were identified as relevant environmental aspects.
- **Fire and life safety:** Considering the high-rise residential nature of the project, fire prevention, emergency evacuation, fire-fighting systems, fire water storage, alarm systems, smoke control, emergency access and building safety provisions were identified as important aspects for review.
- **Resource efficiency and environmental design measures:** Proposed measures such as rainwater harvesting, recharge well, rooftop solar, passive ventilation/cooling features and efficient building services were also considered in the EIA to assess positive environmental aspects of the project.

Based on the above scoping outcomes, the EIA focuses on assessment of site-specific environmental impacts related to construction activities, excavation and slope stabilization, air quality, noise, traffic and access, stormwater drainage, water and wastewater management, solid waste management, occupational health and safety, community health and safety, fire and life safety, energy use, and long-term operation of the residential apartment complex.

1.8.5 Literature Review

Relevant national environmental legislation, regulations, guidelines, standards and available planning documents were reviewed to establish the legal and environmental framework for the proposed project. This included review of the Pakistan Environmental Protection Act, 1997, Pak-EPA (Review of IEE and EIA) Regulations, 2000, applicable environmental quality standards, CDA-related requirements, fire and life safety requirements, and relevant good industry practices for construction and operation of residential apartment buildings.

Available secondary information related to Islamabad, Zone-V, Zaraj Housing Scheme, surrounding land use, environmental baseline conditions, urban development, water and wastewater management, and similar residential/commercial building projects was also reviewed.

1.8.6 Field Surveys and Baseline Data Collection

Baseline environmental conditions of the project area were established through a combination of primary and secondary data collection. Field visits were conducted to assess the project site, adjoining roads, surrounding land uses, nearby receptors, existing drainage features, traffic conditions and general environmental setting of the area.

Primary data collection included site observations, photographic documentation, discussions with project representatives, reconnaissance survey of the surrounding area, and environmental baseline monitoring. Environmental monitoring was carried out to assess existing ambient environmental conditions, including ambient air quality, noise levels, and water quality. A traffic study was also conducted to assess existing traffic conditions around Zaraj Housing Scheme and the project access area.

Secondary data were collected from available project documents, maps, drawings, published sources, regulatory documents and other relevant information to supplement the primary field data.

1.8.7 Alternative Analysis

Analysis of alternatives was carried out as part of the EIA process to compare available project options and assess their relative environmental implications. The alternatives considered include the “no project” option, project location option, design/layout considerations, access arrangements, water supply and wastewater disposal arrangements, energy options, and construction-stage management options.

The alternative analysis helps to justify the selected project option and identify environmentally preferable measures where practical. Particular consideration was given to efficient use of the allotted apartment complex plot, terraced/level-based building arrangement, safe access from the north-side Major Road, restriction of the west-side service path for emergency evacuation only, slope stabilization through engineered retaining structures, wastewater disposal through the society’s treatment system, and incorporation of resource efficiency measures such as rainwater harvesting, recharge well, rooftop solar and passive ventilation/cooling features. Details of the alternative analysis are provided in Chapter 2 of this report.

1.8.8 Stakeholder Consultation

Stakeholder consultation was carried out as an important part of the EIA process to understand local concerns, expectations and suggestions regarding the proposed project. Consultations were undertaken with relevant stakeholders, project representatives and local receptors to share basic project information, understand site-specific issues, and incorporate feedback into the assessment and mitigation planning.

The consultation process was aimed at ensuring transparency, improving project understanding, identifying local environmental concerns, and supporting the development of suitable mitigation and management measures. Details of stakeholder identification, consultation activities, issues raised and responses are presented in Chapter 5 of this report.

1.8.9 Impact Assessment and Mitigation Measures

Potential environmental impacts associated with the construction and operational phases of the project were identified and assessed based on project activities, baseline conditions, site sensitivity, surrounding land use and regulatory requirements. The impact assessment considered both direct and indirect impacts, short-term and long-term impacts, reversible and irreversible impacts, and construction as well as operational-stage impacts.

The impact assessment process included:

- Review of baseline environmental conditions;
- Identification of project activities likely to generate environmental impacts;
- Assessment of the nature, extent, duration and significance of potential impacts;
- Identification of mitigation measures to avoid, minimize or control adverse impacts;
- Assessment of residual impacts after implementation of mitigation measures; and
- Recommendation of monitoring and management measures for effective implementation.

1.8.10 Environmental Management and Monitoring Plan

An Environmental Management and Monitoring Plan (EMMP) has been developed to ensure effective implementation of the recommended mitigation measures during construction and operation of the project. The EMMP defines the proposed mitigation measures, monitoring parameters, monitoring frequency, applicable standards, implementation responsibilities, supervision arrangements and reporting requirements.

The EMMP also provides a practical framework for managing construction-stage impacts such as dust, noise, waste, excavation safety, traffic, occupational health and safety and slope stabilization, as well as operational-stage aspects such as wastewater, solid waste, traffic, energy use, generator emissions, emergency preparedness and fire/life safety.

1.8.11 Preparation of EIA Report

Based on the completed assessment, the draft EIA report was prepared in accordance with the requirements of the Pakistan Environmental Protection Act, 1997 and Pak-EPA (Review of IEE and EIA) Regulations, 2000. The draft report was internally reviewed to ensure technical accuracy, consistency and regulatory alignment.

The draft EIA report was then shared with the Proponent for review and comments. After incorporation of relevant comments and final quality review, the EIA report was finalized for submission to the Pakistan Environmental Protection Agency for review and environmental approval of the proposed project.

1.8.12 Report Structure

Chapter 1: Introduction – Provides an introduction to the project, including background information, study objectives, scope, and the methodology adopted for the EIA study.

Chapter 2: Project Description – Describes the proposed project in detail, including location, layout, project components, design features, site levels, construction and operational activities, utilities, resource requirements, project alternatives and implementation schedule.

Chapter 3: Legal and Regulatory Framework – Presents the applicable policy, legal and institutional framework, including national environmental legislation, regulations, standards, guidelines and relevant institutional requirements applicable to the project.

Chapter 4: Baseline Environmental Conditions – Describes the existing environmental conditions of the project area, including physical environment, biological environment, built environment and surrounding land use.

Chapter 5: Stakeholder Consultation – Provides details of stakeholder consultation, including stakeholder identification, consultation process, issues/concerns raised and responses incorporated into the EIA.

Chapter 6: Environmental Impacts and Mitigation Measures – Assesses the potential environmental impacts of the proposed project during the construction and operational phases and recommends appropriate mitigation measures.

Chapter 7: Environmental Management and Monitoring Plan – Presents the EMMP, including mitigation measures, monitoring requirements, institutional responsibilities, reporting arrangements and implementation mechanisms.

Chapter 8: Conclusion – Summarizes the findings of the EIA and presents the overall conclusion regarding environmental acceptability of the proposed project, subject to implementation of the recommended mitigation and management measures.

1.9 Limitations

This EIA document has been prepared drawing inferences from site visits, primary data and secondary information. The study has been conducted by the consultants in a manner consistent with the level of care and skill exercised by members of the environmental engineering and consulting profession. The consultants have tried to cover all important aspects and relevant impacts of the proposed project. However, this report may not exhaustively cover an investigation of all possible environmental conditions or circumstances that may exist.

The findings and conclusions in this study are based on the primary and secondary data, and a subjective evaluation of the possible environmental aspects that may influence the existing environmental status of the site during construction and operations of the proposed project. In evaluating the proposed project, the consulting team has relied on information provided by the Project Proponent/ Design Consultant. The consultants assume that the information provided is factual and accurate. Also, the consultants accept no responsibility for any deficiency, misstatement, or inaccuracies contained in this report as a result of omission or misrepresentation by any person interviewed or contacted.

It should be recognized that the passage of time affects the information given in this report. Environmental conditions of a site can change. Opinions relating to the specific conditions are based upon information that existed at the time the conclusions were formulated.

The mitigation measures and other recommendations put forth in this report are of the level of conceptual design and implementation framework. The detailed designing and implementation of recommended measures are not part of the current assignment scope. All recommendations would require further separate input and costing at the design level.

1.10 EIA Team

Table 1: EIA Team

S. No	Name	Position in Team	Qualification and Experience
1	Mr. Shahbaz Ahmed	Team Lead / Sr. Environmentalist	MS Environmental Science / 12 years
2	Mr. Jamal Ahmed Qureshi	Environmental Ecologist	MS Environmental Science / 15 years
3	Mr. Sameem ul Islam	Urban Design and Traffic Engineer	M.E. Transportation Infrastructure Management B.E. Urban / 16 years
4	Ms. Samreen Syed	Environmentalist	M.Sc. Environmental Science / 5 years
5	Mr. Syed Waqas Qadri	Environmental, Health & Safety Expert	MS Environmental Science / 12 years

2 PROJECT DESCRIPTION

2.1 Proposed Project

The proposed development is a G+20-storey Residential Apartment Complex titled Atrium Hills, planned at Major Road, Sector B, Zaraj Housing Scheme, Islamabad. The project will be developed on a residential apartment complex plot measuring 16.35 Kanals within Zone-V of Islamabad Capital Territory.

The project will comprise 348 residential apartments of different categories, including 1-bed, 2-bed and 3-bed apartment types. The proposed height of the building is 264'-9". Parking provision has been planned for 526 cars and 57 motorcycles. The ground floor will mainly include amenities and common facilities, the 1st and 2nd floors will comprise apartments, the 3rd to 7th floors will be used for parking, the 8th to 19th floors will comprise apartments, and the 20th floor/mumty will be used for rooftop services.

The project has been planned to provide residential apartments with supporting amenities, parking areas, utility services, internal circulation, water storage, rooftop services, fire and life safety systems, and environmental design features. The main amenities include mosque, grand atrium, community hall, business lounge, day care center, clinic, post office, swimming pool, steam/sauna, gymnasium, EV charging points, rooftop BBQ area and gated security. The proposed fire and life safety provisions include fire hose cabinets, sprinkler system, fire extinguishers, fire pumps, fire water tanks, fire detection and alarm system, fire lifts, smoke extraction, staircase pressurization and fire-rated doors.

The ground coverage of the plot area is less than 50%, remaining area will serve as open space. In addition, an 8 Kanals green park will be developed adjacent to the project site in west, which will improve the visual character of the area, provide open recreational space, support landscaping, and contribute to a better living environment for the residents and surrounding community.

The building has also incorporated environmental design and resource efficiency measures, including rainwater harvesting, rainwater recharge well, rooftop solar, passive ventilation/cooling through atrium design, and EV charging points. The building will be operated through a Building Management Committee owned by Atrium Hills.

The project site has a terraced/level-based building arrangement due to variation in natural ground levels across the plot. This level difference has influenced the building planning, floor relationship, parking arrangement and construction approach. The normal operational access will be from the north-side Major Road, while the west-side service path will only be used for emergency evacuation. The east side of the plot is adjacent to a nullah / stormwater drain, with Aghosh Society located beyond it.

The excavation faces and cut slopes will be stabilized through properly designed retaining structures, including RCC retaining walls / slope stabilization walls, as per the approved structural design and standard engineering practice. During construction, temporary stabilization measures such as shoring, benching, bracing, soil nailing, shotcrete support or other suitable excavation support systems may be adopted, subject to geotechnical and structural design requirements. Project layout drawings are attached as Annexure – 1.

The key project details and salient features are presented in Table 2.

Table 2: Project Details and Salient Features

S.N.	Parameter	Description
1.	Project Title	Atrium Hills
2.	Project Type / Building Configuration	G+20-storey Residential Apartment Complex
3.	Project Location and Coordinates	Major Road, Sector B, Zaraj Housing Scheme, Zone-V, Islamabad Capital Territory. Coordinates: 33°30'45.8"N, 73°09'18.2"E
4.	Plot Category / Proposed Use	Residential apartment complex plot
5.	Plot Area	16.35 Kanals, equivalent to 9,891.75 sq. yd. / 89,025.75 sq. ft.
6.	Ground Coverage of Plot Area	Less than 50%
7.	Total Covered Area	681,361 sq. ft.
8.	Floor Area Ratio (FAR) allowed 1:5	445,128.75 sq. ft.
9.	Designed FAR Area	439,225.00 sq. ft.
10.	Lush Green Park (Neighborhood)	8 Kanal (in the west of the project site)
11.	Building Height	264'-9"
12.	Total Number of Apartments	348 apartments
13.	Apartment Types and Areas	1 Bed Signature Apartment = 975 sq. ft. 2 Bed Executive Apartment = 1,400 sq. ft. 2 Bed Signature Apartment = 1,650 sq. ft. 3 Bed Premium Apartment = 2,100 sq. ft. 3 Bed Signature Apartment = 2,500 sq. ft.
14.	Building Layout / Floor-wise Use	Ground Floor: Amenities 1st and 2nd Floors Apartments 3rd to 7th Floors Parking 8th to 19th Floors Apartments 20th Floor/Mumty Rooftop services
15.	Parking Provision	526 cars and 57 motorcycles
16.	Construction Period	5 to 7 years
17.	Building Operation Arrangement	Building Management Committee owned by Atrium Hills
18.	Main Amenities	Mosque, grand atrium, community hall, business lounge, day care center, clinic, post office, swimming pool, steam/sauna, gymnasium, EV charging points, rooftop BBQ area and gated security
19.	Fire and Life Safety Provisions	Fire hose cabinets, sprinkler system, fire extinguishers, fire pumps, fire water tanks, fire detection and alarm system, fire lifts, smoke extraction, staircase pressurization and fire-rated doors
20.	Environmental Design / Resource Efficiency Measures	Rainwater harvesting, rainwater recharge well, rooftop solar, passive ventilation/cooling through atrium design, and EV charging points as per NEECA.

21.	Land Ownership	Allotment and possession letters from Zaraj Housing Scheme have been issued in favor of the Project Proponent for development of the proposed project. (Annexure – 2).

View of the project from North East

View of the project from West

2.2 Project Objectives

The main objective of the Atrium Hills project is to provide planned apartment-based residential accommodation within Zaraj Housing Scheme, Islamabad, in response to the increasing demand for quality housing in the capital region.

The project aims to support efficient use of urban land through vertical residential development within an already planned housing scheme. It will provide a modern residential environment with necessary amenities, parking, utility services, fire and life safety systems, and resource efficiency measures. The proposed project is also aligned with the growing preference for planned residential living in Islamabad, where better infrastructure, accessibility, education, healthcare, security and livelihood opportunities continue to attract residents from different parts of the country.

2.3 Location and Surroundings

The proposed Atrium Hills project is located at Major Road, Sector B, Zaraj Housing Scheme, Islamabad. The project site falls within Zone-V of Islamabad Capital Territory (ICT). The geographical coordinates of the site are 33°30'45.8"N and 73°09'18.2"E. Zaraj Housing Scheme is located near Main GT Road (N-5), opposite DHA Phase-II and Giga Mall, and is surrounded by established and developing residential areas.

The project site is situated within the planned residential environment of Zaraj Housing Scheme. The surrounding area mainly comprises residential development, internal society roads, apartment/commercial buildings, community facilities, open plots and other urban infrastructure. Within Zaraj Housing Scheme, other similar nature developments are also present, including ZETA Mall, a residential-cum-commercial building, The Atrium Plaza, and Rania Residency Blocks 1, 2 and 3. These developments indicate that the project setting is already characterized by apartment/commercial and mixed-use urban development.

The immediate surroundings of the project site include Major Road and an open plot toward the north. On the east side, the plot is adjacent to a nullah / stormwater drain, and beyond the drain lies Aghosh Society. On the west side, there is a green area / linear park and a service path, followed by residential houses. On the south side, a green area is present.

On the broader surroundings, DHA Phase-II and Giga Mall are located toward the north/northeast side, Aghosh Society is located toward the east and southeast, Jeddah Town and Bahria Town Phase-7 are located toward the west, while Aghosh and DHA Phase-III side lie toward the south/southeast.

The project location is not isolated in nature. It is part of an urbanizing residential area with access to major road links, commercial facilities, educational and healthcare facilities, and other civic infrastructure. The location is therefore suitable for apartment-based residential development, subject to compliance with applicable planning, environmental, traffic, drainage, fire safety, wastewater, solid waste management and building control requirements.

The project location map is provided as Figure 1.

Figure 1: Project Location

2.4 Road Access

The proposed Atrium Hills project is accessible through the existing road network of Zaraj Housing Scheme, which is connected with major regional roads including Main GT Road (N-5) and Islamabad Expressway. These road links provide connectivity of the project site with Rawalpindi, Islamabad, DHA, Bahria Town and other surrounding residential and commercial areas.

Zaraj Housing Scheme has a well-developed internal road network, which provides access to different sectors, residential plots, commercial areas and community facilities within the society. The project site is located on Major Road of Sector B, which will serve as the main access road for normal operation of the proposed apartment complex. The west-side service path will not be used for routine access and will only be used for emergency evacuation, where required.

The project site is located approximately 3 km from Rawat Interchange, about 15 km from Saddar Rawalpindi, around 24 km from Zero Point Islamabad, and approximately 44 km from Islamabad International Airport.

2.5 Land Use and Current Status of the Site

The proposed plot has been allotted for the development of a residential apartment complex as per the approved Layout Plan (LOP) of Zaraj Housing Scheme. The proposed land use is consistent with the designated use of the plot and the surrounding planned residential setting. Approved LOP of Zaraj Housing Scheme showing project location as apartment complex is attached as Annexure – 3.

The immediate surroundings of the site include a mix of residential, apartment/commercial, open and green areas. At present, the project plot is undeveloped and will require site preparation, excavation, cutting, grading and level formation prior to construction. Due to the variation in natural ground levels across the plot, the project has been planned with a terraced/level-based building arrangement. The site consists of natural vegetation and a few mature trees of Dalbergia sissoo (Shisham).

2.6 Green Building Design Considerations and Resource Efficiency Measures

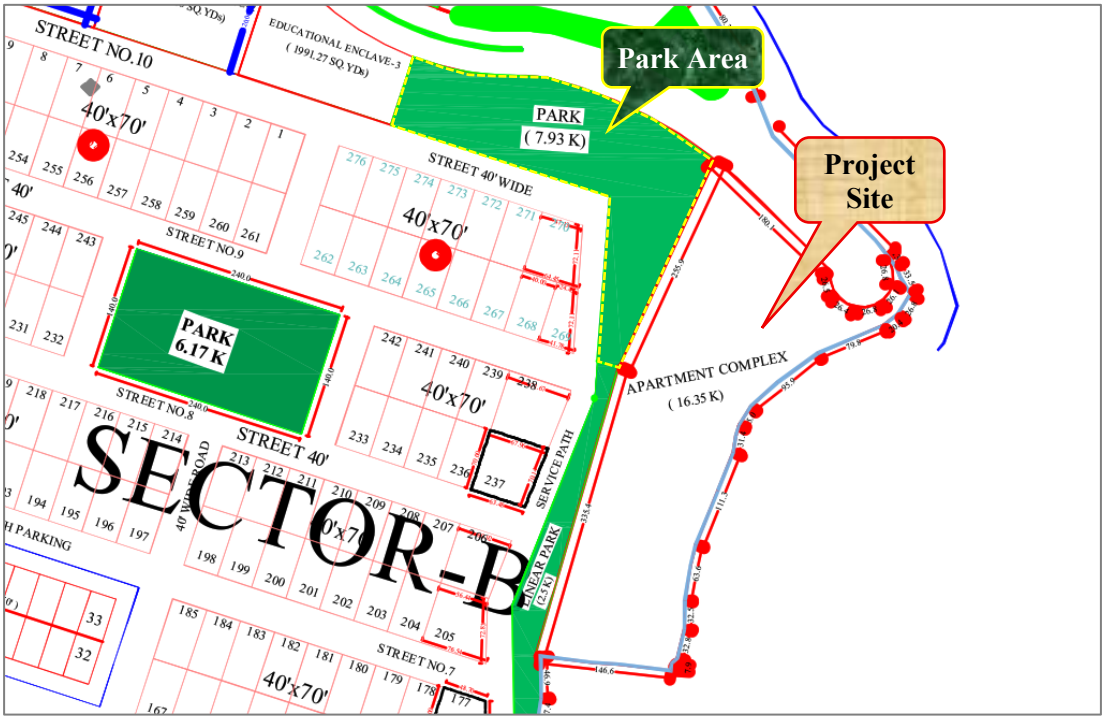
Although the project is not applying for any formal green building certification, several green building design considerations and resource efficiency measures have been incorporated in the project design. These measures aim to reduce resource consumption, improve environmental performance, enhance indoor comfort and support better living conditions within the proposed residential apartment complex.

2.6.1 Lush Green Park

An approximately 8-kanal L-shaped green/open area is located in the neighborhood on the western side of the project site, between the proposed project and the existing service path. This green area is not part of the project plot; however, the client has obtained permission from Zaraj Housing Scheme to develop and maintain this area as a neighborhood green park.

The proposed development of this neighborhood green area will be an important environmental and social enhancement measure for the project surroundings. The area will be developed through planned landscaping, tree plantation, grass cover and suitable ornamental planting, subject to discussion and approval of Zaraj Housing Scheme management. The park will improve the visual and aesthetic character of the area, enhance the streetscape, reduce exposed barren surfaces, support dust control and contribute to local cooling and microclimate improvement.

The green/open area will also act as a soft landscape buffer between the proposed building and the western service path. Plantation in this area will provide shade, improve local greenery, support limited carbon sequestration and create a more pleasant neighborhood environment for residents and nearby community. In addition to this green park, further plantation may also be carried out along the Major Road and other suitable green/open areas, in coordination with and subject to approval from Zaraj Housing Scheme management.



2.6.2 Passive Ventilation through Venturi Effect

The building design incorporates the Venturi effect as a passive ventilation strategy. Internal corridors and atrium spaces are planned with openings that help accelerate air movement and improve natural ventilation. This will support fresh air circulation within internal corridors and atriums and reduce dependence on mechanical ventilation to some extent.

2.6.3 Passive Cooling

Water bodies have been integrated within the atrium areas to support passive cooling. Air movement across water surfaces can help moderate the surrounding air temperature through evaporative cooling. In combination with natural ventilation and stack effect through vertical atrium spaces, this measure will support thermal comfort and energy-efficient building operation.

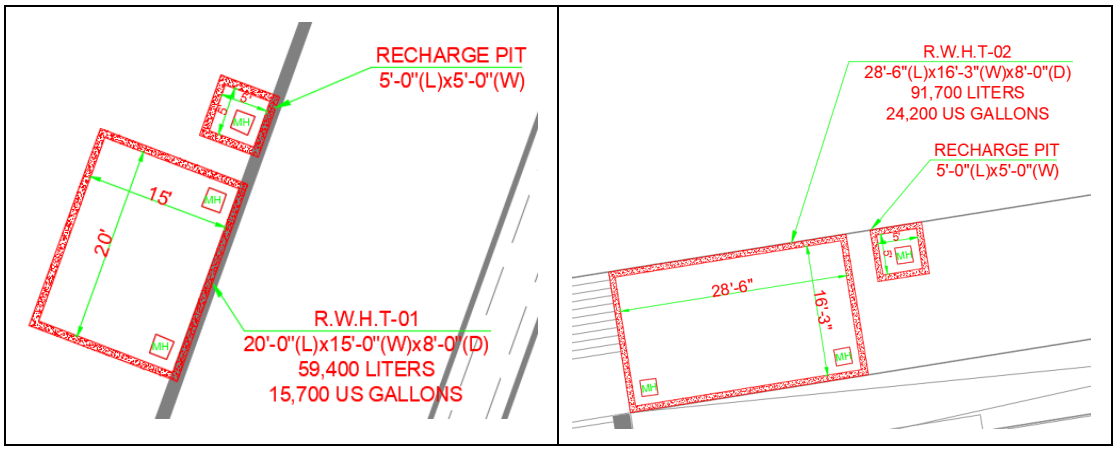
2.6.4 Rainwater Harvesting

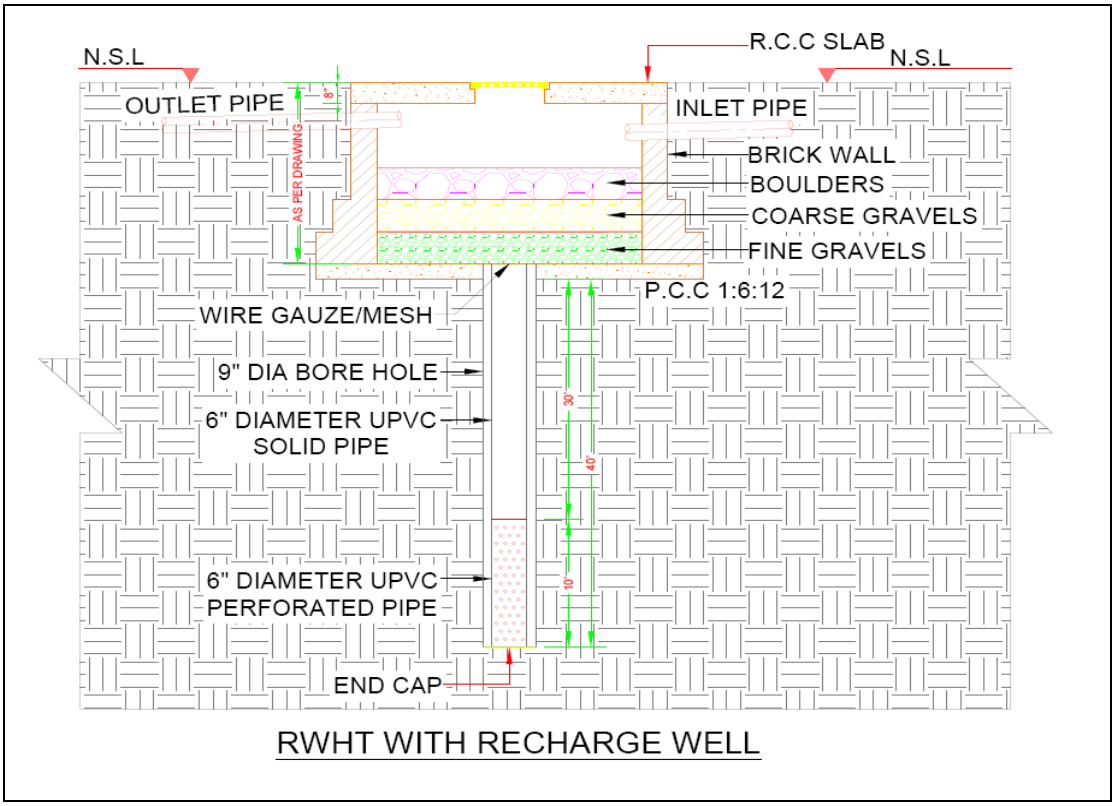
Rainwater harvesting has been incorporated in the project design through provision of two rainwater harvesting tanks. R.W.H.T-01 will be provided at ground floor level with a capacity of 15,700 US gallons, while R.W.H.T-02 will be provided at 9th floor level with a capacity of 24,200 US gallons. The total rainwater harvesting capacity will be 39,900 US gallons.

The harvested rainwater may be used for suitable non-potable purposes such as landscaping, cleaning and other approved uses, subject to operational arrangements.

2.6.5 Rainwater Recharge Wells

Rainwater recharge pits/wells have been proposed with the rainwater harvesting system to support controlled groundwater recharge. The recharge system includes filtration media such as boulders, coarse gravels and fine gravels before water enters the recharge bore. This arrangement will help reduce direct surface runoff and support groundwater recharge where technically feasible.





2.6.6 Rooftop Solar System

A 40 kVA rooftop solar system will be provided as part of the project's resource efficiency measures. The solar system will supplement the building's electricity use for suitable loads and help reduce reliance on conventional electricity supply to a limited extent.

2.6.7 EV Charging Points

As part of the project's energy efficiency and cleaner mobility measures, EV charging points have been incorporated in the building design in accordance with the Energy Conservation Building Code, 2023 (ECBC-2023) and NEECA guidelines. ECBC-2023 requires provision of 5% to 10% EV charging points for high-rise residential parking facilities. Accordingly, EV charging points equivalent to 5% of the total parking provision have been provided in the building design.

The project power drawings show that EV charging points are provided on the parking floors from the 3rd floor to the 7th floor. A total of 29 EV charging points have been provided to support the future use of electric vehicles by residents and visitors and will promote cleaner mobility within the project. This measure will also contribute to reduced dependence on conventional fuel-based vehicles over time, improvement of local air quality, reduction in vehicular emissions and alignment with national energy conservation and sustainable transport objectives.

2.7 Fire and Life Safety Arrangements

Considering the high-rise residential nature of the proposed Atrium Hills project, fire and life safety provisions have been incorporated in the building design to support fire prevention, early detection, emergency response, smoke control, safe evacuation and firefighting access. The proposed Fire and Life Safety (FLS) system has been designed with reference to applicable NFPA standards, Building Code of Pakistan – Fire Safety Provisions and CDA fire prevention

requirements. Firefighting drawings and emergency evacuation plan are attached as **Annexure – 4.**

Fire and Life Safety (FLS) System Design Provisions

1. Dual Compartment Fire Hose Cabinets (Class-III) — NFPA-14
2. Fire Sprinkler System — NFPA-13
3. Fire Extinguishing System — NFPA-10
4. Internal Piping System — NFPA-13
5. Fire Pumping System — NFPA-20 compliance
6. Fire Water Tank Reservoirs — NFPA-22 and NFPA-14
7. Fire Department Connections with dedicated fire tender space
8. Fire Lifts — BCP-2016
9. Fire Suppression System — Clean Agent
10. Fire Detection System — NFPA-72, including addressable fire alarm control panels, smoke detectors, heat detectors, sounders/hooters, flashers and fire-rated wiring
11. Staircase Pressurization System
12. Smoke Extraction System
13. Passive Firefighting Installations, including:
    - Fire-rated doors — NFPA-80
    - Anti-slip tape provision on all stairs
    - Anti-shatter sheets on glass windows
    - Protection of openings and shafts
    - Other installations such as fire cement, where required

Fire and Life Safety Design Codes and Standards Adopted

- NFPA-1 Fire Code
- NFPA-10 Standard for Portable Fire Extinguishers
- NFPA-13 Standard for the Installation of Sprinkler Systems
- NFPA-14 Standard for the Installation of Standpipe and Hose Systems
- NFPA-20 Standard for the Installation of Stationary Pumps for Fire Protection
- NFPA-22 Standard for Water Tanks for Private Fire Protection
- NFPA-72 National Fire Alarm and Signaling Code
- NFPA-80 Standard for Fire Doors and Other Opening Protectives
- NFPA-92 Standard for Smoke Control Systems
- NFPA-101 Life Safety Code
- Building Codes of Pakistan – Fire Safety Provisions (BCP-2016)
- CDA Building Standards for Fire Prevention & Life Safety-2010

Additional project-specific fire safety provisions noted from the fire-fighting drawings include separate firefighting water storage of 285 m^3, NFPA-20 compatible fire pump set with 1,250 US GPM flow and 13 bar pressure, 90-minute fire-rated doors at fire exits, clean agent automatic extinguishers for electrical/technical areas, wet chemical extinguishers for kitchen-related fire risks, and hazard classification of apartments as Light Hazard and parking/commercial areas as Ordinary Hazard. The drawings also require execution through a valid PEC-approved contractor firm, approval of shop drawings/material submittals before installation, minimum 20 psi pressure at the remote sprinkler, and use of black seamless MS Schedule 40 piping inside the building.

2.8 Schedule of Implementation

The construction and development of the proposed Atrium Hills project is expected to be completed within a period of 5 to 7 years. The implementation schedule will depend on regulatory approvals, finalization of detailed engineering designs, mobilization of contractor, availability of construction materials, site conditions, and other project-related factors.

The project implementation will generally include the following major stages: site mobilization, temporary arrangements, site preparation, excavation, cutting and grading, slope stabilization and RCC retaining works, foundation and structural works, construction of floors, installation of MEP services, fire and life safety systems, finishing works, external development, landscaping, testing and commissioning, and final handing over for operation.

During construction, activities will be planned in phases to ensure safe execution of works, proper management of excavated material, control of dust and noise, traffic management, protection of the adjacent stormwater drain, and implementation of occupational health and safety measures. The actual construction schedule may be further refined by the Proponent and contractor at the detailed planning and construction stage.

After completion of construction, the operation and maintenance of the building will be overseen by the Building Management Committee (BMC) owned by Atrium Hills. The committee will be responsible for routine operation, maintenance of common areas, utility services, fire and life safety systems, security, solid waste management coordination, and implementation of building-level environmental management measures.

2.9 Workforce Requirement

Workforce requirement	
Workforce during Construction	200
Workforce during operation	25-30

2.10 Construction Site Office / Limited Camp Arrangement

The project is located within a developed urban area, where skilled, semi-skilled and unskilled labour is readily available from Rawalpindi, Islamabad and nearby localities. Therefore, a large residential construction camp will not be required for the project. Most of the labour and technical staff will commute to the site on a daily basis from surrounding areas. Only a limited number of essential staff, such as security guards, watchmen, site supervisors and other necessary personnel, may stay at the site as per construction requirements.

A temporary site office / limited camp and material storage area will be established in front of the project site along the Major Road, where sufficient open space is available. This portion of the road is currently not being actively used by the public; however, the contractor will ensure proper access control, signage, barricading and safety arrangements so that no obstruction or public safety issue is created.

Construction materials such as steel, shuttering material, pipes, electrical and plumbing materials, blocks, cement and other construction inputs may be temporarily stored in this designated area. Cement, chemicals, paints, oils, fuel and other sensitive materials, if stored at site, shall be kept in covered and secured areas with proper protection against rain, runoff and spillage. Loose construction materials such as sand and aggregates shall be properly stacked and covered, where required, to control dust and prevent wash-off during rainfall.

Sanitation facilities will be provided at the site office/camp, and sewage will be managed through a septic tank arrangement. Solid waste generated from the site office/camp will be collected in covered bins and disposed of through the approved waste collection arrangement. The contractor will maintain proper housekeeping, access control and safety arrangements throughout the construction period.

2.11 Utilities

2.11.1 Water

During Construction:

During construction, water will be required for workers' domestic use, dust suppression, curing where required, washing/cleaning of tools and equipment, wheel washing and general housekeeping. Ready-mix concrete will be used for the project; therefore, water required for concrete batching will not be consumed at the project site.

The maximum construction workforce is expected to be around 200 workers. Based on typical domestic water use of 45–60 liters/person/day at construction sites, workers' water requirement is estimated at about 9–12 m³/day. Considering additional water for dust control, curing, washing and housekeeping, the average construction water demand is estimated at about 25–35 m³/day, while peak demand may reach 40–50 m³/day during active excavation, structural works and frequent dust suppression periods.

Water during construction will be arranged through tanker supply. The contractor will be required to use water efficiently and avoid uncontrolled runoff toward the adjacent nullah / stormwater drain.

During Operation:

The total operational water requirement of the project during operation phase has been estimated as 328,124 liters/day, equivalent to 328.12 m³/day. Water storage has been provided through underground and overhead water storage tanks. The total available domestic water storage capacity is 615.50 m³, which is sufficient for approximately 1.88 days of storage.

Firefighting water storage is provided separately, with a capacity of 285.00 m³ as per NFPA standards.

The source of water supply during operation will be tanker-based supply. No bore well or direct society water supply is proposed for the project.

The water demand calculations are based on the following considerations:

- Domestic water demand has been calculated at 250 liters/capita/day.
- Occupancy has been considered as 2 persons for 1-bed apartment, 3 persons for 2-bed apartment, and 4 persons for 3-bed apartment.
- Visitor water demand has been considered at 15 liters/visitor.
- A 10% miscellaneous allowance has been added to the total calculated demand.
- Firefighting water storage is separate from domestic water storage.

Operational Water Demand Calculation

S. No.	Floor	Floor Description	Total Demand (Liters/day)
1	Ground Floor	Commercial / Amenities	6,575
2	1st Floor	Apartments	3,000

3	2nd Floor	Apartments	3,000
4	3rd Floor	Parking + Apartments	8,000
5	4th Floor	Parking + Apartments	8,000
6	5th Floor	Parking + Apartments	8,000
7	6th Floor	Parking + Apartments	8,000
8	7th Floor	Parking + Apartments	8,000
9	8th Floor	Apartments	21,000
10	9th Floor	Apartments	21,000
11	10th Floor	Apartments	21,000
12	11th Floor	Apartments	21,000
13	12th Floor	Apartments	21,000
14	13th Floor	Apartments	21,000
15	14th Floor	Apartments	21,000
16	15th Floor	Apartments	21,000
17	16th Floor	Apartments	21,000
18	17th Floor	Apartments	21,000
19	18th Floor	Apartments	16,250
20	19th Floor	Apartments	14,250
21	Mumty Floor	Rooftop services	0
22	—	Visitors Water Demand	5,445
		Total	**298,295**
		Miscellaneous @ 10%	**29,829**
		Total Water Demand	**328,124 liters/day**
		Total Water Demand	**328.12 m³/day**

2.11.2 Electricity

During construction:

During the construction phase, electricity will be required for site offices, lighting, construction equipment, tools, water pumps, security arrangements and other temporary construction-related uses. The electricity requirement during construction will be met through a temporary IESCO connection, supplemented by diesel generators where required. Generator use will be limited to backup/temporary power needs, and the contractor will be required to ensure proper maintenance of generators to control noise and exhaust emissions.

During Operation:

During the operational phase, electricity will be required for apartments, common areas, lifts, lighting, water pumps, fire and life safety systems, ventilation/exhaust systems, security systems, EV charging and other building services. The main electricity supply will be through an IESCO connection.

As per the building electrical load calculation, the operational electrical load is as follows:

- Apartments / communal connected load: 4,263.36 kW
- Emergency connected load: 302.50 kW
- Grand total connected load: 4,565.86 kW
- Grand total demand load: 3,652.68 kW

A dedicated transformer room has been provided on the 7th floor, with provision of 4 transformers of 630 kVA each. Diesel-fired backup generators will also be provided, comprising a 400 kVA emergency backup generator and a 440 kVA communal area backup generator.

In addition, a 40 kVA rooftop solar system will be provided as part of the project's resource efficiency measures.

The electrical design basis includes NEPRA CSM-2021 and its amendments 2023, and NFPA-70 National Electrical Code 2014 Edition.

2.11.3 Gas

Gas requirement during the operational phase will mainly be associated with kitchen use in the residential apartments. The Proponent will apply for an SNGPL connection for the project; however, provision of new gas connections is presently subject to government policy restrictions and approval. Therefore, availability of piped natural gas will depend on future approval and supply arrangements by SNGPL.

Gas lines will be provided in the apartment kitchens as part of the building services design. The estimated domestic kitchen gas requirement is 25,000 BTU/hour, based on the International Fuel Gas Code considered by the design consultant.

In case piped natural gas is not available, electric hot plates will be preferred as the primary alternative for kitchen use. Necessary space and electrical connection provisions for hot plates will be incorporated in the kitchen design. Use of LPG cylinders may also be considered as another alternative; however, this option shall be subject to applicable safety requirements, adequate ventilation, safe handling/storage practices, and control measures by the Building Management Committee.

2.11.4 Diesel

Diesel will be required during operation for backup generators. The project includes a 400 kVA emergency backup generator and a 440 kVA communal area backup generator. Diesel will be procured from the local market and stored at site for generator operation during power outages, subject to proper storage, secondary containment, spill prevention and fire safety requirements.

For estimation purposes, considering an assumed power factor of 0.8, average operating load of 60%, and generator operation for about 2 hours/day, the estimated diesel consumption for both backup generators will be approximately 6,300–6,600 liters/month. Actual diesel consumption may vary depending on generator loading, duration of power outages, maintenance condition and operational requirements.

2.12 Project Alternatives

Alternative analysis has been carried out to review the available project options and to identify the environmentally preferable and practically feasible choices for the proposed development. For this EIA, the analysis mainly considers the no project option, location alternative, and key design/planning considerations adopted for the project.

2.12.1 No-Project Alternative

The "No Project" alternative refers to the situation where the proposed Atrium Hills Residential Apartment Complex is not developed. Under this option, construction-related impacts such as dust, noise, traffic movement, excavation, waste generation and temporary disturbance to the surrounding area would be avoided.

However, the no project option would also mean that the allotted residential apartment complex plot would remain undeveloped and would not contribute to the planned housing supply in

Zaraj Housing Scheme. The opportunity to provide apartment-based residential accommodation, supporting amenities, parking, green/open space and building services within an already planned housing scheme would also be lost. Considering the increasing demand for planned residential accommodation in Islamabad, the no project option is not considered a preferred alternative.

2.12.2 Site Alternative

The proposed project is planned on a plot allotted for development of a residential apartment complex as per the approved Layout Plan (LOP) of Zaraj Housing Scheme. The site is located within Zone-V of Islamabad Capital Territory and is surrounded by planned residential, apartment/commercial, open and green areas. Similar nature developments are also present within the housing scheme.

Since the plot is already designated for residential apartment complex development, major location alternatives are limited. The selected location is compatible with the approved land use, surrounding development pattern and planned urban setting of Zaraj Housing Scheme. Therefore, relocation to another site is not considered necessary or practical.

2.12.3 Design and Planning Considerations

Different design and planning considerations have been incorporated to make the proposed project more suitable for the site and surrounding environment. The proposed G+20-storey vertical development supports efficient use of urban land and helps accommodate residential demand within a limited plot area.

The access arrangement has been selected considering traffic management, privacy and minimum disturbance to nearby houses. The north-side Major Road will be used as the main operational access road, while the west-side service path will not be used for normal operation and will only be used for emergency evacuation. This arrangement will help control routine traffic movement and reduce disturbance to residential houses located toward the western side.

For water supply, tanker supply has been selected for construction and operation, and no bore well or direct society water supply is proposed. For kitchen fuel, an SNGPL connection will be applied; however, if piped gas is not available, electric hot plates will be preferred, while LPG cylinders may only be considered subject to safety requirements and building management controls.

The project also includes resource efficiency and environmental design measures such as rooftop solar system, rainwater harvesting, rainwater recharge well, passive ventilation/cooling through atrium design, and EV charging points. In addition, about 8 Kanals of area will be developed and maintained as a lush green neighborhood park, which will improve open space, landscaping and visual quality of the project area.

During construction, ready-mix concrete will be used instead of establishing an on-site batching plant. This option is environmentally preferable as it will help avoid or reduce dust emissions, noise, raw material storage, wastewater generation and housekeeping issues associated with on-site concrete batching.

3 LEGAL AND REGULATORY FRAMEWORK

3.1 Introduction

This chapter provides an overview of the policies, legislation, regulations, standards and guidelines applicable to the proposed Atrium Hills Residential Apartment Complex. The Proponent will be required to comply with all applicable national laws, ICT-specific regulations, CDA requirements and environmental guidelines during the construction and operational phases of the project. Relevant legal and regulatory requirements have been considered during preparation of this EIA and will be reflected in the proposed mitigation measures and Environmental Management and Monitoring Plan (EMMP).

The proposed project is located within the Islamabad Capital Territory (ICT); therefore, federal environmental legislation, Pak-EPA requirements, and ICT/CDA-specific planning, building control, fire safety and municipal regulations are applicable.

3.2 Administrative and Institutional setup for Environmental Management

The Pakistan Environmental Protection Agency (PAK-EPA) has been established by the Federal Government under the Pakistan Environmental Protection Act, 1997 (PEPA 1997). Pak-EPA is headed by the Director General and is responsible for implementation and enforcement of environmental legislation at the federal level, including ICT.

Key functions and powers of PAK-EPA under PEPA 1997 include:

- Administration and enforcement of the Act and rules made thereunder
- Preparation and implementation of national environmental policies
- Establishment, revision, and enforcement of National Environmental Quality Standards (NEQS)
- Conduct of environmental inspections and investigations
- Collection and analysis of environmental samples through certified laboratories

Since the proposed project is located in ICT, this EIA will be submitted to PAK-EPA for review and issuance of environmental approval. PAK-EPA is also authorized to carry out inspections and enforce environmental compliance during project implementation and operation.

3.3 National Climate Change Policy (NCCP) 2021

The National Climate Change Policy, 2021 provides policy direction for climate-resilient and low-carbon development in Pakistan. The policy emphasizes climate adaptation, energy efficiency, water conservation, sustainable urban development, disaster risk reduction, protection of natural resources, and reduction of greenhouse gas emissions.

For the proposed Atrium Hills project, the policy is relevant in relation to efficient use of energy and water, controlled stormwater management, open/green space development, rainwater harvesting, groundwater recharge, passive ventilation/cooling, rooftop solar and proper management of standby generator emissions. The project design includes several such

measures, including rainwater harvesting tanks, rainwater recharge well, rooftop solar system, passive ventilation/cooling through atrium design, EV charging points and development of around 8 Kanals of lush green park in neighborhood. These measures are consistent with the broader objectives of climate-responsive and resource-efficient urban development.

3.4 Pakistan Climate Change Act, 2017

The Pakistan Climate Change Act, 2017 provides the legal and institutional framework for addressing climate change in Pakistan. The Act establishes institutional arrangements such as the Pakistan Climate Change Council, Pakistan Climate Change Authority and Pakistan Climate Change Fund for coordination, implementation and financing of climate change adaptation and mitigation actions.

In the context of the proposed project, the Act is relevant as an enabling legal framework for mainstreaming climate change considerations into development planning. Accordingly, the project will consider practical climate-responsive measures during design, construction and operation, particularly in relation to resource efficiency, stormwater management, energy use, open/green area development and environmentally sound building operation.

3.5 Applicable Laws, Regulations and Guidelines

3.5.1 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 Initial Environmental Examination (IEE) or Environmental Impact Assessment (EIA), as required, is conducted and a report submitted to the federal EPA.

The Act is attached as **Annexure – 5.**

3.5.2 Pakistan EPA (Review of IEE/EIA) Regulations, 2000

The Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulations, 2000 define the procedural requirements for filing, review and approval of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) reports. The Regulations contain Schedules I and II, which identify projects requiring IEE and EIA, respectively.

Housing schemes are listed in Schedule I of the Regulations and generally require an IEE. However, multi-storey apartment buildings are not specifically listed as a separate category in the Schedules. Considering the nature and scale of the proposed Atrium Hills project, its G+20-storey building configuration, total covered area, excavation and slope stabilization requirements, operational water demand, wastewater generation, traffic movement, parking provision and fire/life safety considerations, the project has been considered for preparation of an EIA.

Accordingly, the proposed project is covered under:

Schedule II, Category J: Other Projects

Sub-category 1: Any other project for which filing of an EIA is required by the Federal Agency under sub-regulation (2) of Regulation 5.

Therefore, an Environmental Impact Assessment (EIA) has been prepared for submission to Pak-EPA for review and environmental approval prior to commencement of construction and operation.

The regulations are attached as **Annexure – 6.**

3.5.3 National Environmental Quality Standards (NEQS)

The National Environmental Quality Standards (NEQS), notified under the Pakistan Environmental Protection Act, 1997, specify limits for municipal and industrial effluents, gaseous emissions, ambient air quality, motor vehicle exhaust, noise and drinking water quality. Pak-EPA's rules/regulations page lists the revised NEQS for municipal and liquid industrial effluents and gaseous emissions, as well as NEQS for ambient air, noise and other environmental parameters.

For the proposed Atrium Hills project, NEQS will be relevant mainly during construction and operation in relation to ambient air quality, dust, noise, vehicular emissions, generator emissions, and discharge of domestic wastewater into the society's wastewater management / treatment system. No industrial process wastewater or process-related emissions are anticipated from the residential apartment complex. Therefore, applicable NEQS will be used as reference standards for environmental monitoring and compliance during construction and operational phases. The NEQS are attached as **Annexure – 7**.

Table 3: National Environmental Quality Standard for Ambient Air

Pollutant	Time-weighted average	Concentration in Ambient Air	Method of measurement
Sulfur Dioxide (SO_2)	Annual Average*	80µgm^3	Ultraviolet Fluorescence Method
	24 hours**	120µgm^3	
Oxides of Nitrogen as (NO)	Annual Average*	40µgm^3	Gas Phase Chemiluminescence
	24 hours**	40µgm^3	
Oxides of Nitrogen as (NO_2)	Annual Average*	40µgm^3	Gas Phase Chemiluminescence
	24 hours**	80µgm^3	
O_3	1 hour	130µgm^3	Non-dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	360µgm^3	High volume Sampling, (Average flow rate not less than 1.1m^3/minute)
	24 hours**	500µgm^3	
Respirable Particulate Matter (PM_{10})	Annual Average*	120µgm^3	B Ray absorption method
	24 hours**	150µgm^3	
Respirable Particulate Matter ($PM_{2.5}$)	Annual Average*	15µgm^3	B Ray absorption method
	24 hours**	35µgm^3	
	1 hour	15µgm^3	

Lead (Pb)	Annual Average*	1µgm^3	AAS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	1.5µgm^3	
Carbon Monoxide (CO)	8 hours**	5mg/m^3	Non-dispersive infrared (NDIR) method
	1 hour	10mg/m^3	
**Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.*			
***24-hourly / 8-hourly values should be met 98% of the time in a year. 2% of the time, it may exceed but not on two consecutive days.*			

Table 4: The Motor Vehicle Ordinance (1965) and Rules (1969)

Parameter	Standards (maximum permissible limit)	Measuring method
Noise	85dB(A)	Sound-meter at 7.5 meter from the source

Table 5: National Environmental Quality Standard for Noise

S. #	Category of Area / Zone	Limit in dB(A) Leq*	
		Day Time	Night Time
1	Residential area (A)	55	45
2	Commercial area (B)	65	55
3	Industrial area (C)	75	65
4	Silence Zone (D)	50	45
Note:			
1	Daytime hours: 6.00 a.m. to 10.00 p.m.		
2	Nighttime hours: 10.00 p.m. to 6.00 a.m.		
3	Silence zone; Zone which are declared as such by competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.		
4	Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.		
***dB(A)Leq**	Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.		

Table 6: National Environmental Quality Standard for Municipal and Liquid Industrial Effluents

S. No.	Parameter	Into Inland Waters	Into Sewage Treatment	Into Sea	Unit
1	Temperature or Temp. increase	<3	<3	<3	ºC
2	pH value (H^+)	6-9	6-9	6-9	-
3	Biological Oxygen Demand $(BOD)_5$ at 20 ºC	80	250	80	mg/l
4	Chemical Oxygen Demand $(COD)_{Cr}$	150	400	400	mg/l
5	Total Suspended Solids (TSS)	200	400	200	mg/l
6	Total Dissolved Solids (TDS)	3500	3500	3500	mg/l
7	Oil and Grease	10	10	10	mg/l
8	Phenolic Compounds (as Phenol)	0.1	0.3	0.3	mg/l
9	Chloride (as Cl^-)	1000	1000	SC	mg/l
10	Fluoride (as F^-)	10	10	10	mg/l

11	Cyanide (as CN^-)total	1.0	1.0	1.0	mg/l
12	An-ionic detergents (as MBAS)	20	20	20	mg/l
13	Sulphate(SO_4^{2-})	600	1000	SC	mg/l
14	Sulphide(S^{2-})	1.0	1.0	1.0	mg/l
15	Ammonia (NH_3)	40	40	40	mg/l
16	Pesticides	0.15	0.15	0.15	mg/l
17	Cadmium	0.1	0.1	0.1	mg/l
18	Chromium (trivalent and hexavalent)	1.0	1.0	1.0	mg/l
19	Copper	1.0	1.0	1.0	mg/l
20	Lead	0.5	0.5	0.5	mg/l
21	Mercury	0.01	0.01	0.01	mg/l
22	Selenium	0.5	0.5	0.5	mg/l
23	Nickel	1.0	1.0	1.0	mg/l
24	Silver	1.0	1.0	1.0	mg/l
25	Total toxic metals	2.0	2.0	2.0	mg/l
26	Zinc	5.0	5.0	5.0	mg/l
27	Arsenic	1.0	1.0	1.0	mg/l
28	Barium	1.5	1.5	1.5	mg/l
29	Iron	8.0	8.0	8.0	mg/l
30	Manganese	1.5	1.5	1.5	mg/l
31	Boron	6.0	6.0	6.0	mg/l
32	Chlorine	1.0	1.0	1.0	mg/l

3.5.4 NEQS (Self-Monitoring and Reporting by Industries) Rules, 2001

The National Environmental Quality Standards (Self-Monitoring and Reporting by Industries) Rules, 2001, commonly referred to as the SMART Rules, were notified under the Pakistan Environmental Protection Act, 1997. These Rules provide a framework for self-monitoring, record keeping and reporting of wastewater discharges and air emissions by industrial units according to their pollution potential and category.

The Rules classify industrial sectors into different categories and prescribe monitoring parameters and reporting frequencies for each category. Since the proposed Atrium Hills project is a residential apartment complex and does not involve any industrial process, it is not directly categorized under the SMART Rules, 2001.

However, the general principle of environmental monitoring and record keeping remains relevant for the project. Therefore, applicable monitoring requirements for the project, including ambient air quality, noise, generator emissions and wastewater-related parameters, have been addressed separately in the Environmental Management and Monitoring Plan (EMMP) of this EIA.

3.5.5 Pakistan Environmental Assessment Guidelines

The Federal EPA has prepared a set of guidelines for conducting environmental and social assessments. The guidelines derive from much of the existing work done by international donor agencies and NGOs. The package of regulations, of which the environmental and social guidelines form a part, includes the PEPA, 1997 and the NEQS. These guidelines are listed below followed by comments on their relevance to the proposed project:

- Policy and Procedures for Filing, Review and Approval of Environmental Assessments, Pakistan Environmental Protection Agency, September 1997: These guidelines define the policy context and the administrative procedures that govern the environmental assessment process from the project pre-feasibility stage to the approval of the environmental report.

The section on administrative procedures has been superseded by the IEE-EIA Regulations, 2000.

- Guidelines for the Preparation and Review of Environmental Reports, Pakistan Environmental Protection Agency, 1997: The guidelines on the preparation and review of environmental reports target project proponents and specify:

  i. The nature of the information to be included in environmental reports
  ii. The minimum qualifications of the EIA consultants appointed
  iii. The need to incorporate suitable mitigation measures at every stage of project implementation
  iv. The need to specify monitoring procedures.

The IEE report submission and approval procedure is summarized below:

a) Ten hard copies and two soft copies of the report will be submitted together with a review fee and form included in Schedule V of IEE-EIA Regulations.
b) The EPA will conduct a preliminary scrutiny and reply within 10 days of the submittal of the report.
   a. confirming completeness, or
   b. asking for additional information, if needed, or
   c. Returning the report requiring additional studies, if necessary.
   d. The EPA will review the IEE. The EPA is required to make every effort to complete the IEE review process within 3 months of the issue of confirmation of completeness under regulation 9.
   e. The approval granted at the end of the review process, is valid for three years to start construction.
   f. Once the project construction is complete, the proponent is required to submit a request to EPA for confirmation of compliance. An environmental management plan for the operation phase is to accompany the request.

3.5.6 Guidelines for Public Consultation

Pak-EPA's Guidelines for Public Consultation are applicable to the EIA process. The guidelines emphasize consultation, involvement and participation of stakeholders during environmental assessment. They require that affected communities and relevant stakeholders are informed about the proposed project, given an opportunity to express their views, and that their concerns are considered during project planning and impact assessment.

For this EIA, stakeholder consultation has been carried out during the study to obtain feedback from relevant stakeholders and surrounding receptors. In addition, public participation will also take place during the EIA review process through public hearing / public notice requirements of Pak-EPA, as applicable.

3.5.7 Sectoral Guidelines for Environmental Reports: Housing Estates and New Town Development

Pak-EPA's Sectoral Guidelines for Environmental Reports: Housing Estates and New Town Development are relevant to the proposed project as the development involves residential accommodation within a planned housing scheme. The guidelines address environmental aspects related to site selection, site infrastructure, layout design, construction-stage impacts, operational-stage issues, services, monitoring, management and training. For high-density

housing, the guidelines indicate that environmental impacts are closely linked with the number of units and service requirements, including sewerage systems, treatment and solid waste disposal.

For Atrium Hills, these guidelines are relevant to assessment of construction activities, site access, traffic, water supply, wastewater disposal, solid waste management, drainage, open/green areas, occupational health and safety, and operational management of the residential apartment complex.

3.6 CDA / ICT Planning, Building Control and Municipal Regulatory Framework

The proposed project is located in Zaraj Housing Scheme, Zone-V, Islamabad Capital Territory. Zone-2 and Zone-5 of Islamabad were earmarked for planning and development of housing schemes by the private sector, including cooperative housing societies and private limited companies. The proposed project is therefore required to comply with applicable CDA/ICT planning, zoning, building control, municipal, fire safety, sanitation and solid waste management requirements.

The project shall comply with the approved Layout Plan (LOP) of Zaraj Housing Scheme and all applicable CDA procedures related to building plan approval, construction supervision, completion / occupancy requirements, fire safety, access, parking, drainage, sanitation, solid waste management and protection of municipal infrastructure.

The main CDA/ICT laws, regulations and bye-laws relevant to the proposed project include:

- CDA Ordinance, 1960
- ICT Zoning Regulations, 1992, as amended
- Regulation for Planning and Development of Private Housing / Farm Housing, Apartments and Commercial Schemes / Projects in Zones-2, 4 and 5 of Islamabad Capital Territory, 2023, notified through S.R.O. 886(I)/2023
- Islamabad Capital Territory Building Control Regulations, 2020, as amended in 2023
- Islamabad Residential Sectors Zoning (Building Control) Regulations
- ICT Municipal Bye-Laws
- Islamabad Capital Territory Solid Waste Management / Wing Regulations, 2023
- SOP for Management of Sanitation Services in Islamabad
- Islamabad Fire Prevention and Life Safety Regulations, 2010
- CDA Building Standards for Fire Prevention and Life Safety, 2010

3.7 Energy Conservation Building Code, 2023 (ECBC-2023)

The Energy Conservation Building Code, 2023 (ECBC-2023) has been developed by the National Energy Efficiency and Conservation Authority (NEECA) to promote energy-efficient planning, design, construction and operation of buildings in Pakistan. The Code provides guidance and minimum requirements for key building components and systems, including building envelope, lighting, HVAC, electrical power systems, renewable energy, water reuse, energy management and electric vehicle charging infrastructure.

The proposed Atrium Hills project is a high-rise residential apartment complex with substantial covered area, electrical load and parking provision; therefore, the project falls within the applicability criteria of ECBC-2023. Accordingly, the project design has incorporated energy and resource efficiency measures, including passive ventilation/cooling through atrium-based design, rooftop solar system, rainwater harvesting, rainwater recharge well and provision of EV

charging infrastructure. As per ECBC-2023, 5% to 10% EV charging points are required for high-rise residential parking facilities. Accordingly, EV charging points equivalent to 5% of the total parking provision have been incorporated in the building design.

3.8 Fire Prevention and Life Safety

Fire prevention and life safety requirements are highly relevant to the proposed Atrium Hills project due to its high-rise residential nature, parking floors, common facilities and building services. The project design shall comply with applicable fire prevention and life safety requirements, including:

- Islamabad Fire Prevention and Life Safety Regulations, 2010;
- CDA Building Standards for Fire Prevention and Life Safety, 2010;
- Building Code of Pakistan – Fire Safety Provisions, 2016;
- Relevant NFPA standards adopted in the project fire and life safety design.

The Building Code of Pakistan – Fire Safety Provisions 2016 provides requirements for fire prevention, life safety, fire protection systems and emergency response arrangements for buildings. The project fire and life safety design has already considered NFPA-based provisions including fire hose cabinets, sprinkler system, fire extinguishers, fire water storage, fire pumps, fire detection and alarm system, fire lifts, smoke extraction, staircase pressurization and fire-rated doors. The project shall obtain all required fire safety clearances/approvals from the relevant authority prior to operation.

Fire safety measures implemented at the project site shall be in accordance with these regulations, including provision of fire extinguishers, fire detection and alarm systems, and emergency response arrangements.

3.9 Building Code of Pakistan – Seismic Provisions, 2007

The Building Code of Pakistan – Seismic Provisions, 2007 provides requirements for earthquake-resistant design of buildings and structures in Pakistan. These provisions are relevant to the proposed Atrium Hills project due to its high-rise building configuration, foundation works, excavation, retaining structures and overall structural safety requirements. The code considers seismic zoning, site characteristics, structural configuration, building height, occupancy and structural system for design of buildings.

For the proposed project, detailed structural design, foundation design, RCC retaining walls / slope stabilization walls and other structural components shall be designed and reviewed by qualified structural engineers in accordance with applicable building code and seismic design requirements. Compliance with seismic safety provisions will be important for long-term building safety, especially considering the scale and height of the proposed G+20-storey residential apartment complex.

3.10 Occupational Safety and Health Code of Practice for Construction Sector of Pakistan, 2024

The Pakistan Engineering Council, with support of the International Labour Organization, developed the Occupational Safety and Health Code of Practice for Construction Sector of Pakistan, 2024. The code provides guidance for improving occupational safety and health practices in the construction sector and is based on international good practice, including the ILO Code of Practice on Safety and Health in Construction.

This code is relevant to the proposed project because construction activities will involve excavation, cutting and grading, retaining works, lifting operations, working at height, scaffolding, electrical works, material handling, use of machinery, traffic movement and other construction-related hazards. The contractor shall ensure implementation of suitable occupational health and safety measures, including provision and use of PPE, safe excavation practices, fall protection, machinery safety, lifting safety, emergency preparedness, fire safety, first aid, worker training and regular site supervision.

3.11 Pakistan Penal Code, 1860 and Local Nuisance Provisions

The Pakistan Penal Code, 1860 contains general provisions related to public nuisance, negligent acts, obstruction, safety of persons, and protection of public health and property. Although it is not an environmental law, its provisions may become relevant where construction or operational activities create public nuisance, unsafe conditions, obstruction of public access, excessive noise, dust, improper waste disposal, or risk to nearby residents and road users.

For the proposed project, construction and operational activities shall be managed in a manner that avoids public nuisance and protects nearby residents, workers, road users and surrounding properties. Measures such as dust control, noise control, proper waste management, traffic management, site barricading, protection of the adjacent nullah / stormwater drain and safe movement of construction vehicles will support compliance with these general public safety requirements.

4 Environmental and Social Baseline

This chapter presents the existing environmental and social baseline conditions of the proposed Atrium Hills Residential Apartment Complex prior to commencement of construction activities. The baseline assessment provides a reference for evaluating the potential impacts associated with site preparation, excavation, cutting and grading, slope stabilization, construction works and operation of the proposed residential apartment complex.

Baseline conditions have been defined on the basis of primary environmental monitoring conducted for the project, site visits, surrounding area observations, stakeholder consultations, and secondary information obtained from published studies, government records, maps and regional environmental data relevant to Islamabad Capital Territory (ICT). The baseline assessment covers both the micro-environment and macro-environment of the project area. The micro-environment includes the project site, its immediate surroundings, Zaraj Housing Scheme, and the urban/peri-urban setting of Zone-V, Islamabad, while the macro-environment represents the wider area of Islamabad.

Considering the nature of the project, the baseline has been developed with focus on physical environment, biological environment, built environment, land use, road access, drainage conditions, nearby receptors, traffic conditions, utilities and existing environmental quality. Particular attention has been given to the terraced/level-based site condition, adjacent nullah/stormwater drain, surrounding residential developments, existing vegetation, and other site-specific features that may influence the construction and operational phase impact assessment.

4.1 Project Area

The proposed Atrium Hills project is located at Major Road, Sector B, Zaraj Housing Scheme, Zone-V, Islamabad Capital Territory (ICT), at coordinates 33°30'45.8"N and 73°09'18.2"E. Zaraj Housing Scheme is situated near Main GT Road (N-5), opposite DHA Phase-II and Giga Mall, and is part of the rapidly developing urban and peri-urban belt of Zone-V, Islamabad. For the purpose of baseline assessment, the project area has been described in terms of the micro-environment and macro-environment. The micro-environment includes the project site, its immediate surroundings, Zaraj Housing Scheme and the urban/peri-urban setting of Zone-V, while the macro-environment represents the wider area of Islamabad.

Micro-Environment

The micro-environment of the project includes the proposed plot, its immediate surroundings, Zaraj Housing Scheme and the wider Zone-V setting. The project site is located within a planned residential housing scheme where the existing land use mainly includes residential plots, residential apartment developments, commercial areas, community facilities, parks/green areas, internal roads and utility infrastructure.

The proposed plot is located in Sector B of Zaraj Housing Scheme and has been allotted for development of a residential apartment complex as per the approved Layout Plan (LOP) of the housing scheme. Therefore, the proposed land use is consistent with the designated land use of the plot and the surrounding planned residential setting. The site is presently undeveloped and consists of natural vegetation and a few mature trees.

The immediate surroundings of the project site include Major Road and an open plot toward the north. On the east side, the plot is adjacent to a nullah / stormwater drain, and beyond the drain lies Aghosh Society. On the west side, there is a green area / linear park and a service

path, followed by residential houses. On the south side, a green area is present. These immediate surroundings indicate that the site is located within a developed residential setting, with nearby open/green areas and a stormwater drainage feature.

Zaraj Housing Scheme is a CDA and EPA approved private housing scheme located in Zone-V, Islamabad. As per the approved LOP, the scheme covers a total area of 1,564 Kanals and comprises 1,418 plots. The land use of the scheme includes residential plots, residential apartments, commercial areas, parks and green areas, community hall, educational area, grand masjid, sewage treatment plant, road network and other public/community facilities. The society is a gated community with a developed internal road network and 24/7 security arrangements.

Within Zaraj Housing Scheme, similar residential and mixed-use developments are already present, including Rania Residency Blocks 1, 2 and 3, The Atrium Plaza, and ZETA Mall, a residential-cum-commercial development. This shows that apartment-based and mixed-use development is already part of the existing built environment and approved land use character of the scheme.

At the Zone-V and immediate surrounding level, the project area is influenced by planned residential, commercial, institutional and healthcare developments. Major nearby developments and landmarks include DHA Phase-II, Giga Mall, Institute of Regenerative Medicine (IRM Hospital), Institute of Space Technology (IST), Mumtaz Medical & Dental Complex, and other residential societies, including Aghosh Society, Jeddah Town, Bahria Town Phase-7 and DHA Phase-III side. Several under-development or recently developing projects are also present in the surrounding area, including Seven Star Mall and Residency, Holiday Inn Islamabad, Arena 7 Mall, and other commercial/residential projects along the nearby urban corridor. The micro-environment is therefore urbanizing in character and influenced by residential development, mixed-use/commercial activity, institutional and healthcare facilities, construction activities, vehicular movement, domestic emissions and routine urban noise sources.

Macro-Environment

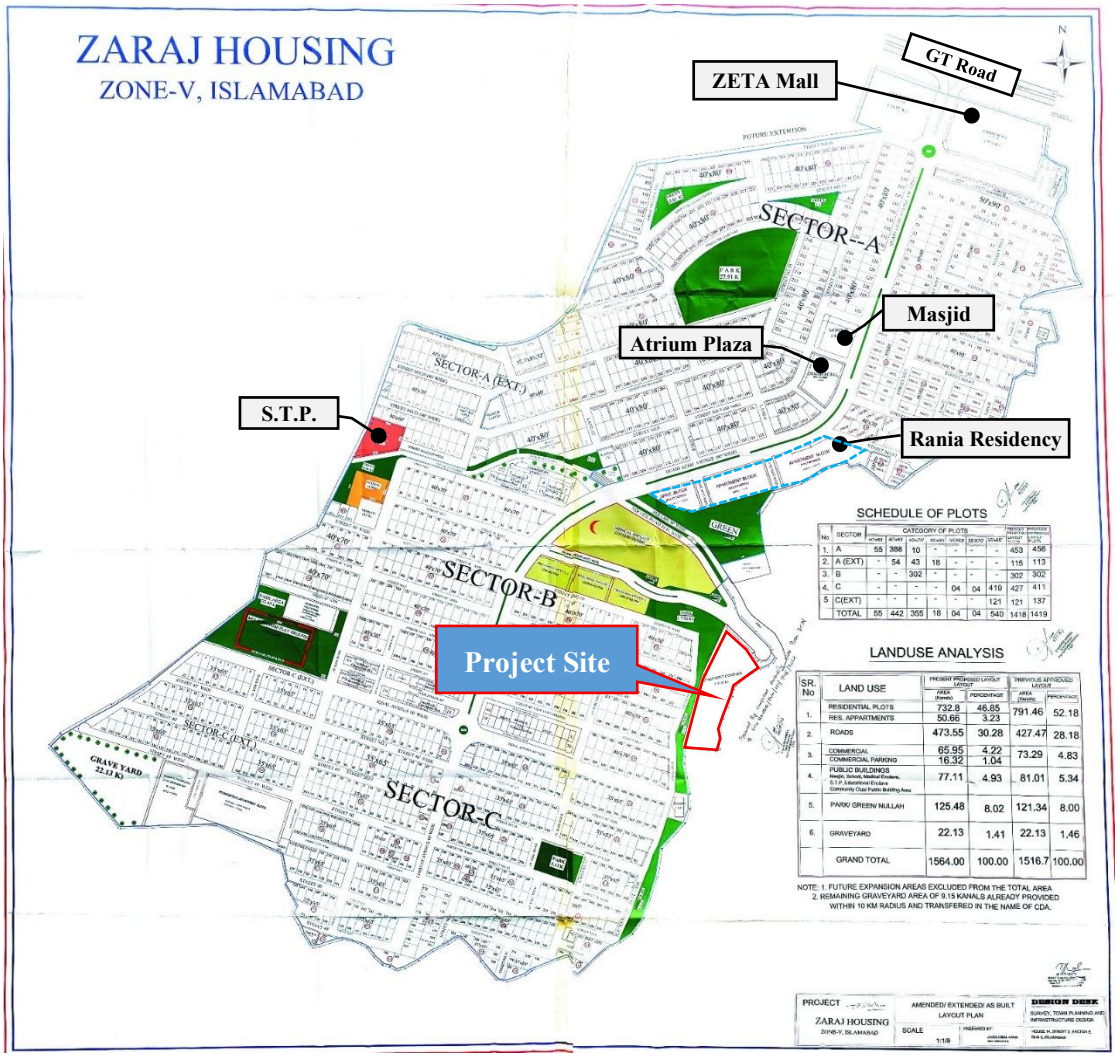
The macro-environment represents the wider Islamabad area within which the project is located. Islamabad is the capital city of Pakistan and is characterized by planned urban sectors, administrative areas, residential neighborhoods, commercial centers, institutional facilities, road infrastructure, parks, green spaces and peri-urban expansion areas. The city has continued to expand toward the south and southwest, including Zone-V and adjoining areas, due to increasing demand for housing, improved accessibility and growth of private residential schemes.

The wider Islamabad region lies within the Potohar Plateau, which is generally characterized by undulating terrain, seasonal drainage channels and a subtropical semi-arid climatic setting. The area experiences hot summers, monsoon rainfall mainly during July to September, and cool winters. Natural drainage in the wider region is generally seasonal and linked with local nullahs and stormwater channels.

The macro-environment of the project includes residential housing schemes, urban settlements, commercial and mixed-use developments, educational and healthcare facilities, public amenities, major road networks and utility infrastructure. The project area is linked with Islamabad and Rawalpindi through regional transport corridors, particularly Main GT Road and Islamabad Expressway, which provide access to major urban services and employment centres.

No protected area, wildlife sanctuary or ecologically sensitive habitat is located within the immediate surroundings of the proposed project site. The broader environmental setting is

predominantly urban and peri-urban, with environmental conditions influenced by traffic movement, construction activities, urban development, domestic activities and associated utility services. The macro-environmental baseline therefore provides the wider context for assessing potential environmental and social impacts of the proposed residential apartment complex.




Project Site


Access road (Major road) | Service Path (west)


Aghosh Society


Houses on the west of Project Site


Park near project in Sector B


Main Road of Zaraj Housing Scheme | Central Commercial area Zaraj


The Smart Lyceum School | SLS School


The Atrtium Plaza | Masjid

	
Rania Residency	Commercial area
	
ZETA Mall	GIGA Mall

4.2 Physical Environment

4.2.1 Topography of the Study Area

The proposed Atrium Hills project site is located within the broader Potohar Plateau / Haripur Basin setting. The topography of the Haripur Basin varies gradually, with ground elevations ranging from approximately 375 meters to about 970 meters above mean sea level. Despite this elevation variation, the overall surface of the basin is relatively flat to gently undulating, reflecting its dominant alluvial nature. The plain to gently undulating topography is indicative of thick deposits of unconsolidated to semi-consolidated sediments, mainly comprising silts, sands, gravels and clays deposited over geological time by river systems draining the surrounding highlands. Such conditions generally support agriculture and urban development, but require careful assessment of soil characteristics, bearing capacity, compressibility and groundwater conditions for infrastructure projects.

At the level of Zaraj Housing Scheme, the terrain has been modified through planned development, including road formation, plot demarcation, grading and provision of infrastructure. The society has relatively elevated areas toward parts of the north and south, while stormwater generally converges toward the central drainage corridor. The overall drainage pattern of the society is toward the west, where the nullah/drainage channel passes through Zaraj Housing Scheme and ultimately drains further west toward the Soan River. The sewage treatment plant of Zaraj Housing Scheme is also located toward the western side of the society.

At the project plot level, the site has a significant variation in ground levels and cannot be described as a flat or gently sloping plot. As shown in the contour/site plan, the lower side of the project is located toward the north/northeast/front side, near the Major Road and adjacent nullah/stormwater drain, where levels are around RL 1598–1600 ft. The western side of the plot and adjoining service path are at a much higher elevation, with levels generally around RL 1690–1710 ft. This shows an elevation difference of approximately 100 ft across the project site.

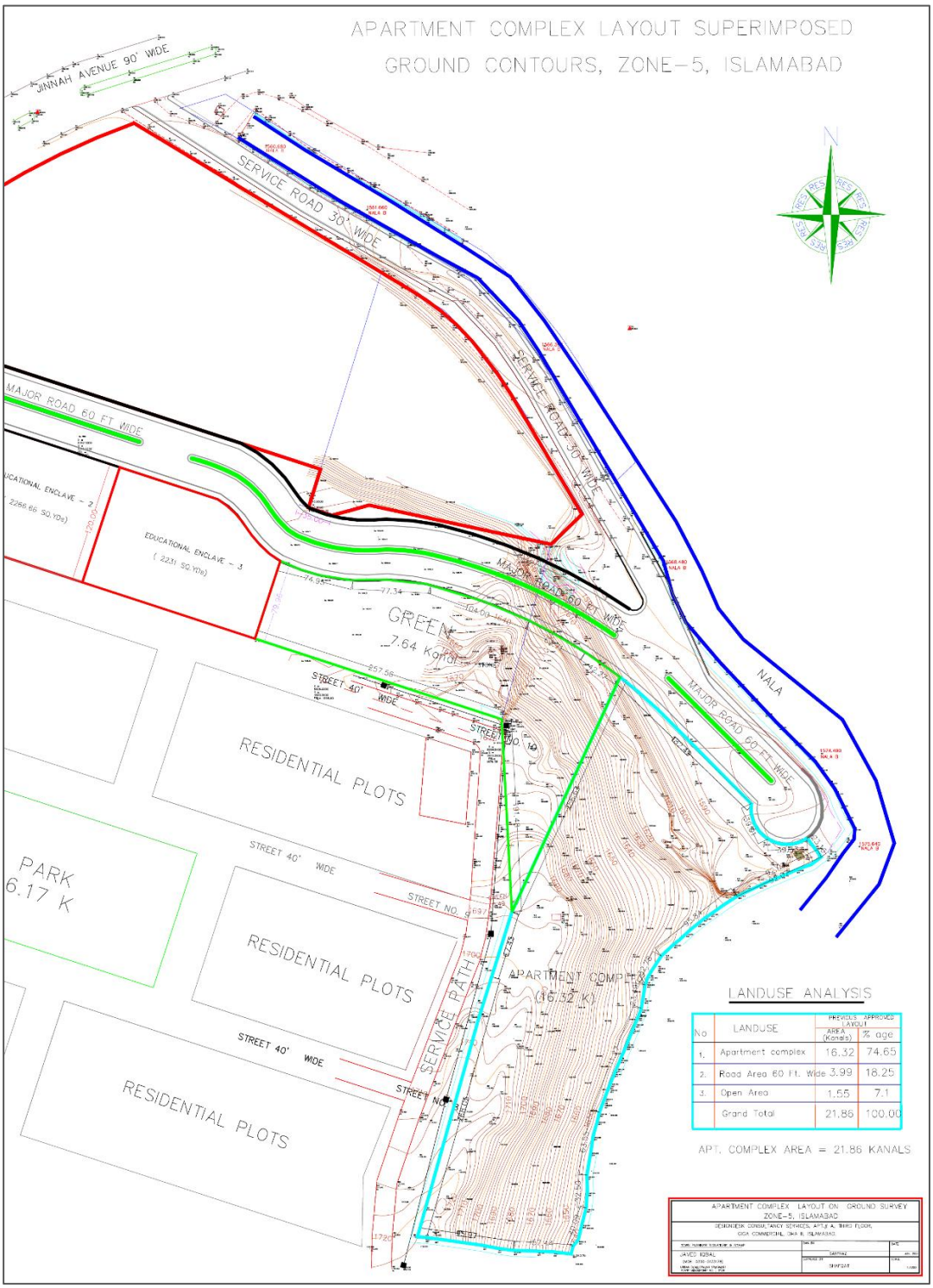


Figure 2: Contour Map of Project Site

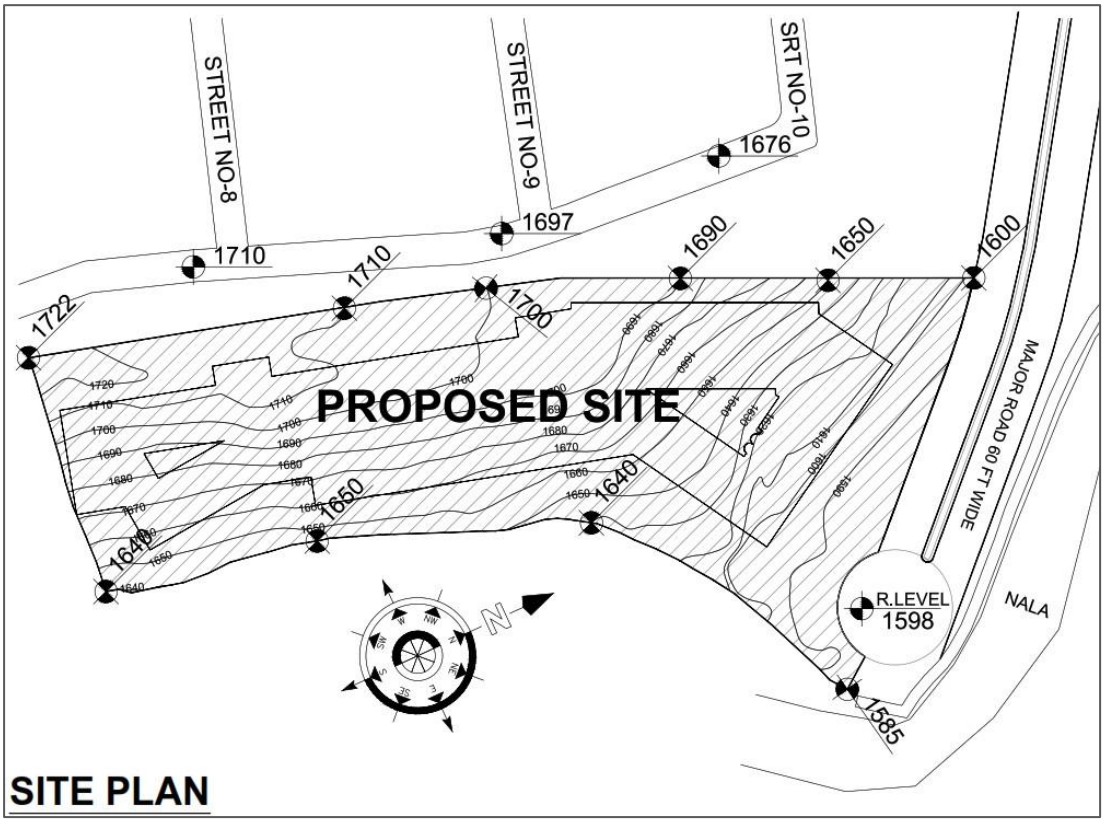


Figure 3: Site Plan Showing Topography of Project Site

Due to this level difference, the project has been planned with a terraced/level-based building arrangement. From the lower/front side, the building will appear as a G+20-storey structure, whereas from the western higher side, the upper floors will relate more closely with the existing road/service level. The site will therefore require excavation, cutting, grading and formation of suitable construction levels before construction of the building.

At the plot level, natural surface runoff is expected to follow the general slope from the higher western side toward the lower north/east/northeastern side, where a nullah/stormwater drain is present adjacent to the plot. Therefore, excavation planning, slope retention, stormwater control and protection of the adjacent drain will be important considerations during construction.

The excavation faces and cut slopes will be stabilized through properly designed retaining structures, including RCC retaining walls / slope stabilization walls, as per the approved structural design and standard engineering practice. Detailed assessment of excavation, slope stability, runoff control and related mitigation measures is provided in the impact assessment and environmental management sections of this EIA.

Figure 4: Physiography of the Study Area

4.2.2 Geology and Soil Condition

The study area lies within the tectono-stratigraphic setting of the Potohar Plateau, which is characterized by sedimentary formations of Paleocene to Recent age.

According to the geological map and stratigraphic column of the study area, the project site is predominantly underlain by Quaternary Alluvial Deposits (Qal). These deposits mainly consist of unconsolidated to semi-consolidated sandy clay, silt, gravel, pebbles, and localized sheet wash materials deposited through fluvial and surface runoff processes. Such materials are common within urbanized sectors of Islamabad and Rawalpindi and generally provide suitable foundation conditions for construction activities when proper geotechnical design measures are adopted.

The surrounding regional geology also indicates the presence of the following geological formations:

- Lockhart Limestone Formation (Tlc) – Paleocene to Eocene Age: This formation generally comprises yellowish-white to grey limestone, marly limestone, and shale intercalations. The unit is relatively competent and contributes to the structural stability of elevated terrain surrounding the broader Islamabad region.
- Margalla Hill Formation (Tm) – Paleocene Age: This formation primarily consists of silty shale, sandstone, marl, and ferruginous materials. These lithological units are exposed in localized areas southwest of the study area and are associated with the Margalla Hill geological sequence.

The soil conditions at the project site are mainly characterized by compacted sandy clay and silty alluvium with varying proportions of gravel and weathered rock fragments. Due to the natural undulating terrain and anthropogenic land development activities within Zaraj Housing Society, localized variations in soil compaction and bearing capacity may occur.

From an engineering geology perspective, the subsurface conditions are considered generally favorable for the proposed apartment development. However, excavation activities, slope cutting, and concentrated surface runoff during construction may increase the potential for localized soil erosion and slope instability if not properly managed.

Considering the natural slope gradient observed particularly at the backside of the project area, the proponent shall construct a properly engineered retaining wall along with appropriate slope stabilization measures to minimize risks associated with land subsidence, soil displacement, and localized slope failure. Controlled excavation, proper compaction, and adequate stormwater drainage provisions shall also be implemented during construction.

The Islamabad region falls within a moderate seismic hazard zone; therefore, the proposed structure shall be designed in accordance with the applicable seismic provisions of the Building Code of Pakistan and relevant engineering standards.

Overall, based on the regional geological setting, stratigraphic interpretation, and existing site conditions, the geology and soil characteristics of the study area are considered suitable for the proposed high-rise residential development subject to detailed geotechnical investigation, structural design compliance, and implementation of appropriate engineering mitigation measures.

Figure 5: Geological & Soil Features of the Study Area

4.2.3 Geotechnical Investigation

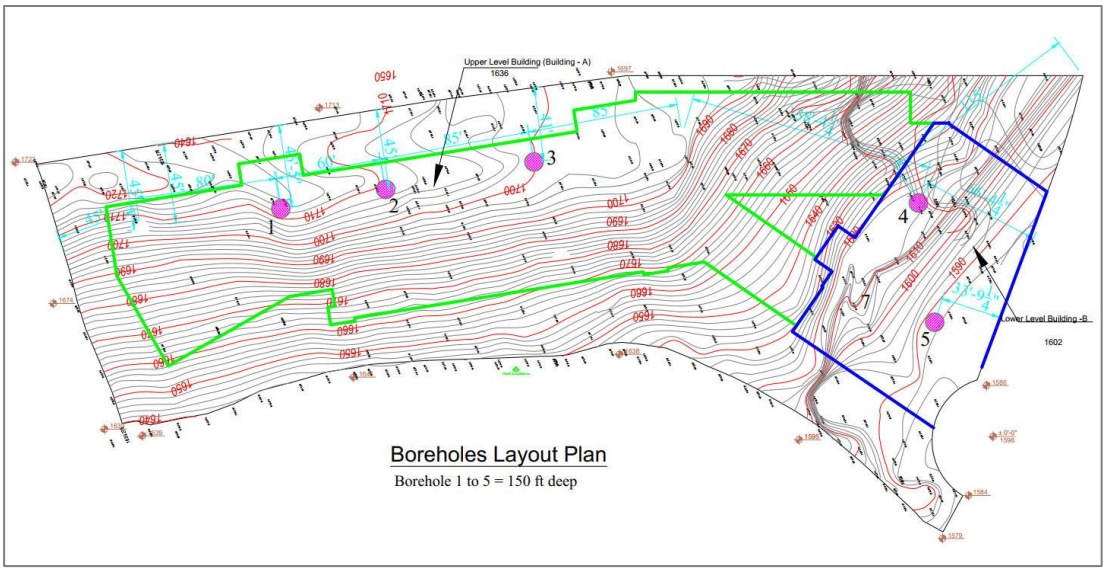
A project-specific geotechnical investigation was conducted for Atrium Hills by AJK Engineers (Pvt.) Ltd. for M/s Design House Islamabad. The investigation included drilling of five boreholes up to 150 ft below existing ground level, Standard Penetration Tests (SPTs), groundwater observations, and laboratory testing of selected soil samples for soil classification and engineering properties.

According to the geotechnical report, the project site is located within the Haripur Basin, which is described as a broad alluvial plain developed through fluvial sedimentation and tectonic controls. The regional soil deposits mainly comprise unconsolidated to semi-consolidated silts, sands, gravels and clays, which are common in alluvial basin conditions. These soil conditions are generally suitable for urban development but require proper assessment of bearing capacity, compressibility, groundwater and foundation design parameters.

The subsurface investigation indicates that the upper strata generally consist of lean clay, gravelly lean clay, sandy silty clay, and silty gravel with sand, extending from the ground surface to varying depths, generally up to about 10–25 ft below existing ground level. These materials are underlain by bedrock consisting mainly of shale, sandstone and mudstone, described as low to medium strength, slightly to highly fractured and weathered in places, extending up to the maximum explored depth. Laboratory classification also indicates the presence of fine and coarse-grained soils, mainly sandy silty clay, silty gravel with sand and gravelly lean clay.

Seepage/perched water was observed in selected boreholes during drilling, particularly at about 20 ft depth in BH-04 and 45 ft depth in BH-05. This perched water condition represents localized or temporary water saturation above the main groundwater table and should be considered during excavation and foundation works. This is different from the deeper regional groundwater condition reported by Zaraj Housing Scheme management.

Based on the subsurface conditions and proposed structural loads, the geotechnical report recommends that raft foundation and/or pile foundation may be considered for safely transferring building loads to the subsurface strata. The detailed foundation design, excavation support, retaining structures and seismic design shall be finalized by the structural/geotechnical design team based on the recommendations of the geotechnical investigation report. The detailed geotechnical investigation report is attached as an **Annexure – 8** to this EIA.



4.2.4 Seismicity of the Area

According to the Building Code of Pakistan (Seismic Provisions-2007) and regional seismic zoning classifications, the Islamabad Capital Territory (ICT) generally falls within Seismic Zone 2B to Zone 3, indicating a moderate to high seismic hazard potential. The area has historically experienced low to moderate intensity earthquakes, while strong seismic events originating from northern Pakistan and Kashmir regions have also been felt within Islamabad and surrounding areas.

The broader regional geology consists of folded and faulted sedimentary formations associated with the Potohar Plateau and Margalla Hill structural system. Although no major active fault line has been identified directly crossing the project footprint, the regional tectonic environment necessitates incorporation of earthquake-resistant engineering design considerations for all major infrastructure developments.

The geotechnical report identifies the project area within Seismic Zone 2B as per the Building Code of Pakistan – Seismic Provisions, 2007, with recommended design consideration for horizontal peak ground acceleration of 0.16g to 0.24g. This PGA has a 10% probability of exceedance in 50 years. The report also indicates that the site may be considered as Site Class C: Very Dense Soil and Soft Rock for foundation design, and that liquefaction is not likely during earthquakes based on the evaluated subsurface and groundwater conditions[3].

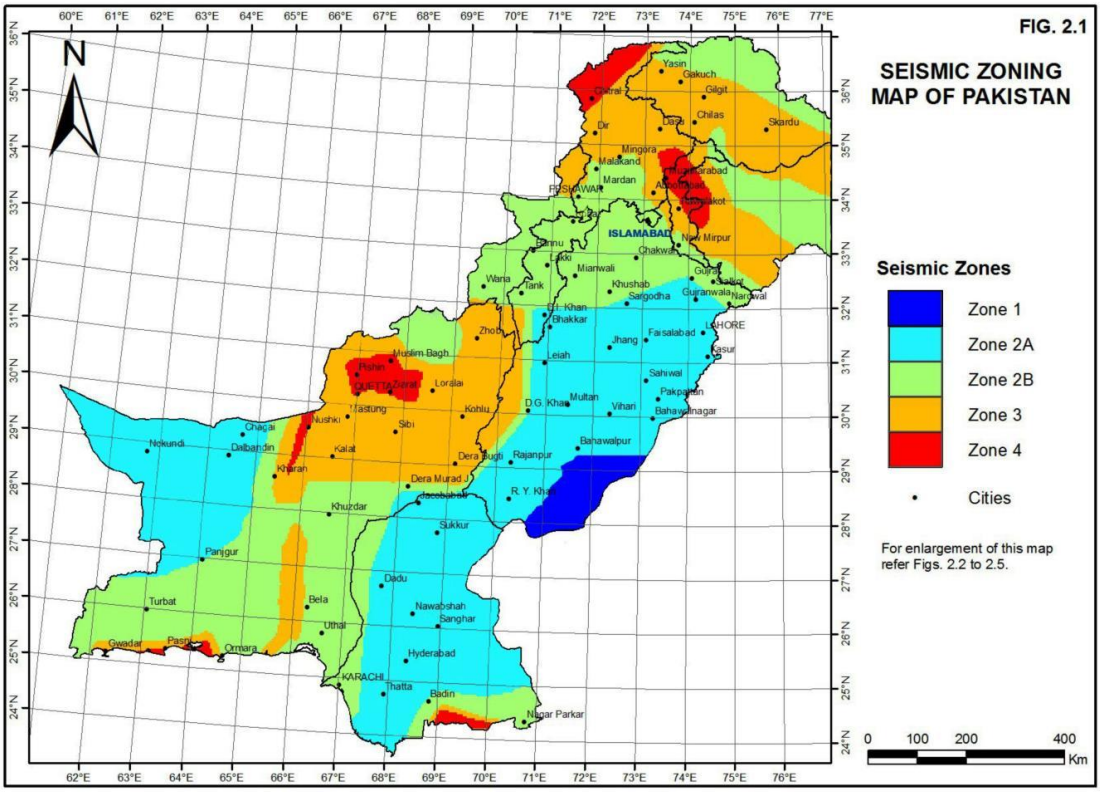


Figure 6: Seismic Zoning Map of Pakistan

4.2.5 Hydrology

The project area experiences seasonal rainfall, with the major precipitation generally occurring during the monsoon months from July to September. The proposed project is located within the Potohar Plateau / Islamabad region, where the natural hydrological regime is influenced by undulating terrain, seasonal nullahs, stormwater channels and increasing urban development. PCRWR's hydrological assessment for Islamabad also highlights the need for integrated management of both surface water and groundwater resources because water demand is increasing while available sources are under stress[4].

[3] Geotechnical Investigation report of the project

[4] https://pcrwr.gov.pk/wp-content/uploads/2023/09/Hydrological-Assessment-of-Surface-and-Groundwater-Resources-of-Islamabad-Pakistan.pdf

At the level of Zaraj Housing Scheme, the natural drainage pattern has been modified through planned development, including road construction, plot demarcation, grading, paved surfaces and engineered drainage infrastructure. The society is relatively elevated from parts of the north and south, and stormwater generally converges toward the middle drainage corridor. The overall drainage pattern of Zaraj Housing Scheme is toward the west, where the nullah / drainage channel passes through the society and ultimately drains further west toward the Soan River.

At the project plot level, the site has significant variation in ground levels. Surface runoff from the project plot is expected to follow the local slope from the higher western side toward the lower north/east/northeastern side, where a nullah / stormwater drain is present adjacent to the plot. This nullah functions as a stormwater conveyance channel during rainfall events and forms an important drainage feature in the immediate project setting.

The project site is not located within a known major floodplain. However, due to the terraced/level-based site condition, excavation works and proximity of the stormwater drain, proper stormwater control will be required during construction. Uncontrolled runoff, erosion and silt-laden discharge toward the adjacent nullah shall be avoided through site grading, temporary drainage arrangements, sediment control and regular housekeeping.

Surface water quality (Soan River): Available literature consistently indicates that the Soan River water quality is influenced by municipal sewage and mixed urban/industrial discharges from the Islamabad–Rawalpindi region—particularly through tributary systems such as Leh/Nullah Lai, which joins the Soan downstream. Studies report deterioration in key parameters (e.g., BOD/COD and solids) after receiving wastewater-laden tributary flows[5].

Scientific literature also documents contamination concerns in parts of the Soan River associated with combined domestic and industrial wastewater inputs and associated pollutant loads[6].

4.2.6 Groundwater

Groundwater in the Islamabad–Rawalpindi region occurs mainly within alluvial deposits and weathered sedimentary formations of the Potohar Plateau. Groundwater is commonly extracted through boreholes and tube wells for domestic and commercial uses. Available regional studies indicate that groundwater in Islamabad has been under increasing stress due to urban expansion, higher abstraction and reduced recharge. A hydrogeological assessment for Islamabad reported a gradual decline in groundwater levels, linked with unsustainable extraction, urban development and reduced percolation, with an average depletion rate reported as about 1.7 meters per year[7].

Groundwater is an important water resource in peri-urban and rural zones (including Zone-V), where users frequently depend on bore wells and tube wells. Hydro-geologically, Islamabad lies within the Soan River basin, and groundwater occurrence is controlled by layered alluvium and lens-shaped aquifer systems typical of the Potohar Plateau. Soan River corridor is hydrologically connected to local groundwater regimes and may contribute to recharge, particularly where groundwater abstraction is sustained.

[5] https://v3.pjsir.org/index.php/physical-sciences/article/download/158/138
[6] https://www.sciencedirect.com/science/article/abs/pii/S0147651314003212
[7] https://www.nestle.pk/sites/g/files/pydnoa361/files/2019-09/Report-Islamabad-Factory-Hydrogeological-study.pdf

Aquifer behavior and recharge linkage with Soan River: A peer-reviewed study focusing specifically on the urban settlement near Kahuta Industrial Triangle adjacent to the Soan River developed a calibrated groundwater flow model and reported that prolonged pumping can alter local groundwater gradients such that the direction of flow reverses, resulting in induced recharge from the Soan River into the groundwater system (i.e., the river can become a source of groundwater recharge under certain pumping conditions)[8].

Zaraj Housing Scheme is officially listed by CDA as a housing scheme located in Zone 5, with an approved LOP and issued NOC. The CDA record also confirms the total scheme area as 1,564 kanals. According to consultation with the Zaraj Management Committee, the groundwater depth in the scheme is approximately 900 ft, and the groundwater level is decreasing over time. This indicates that groundwater is a stressed resource in the area and should not be relied upon as the primary water source for the proposed project.

For the proposed Atrium Hills project, no bore well or direct groundwater abstraction is proposed. The operational water supply will be arranged through tanker supply. As part of the baseline assessment, one groundwater sample was collected from a tube well of Zaraj Housing Scheme and analyzed by an environmental laboratory. The results indicate that the analyzed groundwater sample is in compliance with the applicable drinking water quality standards for the tested parameters. In addition, a surface water sample from the adjacent nullah / stormwater drain was also collected and analyzed. The groundwater and surface water quality analysis reports are attached as **Annexure – 9**.

Considering the declining groundwater trend in the area, the project has incorporated rainwater harvesting and groundwater recharge measures, including rainwater harvesting tanks and recharge well. These measures will support local rainwater management and groundwater recharge where technically feasible, while also reducing direct stormwater runoff from the project site.

4.2.7 Drainage and Wastewater Treatment

Zaraj Housing Scheme has an established internal drainage and wastewater management system. Stormwater runoff within the society is conveyed through the internal drainage network and natural/nullah drainage corridors. The overall drainage channel crosses the society and ultimately drains toward the west, in the direction of the Soan River.

The project's stormwater drainage will be designed to ensure controlled collection and discharge of runoff without causing erosion, water stagnation or direct discharge of silt and construction waste into the adjacent nullah / stormwater drain. During construction, special care will be required to prevent disposal of excavated material, construction debris, slurry, wastewater, oils, grease or other pollutants into the nullah.

Domestic wastewater from the proposed apartment complex will be connected to the sewerage / wastewater management system of Zaraj Housing Scheme. The society has a sewage treatment plant located toward the western side of the scheme. A wastewater sample from the treatment plant was collected and analyzed as part of the baseline assessment. The laboratory results indicate compliance with applicable NEQS for the tested parameters. The wastewater quality analysis report is attached as **Annexure – 9**.

[8] https://pubmed.ncbi.nlm.nih.gov/19468848/

4.2.8 Ambient Air and Noise Quality

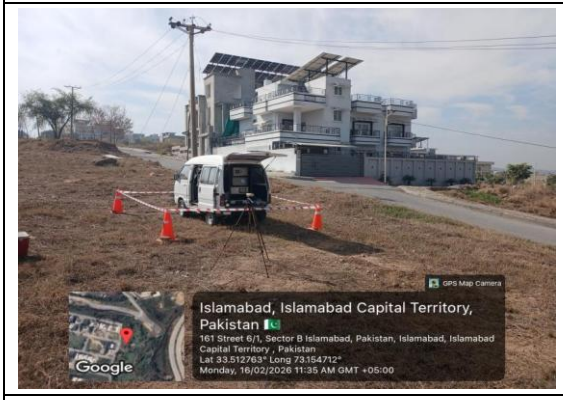
The ambient air quality of the project area is primarily influenced by urban residential activities, vehicular traffic, localized construction activities, exposed surfaces, and commercial operations within the surrounding Islamabad–Rawalpindi urban corridor. No major industrial activity was observed in the immediate surroundings of the project site. Therefore, the existing air quality conditions are mainly associated with traffic emissions, dust from nearby roads and open plots, ongoing development works, and general urban background conditions.

Baseline ambient air quality and noise level monitoring was conducted at the project site on 16 and 17 February 2026. The monitoring point was selected near the residential houses on the western side of the project site, as this location represents the nearest sensitive receptor likely to be influenced by construction and operational activities.

The monitoring results indicate that most of the analyzed ambient air quality parameters were within the applicable NEQS limits. However, $PM_{2.5}$ was found exceeding the prescribed limit, which may be attributed to existing urban background conditions, vehicular movement, exposed soil surfaces, ongoing construction/development activities, and localized dust conditions in the surrounding area.

The existing noise environment of the project area is mainly influenced by traffic movement on internal roads and nearby major roads, routine residential/commercial activities, construction works in the surrounding area, and general urban activity. Noise level monitoring showed that the average daytime noise level was approximately 64 dBA, while the average nighttime noise level was approximately 50 dBA. The detailed ambient air quality and noise monitoring results are attached as **Annexure – 9.**

Ambient Air and Noise Monitoring at Project site (33°30'46.0"N 73°09'17.0"E)



4.2.9 Land Use and Environmental Sensitivity of the Study Area

The surrounding area mainly comprises residential plots, apartment buildings, and commercial outlets of small to medium scale, internal road infrastructure, public utility services, and vacant plots designated for future urban development.

The project site falls within the designated land use planning framework of Zaraj Housing Society and is compatible with the existing and proposed urban development pattern of the area. The surrounding land use features include:

- Residential houses and apartment complexes;
- Commercial and mixed-use developments;
- Internal roads and transportation infrastructure;
- Public amenities and utility services;
- Vacant and under-development residential plots.

The study area is part of a rapidly urbanizing zone influenced by the expansion of Islamabad and Rawalpindi metropolitan regions. Ongoing construction and infrastructure development activities are common within the vicinity, reflecting the increasing residential demand and urban growth trends in the area.

From an environmental sensitivity perspective, no ecologically protected areas, wildlife sanctuaries, national parks, forest reserves, or environmentally critical habitats are located within the immediate influence area of the proposed project. Similarly, no rare, endangered, or protected floral and faunal species were observed during the site reconnaissance survey.

A natural seasonal nullah exists adjacent to the project site and functions as a natural stormwater drainage channel during rainfall events. The Proponent has committed that the nullah shall remain protected and undisturbed during both construction and operational phases of the project. No encroachment, obstruction, waste disposal or construction activity shall be carried out within the nullah corridor to preserve its natural hydrological function and environmental integrity.

The environmental sensitivity of the project area is therefore considered relatively low due to the predominantly urbanized nature of the surroundings and absence of critical ecological receptors. However, certain environmental receptors requiring consideration during project implementation include:

- Nearby residential communities;
- Local traffic and road users;
- Surface drainage pathways including the seasonal Nullah;
- Ambient air and noise quality of the surrounding area.

4.3 Existing Traffic and Road Network Conditions

A project-specific Traffic Impact Study (TIS) was conducted for the proposed Atrium Hills project to assess the existing traffic conditions, road network capacity, access arrangements, parking requirements and likely traffic implications of the proposed development. The study area benefits from good regional connectivity through Islamabad Expressway and Main GT Road (N-5), while at the local level Zaraj Housing Scheme is served by a developed internal road network connecting different sectors, residential areas, apartment buildings and commercial areas.

As part of the traffic baseline, traffic count surveys were conducted at three key locations influencing movement toward the project area, including Talha Road, Talha Road × Zaraj Road

Roundabout, and Potohar Avenue (GT road). Road inventory and traffic flow conditions were also assessed to determine the existing operational performance of the surrounding road network.

The TIS indicates that the surrounding road network is presently operating under favorable traffic conditions. Under the existing condition, the considered road network maintains Level of Service (LOS) A, representing free-flow traffic conditions with low delays and good travel speeds. The existing volume-to-capacity ratio at Potohar Avenue was assessed as 0.55 for arrival flow and 0.40 for departure flow, indicating that the road has available capacity under current conditions.

The project site is located on Major Road, Sector B, which will serve as the normal operational access road for the proposed apartment complex. The west-side service path will not be used for routine access and will only be used for emergency evacuation, where required. The traffic study also assessed society gate operations and concluded that the existing access arrangement is generally functioning within acceptable limits, with only minor peak-period delays.

The TIS also reviewed the proposed parking provision. The project provides 526 car parking spaces and 57 motorcycle spaces. The estimated parking demand was assessed as 353 car spaces and 174 motorcycle spaces. The study concluded that car parking provision is adequate, with a surplus of 173 car spaces. In case motorcycle demand exceeds the designated motorcycle parking, surplus motorcycles may be accommodated within available car parking areas through proper management and demarcation.

Overall, the existing traffic baseline shows that the project area has an adequately developed road network with acceptable operational performance. Detailed traffic analysis, parking

assessment, access gate queue analysis and traffic management recommendations are provided in the Traffic Impact Study attached as an **Annexure – 10** to this EIA.

4.4 Meteorology

Islamabad experiences a subtropical climate characterized by hot summers and cool winters, influenced by western disturbances, winter fog, and the southwest monsoon. Summers are generally hot and humid, with occasional rainfall during the monsoon period, while winters are relatively short and cool with partly cloudy conditions. Over the year, temperatures typically range between 3°C and 38°C, with extreme values rarely falling below 1°C or exceeding 42°C.

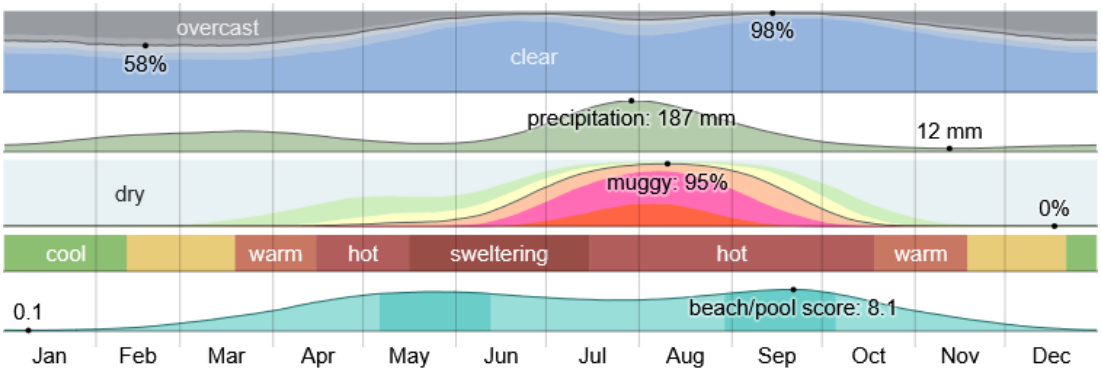


Figure 7: Climate of Islamabad[9]

4.4.1 Temperature

The hot season lasts for 3.0 months, from May 5 to August 5, with an average daily high temperature above 33°C. The hottest month of the year in Islamabad is June, with an average high of 37°C and low of 24°C.

The cool season lasts for 2.9 months, from December 4 to March 1, with an average daily high temperature below 21°C. The coldest month of the year in Islamabad is January, with an average low of 4°C and high of 17°C.

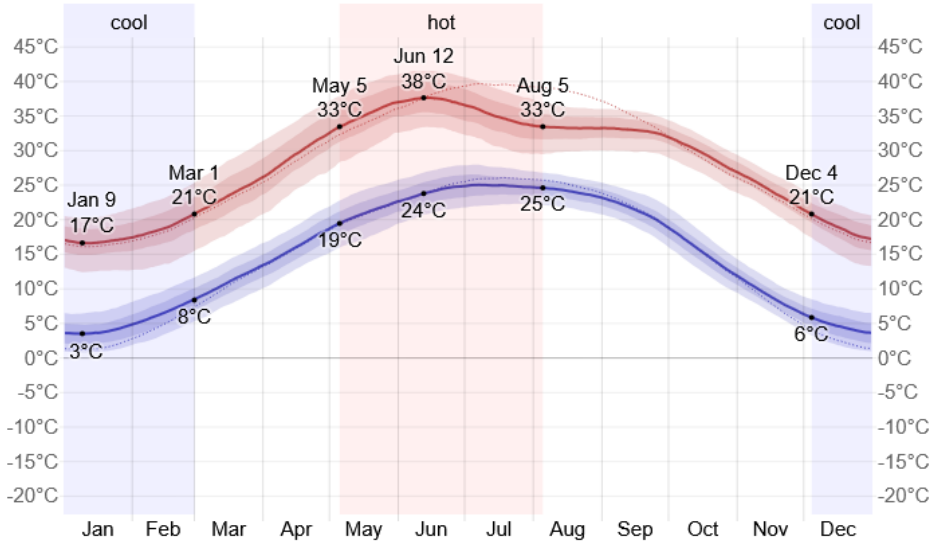


Figure 8: Average High and Low Temperature in Islamabad[10]

[9] © WeatherSpark.com
[10] © WeatherSpark.com

4.4.2 Precipitation

The project area receives rainfall mainly through two seasons: monsoon rainfall (July to September) and winter rainfall (generally December to April) associated with western disturbances. Monsoon rainfall is typically highest in July and August.

4.4.3 Wind Speed and Wind Direction

In Islamabad, winds generally vary seasonally; however, the prevailing wind direction is reported as westerly to northwesterly for most months, with southerly/southeasterly components during peak summer/monsoon months. Typical wind speeds are generally low to moderate (commonly a few knots), which supports dispersion of pollutants under normal conditions.

4.4.4 Relative Humidity

The mean relative humidity in summer is 60 - 80% while the mean relative humidity during winter is 70 - 90%.

Meteorological data of Islamabad sourced from Pakistan Meteorological Department is presented below.

MEAN MONTHLY TEMPERATURE (°C)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2020	9.1	13.3	16.2	21.1	25.7	28.7	30.1	29.1	27.1	22.2	15.0	11.5	20.8
2021	10.9	15.3	18.8	21.8	26.9	29.9	30.1	29.1	28.3	22.7	16.1	11.5	21.8
2022	10.5	12.7	20.7	26.2	29.1	30.4	28.5	29.0	27.6	22.4	16.2	12.3	22.1
2023	9.8	14.9	18.2	22.0	25.2	29.3	28.5	29.7	27.7	21.6	17.3	12.5	21.4
2024	10.3	12.1	17.0	21.0	27.9	31.8	30.4	28.1	28.2	23.8	17.7	11.1	21.6

MONTHLY AMOUNT OF PRECIPITATION (mm)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2020	111.5	65.5	236.8	118.0	131.6	89.0	219.5	398.7	96.0	0.0	92.8	21.2	1580.6
2021	11.7	8.0	104.0	50.0	41.8	122.7	298.5	123.7	222.8	196.7	TRACE	9.8	1189.7
2022	174.2	19.0	45.3	8.2	47.7	133.4	449.0	122.1	102.0	27.8	60.6	9.4	1198.7
2023	45.1	15.3	106.4	41.4	25.5	192.7	454.9	217.0	228.1	34.9	43.9	1.8	1407.0
2024	8.0	71.9	96.0	84.2	15.8	40.8	289.7	424.1	191.1	36.5	2.9	0.0	1261.0

MEAN MONTHLY RELATIVE HUMIDITY (MEAN) AT 0000 UTC (%)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2020	93.0	90.0	94.0	91.0	83.0	84.0	86.0	94.0	94.0	93.0	93.0	94.0	90.8
2021	91.0	88.0	83.0	78.0	79.0	76.0	86.0	90.0	92.0	91.0	93.0	92.0	86.6
2022	93.0	86.0	86.0	76.0	70.0	70.0	93.0	92.0	93.0	94.0	93.0	92.0	86.5
2023	91.0	85.0	90.0	83.0	78.0	82.0	91.0	92.0	92.0	92.0	94.0	91.0	88.4
2024	92.0	88.0	87.0	90.0	74.0	68.0	88.0	94.0	94.0	93.0	94.0	91.0	87.8

MEAN MONTHLY RELATIVE HUMIDITY (MEAN) AT 1200 UTC (%)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2020	55.0	42.0	57.0	46.0	39.0	41.0	51.0	66.0	56.0	47.0	61.0	63.0	52.0
2021	48.0	38.0	40.0	34.0	32.0	31.0	51.0	54.0	58.0	57.0	52.0	51.0	45.5
2022	61.0	44.0	39.0	28.0	31.0	30.0	69.0	62.0	59.0	55.0	65.0	53.0	49.7
2023	53.0	38.0	43.0	31.0	33.0	39.0	62.0	60.0	59.0	60.0	65.0	61.0	50.3
2024	59.0	38.0	41.0	44.0	28.0	32.0	60.0	72.0	63.0	65.0	69.0	55.0	52.2

MEAN MONTHLY WIND SPEED AT 0000 UTC (Knots)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2020	0.1	0.3	0.6	0.1	0.3	0.1	1.0	0.5	0.0	0.0	0.1	0.1	0.3
2021	0.0	0.1	0.2	0.7	0.1	0.0	0.4	0.1	0.0	0.3	0.0	0.0	0.2
2022	0.2	0.2	0.3	0.5	0.3	0.1	0.6	0.0	0.3	0.1	0.2	0.0	0.2
2023	0.0	0.3	0.2	0.3	0.0	0.3	0.3	0.0	0.4	0.5	0.1	0.0	0.2
2024	0.1	0.3	0.0	0.3	0.1	0.4	0.6	1.2	0.3	0.2	0.0	0.0	0.3

MEAN MONTHLY WIND SPEED AT 1200 UTC (Knots)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2020	1.1	2.1	2.3	2.1	1.1	0.9	2.7	1.2	0.5	0.2	0.1	0.2	1.2
2021	0.8	1.2	1.7	1.9	1.9	1.2	1.3	0.4	1.0	0.5	0.1	0.6	1.1
2022	0.8	1.7	2.5	2.0	4.1	2.6	0.5	1.4	0.7	1.0	0.3	0.4	1.5
2023	1.8	2.4	1.9	1.3	1.7	1.2	2.3	1.0	0.9	4.3	0.3	0.3	1.6
2024	0.3	2.5	2.0	2.4	2.5	3.1	3.1	1.2	1.0	0.3	0.1	0.5	1.6

MEAN MONTHLY WIND DIRECTION AT 0000 UTC

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2020	N45E	N45E	E	N45W	N	N45E	N27E	E	CALM	CALM	N45E	S45W	----
2021	CALM	N45E	W	N45W	S45E	CALM	E	N45E	CALM	N	CALM	CALM	----
2022	N45E	N45E	N68E	N45E	N81E	S45E	S23E	CALM	N45E	S45E	N45E	CALM	----
2023	CALM	S45W	CALM	S23E	CALM	S16W	S23E	CALM	N18E	CALM	N45E	CALM	----
2024	N45E	N45E	CALM	S45W	N45E	N56E	N50E	N9E	CALM	S45W	CALM	CALM	----

MEAN MONTHLY WIND DIRECTION AT 1200 UTC

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
2020	S52W	S44W	S41W	S28W	S49W	E	S50W	N76E	S52W	S60W	S45W	S72W	----
2021	S45W	S56W	S58W	S50W	S27W	S34W	S22E	S72W	S05W	CALM	S45W	S45W	----
2022	S59W	S47W	S38W	S41W	S23W	S39W	N72E	S45W	S45W	S37W	S18W	S56W	----
2023	S36W	S50W	S39W	S39W	S42W	S42W	S4W	S31W	S8W	S18W	S45E	S45W	----
2024	S45W	S45W	S51W	S34W	S48W	S33W	S6E	S6W	S45W	S45W	W	S45W	----

(Source: Pakistan Meteorological Department, Islamabad)

4.5 Biological Environment

A baseline ecological survey of the study area was conducted on 4 April 2026 through site reconnaissance, field observations, and visual assessment to identify existing floral and faunal components, ecological sensitivity, and potential environmental receptors within the project vicinity.

The objective of the survey was to document existing floral and faunal resources, identify any species of conservation concern, evaluate habitat characteristics along the alignment, and determine the potential for significant ecological impacts during construction and operation.

4.5.1 Flora (Vegetation):

The vegetation within the study area is generally sparse and reflects the characteristics of an urbanized residential environment with scattered plantation and naturally occurring native species. The floral composition of the project vicinity is predominantly represented by Dalbergia sissoo (Shisham), which is the dominant tree species observed within the study area.

During the field survey, a total of 21 mature Dalbergia sissoo trees were identified within the project area and its immediate surroundings. These trees contribute significantly to the existing urban greenery and ecological aesthetics of the site.

In addition to Dalbergia sissoo, a few scattered Pine trees (Pinus species) were also observed within the vicinity. The ground vegetation is mainly composed of common grasses and naturally occurring herbaceous species adapted to the local climatic conditions.

Among the herbaceous vegetation, Pepperweed (Lepidium latifolium) was identified as one of the major herb species present within the study area. In addition, the invasive weed species Parthenium (Parthenium hysterophorus) and Lantana camara were also observed in scattered patches within open and disturbed areas of the project vicinity. These species are commonly found in urban and peri-urban environments and typically colonize disturbed soils and vacant lands.

Native shrubs, seasonal herbs, and grasses were also observed in undeveloped portions of the site.

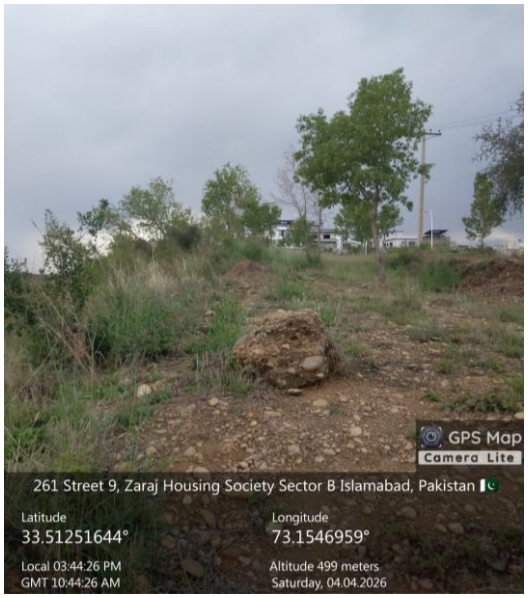
The vegetation cover in the study area primarily includes:

- Dominant Tree Species: *Dalbergia sissoo* (Shisham);
- Associated Tree Species: *Pinus* spp. (Pine trees);
- Major Herb Species: *Lepidium latifolium* (Pepperweed);
- Invasive Species: *Parthenium hysterophorus* and *Lantana camara*;
- Common grasses and native shrubs;
- Urban roadside plantation and ornamental vegetation.

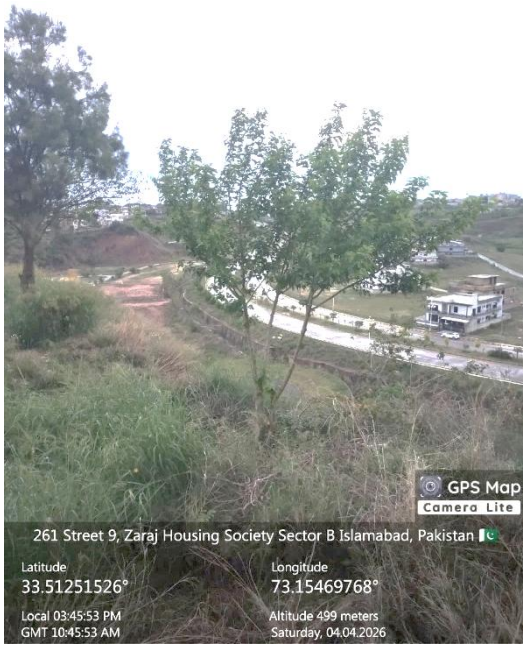
No rare, endangered, threatened or protected floral species were observed during the baseline ecological survey. Similarly, no dense forest patches or ecologically sensitive vegetation communities exist within the project footprint.

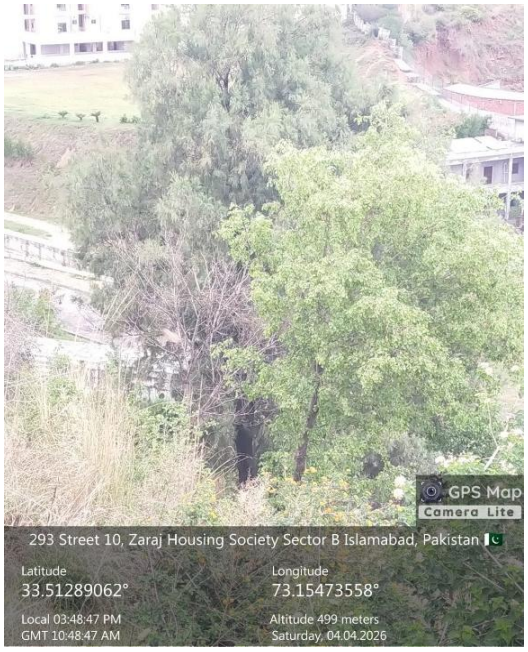
The proponent shall ensure maximum possible protection of the existing mature trees during construction activities. Any unavoidable vegetation disturbance shall be compensated through appropriate compensatory plantation and landscaping measures within the project premises in coordination with the relevant regulatory authorities, where required.

Tree Species in the Study Area

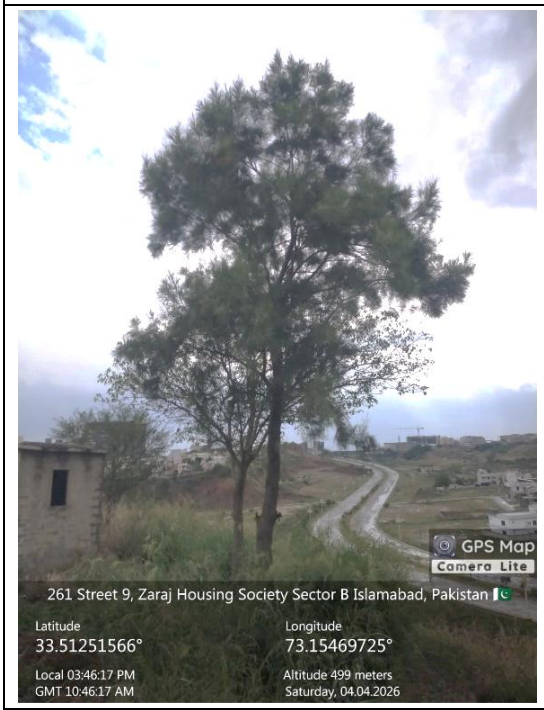


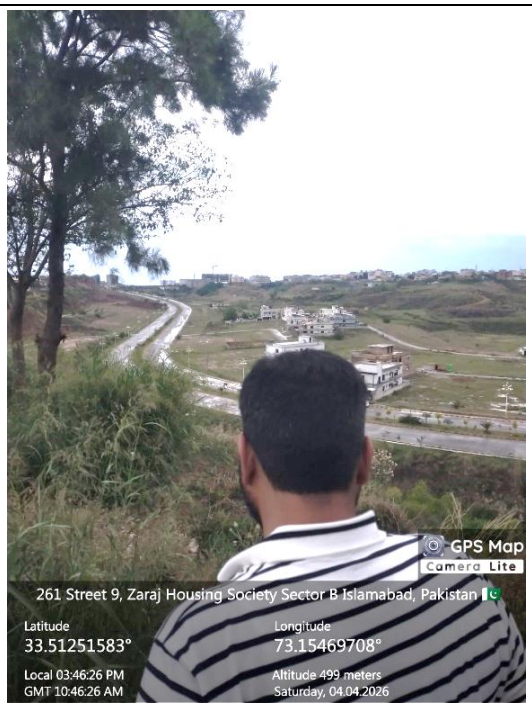
Dalbergia sissoo (Shisham)





Pine trees (Pinus species). & Dalbergia sissoo





Pine trees (Pinus species)

Herbs Species in the Study Area

	
Lepidium latifolium (Pepperweed)	*Common grasses and native shrubs*

Ecological Sensitivity – Flora

No rare, endangered, threatened or protected floral species were observed during the baseline ecological survey. Similarly, no dense forest patches or ecologically sensitive vegetation communities exist within the project footprint.

4.5.2 Fauna:

Continuous human activity, urban expansion, vehicular movement, and ongoing construction activities in adjacent areas have substantially influenced the natural habitat conditions of the locality.

The fauna observed within and around the study area mainly consists of common urban and peri-urban species adapted to disturbed environments. The recorded and commonly observed faunal species include:

- House Sparrow *(Passer domesticus);*
- Common Myna *(Acridotheres tristis);*
- Rock Pigeon *(Columba livia)*;
- House Crow *(Corvus splendens)*;
- Small reptiles and common insects;
- Domestic and stray animals commonly found in residential areas.

The seasonal Nullah located in front of the project site may occasionally attract common bird species and small fauna for temporary shelter and water availability during the monsoon season. However, no significant aquatic or wetland-dependent fauna were observed during the field survey.

No endangered, threatened, rare or legally protected wildlife species were identified within the project area or its immediate surroundings. Furthermore, no wildlife sanctuaries, migratory routes, breeding grounds, nesting habitats, or ecologically sensitive faunal habitats exist within the influence zone of the proposed project.

4.5.3 Protected Area

No notified protected forest, wildlife sanctuary, national park, Ramsar site, or legally designated conservation area lies within the project's direct or indirect area of influence.

4.6 Socio-Economic Baseline

This section describes the socio-economic setting of the project area based on site observations, consultation with Zaraj Housing Scheme management, and available secondary information. For this EIA, the socio-economic baseline has been described in terms of the micro-environment and macro-environment. The micro-environment includes the project site, its immediate surroundings, Zaraj Housing Scheme, and the urban/peri-urban setting of Zone-V, Islamabad, while the macro-environment represents the wider area of Islamabad Capital Territory.

4.6.1 Administrative Setting

Islamabad Capital Territory is administratively divided into five major planning zones, i.e., Zone-I, Zone-II, Zone-III, Zone-IV and Zone-V. The proposed Atrium Hills project is located in Zaraj Housing Scheme, Zone-V, Islamabad Capital Territory. Zone-V includes areas located toward the southern side of Islamabad and has experienced rapid residential, commercial and infrastructure development due to expansion of private housing schemes and improved road connectivity.

The project is located within a CDA-regulated private housing scheme and falls under the planning and regulatory jurisdiction of Islamabad Capital Territory / CDA, along with applicable Pak-EPA environmental approval requirements. The surrounding micro-environment includes multiple CDA-regulated and listed housing schemes in Zone-V.

4.6.2 Population and Demographic Profile

The project falls in Islamabad, the capital of Pakistan. According to the 7th Population and Housing Census (2023), the total population of Islamabad Capital Territory (ICT) is 2,363,863, with an overall population increase of approximately 18% compared to the 2017 census, and estimated average annual growth rate of about 2.8% during 2017–2023.

Table 7: Demographic Profile of Islamabad Capital Territory (Census 2023)

District	Male	Female	Transgender	All Sexes	Sex Ratio (M/100F)	Avg. Annual Growth (2017–2023)	Population Density	Household size	Area (sq.km)
Islamabad (Total)	1,247,693	1,115,900	270	2,363,863	112.60	≈ 2.8%	2609.1	5.75	906
Rural	662,940	591,842	209	1,254,991	109.80	≈ 3.0%			
Urban	584,753	524,058	61	1,108,872	116.03	≈ 2.6%			

4.6.3 Settlements and Land Use Characteristics

The proposed project is located within Sector B of Zaraj Housing Scheme, which is a planned residential housing scheme in Zone-V, Islamabad. As per the approved layout plan, Zaraj Housing Scheme includes residential plots, residential apartments, commercial areas, parks and green areas, community facilities, educational area, grand masjid, sewage treatment plant, road network and other supporting infrastructure. The scheme has a total area of 1,564 kanals and includes 1,418 residential plots.

Based on consultation with Zaraj Housing Scheme management and site observations, approximately 70–80% of the plots in the society are occupied, while some plots and buildings are still under development. The housing scheme has a developed internal road network, gated access and 24/7 security arrangements. The area is mainly residential in character; however, commercial and apartment-based developments are also present within and around the society.

Similar residential and mixed-use developments within Zaraj Housing Scheme include Rania Residency Blocks 1, 2 and 3, The Atrium Plaza, and ZETA Mall. These developments indicate that apartment buildings and residential-cum-commercial projects are already part of the existing built environment of the society. The surrounding broader area includes DHA Phase-II, Giga Mall, Aghosh Society, Jeddah Town, Bahria Town Phase-7, DHA Phase-III side and other residential/commercial developments.

4.6.4 Economic Activity and Livelihoods

The local economy of the project micro-environment is mainly linked with residential services, commercial activity, construction, education, healthcare, retail, transport, security services and small businesses. Within Zaraj Housing Scheme, commercial plazas and shops provide daily-use items and routine services to residents. ZETA Mall is also present within the society, while Giga Mall is located just opposite Zaraj Housing Scheme and serves as a major commercial and shopping facility for the surrounding population.

At the Zone-V level, economic activity is strongly influenced by housing development, construction work, commercial plazas, educational institutions, healthcare facilities, retail markets, transport connectivity and industrial and warehouse/service facilities in Kahuta Industrial Triangle. The project area is well connected with Rawalpindi and Islamabad through Main GT Road (N-5) and Islamabad Expressway, which supports commuting, business activity and access to employment centers. The proposed project is expected to add further residential demand and will also generate temporary construction employment and long-term operation-related jobs for building management, security, maintenance, housekeeping and utility services.

4.6.5 Community Facilities and Public Services

Zaraj Housing Scheme has access to basic community and public services within the society and in its nearby surroundings. According to site information and consultation, the society includes private schools, commercial plazas, clinics, community facilities, green/open areas, internal roads, security arrangements and utility infrastructure. Two private schools are present in the society, including SLS and The Smart Lyceum. Yusra Medical & Dental College is also located in Zaraj Housing Society and is partly functional. PMDC's information identifies Yusra Medical & Dental College as located in Zaraj Housing Society, opposite DHA Phase-II Gate III.

A few private clinics are also present within the housing scheme. For larger commercial and shopping needs, residents have access to ZETA Mall inside/near the society and Giga Mall opposite the society. Major hospitals, educational facilities and commercial areas are also accessible in nearby DHA, Bahria Town, Rawalpindi and Islamabad urban areas.

4.6.6 Water Supply

Zaraj Housing Scheme has its own water supply arrangements for residential houses. As per information obtained from Zaraj Management Committee, the society is currently operating seven tube wells and also supplements the supply through tanker water supply, generally about 3–4 tankers per day, to meet the water requirement of the society. Water supply lines have been

provided to individual houses, and water meters are installed at each house. The responsibility for providing water supply to houses within the society rests with Zaraj Housing Scheme management.

However, the society's water supply system is mainly intended for individual residential houses. Multistorey buildings, apartment complexes and commercial plazas within Zaraj Housing Scheme generally arrange their water supply independently through tanker supply. Therefore, the proposed Atrium Hills project will also arrange its water supply through tanker supply during operation. No bore well or direct use of the society's water supply system is proposed for the project.

Since the project will not abstract groundwater through its own bore well and will not rely on the society's house-level water supply system, it is not expected to directly impact the existing local water resources or domestic water supply arrangement of Zaraj Housing Scheme.

4.6.7 Solid Waste Management

Domestic solid waste management in Zaraj Housing Scheme is being handled through a waste contractor hired by the society management. Color-coded waste bins have been provided within the society, and the contractor collects domestic waste from individual houses, designated waste collection points of apartment buildings, and commercial plazas on a daily basis.

The same arrangement will be applicable for the proposed Atrium Hills project. Within the building, internal waste collection, temporary storage and transfer of waste to the designated main collection point will be the responsibility of Atrium Hills / Building Management Committee. The society's waste contractor will collect waste from the main waste collection point for further disposal in accordance with the existing waste management arrangement of Zaraj Housing Scheme.

4.6.8 Tribes, Ethnic Groups and Languages

The population of Zaraj Housing Scheme is mostly composed of residents who have shifted from different parts of Islamabad, Rawalpindi and other regions of Pakistan. The area therefore reflects the mixed urban demographic character of Islamabad and Rawalpindi, rather than a single traditional tribal or rural community structure.

The broader Islamabad population includes people from different provinces and regions of the country, including Punjabis, Pothoari-speaking communities, Pashtuns, Kashmiris, Urdu-speaking families and other ethnic groups. Urdu is the main language used for general communication, while Punjabi, Pothoari, Pashto, Hindko and other regional languages are also spoken within households and communities. No distinct indigenous, tribal or minority settlement was identified within the immediate project area during site observations.

4.6.9 Housing and Living Conditions

Zaraj Housing Scheme is a planned gated residential community with developed road infrastructure, residential plots, apartment buildings, commercial plazas, parks/green areas and community facilities. Housing conditions in the society are generally urban in character and include completed houses, under-construction houses, apartment buildings and residential-cum-commercial developments. The presence of occupied houses, apartment blocks, schools, clinics, commercial plazas and shopping facilities indicates that the society is already functioning as a developed residential area.

The proposed Atrium Hills project is located in this planned housing environment and is consistent with the existing residential and apartment-based development pattern of the scheme. The project will not involve displacement of any settlement or household, as the plot is undeveloped and already allotted for residential apartment development.

4.6.10 Transport and Accessibility

The project area has good road connectivity through the internal road network of Zaraj Housing Scheme and regional roads. Zaraj Housing Scheme is connected with Rawalpindi and Islamabad through Main GT Road (N-5) and Islamabad Expressway.

The proposed project site is located on Major Road, Sector B, which will serve as the normal operational access road for Atrium Hills. The west-side service path will not be used for normal operation and will only be used for emergency evacuation. The area is accessible from Rawat Interchange, Saddar Rawalpindi, Zero Point Islamabad and Islamabad International Airport through the wider road network. Existing road connectivity supports residential use, but construction traffic and operational traffic will need to be managed through proper access and parking arrangements.