

5. STAKEHOLDER CONSULTATION

Stakeholder consultation was carried out as part of the EIA process to inform relevant stakeholders about the proposed Atrium Hills Residential Apartment Complex, understand their concerns, and incorporate their feedback into the impact assessment and mitigation planning. Consultations were conducted with both primary and secondary stakeholders during April 2026.

Primary stakeholders included the Zaraj Housing Scheme Management Committee, nearby residents of Sector B, residents/management of nearby apartment buildings, and other community members within Zaraj Housing Scheme. These stakeholders were consulted to understand local concerns related to land use, construction disturbance, slope stability, drainage, water supply, privacy, scenic view, construction quality, waste management and overall community safety.

Secondary stakeholders included relevant regulatory and technical stakeholders, including Pak-EPA, CDA Environment Wing and academia. These consultations focused on regulatory compliance, environmental approval requirements, baseline monitoring, green building design considerations, rainwater harvesting, groundwater recharge, tree protection/compensatory plantation, waste management, and sustainable design measures.

The feedback received during consultation has been considered in the EIA, particularly in relation to construction dust and noise control, traffic and access management, slope stabilization, protection of adjacent properties, stormwater drainage, water supply through tankers, wastewater connection to the society system, solid waste management, occupational health and safety, community safety, and fire and life safety arrangements.

5.1 Objectives of Stakeholder Consultation

The stakeholder consultation process was undertaken to:

- Inform stakeholders about the proposed Atrium Hills Residential Apartment Complex, its key components, construction activities and operational arrangements.
- Understand stakeholder perceptions, concerns and expectations related to land use, construction disturbance, access, privacy, drainage, slope stability, water supply, waste management and community safety.
- Obtain feedback from nearby residents, society management and relevant institutional stakeholders for incorporation into the EIA, impact assessment and mitigation planning.
- Identify practical measures to avoid, minimize or manage potential adverse impacts during construction and operation.
- Support transparency and informed decision-making as part of the environmental approval process.

5.2 Stakeholder Identification

Stakeholders were identified based on the location of the project site, immediate surroundings, likely construction and operational impacts, and institutional roles relevant to environmental approval, planning and compliance. For clarity, stakeholders have been grouped into **primary** and **secondary** stakeholders.

Primary stakeholders include those who are directly linked with the project area or may experience direct or temporary impacts during construction and operation. These include

nearby residents, residents/management of nearby apartment buildings, Zaraj Housing Scheme Management Committee, and other community members within the society.

Secondary stakeholders include regulatory bodies, government departments, academia, professionals and institutions having interest or role in environmental compliance, planning, public safety, community services and sustainable development.

5.3 Consultation Methodology

Stakeholder consultations were carried out through meetings, informal discussions, and one-to-one interactions with relevant stakeholders. The consultations were conducted in the project area and with selected institutional stakeholders to understand their views regarding the proposed Atrium Hills Residential Apartment Complex.

During consultation, the stakeholders were briefed about the project location, proposed building configuration, construction activities, access arrangements, utilities, environmental design measures and likely construction and operational impacts. The discussion was kept in simple and non-technical language to ensure clear understanding by community members.

Feedback received from stakeholders was recorded and considered during impact assessment and mitigation planning. The consultation process was conducted in a practical manner to document genuine project-related concerns and avoid creating unrealistic expectations among stakeholders.

5.4 Consultation with Primary Stakeholders

Consultations with primary stakeholders were conducted during April 2026 with stakeholders located within and around the project area. The consulted stakeholders included the Zaraj Housing Scheme Management Committee, residents of nearby houses in Sector B, residents/management of nearby apartment buildings, and other community members of Zaraj Housing Scheme.

The list of consulted primary stakeholders is provided in the table below.

Table 8: Primary Stakeholders Consulted

c	Stakeholder	Person Consulted	Date
1.	Management Committee of Zaraj Housing Scheme	Col. (R) Tariq Rehman Malik Administrator Management Committee	04 April 2026
2.	Management Committee of Rania Residency Block 1, 2 and 3	Ms. Afifa Manager Admin Management Committee	04 April 2026
3.	Residents	Jawad Nasim and Ammad Nasim House number 270, street 10, Sector B (opposite to the project on west side) Zeeshan Kanwar House number 238B, Street 9, Sector B (opposite to the project on west side) Col. Murad Shabir House number 237B, street 8, Sector B (opposite to the project on west side) Gulshair Ahmed Khan House number B1, Street 10, Sector B Murtaza Jamal House 264B, Street 9, Sector B	11 April 2026

		Malik Azhar Sector C 300	
		Raja Iftikhar Hussain Sector A 66	

Feedback of Primary Stakeholders

The feedback received from primary stakeholders has been grouped into three main categories: Zaraj Housing Scheme Management Committee, Rania Residency Management, and nearby residents/community members. Overall, the Zaraj Management Committee and Rania Residency Management did not object to the proposed project, subject to compliance with CDA, society and EPA requirements. Most residents also did not object to the project; however, two nearby residents raised concerns related to scenic view, privacy, cross ventilation, water supply, and possible disturbance during construction and operation.

Table 9: Summary of Feedback from Primary Stakeholders

Stakeholder Category	Main Concerns / Feedback	Suggestions / Required Measures
Zaraj Housing Scheme Management Committee	The project site is designated for apartment complex development. Allotment and possession letters have been issued to the Proponent. The society has no objection to the construction of the project, provided that the Proponent complies with the guidelines and bylaws of Zaraj Housing Scheme and CDA.	The project shall comply with society bylaws, CDA requirements and applicable environmental conditions. Water supply shall be arranged through tankers, as multistorey buildings and commercial plazas in the society arrange their own water supply. Wastewater shall be connected to the existing sewerage system leading to the society's WWTP. Solid waste shall be managed internally by Atrium Hills and handed over at the main waste collection point for collection by the society's waste contractor.
Rania Residency Management Committee	No objection was raised on the proposed project. It was expected that the project will be constructed as per society and CDA guidelines and will provide a good living standard to residents.	The project shall follow EPA environmental guidelines during construction. Noise control measures shall be adopted, and nighttime construction should be avoided.
Nearby residents / community members	Most residents did not object to the project if it has been approved by the society and relevant authorities. General concerns included construction quality, compliance with society guidelines, affordability of apartments, and good construction material.	The project shall follow society and CDA guidelines, use good quality construction material, and maintain proper construction practices.
Nearby residents on western side /	Concerns were raised regarding slope stability, possible damage to adjoining properties, rainwater drainage, soil subsidence, privacy	Slope stability shall be ensured through proper engineering design and construction controls. Drainage shall be properly planned to avoid obstruction, water accumulation

service path side	during construction, and workers sitting in green areas in front of houses.	and soil subsidence. Privacy of nearby houses shall be maintained, and workers shall not be allowed to sit or gather in green areas near residences. In case of any damage due to project activities, the matter shall be addressed through appropriate corrective/compensation mechanism.
	One resident stated that the project plot appears to be part of green area and questioned its status in the approved master plan. Concerns were also raised regarding obstruction of aesthetic/scenic view and water supply arrangement for such a large project.	The project shall clearly demonstrate that the plot is designated for residential apartment development as per approved LOP. The Proponent should ensure proper communication with nearby residents, compliance with approved plans, good architectural/finishing standards, proper drainage and maintenance, privacy-sensitive design/operation where feasible, and effective construction-stage management to reduce dust, noise, disturbance and safety risks.
	Another resident raised serious concern that the project may block the scenic view and affect cross-ventilation of his house. Additional concerns included construction disturbance, noise, privacy during construction and operation, orientation of balconies, and possible seepage/maintenance issues during operation.	

The feedback received from primary stakeholders has been considered in the impact assessment and mitigation planning of this EIA. Particular attention has been given to concerns related to slope stability, protection of nearby properties, stormwater drainage, privacy, construction noise and dust, water supply, waste management, construction quality, and scenic/aesthetic view.

5.5 Consultation with Secondary Stakeholders

Consultations with secondary stakeholders were conducted to obtain views from relevant regulatory, technical and institutional stakeholders. The consulted secondary stakeholders included representatives / officials from Pak-EPA, CDA Environment Wing and academia.

The consultations mainly focused on regulatory compliance, environmental approval requirements, baseline monitoring, protection of the adjacent nullah / stormwater drain, green building design considerations, rainwater harvesting, groundwater recharge, tree protection / compensatory plantation, construction-stage environmental management, solid waste management, wastewater disposal, and fire and life safety arrangements.

The feedback received from secondary stakeholders has been incorporated into the EIA, particularly in relation to environmental monitoring, mitigation measures, stakeholder concerns, project design considerations, and the Environmental Management and Monitoring Plan (EMMP).

Table 10: Secondary Stakeholders Consulted

Sr.#	Stakeholder	Person Consulted	Date
1.	Pakistan EPA	Mr. Muhammad Ramzan, Deputy Director Legal, Pak-EPA	14 April 2026
2.	CDA Environment Wing	Dr. Nafees, DD, Environment Wing, CDA	14 April 2026
3.	International Islamic University Islamabad	Dr. Syeda Maria Ali, Chairperson, Department of Environmental Science	15 April 2026
		Dr. Sara Aamir Lecturer Department of Environmental Science	

Feedback of Secondary Stakeholders

Feedback from secondary stakeholders was obtained from relevant regulatory, technical and academic stakeholders. The consultation mainly focused on environmental approval requirements, baseline monitoring, green building design considerations, water conservation, groundwater recharge, tree protection, waste management, and sustainable design measures.

Table 11: Summary of Feedback from Secondary Stakeholders

Stakeholder	Main Concerns / Feedback	Suggestions / Required Measures
Pakistan Environmental Protection Agency (Pak-EPA)	Pak-EPA emphasized that stakeholder consultation must be carried out with both primary and secondary stakeholders. Baseline environmental monitoring should be conducted at the project site. The Proponent shall ensure compliance with applicable environmental laws during construction and operation.	Construction shall not be started before obtaining environmental approval from Pak-EPA. Baseline monitoring, stakeholder consultation, mitigation measures and environmental management requirements shall be properly covered in the EIA.
CDA Environment Wing	CDA Environment Wing emphasized incorporation of green building concepts in the project design and implementation of these provisions during construction and operation. Rainwater harvesting and groundwater recharge provisions were specifically recommended. Compliance with CDA bylaws was also highlighted.	The project shall incorporate and implement green building/resource efficiency measures, including rainwater harvesting and groundwater recharge. Tree cutting shall be avoided as far as possible; where unavoidable, compensatory plantation shall be carried out. Proper waste collection and disposal arrangements shall also be ensured.
International Islamic University Islamabad (IIUI), Department of Environmental Science	The academic stakeholders highlighted that Islamabad is already facing water shortage issues, and the existing water resources of the society should not be affected. They also supported	The project shall arrange adequate water supply without affecting existing society water resources. Rainwater harvesting and groundwater recharge shall be implemented. Compensatory plantation shall be carried out effectively and

	rainwater harvesting, groundwater recharge, compensatory plantation, eco-design, green building and sustainable development approaches.	survival of plants shall be ensured. The project should also participate in plantation drives. Suggested design measures included glazed glass, heat-resistant paint, improved mechanical ventilation, rooftop/balcony gardening, and outer shades for air conditioners.
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5.6 Project Response and Consideration of Stakeholder Concerns

The concerns and suggestions received from primary and secondary stakeholders have been reviewed and incorporated into the project planning, impact assessment and mitigation measures, where applicable. The project response to the main issues raised during consultation is summarized below.

S. No.	Concern / Suggestion	Project Response / Consideration in EIA
1.	Compliance with EPA, CDA and society requirements	The project will be implemented in accordance with applicable EPA approval conditions, CDA requirements, approved building plans and relevant bylaws of Zaraj Housing Scheme. Construction will not be initiated before obtaining environmental approval from Pak-EPA.
2.	Slope stability and protection of nearby properties	The project site will require excavation, cutting and grading. Excavation faces and cut slopes will be stabilized through properly designed RCC retaining walls / slope stabilization walls as per the approved structural design and geotechnical requirements. Construction will be carried out in a controlled manner to avoid damage to adjacent properties.
3.	Rainwater drainage, soil subsidence and obstruction of natural drainage	The project design and construction planning will ensure proper stormwater management. Drainage paths will not be obstructed, and runoff will be controlled to avoid erosion, water accumulation, soil subsidence and discharge of silt/debris into the adjacent nullah / stormwater drain.
4.	Water supply for the project	The operational water requirement of Atrium Hills will be managed through tanker supply. The project will not use the existing society water supply system meant for houses and no bore well is proposed. Therefore, the project is not expected to directly affect the existing water supply arrangement of Zaraj Housing Scheme.
5.	Wastewater disposal	Domestic wastewater from the project will be connected to the existing sewerage system of Zaraj Housing Scheme, which leads to the society's wastewater treatment plant. The connection and disposal arrangement will be coordinated with the society management.
6.	Solid waste management	Internal waste collection and temporary storage within the building will be managed by Atrium Hills / Building Management Committee. Waste will be transferred to the designated main waste collection point, from where the society's waste contractor will collect it under the existing waste management arrangement.

7.	Construction dust, noise and disturbance	The contractor will be required to implement dust suppression, proper housekeeping, covering of construction materials, controlled vehicle movement, equipment maintenance and noise control measures. Nighttime construction will be avoided as far as possible, especially for high-noise activities.
8.	Privacy of nearby houses during construction and operation	Construction workers will not be allowed to sit or gather in the green areas in front of nearby houses. Site access and worker movement will be controlled. Privacy-related concerns during operation will be addressed through proper building management and use of approved architectural design.
9.	Scenic view / aesthetic concerns	Concerns regarding scenic view and visual obstruction have been noted. The project plot is designated for residential apartment development as per the approved LOP of Zaraj Housing Scheme. The project will be developed according to approved plans, and building finishing, landscaping and maintenance will be important to reduce adverse visual impacts.
10.	Green building design and resource efficiency	The project includes green building/resource efficiency measures such as rainwater harvesting, rainwater recharge well, rooftop solar system, passive ventilation/cooling through atrium design, EV charging points at each floor. In addition, the project will also develop and maintain around 8 Kanals of lush green park in neighborhood.
11.	Tree cutting and compensatory plantation	Tree cutting will be avoided as far as possible. Where removal of trees is unavoidable, compensatory plantation will be carried out. Survival and maintenance of planted trees will be ensured through proper landscaping and maintenance arrangements.
12.	Construction quality and use of good materials	The project will be constructed in accordance with approved structural, architectural and MEP designs, applicable building codes, CDA requirements and standard engineering practices.
13.	Fire and life safety	Fire and life safety provisions have been incorporated in the project design, 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.
14.	Sustainable design suggestions from academia	Suggestions related to eco-design, heat-resistant materials, ventilation, rooftop/balcony gardening and energy efficiency have been noted. Relevant and feasible measures have been considered under environmental design and resource efficiency measures of the project.

Consultation Pics



Col. (R) Tariq Rehman Malik (Administrator), Management Committee, Zaraj Housing Scheme



Jawad Nasim, house number 270, street 10,
Sector B



Gulshair Ahmed Khan, house number B1, Street
10, Sector B



Malik Azhar, Sector C 300 and Raja Iftikhar
Hussain, Sector A 66



Zeeshan Kanwar, House number 238B, Street 9,
Sector B



Dr. Sara Aamir (Lecturer) and Dr. Syeda Maria Ali (Chairperson), Department of Environmental Science, International Islamic University Islamabad

6. ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

This chapter identifies and assesses the potential environmental impacts associated with the proposed Atrium Hills Residential Apartment Complex during the pre-construction, construction and operational phases. The chapter also recommends practical mitigation measures to avoid, minimize or control adverse impacts and to enhance positive environmental outcomes of the project.

The term “impact” in this EIA refers to any change in the existing environmental condition resulting from project activities. Impacts may be adverse or beneficial, temporary or long-term, direct or indirect, and localized or wider in extent. The assessment is based on project design information, baseline environmental conditions, site observations, stakeholder consultations and professional judgment.

The key environmental issues considered in this assessment include site preparation, excavation, slope stabilization, excavated material management, construction waste, air quality, noise and vibration, traffic and access, stormwater drainage and protection of adjacent nullah/stormwater drain, water demand, wastewater disposal, solid waste management, occupational health and safety, community health and safety, energy use, generator emissions, fire and life safety, and resource efficiency measures.

6.1. Impact Assessment Methodology

The impact assessment methodology adopted for this EIA involved identification of project activities likely to interact with the physical, biological and socio-economic environment. The assessment considered the project location, surrounding receptors, terraced/level-based site condition, construction activities, operational requirements, and environmental sensitivities of the project area.

Potential impacts were identified for the following project phases:

- Pre-construction phase;
- Construction phase; and
- Operational phase.

Each impact has been assessed on the basis of its likely source, nature and significance. For this EIA, the impact significance has been described using the following criteria:

Assessment Criterion	Description
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Duration	Short-term or long-term
Extent	Localized or wider
Significance	Low, moderate or high
Residual Impact	Expected remaining impact after mitigation

The entire assessment process was designed to provide a complete evaluation of impacts on the physical, biological, and socio-economic environment. The methodology included identification of risks and hazards associated with project activities through:

- Review of applicable regulatory guidelines and use of a checklist matrix;
- Analysis of information obtained from site surveys, ecological assessments, laboratory results, and stakeholder consultations;

- Professional judgment to assess the magnitude and significance of potential environmental and social impacts, including expert input where required;
- Identification and definition of mitigation measures to reduce impacts to as low as reasonably practicable;
- Prediction of residual impacts, considering long-term and short-term, direct and indirect, and beneficial and adverse impacts.

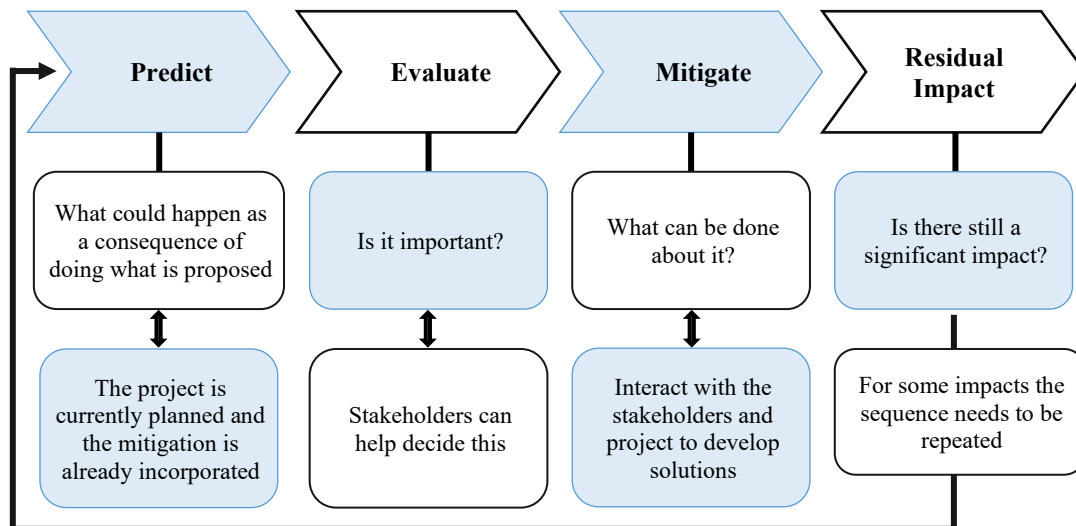


Figure 9: Impact Assessment Strategy

6.2. Screening of Potential Impacts during the Pre-Construction Phase

The pre-construction phase mainly includes finalization of project design, regulatory approvals, contractor selection, site planning, utility coordination and preparation for construction activities. At this stage, physical construction impacts are not expected; however, inadequate planning may result in design, safety, environmental compliance and community-related issues during later stages of the project.

6.2.1 Regulatory Approval and Compliance Requirements

Before commencement of construction, the Proponent is required to obtain environmental approval from Pak-EPA and other applicable approvals / permissions from relevant authorities. If construction activities are initiated without completing the required regulatory process, it may result in non-compliance with applicable environmental laws, delay in project implementation and regulatory action.

This impact is mainly related to project planning and compliance. The impact is direct, short-term and localized, while its significance is assessed as moderate, as non-compliance may affect project approval and implementation.

Mitigation Measures

- Construction activities shall not be initiated before obtaining environmental approval from Pak-EPA.
- The project shall comply with all conditions of environmental approval issued by Pak-EPA.
- Required approvals / clearances from CDA, Zaraj Housing Scheme and other relevant authorities shall be obtained before construction.
- Approved building plans, fire safety provisions, utility arrangements and environmental design commitments shall be followed during implementation.

- The Proponent shall ensure that environmental approval conditions are communicated to the contractor before mobilization.

Residual Impact

After obtaining required approvals and ensuring compliance with regulatory conditions, the residual impact is expected to be low.

6.2.2 Building Design, Environmental and Safety Considerations

The proposed project involves development of a G+20-storey residential apartment complex on a plot having significant variation in ground levels. If environmental, structural and safety considerations are not properly incorporated at the design stage, it may result in issues related to stormwater drainage, slope stability, fire and life safety, wastewater disposal, solid waste management, traffic circulation, parking, emergency access and utility management during construction and operation.

The impact is direct, long-term and project-specific. Its significance is assessed as moderate, because design-stage gaps may create long-term operational, environmental and safety issues.

Mitigation Measures

- Final building design shall incorporate environmental and resource efficiency measures, including rainwater harvesting, rainwater recharge well, rooftop solar, passive ventilation / cooling, EV charging points and green/open area development.
- Fire and life safety provisions shall be implemented as per the approved fire-fighting design, applicable NFPA standards, BCP-2016 and CDA requirements.
- Stormwater drainage shall be designed to avoid uncontrolled runoff, erosion and discharge of silt or waste into the adjacent nullah / stormwater drain.
- Wastewater disposal arrangement shall be coordinated with Zaraj Housing Scheme for connection with the society sewerage system leading to WWTP.
- Solid waste collection points and internal waste handling arrangements shall be incorporated in building management planning.
- Access and parking arrangements shall be implemented in line with approved plans and Traffic Impact Assessment recommendations.
- The building shall be designed in accordance with applicable CDA building control requirements and approved architectural, structural and MEP drawings.

Residual Impact

With proper incorporation of environmental, structural and safety considerations in the final design, the residual impact is expected to be low.

6.2.3 Seismic Design, Foundation Design and Slope Stabilization Planning

The project site has a terraced / level-based condition with significant variation in ground levels. Improper planning of foundation design, seismic design, excavation support or slope stabilization may create risks during construction and operation, including slope instability, settlement, unsafe excavation faces, damage to nearby properties and long-term structural safety concerns.

As per the project-specific geotechnical investigation, the project area falls within Seismic Zone 2B under the Building Code of Pakistan – Seismic Provisions, 2007. The report recommends design consideration for horizontal peak ground acceleration of 0.16g to 0.24g and classifies the site as Site Class C: Very Dense Soil and Soft Rock. These findings are important for

structural design, foundation selection, retaining structures and seismic safety of the proposed high-rise building.

The impact is direct, long-term and localized, with moderate to high significance if not properly addressed at the design and planning stage.

Mitigation Measures

- Structural and foundation design shall incorporate the recommendations of the project-specific geotechnical investigation.
- Seismic design shall be carried out as per Building Code of Pakistan – Seismic Provisions, 2007 and applicable structural design standards.
- Foundation design shall be finalized by qualified structural / geotechnical engineers based on soil conditions, bearing capacity, settlement criteria and building loads.
- Excavation faces and cut slopes shall be stabilized through properly designed RCC retaining walls / slope stabilization walls.
- Temporary construction-stage stabilization measures such as shoring, benching, bracing, soil nailing, shotcrete support or other suitable systems shall be adopted where required.
- Drainage behind retaining structures and along excavated faces shall be properly designed to avoid water pressure build-up and slope instability.

Residual Impact

With proper seismic design, foundation design and slope stabilization planning, the residual impact is expected to be low to moderate during construction and low during operation.

6.2.4 Vegetation Management Prior to Site Clearance

The project site is currently undeveloped and consists of natural vegetation and a few mature trees of *Dalbergia sissoo* (Shisham). Site clearance without prior planning may result in unnecessary removal of vegetation and trees, loss of local greenery and disturbance to the existing site condition.

The impact is direct, localized and long-term in case of tree removal. The significance is assessed as moderate, considering the limited but visible vegetation present on the site.

Mitigation Measures

- Tree cutting shall be avoided as far as possible during site planning and construction layout finalization.
- A tree inventory shall be prepared before site clearance.
- Trees that do not directly conflict with construction shall be protected.
- Where tree removal is unavoidable, compensatory plantation shall be carried out within the project area / green park area or other suitable locations in coordination with relevant authorities / society management.
- Survival of compensatory plantation shall be ensured through watering, protection and maintenance.
- Unnecessary vegetation clearance outside the approved construction footprint shall be prohibited.

Residual Impact

With tree protection and compensatory plantation, the residual impact is expected to reduce to low.

6.2.5 Stakeholder Information and Grievance Handling before Construction

If nearby residents and society management are not informed before construction activities, it may result in complaints, misunderstanding and community concerns regarding construction disturbance, privacy, traffic, slope stability, drainage and safety. Stakeholder consultation has already identified concerns from nearby residents, particularly regarding scenic view, privacy, slope stability, drainage and construction disturbance.

The impact is indirect, short-term and localized, with moderate significance if communication is not maintained.

Mitigation Measures

- The Proponent / contractor shall maintain coordination with Zaraj Housing Scheme Management Committee before and during construction.
- Nearby residents shall be informed before start of major construction activities, especially excavation, heavy vehicle movement and high-noise works.
- A project-level complaint / grievance register shall be maintained at site.
- Contact details of the responsible site representative shall be shared with society management.
- Complaints shall be recorded, reviewed and addressed in a timely manner.
- Construction workers shall be instructed not to sit, gather or create disturbance in green areas or near nearby houses.

Residual Impact

With timely information sharing and grievance handling, the residual impact is expected to be low.

6.3. Screening of Impacts during the Construction Phase

The construction phase is expected to generate the most significant temporary environmental impacts due to site clearance, excavation, cutting, grading, structural works, material movement, machinery operation and workforce presence.

Overall, the construction-phase impacts are expected to be manageable through good construction practices and implementation of standard environmental and occupational health and safety measures.

6.3.1 Site Clearance and Vegetation / Tree Removal

The project site is presently undeveloped and consists of natural vegetation and a few mature trees of *Dalbergia sissoo* (Shisham). Site clearance will be required prior to excavation and construction. If vegetation clearance and tree removal are not properly managed, it may result in loss of local greenery, reduction in visual quality, disturbance to existing site condition and unnecessary removal of trees.

The impact is direct, localized and long-term where tree removal is involved. Considering the limited number of mature trees present at the site, the impact significance is assessed as moderate.

Mitigation Measures

- Tree cutting shall be avoided as far as possible in the surroundings of the project site.
- A tree inventory shall be prepared before site clearance.
- Trees not falling within the construction footprint shall be protected.

- Unnecessary vegetation clearance outside the approved construction area shall be prohibited.
- Where tree removal is unavoidable, compensatory plantation shall be carried out within the project green/open area or at suitable locations in coordination with Zaraj Housing Scheme / relevant authority.
- Planted trees shall be properly watered, protected and maintained to ensure survival.

Residual Impact

With controlled site clearance and compensatory plantation, the residual impact is expected to reduce to low.

6.3.2 Excavation, Cutting, Grading, Slope Stability and Change in Site Levels

The project site has a terraced/level-based condition with significant variation in ground levels. Construction will require excavation, cutting, grading and formation of suitable construction levels. These activities may disturb the existing landform and create temporary risks related to slope instability, unsafe excavation faces, localized soil erosion, settlement, and potential damage to nearby properties if not properly planned and controlled.

The impact is direct, localized and short to medium-term during construction. Due to the scale of excavation and level difference across the site, the impact significance is assessed as moderate to high before mitigation.

Mitigation Measures

- Excavation, cutting and grading shall be carried out as per the approved engineering design.
- Recommendations of the geotechnical investigation shall be incorporated in excavation, foundation and retaining structure design.
- Excavation faces and cut slopes shall be stabilized through properly designed RCC retaining walls / slope stabilization walls.
- Temporary stabilization measures such as shoring, benching, bracing, soil nailing, shotcrete support or other suitable systems shall be adopted where required.
- Excavation shall be carried out in a controlled and phased manner.
- Excessive surcharge loads near excavation edges shall be avoided.
- Drainage shall be provided to avoid water accumulation behind retaining structures or along excavation faces.
- Regular inspection of excavation faces, retaining works and adjacent properties shall be carried out during construction.

Residual Impact

With proper geotechnical design, controlled excavation and slope stabilization measures, the residual impact is expected to reduce to low to moderate during active earthworks.

6.3.3 Generation and Management of Excavated Material

Excavation, cutting and grading will generate a considerable quantity of excavated soil and rock/earth material. If excavated material is not properly managed, it may cause dust generation, obstruction of access roads, visual nuisance, blockage of drainage paths, and risk of material entering the adjacent nullah/stormwater drain.

The impact is direct, localized and short-term, but considering the expected excavation requirements, the significance is assessed as moderate.

Mitigation Measures

- Suitable excavated material shall be reused for backfilling, leveling, landscaping or other approved project uses, where technically feasible.
- Surplus excavated material shall be transported to approved / designated disposal or reuse sites designated by Zaraj Housing Scheme / CDA.
- Temporary stockpiles shall be placed away from the adjacent nullah/stormwater drain and nearby houses.
- Stockpiles shall be covered or sprinkled with water to minimize dust.
- Excavated material shall not be dumped on roads, green areas, service paths or drainage channels.
- Transportation of excavated material shall be carried out through covered vehicles, where required.
- Records of disposal / reuse locations shall be maintained by the contractor.

Residual Impact

With proper reuse, controlled stockpiling and disposal at approved locations, the residual impact is expected to be low.

6.3.4 Soil Erosion, Silt-Laden Runoff and Impact on Adjacent Nullah / Stormwater Drain

The east side of the project plot is adjacent to a nullah/stormwater drain. During excavation and construction, exposed soil, stockpiles, loose material and runoff from active work areas may generate silt-laden water. If not controlled, this may enter the adjacent nullah, affect drainage flow, cause sediment deposition and create localized pollution.

The impact is direct, localized and short-term, but due to the proximity of the nullah/stormwater drain, the significance is assessed as moderate.

Mitigation Measures

- No construction waste, excavated material, cement slurry, oil, grease or wastewater shall be discharged into the nullah/stormwater drain.
- Temporary drainage arrangements shall be provided during construction.
- Silt traps, sediment barriers, sandbags or other suitable controls shall be installed where runoff may flow toward the drain.
- Stockpiles shall be located away from the nullah and protected from runoff.
- Excavation and open soil areas shall be stabilized progressively where possible.
- Housekeeping shall be maintained to prevent loose material from entering drainage channels.
- Construction activities near the drain shall be supervised carefully, especially during rainy periods.

Residual Impact

With effective runoff and sediment control, the residual impact is expected to be low.

6.3.5 Construction Waste Generation and Disposal

Construction activities will generate waste such as concrete debris, cement bags, packaging material, steel scrap, wood, plastic, empty containers and domestic waste from workers. Small quantities of hazardous waste such as used oil, oily rags, grease containers or contaminated soil may also be generated from machinery maintenance activities. Improper handling of waste may

result in visual nuisance, blocked drainage, soil contamination, pest attraction and unsafe working conditions.

The impact is direct, localized and short-term. The significance is assessed as moderate before mitigation.

Mitigation Measures

- A construction waste management system shall be implemented at site.
- Waste shall be segregated into reusable, recyclable, general and hazardous waste categories.
- Recyclable waste such as scrap metal, wood and packaging material shall be handed over to recyclers.
- Domestic waste shall be collected in covered bins and disposed of through the society's waste management arrangement or approved municipal system.
- Hazardous waste shall be stored in labeled, leak-proof containers and handed over to authorized handlers.
- Open dumping and burning of waste at site shall be strictly prohibited.
- Construction waste shall not be dumped into the adjacent nullah/stormwater drain, green areas or service path.

Residual Impact

With proper segregation, storage and disposal, the residual impact is expected to reduce to low.

6.3.6 Construction Site Office / Limited Camp and Material Storage Area

Since the project is located in a developed urban area, most of the labour and technical staff will commute daily from Rawalpindi, Islamabad and nearby areas. Therefore, no large-scale residential labour camp is anticipated. However, a temporary site office / limited camp and material storage area may be established in front of the project site along the Major Road for essential staff, site management and temporary storage of construction materials.

Potential impacts may include generation of domestic sewage, solid waste, poor housekeeping, dust from loose materials, runoff carrying silt or construction residues, accidental spillage from stored oils/chemicals, obstruction of access and minor safety risks if the area is not properly managed. The impact is direct, temporary and localized. The significance is assessed as low to moderate before mitigation.

Mitigation Measures

- No large-scale residential labour camp shall be established at the project site.
- Only limited essential staff shall be allowed to stay at site, as required.
- Sanitation facilities shall be provided, and sewage shall be managed through a properly designed septic tank.
- No untreated sewage shall be discharged into open land, roadside areas or the nearby stormwater drain/nullah.
- Covered waste bins shall be provided at the site office/camp.
- The contractor shall ensure regular cleaning, housekeeping, pest control and safe drinking water availability.
- The site office/camp area shall be properly barricaded, and access shall be controlled.
- No encroachment or obstruction shall be created on the Major Road.
- Construction materials shall be stored only within the designated storage area.
- Loose materials such as sand, aggregate and excavated material shall be properly stacked and covered, where required.

- Cement, paints, oils, fuel and chemicals shall be stored in covered and secured areas.
- Spill kits / absorbent material shall be available where oil, fuel or chemicals are stored.
- Material storage shall not obstruct the Major Road, emergency access or public movement.
- No material, waste or wash water shall be allowed to enter the nearby stormwater drain/nullah.
- Regular housekeeping shall be maintained by the contractor.

Residual Impact

With proper sanitation, septic tank arrangement, covered waste collection and regular housekeeping, the residual impact is expected to be low.

6.3.7 Air Quality Impacts from Dust and Exhaust Emissions

Construction activities may affect ambient air quality due to dust emissions from site clearance, excavation, cutting, grading, material handling, exposed soil surfaces, stockpiles and movement of vehicles. Exhaust emissions may also be generated from construction machinery, trucks, loaders, cranes, concrete pumps, temporary generators and other diesel-operated equipment.

The impact is direct, localized and short-term. Since nearby houses are present on the western side and other residential receptors exist around the project site, the impact significance is assessed as moderate.

Mitigation Measures

- Regular water sprinkling shall be carried out on exposed soil surfaces, access routes and active work areas.
- Stockpiles of soil, sand and fine material shall be covered or kept moist.
- Ready-mix concrete shall be used; no on-site batching plant shall be established.
- Construction vehicles carrying loose material shall be covered.
- Vehicle speed within the site and society roads shall be controlled.
- Machinery and vehicles shall be properly maintained to reduce smoke emissions.
- Idling of vehicles and machinery shall be minimized.
- Dust-generating activities shall be avoided during high wind conditions, where practical.
- Green sheets / temporary dust screens shall be installed along the active construction boundaries, particularly toward nearby residential receptors, to minimize dust dispersion from excavation, material handling and other construction activities.
- These screens shall be properly fixed, maintained and replaced where damaged to ensure their effectiveness throughout the active construction period.

Residual Impact

With implementation of dust control and equipment maintenance measures, the residual impact is expected to be low to moderate, limited mainly to active construction periods.

6.3.8 Noise and Vibration Impacts

Noise and vibration may be generated from excavation equipment, cutting/grading activities, concrete works, cranes, loaders, generators, trucks, material loading/unloading and general construction activities. Nearby residential houses, especially on the western side of the project, may experience temporary disturbance if noise is not properly controlled.

The impact is direct, localized and short-term. Due to nearby residential receptors, the impact significance is assessed as moderate.

Mitigation Measures

- High-noise activities shall be restricted to daytime as far as possible.
- Nighttime construction shall be avoided, especially for noisy activities.
- Construction machinery shall be properly maintained and fitted with silencers/mufflers where applicable.
- Generators shall be placed at suitable locations with acoustic control/canopies where required.
- Unnecessary honking and idling of vehicles shall be prohibited.
- Material loading/unloading shall be managed to avoid sudden high noise.
- Nearby residents shall be informed before any unusually noisy construction activity.
- Noise monitoring shall be carried out as per EMMP requirements.

Residual Impact

With proper timing, equipment maintenance and noise control measures, the residual impact is expected to be low to moderate and temporary.

6.3.9 Construction Traffic and Access Disturbance

Construction traffic will include movement of trucks, machinery, material delivery vehicles, ready-mix concrete transit mixers, workers' vehicles and disposal vehicles. If not properly managed, construction traffic may cause disturbance to society roads, inconvenience to residents, temporary obstruction, safety risks and dust/noise impacts.

The impact is direct, localized and short-term. The significance is assessed as moderate.

Mitigation Measures

- Construction traffic shall use designated access routes.
- The north-side Major Road shall be used as the main access for construction traffic.
- The west-side service path shall not be used for routine construction traffic and shall remain restricted for emergency evacuation only.
- Material deliveries shall be scheduled to avoid unnecessary congestion and peak movement periods.
- Construction vehicles shall not block house entrances, internal roads, service paths or emergency access.
- Signage, flagmen and traffic control measures shall be provided where required.
- Vehicle speed within Zaraj Housing Scheme shall be controlled.
- Tires/wheels of vehicles shall be cleaned where required to avoid mud tracking.

Residual Impact

With traffic management and controlled access, the residual impact is expected to reduce to low.

6.3.10 Climate Change Impact during Construction

During the construction phase, greenhouse gas emissions will mainly be generated from embodied carbon in construction materials, operation 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. Major material-related emissions will be associated with cement, concrete, steel reinforcement, blocks, glass, aluminium and finishing materials. Fuel-related emissions will be temporary and will depend on the type, number and operating hours of construction equipment and vehicles.

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 proposed 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. The main opportunities for reduction will include efficient material planning, use of ready-mix concrete where feasible, optimized transport trips, regular maintenance of machinery, avoidance of unnecessary idling, preference for energy-efficient construction equipment, proper scheduling of material deliveries and reuse/recycling of construction waste where practicable.

The impact is direct and indirect, temporary to medium-term, and project-specific. The significance is assessed as moderate before mitigation.

Mitigation Measures

- Construction material requirements shall be planned efficiently to avoid over-ordering and wastage.
- Cement, steel, concrete and finishing materials shall be used efficiently through proper site supervision and quality control.
- Locally available construction materials shall be preferred where technically feasible to reduce transportation-related emissions.
- Construction vehicles and machinery shall be regularly maintained to ensure efficient fuel use and reduced exhaust emissions.
- Unnecessary idling of machinery, generators and vehicles shall be avoided.
- Construction traffic and material delivery trips shall be planned to reduce repeated or partially loaded trips.
- Excavated material shall be reused on-site as far as technically feasible for backfilling, leveling or other suitable purposes.
- Construction waste shall be segregated, reused or recycled where practicable.
- Energy-efficient lighting and equipment shall be used at the site office and construction areas.
- Diesel generator use shall be minimized where grid electricity is available.

Residual Impact

With efficient material use, proper equipment maintenance, optimized transportation, reuse of excavated material and construction waste minimization, the residual climate change impact from construction-stage carbon emissions is expected to remain low to moderate.

6.3.11 Water Consumption during Construction

Water will be required during construction 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; therefore, water required for concrete batching will not be consumed at site. Construction water will be arranged through tanker supply.

The impact is direct, localized and short-term. Since the project will not use society water supply or groundwater through a project bore well, the significance is assessed as low to moderate.

Mitigation Measures

- Water shall be supplied through tanker arrangement.
- No project bore well shall be installed for construction water abstraction.
- Water shall be used efficiently and wastage shall be avoided.
- Water sprinkling shall be done as required and not excessively.
- Leakage from temporary water storage or supply lines shall be controlled.

- Washing activities shall be managed to avoid uncontrolled runoff.

Residual Impact

With tanker-based supply and efficient use, the residual impact is expected to be low.

6.3.12 Wastewater Generation from Workers and Site Activities

Wastewater during construction may be generated from workers' domestic use, site washing, equipment cleaning and housekeeping activities. If not properly managed, wastewater may create unhygienic conditions, ponding, odor, soil contamination and risk of discharge toward the adjacent nullah/stormwater drain.

The impact is direct, localized and short-term. The significance is assessed as moderate before mitigation.

Mitigation Measures

- Adequate toilet and washing facilities shall be provided for construction workers.
- Domestic wastewater shall be discharged into the approved sewerage arrangement of the society or properly managed through temporary sanitation facilities.
- Wastewater from washing/cleaning shall not be discharged into the adjacent nullah/stormwater drain.
- Oil/grease-contaminated wastewater shall be avoided; machinery maintenance shall be carried out in designated areas.
- Standing wastewater and ponding shall be prevented.
- Sanitation facilities shall be regularly cleaned and maintained.

Residual Impact

With proper sanitation and wastewater control, the residual impact is expected to be low.

6.3.13 Occupational Health and Safety Risks

Construction activities will involve excavation, working at height, lifting operations, scaffolding, electrical works, hot works, material handling, operation of machinery, use of tools, vehicle movement and confined/limited access areas. These activities may create occupational health and safety risks including falls, struck-by incidents, equipment accidents, electrocution, slips/trips, fire, heat stress and excavation-related hazards.

The impact is direct, localized and short to medium-term during construction. Due to the nature and height of the building, the significance is assessed as high before mitigation.

Mitigation Measures

- Contractor shall prepare and implement a site-specific Health, Safety and Environment Plan.
- Competent HSE staff shall be deployed at site.
- Workers shall be provided with appropriate PPE, including helmets, safety shoes, gloves, reflective vests, eye protection and full-body harnesses where required.
- Excavation safety measures shall be implemented, including barricading, safe access/egress, slope support and warning signs.
- Fall protection shall be mandatory for work at height.
- Lifting operations shall be carried out by trained operators using inspected equipment.
- Scaffolding shall be erected and inspected by competent persons.
- Electrical works shall be carried out by authorized persons with lockout/tagout controls where required.

- Toolbox talks, safety training and emergency drills shall be conducted regularly.
- First aid facilities and emergency response arrangements shall be available at site.

Residual Impact

With strict implementation of HSE controls, the residual impact is expected to reduce to moderate, and manageable through continuous supervision.

6.3.14 Community Health, Safety and Nuisance Impacts

Nearby residents may experience temporary nuisance and safety concerns during construction due to dust, noise, vibration, vehicle movement, visual disturbance, privacy issues, worker movement, and risk from open excavations or falling materials. Residents on the western side have specifically raised concerns regarding privacy, slope stability, damage to property and disturbance during construction.

The impact is direct and indirect, localized and short-term. The significance is assessed as moderate before mitigation.

Mitigation Measures

- Construction site shall be properly barricaded and access shall be controlled.
- Warning signs shall be installed around active work areas.
- Workers shall not be allowed to sit or gather in green areas or near nearby houses.
- Construction activities shall be managed to minimize disturbance to nearby residents.
- Dust and noise control measures shall be implemented.
- High-risk activities shall be supervised and restricted within the site boundary.
- Safe movement of construction vehicles shall be ensured through flagmen and speed control.
- Any complaint from nearby residents shall be recorded and addressed through the project grievance mechanism.
- Construction materials shall be stored safely and shall not obstruct roads, service paths or public access.
- Green sheets / temporary screening shall be provided along exposed construction boundaries to reduce visual nuisance, improve construction-site aesthetics, minimize privacy impacts on nearby residents and restrict direct view of active construction areas.

Residual Impact

With access control, community safety measures and grievance handling, the residual impact is expected to be low to moderate.

6.3.15 Fire and Emergency Risks during Construction

Construction activities may involve temporary electrical connections, diesel generators, fuel storage, welding, cutting, combustible materials, formwork, packaging and worker facilities. Improper management of these activities may increase the risk of fire, injury, property damage or emergency situations.

The impact is direct, localized and short-term. The significance is assessed as moderate before mitigation.

Mitigation Measures

- Fire extinguishers shall be provided at site offices, fuel storage areas, generator areas, electrical panels and hot work locations.
- Hot work shall be controlled through permit / supervision system.

- Fuel and diesel shall be stored in designated areas with secondary containment and away from ignition sources.
- Electrical wiring and temporary connections shall be properly installed and maintained.
- Combustible materials shall be stored safely and away from hot work areas.
- Emergency contact numbers and evacuation routes shall be displayed at site.
- Workers shall be trained in fire prevention and emergency response.
- First aid and emergency response arrangements shall be maintained.

Residual Impact

With fire prevention and emergency preparedness measures, the residual impact is expected to be low.

6.3.16 Positive Impact through Temporary Employment and Local Business Opportunities

Construction of the project will create temporary employment opportunities for skilled, semi-skilled and unskilled workers. Local businesses may also benefit from demand for construction materials, transport, food supply, security, equipment rental and other support services.

The impact is positive, short to medium-term and localized, with low to moderate beneficial significance.

Enhancement Measures

- Local labor shall be hired where feasible.
- Local suppliers and service providers shall be engaged where practical.
- Fair working conditions and timely payment shall be ensured.
- Workers shall be provided safe working conditions and basic facilities.

Residual Impact

The residual impact will remain positive during the construction phase.

6.4. Screening of Potential Impacts during the Operation Phase

During the operational phase, the proposed Atrium Hills project will function as a residential apartment complex with supporting amenities, parking areas, utility services, fire and life safety systems, internal waste management arrangements, water storage, rooftop services and building management arrangements. Compared to the construction phase, the operational impacts are expected to be more long-term in nature, but generally manageable through proper design, routine maintenance, building management controls and compliance with society / regulatory requirements.

The main operational impacts are expected to be associated with increased occupancy, vehicular movement, water demand, wastewater generation, solid waste generation, electricity consumption, standby generator operation, stormwater management, fire and life safety, privacy/community concerns, visual/shadow effects and long-term building maintenance. The project has also incorporated several positive environmental and resource efficiency measures, including rainwater harvesting, groundwater recharge well, rooftop solar system, passive ventilation/cooling through atrium design, EV charging points and development of lush green park in neighborhood.

6.4.1 Water Consumption

During operation, water will be required for domestic use of residents, visitors, common facilities, cleaning, housekeeping and other routine building uses. The total operational water

demand of the project has been estimated as 328,124 liters/day, equivalent to 328.12 m³/day. Water is already a scarce resource in Islamabad, and the city is facing increasing pressure on available water sources due to urban growth and rising demand. Therefore, water conservation and efficient water use will be important during the operational phase.

The project will arrange its operational water supply through tanker supply. No bore well or direct use of Zaraj Housing Scheme's domestic water supply system is proposed. This is consistent with the existing practice in the society, where multistorey buildings, apartment complexes and commercial plazas generally arrange their own water supply through tankers, while the society water supply system is mainly meant for individual residential houses.

The impact is direct, long-term and localized. Since the project will not abstract groundwater through its own bore well and will not use the society's house-level water supply system, the significance is assessed as moderate before management measures.

Mitigation Measures

- Water supply during operation shall be arranged through tanker supply.
- No project bore well shall be installed for groundwater abstraction.
- The project shall not use the existing society water supply system meant for individual houses.
- Water-efficient fixtures shall be installed in apartments and common facilities, where feasible.
- Water use shall be monitored by the Building Management Committee to identify leakage, wastage or abnormal consumption.
- Regular inspection and maintenance of water storage tanks, pipelines, valves and pumps shall be carried out to avoid leakage.
- Residents and building staff shall be encouraged to adopt water conservation practices.
- Rainwater harvesting shall be used for suitable non-potable purposes, such as gardening, cleaning and other approved uses, where feasible.
- Treated wastewater from the society's WWTP/STP may be used for gardening and landscaping, subject to quality compliance, availability and approval of society management.
- Water tanker movement shall be managed to avoid traffic obstruction and disturbance to residents.

Residual Impact

With tanker-based supply, no groundwater abstraction, water conservation and rainwater harvesting, the residual impact is expected to reduce to low to moderate.

6.4.2 Wastewater Generation

During operation, domestic wastewater will be generated from apartments, washrooms, kitchens, common facilities, cleaning and other routine residential uses. No industrial or process wastewater will be generated from the proposed project. Based on the standard assumption that approximately 80% of total water consumption converts into wastewater, the estimated wastewater generation from the project will be 262.50 m³/day.

$328.12 \text{ m}^3/\text{day} \times 80\% = 262.50 \text{ m}^3/\text{day}$ or approximately 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. If wastewater is not properly connected, conveyed or managed, it may cause odor, unhygienic conditions, leakage, blockage, overflow or contamination of stormwater drains. However, baseline assessment

indicates that Zaraj Housing Scheme has an operational wastewater treatment plant, and wastewater quality monitoring of the treatment plant showed compliance with applicable NEQS for the tested parameters.

The impact is direct, long-term and localized. The significance is assessed as moderate before mitigation, mainly due to the expected wastewater quantity from the proposed high-rise residential apartment complex.

Mitigation Measures

- Wastewater from the project shall be connected to the approved sewerage system of Zaraj Housing Scheme for treatment at the society's WWTP.
- No untreated wastewater shall be discharged into the adjacent nullah / stormwater drain.
- Sewer lines, manholes and internal drainage systems shall be properly designed and maintained.
- Grease traps / appropriate control arrangements shall be provided where required for kitchen/common facility wastewater.
- Regular inspection and maintenance of internal sewerage lines shall be carried out.
- Any blockage, leakage or overflow shall be addressed immediately.
- Coordination shall be maintained with Zaraj Housing Scheme management for wastewater connection and disposal arrangement.

Residual Impact

With proper sewerage connection, routine maintenance and disposal through the society's WWTP, the residual impact is expected to be low.

6.4.3 Municipal Solid Waste Generation and Management

During operation, municipal solid waste will be generated from apartments, common areas, amenities, offices, cleaning activities and visitors. The waste stream will mainly include food waste, packaging, paper, plastic, cardboard, glass, metal, sanitary waste and other domestic waste. If not properly collected and stored, solid waste may cause odor, littering, pest attraction, unhygienic conditions and visual nuisance.

For estimation of municipal solid waste generation, a waste generation rate of 0.89 kg/capita/day has been adopted with reference to Islamabad-based study findings for high-income households. Based on the 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.

Daily waste generation = 1,170 persons × 0.89 kg/capita/day = 1,041.3 kg/day

Annual waste generation = 1,041.3 kg/day × 365 days = 380,074.5 kg/year, say 380 tons/year.

Domestic solid waste management in Zaraj Housing Scheme is being handled through a waste contractor hired by the society management. The same arrangement will be applicable for Atrium Hills, where internal waste collection will be managed by the Building Management Committee and waste will be transferred to a main collection point for collection by the society's contractor.

The impact is direct, long-term and localized. The significance is assessed as moderate before mitigation.

Mitigation Measures

- Internal waste collection arrangements shall be established within the building.

- Waste shall be collected from apartments and common areas and transferred to a designated main waste collection point.
- Color-coded covered bins shall be provided at appropriate locations.
- Waste segregation shall be promoted, where feasible, especially for recyclables.
- Encourage residents to segregate kitchen waste so it can be used for composting by the waste contractor.
- The main waste collection area shall be properly maintained, washable and protected from animals/pests.
- Waste shall be handed over to the society's waste contractor on a regular basis.
- Open dumping, burning or disposal of waste into stormwater drains/nullah shall be strictly prohibited.
- Building Management Committee shall supervise housekeeping and waste management arrangements.

Residual Impact

With proper internal collection, covered storage and regular removal by the society's waste contractor, the residual impact is expected to be low.

6.4.4 Energy Consumption and Electricity Demand

During operation, 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 electrical load calculation, the grand total connected load is 4,565.86 kW, and the grand total demand load is 3,652.68 kW.

High electricity demand may increase pressure on the local electricity distribution system and contribute indirectly to greenhouse gas emissions associated with grid electricity. However, the project includes a dedicated transformer room on the 7th floor with 4 transformers of 630 kVA each, backup generators, and a 40 kVA rooftop solar system as part of resource efficiency measures.

The impact is indirect, long-term and wider/localized, with moderate significance.

Mitigation Measures

- Electrical systems shall be installed as per the approved electrical design and applicable standards.
- Energy-efficient lighting and equipment shall be used in common areas where feasible.
- Residents shall be encouraged to adopt energy-efficient appliances and responsible electricity use.
- The rooftop solar system shall be installed and maintained.
- Lifts, pumps and ventilation systems shall be maintained for efficient operation.
- Common area electricity use shall be monitored by the Building Management Committee.
- Electrical rooms, transformer room and panels shall be properly ventilated, secured and maintained.

Residual Impact

With energy-efficient design, rooftop solar and proper maintenance of electrical systems, the residual impact is expected to be low to moderate.

6.4.5 Air Emissions and Noise from Backup Generators

The project includes diesel-fired backup generators comprising a 400 kVA emergency backup generator and a 440 kVA communal area backup generator. These generators will be used during power outages and emergency/backup situations. Generator operation may result in localized air emissions, including particulate matter, NO_x, SO_x, CO and CO₂, as well as noise.

For planning purposes, considering generator operation for about 2 hours/day, the estimated diesel consumption for both backup generators is approximately 6,300–6,600 liters/month. Actual consumption will depend on generator loading, power outage duration and operational requirements.

The impact is direct, intermittent, localized and long-term. The significance is assessed as moderate before mitigation.

Mitigation Measures

- Generators shall be properly maintained as per manufacturer recommendations.
- Generator stacks shall be designed/installed to ensure proper dispersion of emissions.
- Low-sulfur diesel shall be used where available.
- Generator operation shall be limited to backup/emergency requirements.
- Acoustic enclosures / silencers shall be provided to reduce noise.
- Generators shall be placed in designated locations with proper ventilation and fire safety arrangements.
- Diesel storage shall include secondary containment, spill control and restricted access.
- Emissions and noise monitoring shall be carried out as per EMMP requirements.

Residual Impact

With proper generator maintenance, acoustic control and limited operation, the residual impact is expected to be low to moderate.

6.4.6 Fire and Life Safety Risks

As a high-rise residential apartment complex, Atrium Hills may face fire and life safety risks during operation due to residential kitchens, electrical systems, parking areas, generators, transformers, common facilities, vertical circulation and high occupancy. Fire safety is therefore a key operational concern.

The fire-fighting design classifies apartments as Light Hazard, while parking/commercial areas are classified as Ordinary Hazard. The project design includes 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 impact is direct, long-term and building-wide. Considering the high-rise nature of the building, the significance is assessed as high before mitigation.

Mitigation Measures

- Fire and life safety systems shall be installed as per the approved fire-fighting design.
- Fire systems shall comply with applicable NFPA standards, BCP-2016 and CDA fire safety requirements.
- Fire detection and alarm systems shall be maintained in operational condition.
- Fire hose cabinets, extinguishers, pumps, sprinkler system, fire water tanks and fire lifts shall be regularly inspected and maintained.
- Staircases, fire exits and emergency routes shall remain free from obstruction.
- Fire drills shall be conducted periodically for residents, staff and building management.

- Building Management Committee shall maintain an emergency response plan.
- Residents and staff shall be informed about fire safety procedures and emergency evacuation arrangements.
- Electrical rooms, generator areas and transformer room shall be secured and maintained with appropriate fire protection.

Residual Impact

With full installation, testing, maintenance and operation of fire and life safety systems, the residual impact is expected to reduce to moderate, requiring continuous management.

6.4.7 Stormwater Runoff and Protection of Adjacent Nullah / Drainage System

The project site is located adjacent to a nullah / stormwater drain on the eastern side. During operation, stormwater runoff may be generated from rooftop areas, paved surfaces, ramps, driveways and other hard surfaces. If not properly managed, runoff may cause erosion, water stagnation, sediment movement, or uncontrolled discharge into the adjacent drain.

The project includes rainwater harvesting and rainwater recharge well as environmental design measures. These features will help manage part of the stormwater runoff and support recharge where technically feasible.

The impact is direct, long-term and localized. The significance is assessed as moderate before mitigation due to the proximity of the nullah/stormwater drain.

Mitigation Measures

- Stormwater drainage system shall be designed and maintained to safely collect and convey runoff.
- No solid waste, wastewater, oil, grease or debris shall be discharged into the adjacent nullah/stormwater drain.
- Rainwater harvesting tanks and recharge well shall be maintained in functional condition.
- Roof drains, stormwater channels, gratings and collection points shall be cleaned regularly.
- Silt traps / screens shall be provided where required.
- Landscape areas shall be maintained to reduce runoff and improve infiltration.
- Any blockage or damage to drainage structures shall be repaired immediately.

Residual Impact

With proper stormwater design, rainwater harvesting, recharge well and maintenance of drainage systems, the residual impact is expected to be low.

6.4.8 Community Health, Safety and Privacy Concerns

During operation, community concerns may relate to traffic movement, parking management, privacy of nearby houses, building security, waste handling, emergency access, maintenance quality and interaction with nearby residents. Residents on the western side raised concerns regarding privacy, scenic view, cross ventilation and possible disturbance from the proposed building.

The impact is direct/indirect, long-term and localized. The significance is assessed as moderate before mitigation.

Mitigation Measures

- The building shall be operated through the Building Management Committee.
- Security arrangements shall be maintained at entry/exit points and common areas.

- Access control and visitor management shall be implemented.
- Parking and traffic movement shall be managed within the approved parking and circulation arrangement.
- Waste collection and housekeeping shall be properly maintained.
- Privacy-related concerns shall be managed through controlled use of common areas, building rules and good maintenance practices.
- Emergency access shall remain clear at all times.
- A complaint handling mechanism shall be maintained for residents and nearby community members.

Residual Impact

With proper building management, security and complaint handling, the residual impact is expected to be low to moderate.

6.4.9 Visual / Aesthetic Impact and Building Maintenance Issues

The proposed project is a G+20-storey residential apartment complex and will become a prominent built feature within Zaraj Housing Scheme. Nearby residents, particularly toward the western side, raised concerns regarding scenic view and visual obstruction. Poor building maintenance, seepage, façade deterioration, exposed utilities or unmanaged waste may also affect the visual quality of the surrounding area during operation.

The impact is direct, long-term and localized. The significance is assessed as moderate.

Mitigation Measures

- The project shall be constructed as per approved architectural and finishing design.
- Building façade, balconies, common areas and external services shall be properly maintained.
- Landscaping and development of a lush green park in neighborhood will improve the aesthetics of the project area.
- Seepage, leakage or façade defects shall be repaired promptly.
- Waste storage areas shall be screened and maintained.
- Rooftop services and utilities shall be properly organized and maintained.
- Building Management Committee shall ensure routine inspection and maintenance of the building.

Residual Impact

With good architectural finishing, landscaping and routine maintenance, the residual impact is expected to be low to moderate.

6.4.10 Traffic Movement, Access and Parking Demand

During operation, the proposed Atrium Hills project will generate additional traffic due to movement of residents, visitors, service vehicles, delivery vehicles and building management staff. The main traffic-related concerns may include increase in vehicle movement on internal society roads, access gate operation, parking management, internal circulation and possible spillover parking if not properly controlled.

A project-specific Traffic Impact Study (TIS) has been conducted for the proposed development (TIS annexed). The study included traffic count surveys, parking demand analysis, access gate queue analysis, volume-to-capacity ratio analysis and Level of Service (LOS) assessment. The project site is located within an established residential area with an

adequately developed road network, and the surrounding roads were found to be operating under acceptable traffic conditions.

As per the TIS, the proposed 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 the car parking provision is adequate, with a surplus of 173 car spaces. However, motorcycle parking will require proper management and demarcation, and where required, surplus motorcycles may be accommodated within available parking areas through internal parking management.

The TIS further indicates that the surrounding road network has sufficient capacity to accommodate the projected traffic from the proposed project. Under existing conditions, the considered road network is operating at LOS A. With the proposed project and two-year growth scenario, some road sections may operate at LOS B, while others will continue at LOS A, indicating acceptable traffic performance. The volume-to-capacity ratio at Potohar Avenue increases from 0.55 to 0.68 for arrival flow and from 0.40 to 0.51 for departure flow under the project-built scenario, which remains within acceptable operational limits.

The impact is direct, long-term and localized. Considering the available road capacity, adequate car parking provision and acceptable LOS after project traffic, the significance is assessed as low to moderate before management measures.

Mitigation Measures

- The north-side Major Road shall be used as the normal access road for the project.
- The west-side service path shall not be used for normal operation and shall only be used for emergency evacuation, where required.
- Project access points shall be clearly defined and properly channelized to minimize vehicular conflict.
- Separate inbound and outbound lanes shall be provided / maintained at the main access gate, where feasible.
- Resident, visitor and motorcycle parking areas shall be clearly demarcated.
- Clear floor numbering, directional arrows and wayfinding signage shall be installed across parking levels.
- Adequate lighting shall be provided at access points, internal circulation routes and parking areas.
- On-street parking and spillover parking on adjoining roads shall be strictly prohibited.
- Society gate operation shall be monitored periodically during peak hours.
- A post-occupancy traffic review shall be conducted after full project operation to verify actual traffic conditions and identify any further management needs.

Residual Impact

With implementation of the traffic management measures and parking controls recommended in the TIS, the residual impact is expected to be low and manageable during operation.

6.4.11 Shadow Impact on Nearby Receptors

A project-specific Shadow Analysis Study has been conducted for the proposed Atrium Hills development to assess the likely shadow pattern after construction of the G+20-storey building. The study considered the project location in Islamabad at approximately 33.5°N latitude, building height and massing, sun path variation during different seasons, and likely shadow direction during morning, noon and afternoon periods.

The shadow analysis indicates that the most critical shadow condition is expected during the winter season / December solstice, when the sun angle is low and shadow lengths are longer. Under this condition, the proposed building may cast extended shadows of up to approximately 100 meters, mainly toward the north. During summer, due to higher sun altitude, shadows are expected to remain shorter and more concentrated near the building base. During equinox periods, shadow conditions are expected to be moderate.

The study further indicates that the proposed building form is segmented and articulated, rather than a single solid rectangular block. This helps break the shadow pattern and allows some light penetration between building wings, thereby reducing the intensity of continuous shadow impact. Internal roads, parking lanes and circulation areas may experience shading, particularly during winter mornings and evenings; however, this may also provide thermal comfort for parked vehicles and paved areas.

Off-site shadow impacts are expected to be mainly limited to areas located toward the northern side of the project, while the southern side is expected to receive comparatively better sunlight exposure. Based on the study findings, the shadow impact is assessed as direct, long-term and localized, with moderate significance before management measures. The Shadow Analysis Study is attached as an **Annexure – 11** to this EIA.

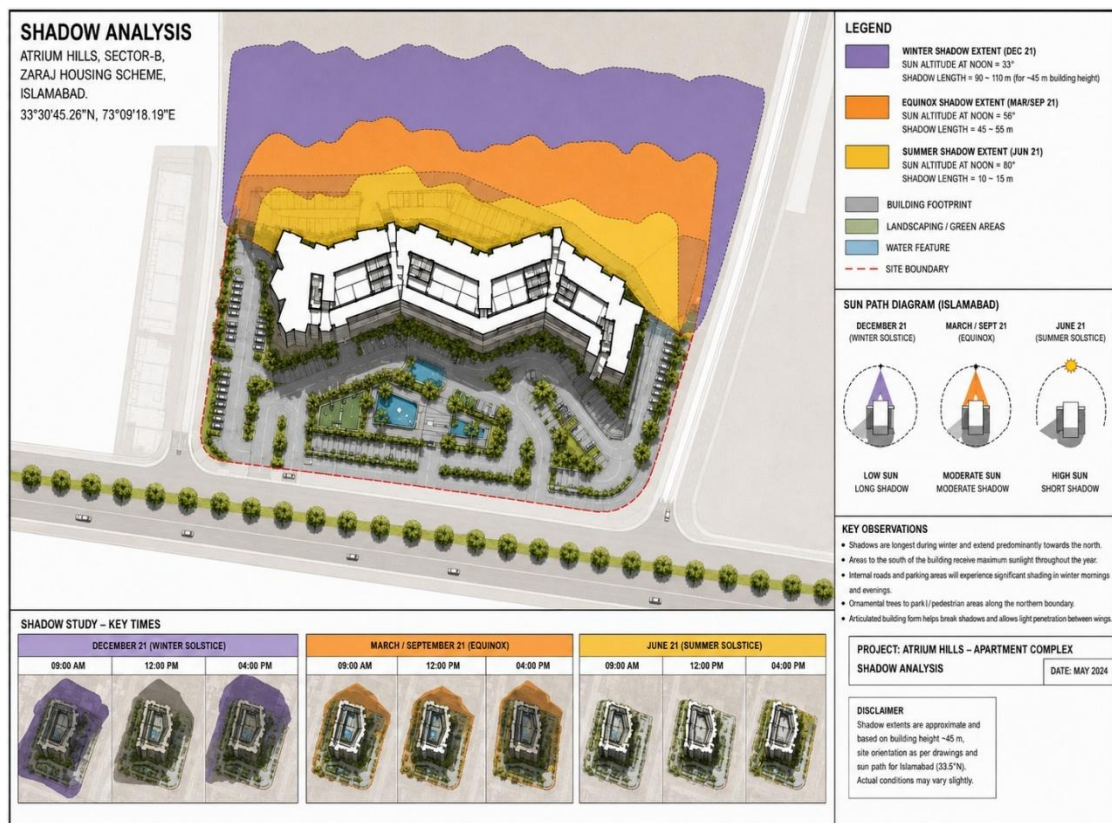


Figure 10: Shadow Analysis Visual Diagram

Mitigation / Management Measures

- The project shall be developed in accordance with the approved architectural design and building configuration.
- The segmented/articulated building form shall be maintained to avoid creating a single continuous shadow block.

- Open spaces, green areas and internal circulation areas shall be properly maintained to improve the visual and environmental quality of shaded areas.
- Building façade, balconies and external finishes shall be properly maintained to reduce visual harshness and improve aesthetic quality.
- Adequate outdoor lighting shall be provided in shaded internal circulation and parking areas, where required.
- The Building Management Committee shall ensure proper maintenance of common areas, landscaping and external building elements during operation.

Residual Impact

With the proposed building form, open/green area development, proper maintenance and management of shaded areas, the residual shadow impact is expected to remain low to moderate and localized.

6.4.12 Positive Impacts from Planned Housing, Amenities and Local Services

The project will provide planned apartment-based residential accommodation within Zaraj Housing Scheme in response to increasing demand for quality housing in the capital region. The project will also include amenities such as mosque, grand atrium, community hall, business lounge, day care center, clinic, post office, swimming pool, steam/sauna, gymnasium, rooftop BBQ area, gated security and EV charging points.

The impact is positive, long-term and localized, with moderate beneficial significance.

Enhancement Measures

- Amenities and common facilities shall be properly operated and maintained.
- Building Management Committee shall ensure safe, clean and organized operation.
- Security, housekeeping, waste management, water supply and fire safety systems shall be maintained.
- Local employment may be preferred for building operation, security, housekeeping and maintenance services where feasible.

Residual Impact

The residual impact will remain positive during the operational phase.

6.4.13 Positive Impacts from Green Building / Resource Efficiency Measures

The project includes several green building design and resource efficiency measures. These include rainwater harvesting tanks, rainwater recharge well, rooftop solar system, passive ventilation/cooling through atrium design and EV charging points and development of around 8 Kanals of lush green park in neighborhood. These measures will help improve the environmental performance of the project and provide better living conditions for residents.

The impact is positive, long-term and localized, with moderate beneficial significance.

Enhancement Measures

- Rainwater harvesting and recharge systems shall be kept functional.
- Rooftop solar system shall be maintained.
- Green/open areas shall be developed and maintained with suitable plantation.
- Passive ventilation/cooling features shall not be obstructed during operation.
- EV charging points shall be operated with proper safety controls.
- Regular maintenance shall be ensured by the Building Management Committee.

Residual Impact

The residual impact will remain positive during the operational phase.

6.4.14 Climate Change Impact

During operation, the proposed Atrium Hills project will have both direct and indirect climate change-related impacts. The main sources of greenhouse gas (GHG) emissions will include electricity consumption, diesel use in backup generators and, if available, natural gas use in apartment kitchens. Other indirect sources may include water tanker movement, residents' vehicle use, solid waste disposal, refrigerant leakage and maintenance-related activities; however, these cannot be reliably quantified at this stage due to absence of actual operational data.

Islamabad is already facing climate-related concerns such as increasing temperature, heat stress, intense rainfall events, urban flooding risks, pressure on water resources and increased demand for cooling and electricity. Therefore, climate-responsive design and efficient resource management are important for long-term operation of the building. The GHG Protocol defines purchased electricity as Scope 2 emissions, while fuel combustion within the project boundary is treated as direct Scope 1 emissions.

For this EIA, a Tier-1 operational carbon footprint estimate has been prepared using available project data and reasonable assumptions. The estimate includes grid electricity consumption, diesel generator operation and conditional kitchen gas use. The electricity calculation is based on the project's demand load. Diesel emissions are based on estimated monthly diesel consumption for backup generators. Natural gas emissions are included only as a conditional estimate, because SNGPL connection is not confirmed at this stage and electric hot plates may be used instead.

For calculation, the following assumptions have been used:

- Grand total demand load: 3,652.68 kW
- Average electricity load utilization: 30%
- Annual operating hours: 8,760 hours/year
- Grid electricity emission factor: 0.500 kgCO₂e/kWh as planning assumption
- Diesel consumption: 6,450 liters/month, based on 2 hours/day generator operation
- Diesel emission factor: 2.68 kgCO₂e/liter; EIA's diesel factor is about 10.19 kgCO₂/gallon, which is approximately the same range when converted to liters.
- Kitchen gas demand: 25,000 BTU/hour/kitchen
- Number of apartment kitchens: 348
- Assumed gas use: 3 hours/day/kitchen
- Natural gas emission factor: 52.91 kgCO₂/MMBtu, based on EIA natural gas CO₂ factor.

Table 12: Operational Phase Carbon Footprint Estimate, (Tier-1)

Emission Source	Scope	Activity Data / Assumption	Emission Factor Used	Estimated Annual Emissions (tCO ₂ e/year)
Grid electricity consumption	Scope 2	3,652.68 kW × 8,760 hr/year × 30% = 9,599,243 kWh/year	0.500 kgCO ₂ e/kWh	4,799.6
Diesel generator operation	Scope 1	6,450 liters/month × 12 = 77,400 liters/year	2.68 kgCO ₂ e/liter	207.4

Natural gas for kitchens, if SNGPL gas is available	Scope 1	348 kitchens × 25,000 BTU/hr × 3 hr/day × 365 days = 9,526.5 MMBtu/year	52.91 kgCO ₂ /MMBtu	504.0
Total, without natural gas use	—	Grid electricity + diesel generator	—	5,007.0
Total, with natural gas use	—	Grid electricity + diesel generator + kitchen gas	—	5,511.0

The above estimate indicates that grid electricity will be the dominant source of operational GHG emissions. Diesel generator emissions will be intermittent and linked with power outages. Gas-related emissions will apply only if piped natural gas becomes available and is used by residents. If electric hot plates are used instead of gas, the kitchen energy demand will be reflected in electricity consumption rather than gas emissions.

This Tier-1 estimate does not include embodied carbon of construction materials, residents' vehicle emissions, water tanker fuel use, solid waste disposal emissions, refrigerant leakage, or other Scope 3 sources, as these require actual operational records and cannot be reliably calculated at this stage.

The impact is indirect, long-term and wider in nature, with moderate significance due to long-term electricity demand and building operation.

Mitigation Measures

- Energy-efficient lighting, equipment and building services shall be used where feasible.
- The 40 kVA rooftop solar system shall be installed and maintained to supplement electricity use.
- Passive ventilation and cooling through atrium design shall be maintained and not obstructed.
- Lifts, pumps, ventilation systems and common area electrical systems shall be regularly maintained to reduce energy losses.
- Diesel generators shall be operated only for backup/emergency use and maintained for efficient combustion.
- Water conservation measures shall be implemented, including efficient fixtures, leakage control and reuse of harvested rainwater for suitable non-potable uses.
- Treated wastewater from the society's WWTP/STP may be used for gardening and landscaping, subject to quality compliance, availability and approval of society management.
- Green/open area, including the lush green park in neighborhood, shall be developed and maintained to support local cooling and improved microclimate.
- Solid waste segregation and recycling shall be promoted where feasible.
- EV charging points shall be maintained to support cleaner mobility options.
- The Building Management Committee shall maintain records of electricity use, diesel consumption, water use and waste management during operation.

Residual Impact

With implementation of energy efficiency measures, rooftop solar, controlled generator operation, water conservation, rainwater harvesting, treated wastewater reuse for landscaping, green area development and routine building management, the residual climate-related impact is expected to remain low to moderate and manageable during operation.

7. ENVIRONMENTAL MANAGEMENT AND MONITORING PLAN

This chapter presents the Environmental Management and Monitoring Plan (EMMP) for the proposed Atrium Hills Residential Apartment Complex. The EMMP has been developed to ensure that the environmental impacts identified during the pre-construction, construction and operational phases are effectively managed, minimized and monitored in accordance with applicable environmental regulations, approval conditions and good engineering / environmental practices.

The EMMP translates the mitigation measures identified in Chapter 6 into specific actions, implementation responsibilities, monitoring requirements and reporting arrangements. It also provides the framework for environmental compliance, occupational health and safety, community safety, emergency preparedness, waste management, traffic management, stormwater control, and protection of nearby receptors during construction and operation of the project.

Considering the nature of the proposed project as a G+20-storey residential apartment complex involving site preparation, excavation, cutting and grading, slope stabilization, construction activities and long-term building operation, the EMMP has been designed to be practical, site-specific and implementable. Particular emphasis has been placed on excavation and slope stability, protection of the adjacent nullah / stormwater drain, dust and noise control, construction waste and excavated material management, traffic and access control, water and wastewater management, fire and life safety, and building management during operation.

7.1 Scope of EMMP

The Environmental Management and Monitoring Plan (EMMP) consists of the following main components:

- Applicable legislation, standards and guidelines;
- Organizational structure and responsibilities;
- Mitigation plan / matrix;
- Environmental monitoring plan;
- Emergency preparedness and response arrangements; and
- Reporting and documentation requirements.

The EMMP covers the pre-construction, construction and operational phases of the proposed Atrium Hills Residential Apartment Complex. It provides practical mitigation and monitoring measures for managing the environmental impacts identified in Chapter 6, including excavation and slope stabilization, dust and noise control, construction waste and excavated material management, traffic and access control, stormwater management, protection of the adjacent nullah / stormwater drain, water and wastewater management, solid waste management, occupational health and safety, community safety, fire and life safety, and operational building management.

7.2 Legal Framework

The applicable legal and regulatory framework for the proposed Atrium Hills Residential Apartment Complex has been discussed in detail in Chapter 3 of this EIA. The Proponent shall

ensure that construction and operation of the project are carried out in compliance with relevant environmental laws, CDA/ICT regulations, building control requirements, fire and life safety provisions, and applicable guidelines.

The Proponent shall also ensure that the contractor, site management team, building management committee and other key personnel are aware of the applicable legal requirements and environmental approval conditions. Compliance with relevant standards, including NEQS for ambient air quality, noise, wastewater, gaseous emissions and other applicable parameters, shall be ensured through implementation of mitigation measures, environmental monitoring, proper record keeping and reporting as defined in this EMMP.

7.3 Organizational Structure and Roles and Responsibilities

Implementation of the EMMP will require coordination among the main organizations involved in project planning, construction, operation and regulatory oversight. For the proposed Atrium Hills Residential Apartment Complex, the key organizations include the Project Proponent, the Construction Contractor, and the Pakistan Environmental Protection Agency (Pak-EPA) as the regulatory authority. During operation, the Building Management Committee of Atrium Hills will be responsible for day-to-day environmental management, maintenance and compliance within the building.

The overall responsibility for ensuring implementation of the EMMP will rest with the Project Proponent. The Contractor will be responsible for implementing construction-phase mitigation measures at site, while Pak-EPA will provide regulatory oversight through review of environmental compliance, inspections and enforcement of approval conditions, where required.

7.3.1 Project Proponent – M/s Atrium Hills

The Project Proponent shall have overall responsibility for environmental compliance of the proposed project during construction and operation. The Proponent shall ensure that the project is implemented in accordance with the EIA, environmental approval conditions, approved project design, CDA requirements, Zaraj Housing Scheme requirements and other applicable laws and regulations.

The main responsibilities of the Proponent will include:

- Obtain environmental approval from Pak-EPA before commencement of construction;
- Ensure implementation of the EMMP during construction and operation;
- Include relevant environmental, health and safety requirements in contractor agreements;
- Ensure availability of adequate resources for implementation of mitigation and monitoring measures;
- Appoint / designate responsible staff for environmental compliance coordination;
- Ensure implementation of slope stabilization, stormwater control, wastewater disposal, solid waste management, traffic management, fire and life safety, and community safety measures;
- Maintain coordination with Pak-EPA, CDA, Zaraj Housing Scheme Management Committee and other relevant authorities;
- Submit environmental compliance reports to Pak-EPA, where required;

- Ensure that complaints from nearby residents and stakeholders are recorded and addressed in a timely manner.

7.3.2 Construction Contractor

The Construction Contractor shall be responsible for day-to-day implementation of the EMMP during the construction phase. The Contractor shall ensure that all construction activities are carried out in accordance with approved drawings, applicable safety requirements, environmental approval conditions and instructions of the Proponent / supervising team.

The main responsibilities of the Contractor will include:

- Implement construction-phase mitigation measures specified in the EMMP;
- Prepare and implement site-specific plans, including construction traffic management, waste management, excavation safety, dust and noise control, emergency response and occupational health and safety arrangements;
- Deploy competent site staff / HSE personnel for supervision of environmental, health and safety requirements;
- Control dust, noise, construction waste, excavated material, wastewater and runoff from the site;
- Ensure proper protection of the adjacent nullah / stormwater drain from silt, waste, wastewater, oil, grease and construction debris;
- Ensure safe excavation, slope support, shoring / benching / bracing and other temporary stabilization measures, where required;
- Provide PPE, safety training, toolbox talks, first aid and emergency response arrangements for workers;
- Maintain site housekeeping and prohibit open dumping or burning of waste;
- Maintain records of waste disposal, water use, incidents, complaints, training and environmental monitoring, where applicable;
- Report environmental incidents, accidents and community complaints to the Proponent immediately.

7.3.3 Building Management Committee – Operation Phase

After completion of construction, the Building Management Committee of Atrium Hills will be responsible for operation and maintenance of the building and implementation of operational-phase environmental management measures.

The main responsibilities of the Building Management Committee will include:

- Manage water supply through tanker arrangements and monitor water use;
- Ensure maintenance of water storage tanks, pumps, pipelines and distribution system;
- Maintain sewerage connection with Zaraj Housing Scheme system and ensure proper wastewater conveyance to the society WWTP/STP;
- Manage internal solid waste collection, temporary storage and handover to the society's waste contractor;
- Maintain rainwater harvesting tanks, recharge well, stormwater drains and landscaping;
- Ensure proper operation and maintenance of diesel generators, transformer room, electrical systems and rooftop solar system;

- Maintain fire and life safety systems, including fire pumps, alarms, sprinklers, fire hose cabinets, fire extinguishers, fire lifts, smoke extraction, staircase pressurization and fire-rated doors;
- Conduct periodic fire drills and emergency preparedness activities;
- Maintain building housekeeping, pest control, security, parking management and community complaint handling;
- Keep records of water use, diesel consumption, waste handling, maintenance, inspections and complaints.

7.3.4 Regulatory Authority – Pakistan Environmental Protection Agency

Pak-EPA shall act as the regulatory authority responsible for environmental review and oversight of the project. Pak-EPA may conduct inspections, audits and compliance verification visits as deemed necessary to ensure compliance with the environmental approval conditions and applicable environmental legislation.

Pak-EPA may require submission of periodic compliance reports and may issue directions, recommendations or enforcement actions in case of non-compliance. The Project Proponent shall fully cooperate with Pak-EPA, facilitate access to the project site and relevant records, and implement any corrective measures required by the Agency within the stipulated timelines.

7.4 Maintenance and Review of the EMMP

The Environmental Management and Monitoring Plan (EMMP) shall be maintained as a living document to ensure its continued relevance and effectiveness throughout the project life cycle. The purpose of maintaining the EMMP is to ensure that all mitigation, monitoring and reporting requirements identified in the EIA are properly implemented and updated, where required, in response to changes in project activities, site conditions, regulatory requirements or operational arrangements.

During the construction phase, the responsibility for implementation and regular review of the EMMP shall rest with the Project Proponent, with support from the Construction Contractor and site supervision team. During the operational phase, the Building Management Committee of Atrium Hills shall be responsible for maintaining and implementing the relevant operational-phase EMMP requirements.

Maintenance of the EMMP shall include the following key actions:

- Periodic review of mitigation and monitoring measures to verify their effectiveness and adequacy;
- Updating the EMMP, where required, to reflect changes in construction methods, operational practices, building services, regulatory requirements or site conditions;
- Incorporation of corrective and preventive actions identified through inspections, monitoring, complaints, incidents or regulatory observations;
- Ensuring that the contractor, site staff, building management staff and other relevant personnel are aware of their responsibilities under the EMMP;

- Maintaining records related to environmental monitoring, waste management, water use, diesel consumption, trainings, inspections, incidents, complaints and corrective actions; and
- Sharing compliance information with Pak-EPA and other relevant authorities, where required.

Any significant change in project design, construction methodology or operational arrangement that may have environmental implications shall be reviewed by the Proponent and, where applicable, communicated to the relevant regulatory authority in accordance with applicable legal requirements and environmental approval conditions.

7.5 Environmental Health and Safety Management

Environmental Health and Safety (EHS) management is an important component of the Environmental Management and Monitoring Plan (EMMP). This section outlines the measures required to protect the health and safety of workers, visitors, residents, nearby community and other stakeholders during the construction and operational phases of the proposed Atrium Hills Residential Apartment Complex.

Considering the nature of the project, key EHS risks during construction will be associated with excavation, cutting and grading, slope stabilization works, working at height, lifting operations, machinery movement, electrical works, construction traffic, dust, noise, fire hazards and emergency situations. During operation, EHS risks will mainly relate to fire and life safety, electrical systems, lifts, generators, transformer room, parking areas, water and wastewater systems, solid waste handling, housekeeping, security and emergency response.

During the construction phase, the Proponent will hire / designate an HSE Engineer to oversee EHS compliance at site. The Construction Contractor will also deploy its own HSE Officer for day-to-day implementation of safety measures, toolbox talks, site inspections, worker training, incident reporting and emergency preparedness. During the operational phase, the Building Management Committee will be responsible for overseeing EHS arrangements, including fire safety, building maintenance, emergency response, housekeeping, waste management, security and complaint handling.

7.5.1 Health and Safety during the Construction Phase

Construction activities may create risks for workers and nearby community due to excavation, open edges, working at height, scaffolding, lifting, material handling, electrical works, hot works, machinery operation, vehicle movement and general site activities.

EHS Management Measures:

- Deploy a qualified HSE Engineer by the Proponent and an HSE Officer by the Contractor during construction.
- Prepare and implement a site-specific Health, Safety and Environment Plan.
- Provide and enforce use of PPE, including helmets, safety shoes, gloves, reflective vests, masks, eye protection and safety harnesses where required.
- Ensure safe excavation practices, including barricading, warning signs, safe access/egress and slope support where required.

- Implement fall protection measures for work at height.
- Ensure scaffolding, lifting equipment and electrical installations are inspected by competent persons.
- Conduct regular toolbox talks, safety training and site inspections.
- Maintain good housekeeping to prevent slips, trips, falls and obstruction of access routes.
- Restrict unauthorized access to construction areas.
- Provide first-aid facilities and emergency contact information at site.
- Maintain incident, near-miss, training and inspection records.
- Avoid high-noise activities during nighttime and minimize disturbance to nearby residents.

7.5.2 Health and Safety during the Operation Phase

During operation, EHS risks will be associated with residential occupancy, parking areas, lifts, electrical rooms, transformer room, backup generators, fire and life safety systems, water storage, solid waste handling, housekeeping, maintenance works and emergency situations.

EHS Management Measures:

- The Building Management Committee shall oversee operational EHS management.
- Fire and life safety systems shall be regularly inspected, tested and maintained.
- Fire exits, staircases, corridors and emergency access routes shall remain clear at all times.
- Periodic fire drills and emergency response trainings shall be conducted for staff and residents.
- Lifts, generators, transformer room, electrical panels and pumps shall be operated and maintained by trained / authorized personnel.
- Diesel storage and generator areas shall be managed with spill prevention, ventilation, restricted access and fire safety arrangements.
- Internal solid waste collection and housekeeping shall be properly managed to avoid odor, pests, unhygienic conditions and fire risk.
- Water tanks, sewerage lines, pumps and drainage systems shall be inspected and maintained regularly.
- Parking areas shall be properly lit, ventilated and managed for safe vehicle and pedestrian movement.
- Security and visitor management arrangements shall be maintained.
- A complaint and incident reporting mechanism shall be maintained for residents and nearby community.
- Records of maintenance, inspections, drills, incidents and corrective actions shall be maintained by the Building Management Committee.

7.6 Mitigation Plan

The mitigation plan translates the impact assessment findings presented in Chapter 6 into practical and implementable measures to avoid, minimize or manage potential adverse environmental, health and safety impacts during the pre-construction, construction and operational phases of the proposed Atrium Hills Residential Apartment Complex.

The mitigation plan is presented in the form of mitigation matrices for the construction and operational phases in Table 13 and Table 14 respectively. The identified impacts and corresponding mitigation measures have already been discussed in detail in Chapter 6 of this EIA. The Proponent, Construction Contractor and Building Management Committee shall ensure implementation of these mitigation measures throughout the relevant phases of the project.

The mitigation matrix defines the key impact source, recommended mitigation measures, implementation responsibility and monitoring requirements to support effective environmental management and compliance with applicable regulatory requirements and Pak-EPA approval conditions.

7.7 Monitoring Plan

Environmental monitoring is an essential component of the Environmental Management and Monitoring Plan (EMMP). The purpose of monitoring is to ensure that the mitigation measures identified in Chapter 6 are effectively implemented and that the environmental performance of the project remains within applicable standards during the construction and operational phases.

The monitoring plan will help verify compliance with environmental approval conditions, NEQS, CDA / ICT requirements, and the mitigation measures included in this EIA. It will also support early identification of non-compliances, complaints, incidents or site-specific issues requiring corrective action.

A detailed monitoring plan for the construction and operational phases is provided in Table 15 and Table 16. The Proponent, through the designated HSE Engineer / environmental compliance representative, shall oversee implementation of the monitoring plan during construction. The Construction Contractor shall support monitoring by maintaining site records and implementing corrective actions. During operation, the Building Management Committee shall be responsible for monitoring and record keeping related to water use, wastewater disposal, solid waste management, generator operation, fire and life safety systems, complaints and maintenance activities.

Records of environmental monitoring, inspections, non-compliances, complaints and corrective actions shall be maintained and reviewed periodically. Any major non-compliance shall be reported to the Proponent and corrective measures shall be implemented within an appropriate timeframe.

7.7.1 Corrective Actions

If environmental monitoring, site inspections, complaints, incidents or regulatory observations indicate any non-compliance or deviation from acceptable standards, corrective actions shall be initiated in a timely manner. Corrective actions will be aimed at removing the cause of non-compliance, preventing recurrence and improving environmental and safety performance.

Corrective actions may include:

- Modification of construction or operational practices;
- Repair, maintenance or replacement of equipment, machinery or building services;

- Improvement of dust, noise, wastewater, drainage, waste management or traffic control measures;
- Additional training, toolbox talks or awareness sessions for workers / staff;
- Engagement of specialized service providers, where required, such as waste contractors, pest control service providers, fire safety service providers or maintenance contractors;
- Strengthening of supervision, housekeeping, signage, barricading or emergency response arrangements; and
- Review and update of relevant procedures or management controls.

All corrective actions shall be documented, including the nature of non-compliance, action taken, responsible person and completion status. During construction, corrective actions shall be reviewed by the Proponent's designated HSE Engineer / environmental compliance representative in coordination with the Contractor. During operation, corrective actions shall be reviewed by the Building Management Committee or its designated representative.

Table 13: Mitigation Matrix for Construction Phase

Environmental Aspect	Potential Impact	Mitigation Measures	Monitoring Verification	Responsibility	Applicable Standard Reference
Site clearance and vegetation / tree removal	Loss of local vegetation, removal of mature trees and reduction in visual quality	• Avoid tree cutting as far as possible • Prepare tree inventory before site clearance • Protect trees outside construction footprint • Carry out compensatory plantation where tree removal is unavoidable • Ensure watering, protection and survival of planted trees	Tree inventory; visual inspection; plantation record; survival monitoring	Contractor; Proponent / HSE Engineer	EIA / EMMP; Pak-EPA approval conditions; CDA / society requirements
Excavation, cutting, grading and slope stability	Slope instability, unsafe excavation faces, settlement, erosion and possible damage to nearby properties	• Carry out excavation as per the approved engineering design • Follow geotechnical investigation recommendations • Stabilize cut slopes through RCC retaining walls / slope stabilization walls • Use temporary shoring, benching, bracing, soil nailing or shotcrete where required • Avoid surcharge loads near excavation edges • Provide drainage to avoid water accumulation	Site inspection; approved drawings; geotechnical report; retaining wall inspection; incident/complaint record	Contractor; Proponent / HSE Engineer; Structural / Geotechnical Consultant	Geotechnical Investigation Report; approved structural design; Building Code of Pakistan; EIA / EMMP
Excavated material management	Dust, obstruction of access roads, blockage of drainage paths and entry of material into nullah / stormwater drain	• Reuse suitable excavated material where feasible • Dispose surplus material at approved / designated locations • Keep stockpiles away from nullah, houses and roads • Cover or sprinkle stockpiles to control dust • Do not dump material on roads, green areas, service path or drainage channels • Maintain disposal / reuse records	Visual inspection; stockpile location check; disposal records; photographs	Contractor; Proponent / HSE Engineer	EIA / EMMP; CDA / society requirements
Construction waste generation and disposal	Visual nuisance, blocked drainage, soil contamination, pest attraction and unsafe site conditions	• Segregate reusable, recyclable, general and hazardous waste • Provide covered waste bins at site • Hand over recyclable waste to recyclers • Store hazardous waste in labelled leak-proof containers • Dispose domestic waste through society / approved municipal arrangement • Prohibit open dumping and burning • Do not dump waste into nullah / stormwater drain	Waste storage inspection; waste disposal records; housekeeping checks; complaint register	Contractor; Proponent / HSE Engineer	EIA / EMMP; ICT / CDA solid waste requirements; Pak-EPA approval conditions

Air quality: dust and exhaust emissions	Temporary deterioration of ambient air quality due to dust and machinery / vehicle emissions	• Carry out water sprinkling on exposed surfaces and access routes • Cover or keep stockpiles moist • Use ready-mix concrete; no on-site batching plant • Cover vehicles carrying loose material • Control vehicle speed within society roads • Maintain machinery and vehicles • Minimize idling • Provide temporary screens where required near houses	Visual dust inspection; ambient air monitoring; vehicle condition check; complaint register	Contractor; Proponent / HSE Engineer	NEQS for Ambient Air; EIA / EMMP
Noise and vibration	Temporary disturbance to nearby residents due to construction equipment, vehicles, generators and loading/unloading	• Restrict high-noise activities to daytime • Avoid nighttime construction, especially noisy works • Maintain machinery and provide silencers / mufflers • Use acoustic canopies for generators where required • Prohibit unnecessary honking and idling • Inform nearby residents before unusually noisy activities • Conduct noise monitoring as per EMMP	Noise monitoring; site inspection; equipment maintenance record; complaint register	Contractor; Proponent / HSE Engineer	NEQS for Noise; EIA / EMMP
Construction traffic and access	Traffic disturbance, obstruction of internal roads, safety risks and inconvenience to residents	• Use designated construction access routes • Use north-side Major Road as main construction access • Do not use west-side service path for routine construction traffic • Schedule material deliveries to avoid unnecessary congestion • Do not block house entrances, roads or emergency access • Provide signage, flagmen and speed control • Clean vehicle wheels where required	Traffic/site inspection; access route checks; complaint register; delivery schedule	Contractor; Proponent / HSE Engineer	Traffic Impact Study; EIA / EMMP; Zaraj Society requirements
Soil erosion, silt-laden runoff and nullah protection	Sediment flow, blockage or pollution of adjacent nullah / stormwater drain	• Do not discharge construction waste, excavated material, cement slurry, oil, grease or wastewater into the nullah • Provide temporary drainage arrangements • Install silt traps, sediment barriers or sandbags where required • Keep stockpiles away from nullah • Stabilize exposed soil progressively • Maintain housekeeping, especially during rainy periods	Visual inspection; drainage inspection; rainfall-event checks; photographs; complaint register	Contractor; Proponent / HSE Engineer	EIA / EMMP; Pak-EPA approval conditions; CDA / society drainage requirements
Construction water use	Use of water for workers, dust suppression, curing, washing and housekeeping	• Arrange construction water through tanker supply • Do not install project bore well • Use water efficiently and avoid wastage • Control	Water tanker records; visual inspection; leakage checks	Contractor; Proponent / HSE Engineer	EIA / EMMP; water conservation good practice

		leakage from temporary water storage / pipelines • Manage washing activities to avoid uncontrolled runoff			
Wastewater and sanitation	Unhygienic conditions, ponding, odor, soil contamination and discharge toward nullah	• Provide adequate toilet and washing facilities for workers • Connect domestic wastewater to approved society sewerage arrangement or temporary sanitation system • Do not discharge wastewater into nullah / stormwater drain • Carry out machinery maintenance in designated areas • Prevent ponding and maintain sanitation facilities	Sanitation inspection; wastewater disposal arrangement; housekeeping checks; complaint register	Contractor; Proponent / HSE Engineer	NEQS for wastewater where applicable; EIA / EMMP
Occupational health and safety	Injury or accident risks from excavation, working at height, lifting, scaffolding, machinery, electrical works and vehicle movement	• Prepare and implement site-specific HSE Plan • Deploy competent HSE staff • Provide and enforce PPE use • Barricade excavations and provide safe access / egress • Enforce fall protection for work at height • Use trained operators and inspected lifting equipment • Inspect scaffolding and electrical systems • Conduct toolbox talks, training and emergency drills • Provide first aid facilities	HSE inspections; PPE checks; training records; incident / near-miss records; equipment inspection records	Contractor; Proponent / HSE Engineer	Occupational Safety and Health Code of Practice for Construction Sector of Pakistan; EIA / EMMP
Community health, safety and nuisance	Dust, noise, vibration, privacy disturbance, unsafe access, worker movement and risk to nearby residents	• Barricade the construction site and control access • Install warning signs • Do not allow workers to sit or gather near nearby houses / green areas • Implement dust and noise control measures • Supervise high-risk activities • Ensure safe movement of construction vehicles • Maintain grievance / complaint register • Store materials without obstructing roads or public access	Site inspection; barricading/signage checks; complaint register; corrective action record	Contractor; Proponent / HSE Engineer	EIA / EMMP; Zaraj Society requirements
Fire and emergency risks	Fire, injury or property damage from temporary electrical connections, generators, fuel storage, welding and combustible materials	• Provide fire extinguishers at site offices, generator areas, fuel storage and hot work locations • Control hot work through supervision / permit system • Store fuel with secondary containment away from ignition sources • Maintain safe temporary electrical connections • Store combustible materials safely • Display emergency contacts and	Fire extinguisher inspection; fuel storage inspection; emergency drill / training records; incident record	Contractor; Proponent / HSE Engineer	BCP-2016; CDA fire safety requirements; EIA / EMMP

		evacuation routes • Train workers in fire prevention and emergency response			
Employment and local business opportunities	Positive temporary employment and local business benefits	• Hire local labour where feasible • Engage local suppliers / service providers where practical • Ensure fair working conditions and timely payment • Provide safe working conditions and basic facilities	Employment records; contractor records; worker facility inspection	Contractor; Proponent	EIA / EMMP; applicable labour requirements

Table 14: Mitigation Matrix for Operation Phase

Environmental Aspect	Potential Impact	Mitigation Measures	Monitoring / Verification	Responsibility	Applicable Standard / Reference
Water consumption and tanker supply	Pressure on water resources, inefficient use of water and disturbance due to tanker movement	• Arrange water through tanker supply • No project bore well shall be installed • Do not use society water supply meant for individual houses • Install water-efficient fixtures where feasible • Monitor water use and repair leakages promptly • Use harvested rainwater for non-potable uses where feasible • Use treated wastewater from society WWTP/STP for gardening, subject to approval and quality compliance	Water supply records; tanker records; inspection of tanks/pipelines; leakage complaints; water use records	Building Management Committee	EIA / EMMP; water conservation good practice; society requirements
Wastewater generation and disposal	Leakage, blockage, odor, unhygienic conditions, overflow and contamination of stormwater drains	• Connect wastewater to approved sewerage system of Zaraj Housing Scheme leading to WWTP • No untreated wastewater discharge into nullah / stormwater drain • Maintain sewer lines, manholes and internal drainage system • Provide grease traps / control measures where required • Address blockage, leakage or overflow immediately • Maintain coordination with Zaraj Management Committee	Sewerage system inspection; maintenance records; complaint register;	Building Management Committee; Zaraj Management Committee	NEQS for wastewater where applicable; EIA / EMMP; society requirements
Municipal solid waste generation	Odor, littering, pest attraction, unhygienic conditions and visual nuisance	• Establish internal waste collection system • Provide color-coded covered bins • Transfer waste to designated main collection point • Promote segregation of recyclables and kitchen waste where feasible • Keep waste collection area clean, washable and protected from pests • Hand over waste regularly to society's waste contractor • Prohibit open dumping, burning or disposal into drains/nullah	Waste collection records; inspection of bins and waste point; housekeeping checks; complaint register	Building Management Committee; Society waste contractor	ICT / CDA solid waste requirements; EIA / EMMP
Energy consumption and electricity demand	High electricity demand, pressure on distribution system and indirect GHG emissions	• Install electrical systems as per approved design • Use energy-efficient lighting and equipment in common areas where feasible • Maintain rooftop solar system • Maintain lifts, pumps and ventilation systems for efficient operation	Electricity bills/records; maintenance records; solar system inspection; electrical room inspection	Building Management Committee	Approved electrical design; NEPRA / IESCO requirements; EIA / EMMP

		Monitor common area electricity use • Secure and ventilate transformer room, electrical rooms and panels			
Backup generator emissions and noise	Localized air emissions, GHG emissions and noise during generator operation	• Operate generators only for backup/emergency use • Maintain generators as per manufacturer recommendations • Provide proper stack height / exhaust arrangement • Use low-sulfur diesel where available • Provide acoustic enclosure / silencers • Store diesel with secondary containment and spill control • Conduct emissions and noise monitoring as per EMMP	Generator logbook; diesel consumption record; maintenance record; stack inspection; noise/emission monitoring; complaint register	Building Management Committee	NEQS for gaseous emissions and noise; EIA / EMMP
Fire and life safety	Fire, smoke, injury, property damage and evacuation risks in high-rise building	• Install and maintain approved fire and life safety systems • Maintain fire pumps, fire tanks, sprinkler system, fire hose cabinets and extinguishers • Maintain fire detection/alarm system, fire lifts, smoke extraction and staircase pressurization • Keep fire exits, stairs and emergency routes clear • Conduct periodic fire drills • Maintain emergency response plan • Secure transformer room, generator area and electrical rooms	Fire system inspection/test records; drill records; maintenance logs; emergency route inspection; fire safety audit	Building Management Committee	BCP-2016; CDA Fire Prevention and Life Safety requirements; NFPA standards; approved fire design
Stormwater runoff and adjacent nullah / drainage protection	Runoff, blockage, erosion, water stagnation and pollution of adjacent nullah / stormwater drain	• Maintain stormwater drainage system • Keep rainwater harvesting tanks and recharge well functional • Prohibit discharge of wastewater, solid waste, oil, grease or debris into nullah • Clean roof drains, gratings, channels and collection points regularly • Provide / maintain silt traps or screens where required • Repair any damaged drainage structure immediately	Drainage inspection; rainwater harvesting/recharge well inspection; cleaning records; complaint register	Building Management Committee	EIA / EMMP; CDA / society drainage requirements
Community health, safety and privacy	Disturbance to nearby residents, privacy concerns, unsafe movement, poor housekeeping and complaints	• Maintain access control and security arrangements • Manage visitor entry and parking • Keep emergency access clear • Maintain housekeeping and waste management • Manage privacy-related concerns through building rules and controlled use of common areas • Maintain complaint handling mechanism	Security records; complaint register; housekeeping inspection; parking/access inspection	Building Management Committee	EIA / EMMP; society requirements

Visual / aesthetic impact and building maintenance	Visual obstruction, façade deterioration, seepage, poor maintenance and reduced visual quality	• Maintain building façade, balconies and external finishes • Develop and maintain landscaping / green areas • Repair seepage, leakage and façade defects promptly • Screen and maintain waste storage areas • Organize and maintain rooftop services and utilities • Conduct routine building inspections	Maintenance records; façade inspection; landscaping inspection; complaint register	Building Management Committee	Approved architectural design; EIA / EMMP
Traffic movement, access and parking	Increase in local traffic, parking mismanagement, access conflict and spillover parking	• Use north-side Major Road as normal access • West-side service path shall only be used for emergency evacuation • Clearly demarcate resident, visitor and motorcycle parking • Provide directional signage and floor numbering in parking areas • Maintain adequate lighting in parking and circulation areas • Prohibit spillover parking on adjoining roads • Conduct post-occupancy traffic review, if required	Parking inspection; traffic/queue observation; signage inspection; complaint register; post-occupancy review	Building Management Committee	Traffic Impact Study; EIA / EMMP; society requirements
Shadow impact on nearby receptors	Localized shadowing, visual concern and reduced sunlight exposure in some nearby areas	• Maintain approved architectural configuration • Maintain segmented/articulated building form • Maintain open spaces, green areas and internal circulation areas • Provide adequate lighting in shaded parking / circulation areas where required • Maintain façade, balconies and common areas	Building maintenance record; lighting inspection; complaint register	Building Management Committee	Shadow Analysis Study; approved architectural design; EIA / EMMP
Climate change / GHG emissions	Long-term indirect emissions from electricity use, diesel generators and possible gas use	• Use energy-efficient lighting and equipment where feasible • Maintain 40 kVA rooftop solar system • Maintain passive ventilation/cooling features • Operate diesel generators only for backup/emergency use • Maintain records of electricity use and diesel consumption • Promote water conservation, waste segregation and recycling • Maintain green/open areas to support local cooling	Electricity and diesel records; solar maintenance record; waste records; landscaping inspection	Building Management Committee	EIA / EMMP; National Climate Change Policy; good resource efficiency practices
Planned housing, amenities and local services	Positive impact through housing supply, amenities and local service opportunities	• Operate and maintain common amenities properly • Maintain security, housekeeping and fire safety systems • Prefer local employment for building operation and maintenance where feasible • Maintain organized building management system	Maintenance records; employment/service records; complaint register	Building Management Committee	EIA / EMMP; building management requirements

Green building / resource efficiency measures	Positive impact through improved resource efficiency and environmental performance	• Keep rainwater harvesting and recharge systems functional • Maintain rooftop solar system • Maintain lush green park/open area and plantation • Keep passive ventilation/cooling features unobstructed • Operate EV charging points with safety controls • Ensure regular maintenance by Building Management Committee	Inspection of green building features; solar system records; plantation survival record; EV charging inspection	Building Management Committee	EIA / EMMP; approved design; Pak-EPA / CDA requirements
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Table 15: Environmental Monitoring Plan (Construction Phase)

Environmental Concern	Parameters to be Monitored	Monitoring Location	Frequency	Responsibility
Ambient air quality / dust	Visible dust; PM _{2.5} , PM ₁₀	Construction site near nearest sensitive receptor, especially western-side houses	Daily visual inspection; instrumental monitoring on quarterly basis	Contractor; Proponent / HSE Engineer; EPA-approved laboratory
Noise level	Leq dB(A) during construction activities	Construction site boundary and nearest sensitive receptor, especially western-side houses	Daily observation; instrumental monitoring on quarterly basis	Contractor; Proponent / HSE Engineer; EPA-approved laboratory
Excavation and slope stability	Condition of excavation faces, shoring, retaining works, cracks, settlement, unsafe edges and water accumulation	Excavation areas, cut slopes, retaining wall locations and adjacent properties	Daily during excavation and retaining works	Contractor; Proponent / HSE Engineer; Structural / Geotechnical Consultant
Nullah / stormwater drain protection	Silt runoff, waste entry, blockage, erosion, sediment barriers and housekeeping near drain	Eastern side nullah / stormwater drain and site drainage points	Daily; additional inspection after rainfall	Contractor; Proponent / HSE Engineer
Construction waste and excavated material	Waste segregation, storage, disposal records, stockpile management and hazardous waste handling	Construction site, waste storage area, stockpile areas and disposal routes	Daily inspection; disposal records as generated	Contractor; Proponent / HSE Engineer
Wastewater and sanitation	Worker sanitation facilities, wastewater disposal, ponding, leakage and discharge control	Worker facilities, washing areas, site drainage points	Daily inspection	Contractor; Proponent / HSE Engineer
Occupational health and safety	PPE use, excavation safety, work at height, lifting safety, scaffolding, electrical safety, first aid, training and incidents	Construction site and worker areas	Daily inspection; toolbox talks as per site schedule; incident reporting immediately	Contractor / HSE Officer; Proponent / HSE Engineer
Community health and safety	Barricading, warning signs, traffic safety, worker movement, complaints and disturbance to nearby residents	Site boundary, access road, western-side houses, service path and nearby receptors	Daily inspection; complaint review as received	Contractor; Proponent / HSE Engineer
Fire and emergency preparedness	Fire extinguishers, fuel storage, hot work controls, emergency access, first aid and emergency contact display	Site office, generator/fuel area, hot work areas and material storage areas	Weekly inspection; daily during hot work / fuel handling	Contractor / HSE Officer; Proponent / HSE Engineer

Tree protection / compensatory plantation	Tree protection, tree removal record, compensatory plantation and plant survival	Project site and plantation areas	Before site clearance; monthly during construction where plantation is carried out	Contractor; Proponent / HSE Engineer
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Table 16: Environmental Monitoring Plan (Operation Phase)

Environmental Concern	Parameters to be Monitored	Monitoring Location	Frequency	Responsibility
Water supply and conservation	Water tanker records, water use, leakage, condition of storage tanks and pipelines	Water storage tanks, pumps, pipelines and building water distribution system	Monthly inspection; records on regular basis	Building Management Committee
Wastewater disposal	Sewer connection, leakage, blockage, overflow, odor and disposal to society sewerage system / WWTP	Internal sewerage system, manholes and connection point with society sewerage system	Monthly inspection; additional inspection in case of complaint	Building Management Committee
Solid waste management	Waste collection, covered bins, housekeeping, waste storage condition and handover to society contractor	Waste collection points, main waste storage area and common areas	Daily housekeeping check; monthly review	Building Management Committee
Generator emissions and noise	Generator operation hours, diesel consumption, maintenance record, visible smoke, stack emissions and noise level	Generator room / generator exhaust area and nearest sensitive receptor, where required	Monthly record review; instrumental monitoring annually	Building Management Committee / EPA-approved laboratory
Fire and life safety	Fire alarm, sprinkler system, fire pumps, fire tanks, fire hose cabinets, extinguishers, fire exits, smoke extraction, staircase pressurization and emergency lighting	Entire building, parking floors, common areas, fire pump room, fire exits and emergency routes	Monthly inspection; fire drills at least biannually	Building Management Committee / Fire Safety Contractor
Energy efficiency and climate-related records	Electricity consumption, solar system operation, diesel use and maintenance of passive ventilation / cooling features	Electrical room, solar system, common areas, generator room and atrium areas	Monthly record review	Building Management Committee
Community complaints and safety	Complaints related to traffic, parking, privacy, waste, noise, safety and maintenance	Complaint register / building management office	Continuous record keeping; monthly review	Building Management Committee

7.8 Training

Training and capacity building will be required to ensure effective implementation of the Environmental Management and Monitoring Plan (EMMP) and to promote safe and environmentally responsible practices during construction and operation of the project. The training requirements will be more detailed during the construction phase due to excavation, working at height, machinery use, traffic movement and other construction-related risks. During operation, training requirements will mainly relate to building management, fire safety, emergency response, housekeeping, waste management and maintenance activities.

7.8.1 Training during the Construction Phase

During construction, the Proponent's HSE Engineer and Contractor's HSE Officer will be responsible for arranging and documenting relevant trainings, toolbox talks and awareness sessions for workers and site staff.

Training Category	Training Contents	Frequency	Responsibility
Environmental Awareness Training	Overview of EMMP, dust control, noise control, waste segregation, housekeeping, water conservation, protection of adjacent nullah / stormwater drain	At induction and refresher as required	Contractor HSE Officer / Proponent HSE Engineer
Occupational Health and Safety Training	Use of PPE, excavation safety, work at height, scaffolding safety, lifting safety, electrical safety, machinery safety, safe access/egress and housekeeping	At induction and regular toolbox talks	Contractor HSE Officer
Emergency Preparedness and Fire Safety Training	Use of fire extinguishers, emergency contacts, evacuation procedures, first aid arrangements, fuel/diesel handling and hot work precautions	At induction and periodic drills / refresher	Contractor HSE Officer / Site Supervisor
Traffic and Community Safety Awareness	Speed control, safe vehicle movement, designated access routes, avoidance of west-side service path for routine movement, no obstruction of roads/house entrances, respectful behavior with nearby residents	At induction and as required	Contractor HSE Officer / Site Supervisor

7.8.2 Training during the Operation Phase

During operation, the Building Management Committee will be responsible for ensuring that relevant building management staff, security staff, maintenance staff, housekeeping staff and other concerned personnel are trained according to their assigned duties.

Training Category	Training Contents	Frequency	Responsibility
Building Environmental Management Training	Waste collection, housekeeping, water conservation, rainwater harvesting system, stormwater drain protection, complaint handling and record keeping	At induction and annual refresher	Building Management Committee

Fire Safety and Emergency Evacuation Training	Fire alarm response, evacuation routes, fire exits, use of extinguishers, emergency communication, role of building staff during emergency	At induction and refresher as required	Building Management Committee / Fire Safety Contractor
Fire Evacuation Drill	Practical evacuation drill for building staff and residents / occupants	Biannually	Building Management Committee / Fire Safety Contractor
Maintenance and Utility Safety Training	Safe operation/maintenance of lifts, pumps, generators, transformer room, electrical panels, water tanks, sewerage system and rooftop services	At induction and as required for relevant staff	Building Management Committee / Maintenance Contractor
Waste Management and Housekeeping Training	Internal waste collection, handling of bins, main waste collection point, pest prevention, cleanliness of common areas and safe handling practices	At induction and annual refresher	Building Management Committee / Housekeeping Supervisor

7.8.3 Training Needs Assessment

In addition to planned trainings, special or refresher training shall be arranged when required. The need for additional training may arise in the following situations:

- induction of new contractor, subcontractor, building management staff or maintenance staff;
- start of a new construction activity or operational procedure;
- repeated non-compliance observed during monitoring or inspections;
- occurrence of any accident, incident, near miss, fire alarm event or emergency situation;
- change in legal requirements, approval conditions or EMMP requirements; and
- complaints from nearby residents, building users or society management related to environmental, safety or operational issues.

Training records, attendance sheets, toolbox talk records, drill reports and photographs shall be maintained as part of EMMP documentation.

7.9 Environmental Management Budget

The environmental management budget has been prepared to support effective implementation of the Environmental Management and Monitoring Plan (EMMP) for the proposed Atrium Hills Residential Apartment Complex. The budget covers key costs associated with environmental mitigation measures, monitoring, occupational health and safety, waste management, traffic and community safety, emergency preparedness, training and contingency requirements during the construction and operational phases of the project.

The budget provided below is an indicative first-year environmental management budget. It may be reviewed and updated during project implementation based on actual construction activities, site conditions, monitoring requirements, Pak-EPA approval conditions, and contractor's work plan. The cost of permanent engineering design items such as RCC retaining walls, fire and life safety systems, rainwater harvesting tanks, recharge well, rooftop solar system, wastewater connection, and building services has not been included in this EMMP budget, as these are part of the main project construction / MEP cost.

Table 17: Environmental Management Budget

S. No.	Item	Description	Estimated Cost (PKR)
1.	HSE supervision / environmental compliance support	Site-level HSE / environmental supervision, inspections, documentation and reporting support	1,800,000
2.	Personal Protective Equipment (PPE)	Safety helmets, gloves, safety shoes, masks, reflective jackets, goggles, safety harnesses and other PPE for workers	800,000
3.	Dust control measures	Water sprinkling, covers for stockpiles/materials, dust screens and related site control measures	350,000
4.	Construction waste management	Waste bins, segregation arrangements, temporary waste storage area and housekeeping measures	400,000
5.	Wastewater and sanitation facilities	Temporary toilets, washing facilities, cleaning and maintenance during construction	600,000
6.	Occupational health and safety measures	Barricading, warning signs, excavation safety signage, first-aid boxes, safety posters and site access control	700,000
7.	Fire and emergency preparedness	Fire extinguishers, emergency signage, spill kits, first-aid/emergency response arrangements	500,000
8.	Environmental monitoring	Ambient air, noise, wastewater / water quality and generator emissions monitoring through EPA-approved laboratory, as required	1,800,000
9.	Training and awareness	Worker induction, toolbox talks, OHS training, emergency response training and environmental awareness sessions	300,000
10.	Community safety and grievance management	Complaint register, notice boards, community coordination, signage and minor corrective actions	200,000
11.	Tree protection / compensatory plantation	Tree protection, plantation, watering and survival maintenance during initial period	400,000
		Subtotal	7,850,000
		Contingency @ 10%	785,000
		Total Indicative EMMP Budget	8,635,000

The above budget is indicative and shall be refined before construction based on the contractor's method statement, construction schedule, environmental approval conditions and monitoring frequency required by Pak-EPA. During operation, recurring environmental management costs, including waste collection, fire safety inspection, generator monitoring, water system maintenance, drainage maintenance, landscaping and emergency preparedness, shall be included in the annual operation and maintenance budget of the Building Management Committee.

7.10 Site Restoration and Rehabilitation Plan

The Site Restoration and Rehabilitation Plan has been prepared to ensure that areas temporarily affected during construction activities are restored to a clean, safe and stable condition after completion of works. Since the proposed project involves excavation, cutting, grading, construction activities and movement of construction materials/equipment within a developed

housing scheme, site restoration will be important to avoid residual environmental and safety impacts.

The following restoration measures shall be implemented:

- All construction debris, surplus materials, packaging waste, scrap, temporary facilities and unused materials shall be removed from the site after completion of construction works.
- Temporary waste storage areas shall be cleared, cleaned and restored, and no waste shall be left on open plots, green areas, service paths, roads, drains or adjoining areas.
- Surplus excavated material shall be removed from the site or reused only at approved locations, as per construction requirements and site restoration plan.
- All access routes, internal roads, paved surfaces and adjoining areas affected by construction movement shall be cleaned and restored.
- Any damage caused to society roads, service paths, drainage structures or adjoining areas due to construction activities shall be repaired in coordination with Zaraj Housing Scheme Management Committee.
- Temporary drainage arrangements, sediment barriers, silt traps, barricades, scaffolding, signage and temporary structures shall be safely dismantled and removed after completion of relevant works.
- The adjacent nullah / stormwater drain shall be checked and cleared of any construction-related debris, silt or obstruction.
- Exposed soil areas shall be levelled, compacted and stabilized to prevent dust generation, erosion and runoff.
- Green/open areas affected during construction shall be restored through landscaping, plantation and surface stabilization.
- Permanent utilities, sewerage connection, stormwater drainage, water storage, firefighting systems, electrical systems and access arrangements shall be checked to ensure they are functional before operation.

Site restoration shall be considered complete when the project site and adjoining affected areas are free from construction waste, unsafe conditions, drainage obstruction, environmental nuisance and temporary construction-related hazards.

7.11 Tree Plantation and Landscaping Plan

The Tree Plantation and Landscaping Plan has been prepared to enhance the visual quality, microclimate, environmental performance and neighborhood character of the proposed Atrium Hills project. The project site currently consists of natural vegetation and a few mature trees of *Dalbergia sissoo* (Shisham). Tree cutting shall be avoided as far as technically feasible. Where removal of any tree is unavoidable due to the approved construction footprint, compensatory plantation shall be carried out.

The project also includes the proposed development and maintenance of an approximately 8-kanal L-shaped neighborhood green/open area located on the western side of the project site. Although this green area is not part of the project plot, the client has obtained permission from Zaraj Housing Scheme to develop and maintain it as a green park. This park will support landscaping, visual improvement, dust control, local cooling, limited carbon sequestration and improvement of the living environment for residents and nearby community.

The plantation design shall be finalized in coordination with Zaraj Housing Scheme management. Based on the available park boundary/perimeter and planting strips, trees may be planted at approximately 5 m to 6 m spacing, depending on species type, canopy spread, available root zone, visibility and utility constraints. The final number of trees shall be

determined after confirmation of the park dimensions and landscape layout. Additional plantation may also be carried out along the Major Road and other suitable green/open areas after discussion and approval from Zaraj Housing Scheme management.

The plantation plan shall include the following measures:

- Existing mature trees shall be protected where technically feasible.
- A tree inventory shall be prepared before site clearance.
- Unnecessary removal of trees or vegetation outside the approved construction footprint shall be prohibited.
- Compensatory plantation shall be carried out for trees removed during construction.
- Plantation shall preferably include native, climate-resilient and drought-tolerant species suitable for Islamabad / Potohar region.
- Trees shall generally be planted at suitable spacing, preferably around 5 m to 6 m for medium to large canopy trees, subject to final landscape design.
- Planted saplings shall be protected through tree guards or other suitable protection measures.
- Regular watering, mulching, pruning and maintenance shall be carried out to ensure healthy growth and survival.
- Dead or damaged plants shall be replaced during the next suitable plantation season.
- Landscaping shall be integrated with stormwater management, rainwater harvesting, recharge measures and open/green area development.
- Plantation along the Major Road and other nearby suitable areas shall be carried out in coordination with Zaraj Housing Scheme management.

The proposed plantation may include suitable native and adapted species such as:

- Sheesham (*Dalbergia sissoo*)
- Neem (*Azadirachta indica*)
- Amaltas (*Cassia fistula*)
- Kachnar (*Bauhinia variegata*)
- Sukh Chain (*Pongamia pinnata*)
- Chir Pine (*Pinus roxburghii*) where suitable
- Other locally suitable ornamental / shade trees

The Proponent / Contractor shall be responsible for protection of existing trees and initial plantation during construction. During operation, the Building Management Committee shall be responsible for maintenance of landscaping, watering, replacement of dead plants and long-term survival of plantation. The maintenance arrangement shall also cover the neighborhood green park, subject to the permission and conditions agreed with Zaraj Housing Scheme management.

7.12 Waste Management Plan

This Waste Management Plan has been developed to ensure proper segregation, handling, temporary storage, collection and disposal of wastes generated during the construction and operational phases of the proposed Atrium Hills Residential Apartment Complex. The plan aims to prevent littering, odor, pest attraction, blockage of drains, soil contamination, visual nuisance and disposal of waste into the adjacent nullah / stormwater drain.

7.12.1 Construction Phase Waste Management

During construction, waste will mainly include excavated material, construction debris, packaging waste, scrap materials, domestic waste from workers, and small quantities of hazardous waste from equipment maintenance.

Types of Waste:

- Excavated soil / surplus earth material;
- Construction debris such as concrete pieces, broken blocks, tiles, cement bags and formwork waste;
- Packaging waste such as cartons, plastic wrapping, polythene, wood and pallets;
- Scrap metal, steel pieces, cables and other recyclable materials;
- Domestic waste generated by construction workers;
- Small quantities of hazardous waste such as used oil, oily rags, grease containers, paint containers and contaminated soil, if any.

Management Measures:

- Waste shall be segregated at source into reusable, recyclable, general and hazardous waste categories.
- Suitable excavated material shall be reused for backfilling, leveling, landscaping or other approved project uses, where technically feasible.
- Surplus excavated material shall be transported to approved / designated disposal or reuse locations.
- Temporary waste storage areas shall be provided within the site, away from the adjacent nullah / stormwater drain, access routes and nearby houses.
- Recyclable waste such as scrap metal, wood, cardboard and packaging material shall be handed over to recyclers.
- Domestic waste shall be stored in covered bins and disposed of through the society's waste management arrangement or approved municipal system.
- Hazardous waste shall be stored separately in labeled, leak-proof containers and handed over to authorized waste handlers, where required.
- Open dumping and burning of waste at site shall be strictly prohibited.
- No construction waste, excavated material, cement slurry, wastewater, oil, grease or debris shall be disposed of into the adjacent nullah / stormwater drain, green areas, service path or society roads.
- The Construction Contractor shall be responsible for construction-phase waste management under the supervision of the Proponent / HSE Engineer.

7.12.2 Operation Phase Waste Management

During operation, waste will mainly comprise domestic municipal waste generated from apartments, common areas, amenities, offices, visitors, cleaning activities and building maintenance. The waste stream will be mostly non-hazardous; however, small quantities of special waste may be generated from maintenance activities

Types of Waste:

- Food waste and kitchen waste from apartments;
- Paper, cardboard, plastic, glass, metal and packaging waste;
- Sanitary waste from apartments and common facilities;
- General waste from common areas, offices and amenities;
- Garden waste from landscaping and green/open areas;

- Maintenance waste such as used lamps, filters, empty chemical containers and small quantities of e-waste from equipment replacement

Management Measures:

- Internal waste collection arrangements shall be established within the building.
- Covered bins shall be provided at suitable locations, including common areas and waste collection points.
- Waste segregation shall be promoted, where feasible, particularly for recyclables and organic waste.
- Waste from apartments and common areas shall be transferred to the designated main waste collection point of the building.
- The main waste collection area shall be properly maintained, washable, covered / protected and regularly cleaned to avoid odor, pests and visual nuisance.
- The society's waste contractor will collect waste from the main waste collection point as per the existing waste management arrangement of Zaraj Housing Scheme.
- Recyclable waste may be separately handed over to recyclers, where feasible.
- Garden waste shall be managed through collection and reuse / composting where practical, or handed over through the society waste arrangement.
- E-waste and maintenance-related special waste shall be stored separately and disposed of through appropriate recyclers / handlers.
- Open dumping, burning or disposal of waste into stormwater drains / nullah shall be strictly prohibited.
- The Building Management Committee shall be responsible for implementation of operational-phase waste management within Atrium Hills.

7.12.3 Monitoring and Record Keeping

- Regular inspection of waste collection points, bins and temporary storage areas shall be carried out.
- Waste collection and handover records shall be maintained by the Contractor during construction and by the Building Management Committee during operation.
- Records of recyclable waste, hazardous waste / special waste and disposal contractor receipts shall be maintained where applicable.
- Housekeeping conditions shall be checked regularly to prevent odor, littering, pest attraction and blockage of drains.
- Any complaint related to waste management shall be recorded and corrective action shall be taken promptly.

7.13 Emergency Response Plan

The Emergency Response Plan (ERP) has been prepared to ensure timely and effective response to potential emergency situations that may arise during the construction and operational phases of the proposed Atrium Hills Residential Apartment Complex. The purpose of the ERP is to minimize risks to human life, property, nearby residents, building occupants and the environment through preparedness, clear responsibilities and prompt response actions.

An emergency may be defined as any sudden event that causes, or has the potential to cause, injury, loss of life, property damage, environmental damage or disruption of normal project activities. Prevention through safe design, proper maintenance, training, monitoring and emergency preparedness will remain the primary approach.

7.13.1 Objectives

The main objectives of the Emergency Response Plan are to:

- Protect the lives and safety of construction workers, residents, visitors, building staff and nearby community;
- Ensure timely response to fire, accident, medical, spill, structural, electrical and natural hazard emergencies;
- Minimize damage to property, building services, utilities and surrounding infrastructure;
- Prevent contamination of soil, stormwater drains and the adjacent nullah during emergency situations;
- Define roles and responsibilities for emergency preparedness and response;
- Ensure availability of emergency equipment, communication arrangements and evacuation procedures; and
- Support regular training, drills, review and improvement of emergency preparedness arrangements.

7.13.2 Potential Emergency Scenarios

Potential emergency scenarios during construction and operation may include:

- Fire incidents due to electrical faults, hot work, fuel storage, generators, transformers or combustible materials;
- Medical emergencies, injuries or accidents at site / within the building;
- Excavation-related incidents, slope instability or fall from height during construction;
- Machinery, lifting or vehicle-related accidents during construction;
- Diesel, oil or chemical spills from generators, machinery maintenance or storage areas;
- Electrical emergencies involving transformer room, electrical panels, wiring or temporary electrical connections;
- Lift-related emergency during operation;
- Smoke accumulation or evacuation-related emergency in high-rise building;
- Gas leakage / LPG-related emergency, where applicable;
- Natural events such as earthquake, intense rainfall or stormwater flooding; and

7.13.3 Emergency Preparedness Measures

The following emergency preparedness measures shall be implemented:

- Fire and life safety systems shall be installed and maintained as per approved design, including fire alarm system, fire extinguishers, sprinkler system, fire hose cabinets, fire pumps, fire water tanks, smoke extraction, staircase pressurization, fire lifts and fire-rated doors.
- Clearly marked emergency exits, evacuation routes, assembly areas and emergency signage shall be provided.
- Fire extinguishers shall be installed at strategic locations, including generator areas, electrical rooms, transformer room, parking areas, common areas and maintenance areas.
- First-aid kits and trained first-aiders shall be available during construction and operation.
- Emergency contact numbers shall be displayed at prominent locations.
- Diesel storage and generator areas shall be provided with spill control arrangements, secondary containment and restricted access.
- During construction, excavation areas, open edges and high-risk zones shall be barricaded and provided with warning signs.
- Emergency access routes shall be kept clear at all times.

- A complaint / incident register shall be maintained by the Contractor during construction and by the Building Management Committee during operation.
- Fire drills and evacuation drills shall be conducted periodically, including biannual evacuation drills during operation.

7.13.4 Emergency Response Procedures

Fire Emergency

- Raise the alarm immediately and inform the emergency response team / building management.
- Switch off electrical supply, if safe to do so.
- Use appropriate fire extinguishers for small / initial fires only, if trained and safe.
- Evacuate occupants through designated emergency routes.
- Do not use lifts during fire emergency, except designated fire lifts by emergency responders.
- Assemble at designated safe assembly areas and conduct headcount.
- Contact Rescue 1122 / fire brigade and relevant emergency services where required.
- Do not re-enter the affected area until declared safe by the responsible authority / emergency team.

Medical Emergency / Injury

- Provide first aid immediately through trained first-aider.
- Stop work in the affected area, where required.
- Arrange transport to the nearest medical facility or call emergency services.
- Record and report the incident.
- Investigate the cause and implement corrective actions.

Diesel / Oil / Chemical Spill

- Restrict access to the affected area.
- Stop the source of spill, if safe to do so.
- Use spill kits, sand or absorbent material to contain the spill.
- Prevent spill from entering stormwater drains, sewerage lines or adjacent nullah.
- Collect contaminated material and dispose of through appropriate waste handling arrangement.
- Record the incident and implement preventive action.

Earthquake

- Follow “Drop, Cover and Hold” during shaking.
- Stay away from windows, glass and unsecured objects.
- Evacuate the building only after shaking stops, using designated escape routes.
- Assemble at designated safe areas and conduct headcount.
- Inspect the building, utilities, fire systems and structural elements before re-entry.
- Do not resume normal operation until safety clearance is obtained.

Flooding / Heavy Rainfall / Drainage Emergency

- Inspect stormwater drains, rainwater harvesting system, recharge well and adjacent nullah side.
- Remove blockages from drains, gratings and channels where safe.
- Prevent waste, debris, silt or contaminated water from entering the nullah.
- Restrict access to flooded or unsafe areas.

- Report major drainage failure to building management and Zaraj Housing Scheme management.

Lift Emergency

- Inform building management / maintenance team immediately.
- Do not attempt forced opening of lift doors by untrained persons.
- Contact authorized lift maintenance contractor.
- Maintain communication with trapped persons until rescue is completed.
- Record the incident and inspect the lift before reuse.

7.13.5 Roles and Responsibilities

Emergency response will be managed through designated responsible persons during construction and operation.

During Construction

- Proponent / HSE Engineer: Overall supervision of emergency preparedness and coordination with contractor and authorities.
- Contractor / HSE Officer: Day-to-day implementation of emergency preparedness, fire safety, first aid, training and incident reporting.
- Site Supervisors: Immediate response, evacuation support and control of workers during emergency.
- Workers: Follow emergency instructions, use PPE, report unsafe conditions and evacuate when instructed.

During Operation

- Building Management Committee: Overall responsibility for emergency preparedness, fire safety, evacuation arrangements, maintenance of emergency systems and coordination with authorities.
- Fire Safety / Maintenance Contractor: Inspection, testing and maintenance of fire and life safety systems.
- Security Staff: Access control, emergency communication, evacuation support and coordination with emergency services.
- Maintenance Staff: Response to electrical, lift, generator, water, sewerage and building service emergencies.
- Residents / Occupants: Follow emergency instructions, avoid obstruction of emergency routes and participate in evacuation drills where required.

7.13.6 Training, Drills, and Review

- Emergency response training shall be provided to construction staff, building management staff, security staff and maintenance staff according to their roles.
- Fire safety and emergency evacuation drills shall be conducted periodically.
- During operation, fire evacuation drills shall be conducted biannually.
- Lessons learned from drills, incidents or near misses shall be documented.
- The Emergency Response Plan shall be reviewed and updated where required based on changes in building operation, emergency equipment, staffing, incidents or regulatory requirements.

7.13.7 Reporting, Documentation and Record Keeping

Reporting, documentation and record keeping are essential for demonstrating effective implementation of the Environmental Management and Monitoring Plan (EMMP) and compliance with applicable environmental, health and safety requirements. The Proponent, Contractor and Building Management Committee shall maintain relevant records according to their respective responsibilities during construction and operation.

The documentation system will support internal review, regulatory inspections, corrective actions and continuous improvement of environmental and safety performance.

The following records shall be maintained, where applicable:

- Environmental monitoring records, including ambient air quality, noise, wastewater, water quality and generator emission monitoring;
- Construction waste and excavated material management records;
- Solid waste collection and handover records;
- Hazardous / special waste handling and disposal records, where applicable;
- Water tanker supply and water consumption records;
- Diesel consumption and generator operation logbooks;
- Maintenance records for generators, lifts, pumps, transformer room, electrical systems and building services;
- Fire safety inspection, testing and maintenance records;
- Fire drill and emergency evacuation drill records;
- Occupational health and safety records, including PPE issuance, toolbox talks, trainings, incidents, accidents, near misses and first-aid records;
- Complaints / grievance register and corrective action records;
- Tree plantation, landscaping and plant survival records;
- Inspection checklists and non-compliance records;
- Correspondence with Pak-EPA, CDA, Zaraj Housing Scheme Management Committee and other relevant authorities.

During construction, the Contractor shall maintain site-level records and submit them to the Proponent / HSE Engineer for review. During operation, the Building Management Committee shall maintain operational records and make them available for internal review and regulatory inspection, where required.

8. CONCLUSION

This Environmental Impact Assessment (EIA) has been prepared for the proposed Atrium Hills Residential Apartment Complex located at Major Road, Sector B, Zaraj Housing Scheme, Zone-V, Islamabad Capital Territory, in accordance with the Pakistan Environmental Protection Act, 1997 and the Pak-EPA (Review of IEE and EIA) Regulations, 2000.

The proposed project is a G+20-storey residential apartment complex on a plot designated for apartment development as per the approved Layout Plan of Zaraj Housing Scheme. The project includes residential apartments, parking floors, amenities, utility services, fire and life safety systems, green/open area, and environmental design features.

The baseline assessment shows that the project area is mainly urban in character, with residential, commercial and mixed-use developments in the surroundings. The site is currently undeveloped and has a terraced/level-based condition requiring excavation, cutting, grading and slope stabilization. A nullah/stormwater drain is present along the eastern side of the plot, while residential houses are located toward the western side.

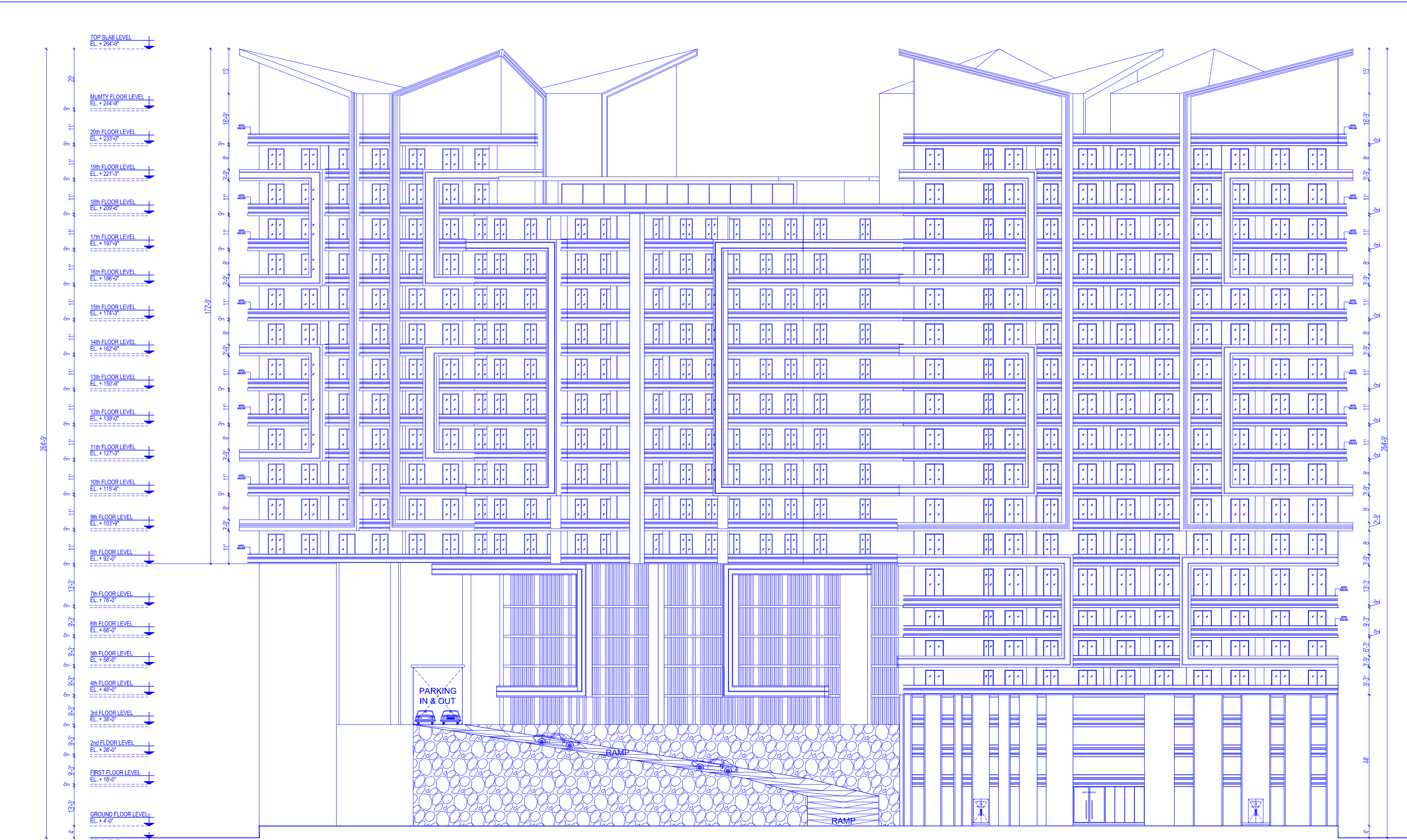
The main construction-phase impacts are expected to be temporary and localized, including excavation and slope stability risks, dust, noise, construction traffic, waste generation, runoff control, protection of the adjacent nullah, occupational health and safety, and community safety. During operation, key impacts will relate to water demand, wastewater disposal, solid waste management, electricity use, generator emissions, fire and life safety, traffic, visual/shadow effects, and building management.

The project also includes positive environmental and resource efficiency measures such as rainwater harvesting, rainwater recharge well, rooftop solar, passive ventilation/cooling through atrium design, EV charging points, and development of around 8 Kanals of lush green park in neighbourhood.

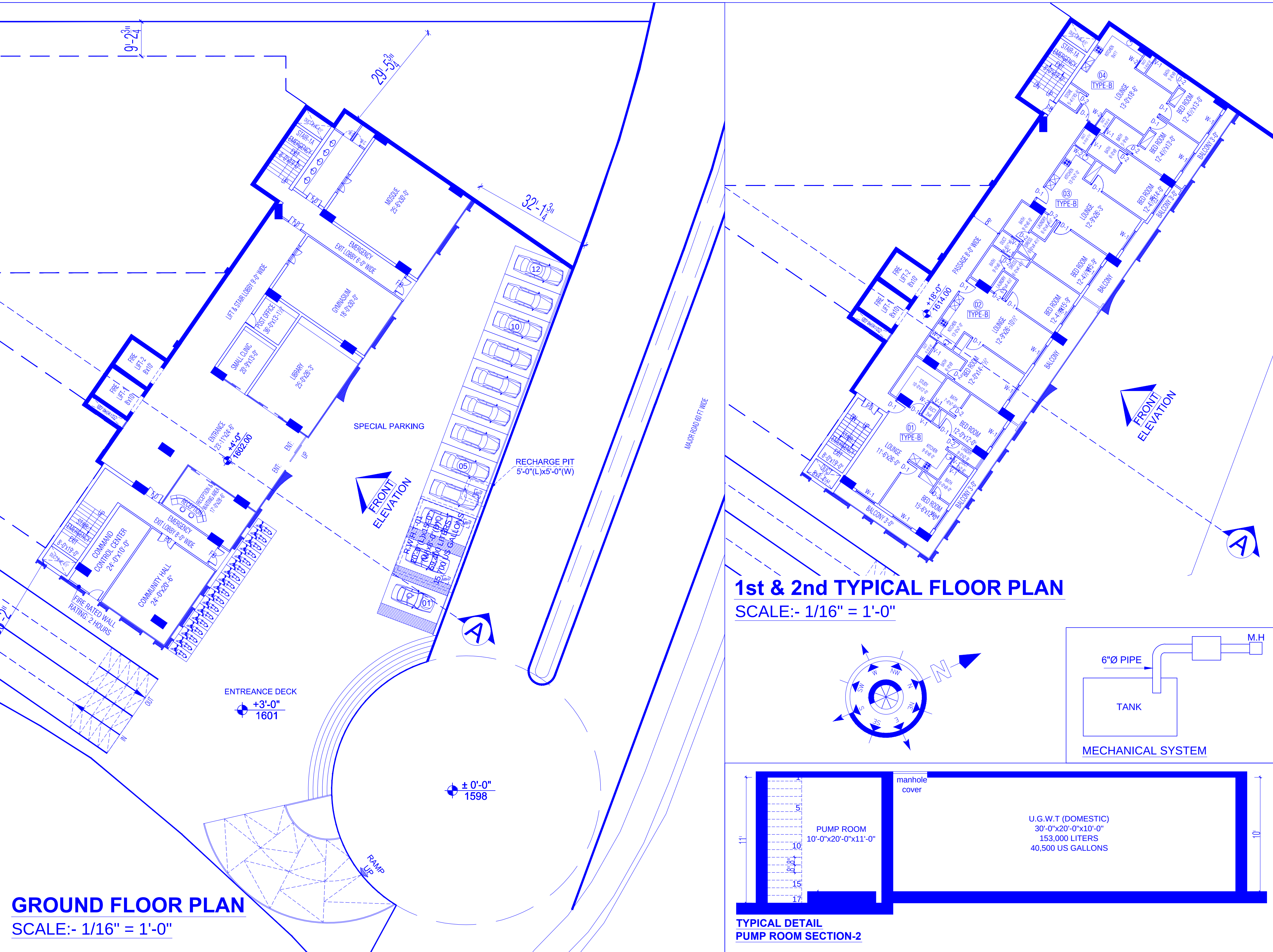
A comprehensive Environmental Management and Monitoring Plan (EMMP) has been prepared to manage the identified impacts during construction and operation. Based on the findings of this EIA, the proposed project is considered environmentally manageable, provided that the mitigation measures, monitoring requirements, and EMMP commitments are fully implemented.

ANNEXURES

Annexure – 1:
Project Layout Drawings



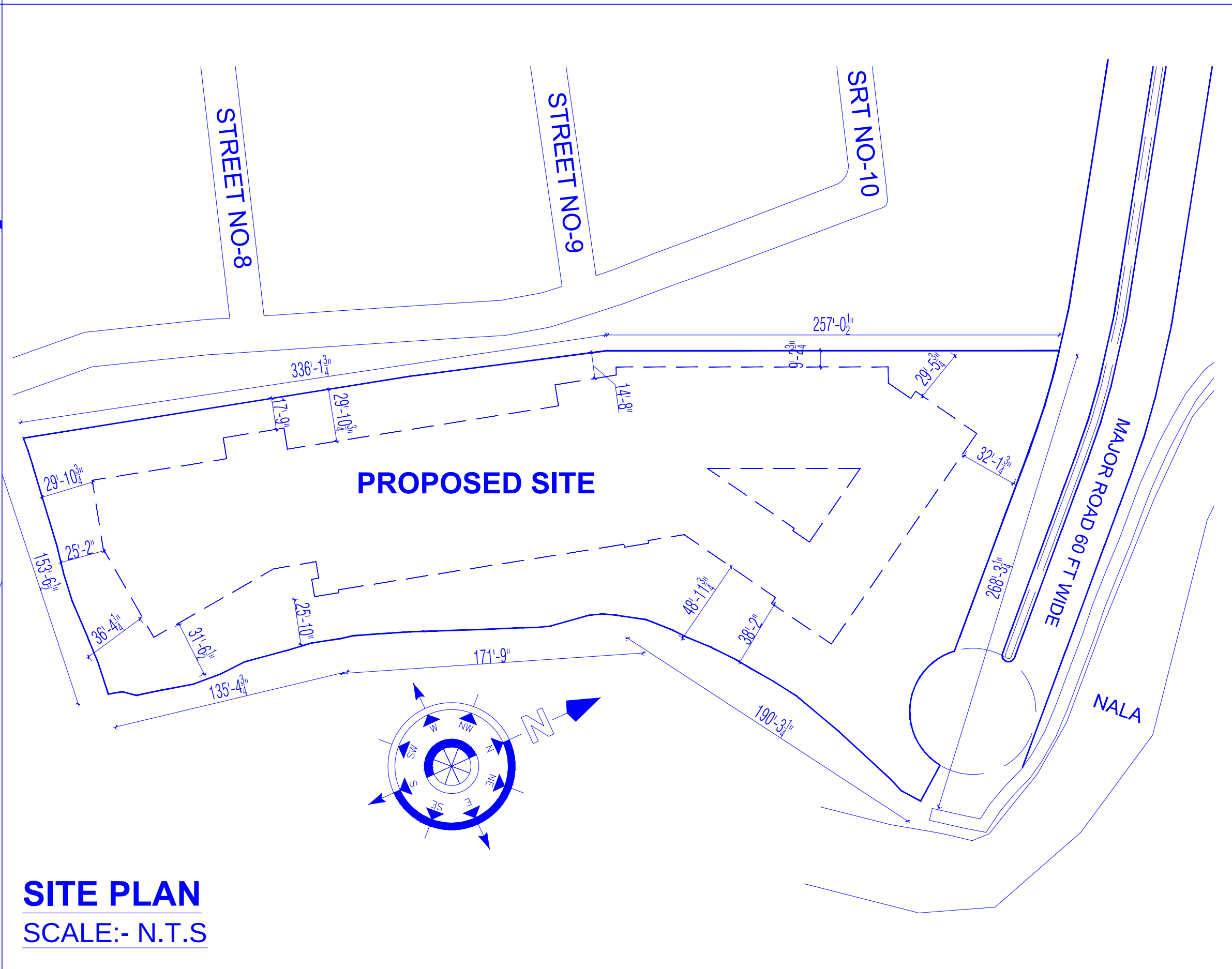
FRONT ELEVATION
SCALE:- 1/16" = 1'-0"



GROUND FLOOR PLAN
SCALE:- 1/16" = 1'-0"



3D VIEW



SITE PLAN
SCALE:- N.T.S

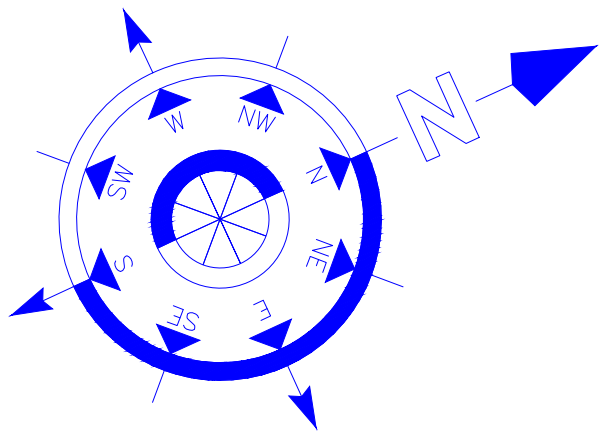
BYE LAWS ANALYSIS		
ICT BCR 2023 reference Clause 8.20 - Planning Parameters for construction of apartment buildings in CDA approved Housing Societies/sectors.		
DESIGN PARAMETERS	PERMISSIBLE	DESIGNED
F.A.R	1.5	1.4.91
GROUND COVERAGE	50 %	49.80 %
NO OF STOREYS @ 1.5	FLEXIBLE	G+20
AMENITIES	5 %	12 %

BYE LAWS & AREA

TOTAL AREA OF PLOT	= 9891.75 SQYD
TOTAL AREA OF PLOT	= 89025.75 SFT
FAR AREA 1:5 89025.75x5	= 445128.75 SFT
PROJECT DESIGN FAR AREA	= 445076.00 SFT
GROUND COVEREG 49.50% OF PLOT AREA	= 44445.00 SFT
AMENITIES AREA 5% OF GROUND COVERAGE	= 2225.64 SFT
HEIGHT OF BUILDING = + 264'-9" (FROM MAIN ROAD)	
TOTAL NO OF APARTMENTS	= 348
PARKING ALLOWED 348x1.5=522 (GIVEN = 535 CARS, 57 BIKES)	

SCHEDULE OF OPENINGS

S.No.	TYPE	WIDTH	HEIGHT	REMARKS
01-	FD-1	4'-0"	8'-0"	FIRE DOOR
02-	D1	3'-6"	7'-0"	WOODEN GLAZED
03-	D2	2'-6"	7'-0"	//
04-	W1	6'-0"	6'-6"	ALLUMINIUM
05-	W2	4'-0"	3'-0"	//
06-	V1	2'-0"	2'-0"	STEEL



CERTIFICATES

- 1-SOUNDNESS AND STABILITY OF THE STRUCTURE IS CERTIFIED.
- 2-CERTIFIED THAT THE SEWERAGE AND STORM WATER
- 3-SYSTEM WILL EFFECTIVELY BE CONNECTED TO MAINS.LINES
- 4-2" WATER CONNECTION IS REQUIRED
- 5-THE STRUCTURE OF THIS BUILDING HAS BEEN DESIGNED.

PROJECT:
**ATRIUM HILLS
SECTOR-B, APARTMENT COMPLEX,
ZARAJ HOUSING SCHEME, ISLAMABAD.**

OWNER,S:
MR. ZIA-UR-REHMAN

TITLE:
SUBMISSION DWG.

DRAWN BY:
M. AZHAR **01/06**

SCALE:
1/32" = 1'-0" DATE:
04-10-2026

ARCHITECT'S SIGNATURE:

APPROVAL:

