

CAPITAL DEVELOPMENT AUTHORITY



**ENVIRONMENTAL IMPACT ASSESSMENT
REPORT**

FOR

**TRAFFIC MANAGEMENT SOLUTION AT
KASHMIR CHOWK MURREE ROAD ISLAMABAD**

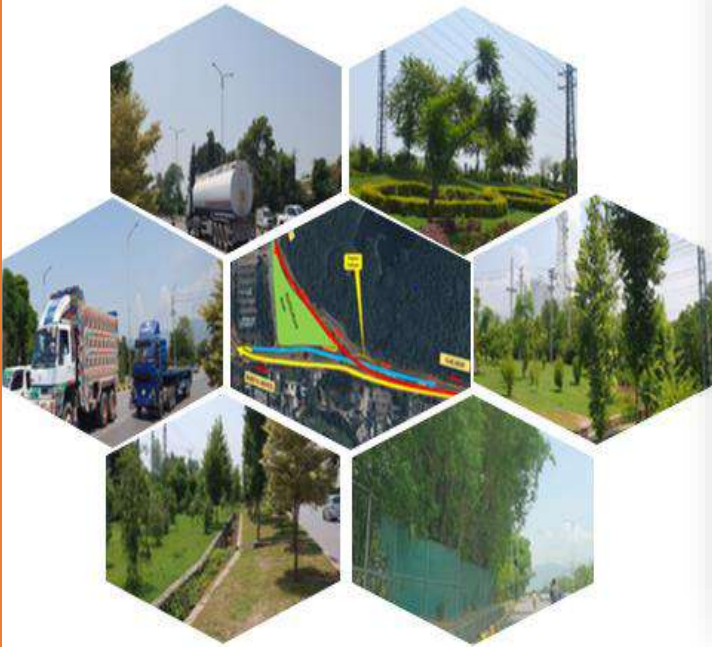


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Annexure-C: Site Specific Management Plan (Plantation Plan, OHS Plan, Site Restoration, Demolition/Dismantling and restoration/restitution plan);

Annexure-D: Climate Impact Assessment.



LIST OF ABBREVIATIONS

<u>Abbreviation</u>	<u>Description</u>
AASHTO	American Association of State Highway and Transportation Officials
AADT	Average Annual Daily Traffic
BOD	Bio-chemical Oxygen Demand
°C	Degree Centigrade
CC	Construction Contractor
CDA	Capital Development Authority
SC	Supervision Consultant
CO	Carbon Monoxide
DG	Director General
DO	Dissolved Oxygen
EE	Environmental Engineer
EMMP	Environmental Management and Monitoring Plan
EIA	Environmental Impact Assessment
EALS	Environment Afforestation Land and Social
HSE	Health Safety and Environment
ITP	Islamabad Traffic Police
IEE	Initial Environmental Examination
KPH	Kilometer per Hour
LAA	Land Acquisition Act
LOS	Level of Services
MCC	Manual Classified Counts
NEQS	National Environmental Quality Standards
NESPAK	National Engineering Services Pakistan
NCS	National Conservation Strategy
NO _x	Nitrogen Oxides
NSR	Noise Sensitive Receptors
PEPA	Pakistan Environmental Protection Act
PEPC	Pakistan Environmental Protection Council
PGA	Peak Ground Acceleration
PPC	Pakistan Penal Code
PAP	Projected Affected Person
PPE	Personal Protective Equipment
PM	Particulate Matter
RE	Resident Engineer
SC	Supervision Consultant
STDs	Sexually Transmitted Diseases
RCC	Reinforce Cement Concrete
SO _x	Sulfur Oxides
SWM	Solid Waste Management
TA	Technical Assistance
TA	Technical Assistance
TSS	Total Suspended Solids
TDS	Total Dissolved Solids
WHO	World Health Organization

GLOSSARY

AOI (Area of Influence):	The Area likely to be affected by the project, including all its ancillary aspects, such as power transmission corridors, pipelines, canals, tunnels, relocation and access roads, for Proposed Underpass site and Disposal areas, and construction camps, as well as unplanned developments induced by the project (e.g., spontaneous settlement, logging, or shifting agriculture along access roads).
Alternatives	Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, temporal alternatives or the “do-nothing” alternative.
Affected Person / People (APs)-	Any person affected by Project-related changes in use of land, water, natural resources, or income losses.
Biodiversity	The number and types of plants and animals that exist in a particular area.
Baseline Condition	A baseline condition is a measure of the subjects responses on the dependent variable before implementing the experimental manipulation. The reason to conduct a baseline condition is to identify the subjects' preexisting responses without the influence of the manipulation.
Cultural resources	A broad term covering any physical, natural and spiritual properties and features that are adapted, used and created by humans, in the past and the present. Cultural resources include traditional systems of cultural practice, belief or social interaction.
Compensation	Payment in cash or in kind for an asset or a resource that is acquired or affected by a project at the time the asset needs to be replaced.
Concerned Stakeholders	Those authorities whose responsibility is potentially affected by the project and other parties doing civil services. For example: authorities concerning public transport, energy supply, postal and telecommunication services etc. and also municipalities which area is likely to be affected are concerned stakeholders in this sense.
Direct impacts	Impacts that are caused directly by an activity and generally occur at the same time and at the place of the activity. These impacts are

	generally associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
Domestic Waste	Solid waste, composed of garbage and rubbish, which normally originates from residential, private households, or apartment buildings. Domestic waste may contain a significant amount of toxic or hazardous waste from improperly discarded pesticides, paints, batteries, and cleaners.
Do-nothing alternative	The “do-nothing” alternative is the option of not undertaking the proposed activity or any of its alternatives. The “do-nothing” alternative also provides the baseline against which the impacts of other alternatives should be compared.
Ecosystem	Organisms together with their abiotic environment, forming an interacting system, inhabiting an identifiable space
Effluent	The water which flows out of the man made system into a water body, usually waste water
Endangered species	Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.
Environment	The surroundings within which humans exist and that are made up of: - i). The land, water and atmosphere of the earth; - ii). Micro-organisms, plant and animal life; - iii). Any part or combination of (i) and (ii) and the inter-relationships among and between them; and - iv). The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.
Environmental Impact Assessment	EIA is the formal process "aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local

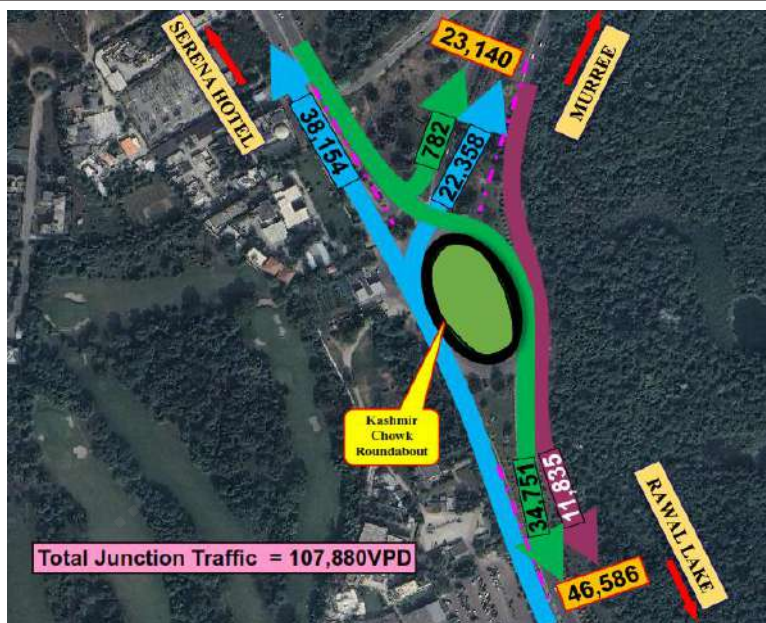
	environment and present the predictions and options to decision-makers."
Environmental Impact	The degree of change in an environment resulting from the effect of an activity on the environment, whether desirable or undesirable. Impacts include both the direct or indirect consequences of an activity.
Environmental Management Plan	An EMP is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.
Erosion	Wearing a way of rock and soil by physical or chemical action, especially by wind or water, leading to removal of particles
Flora	The plant life of a region
Fauna	The animal life of a region
Ground water	Subsurface water in the saturated zone below the water table
Habitat	The natural home or environment of an animal, plant, or other organism.
Hazardous	Process or substances which have the potential to cause significant danger or harm to human health or the environment (e.g., hazardous waste)
Indigenous	The species confined naturally (native) in an area, region, or country
Indirect Impact	Indirect or induced changes that may occur as a result of the proposed activity (e.g. the reduction of water in a stream that supplies water to a reservoir that supplies water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
Land	Terrestrial bio-productive system that comprises soil, vegetation and other biota, as well as ecological and hydrological processes that operates within the system.
Legal Requirement	Identification and listing of the specific legislation and permit requirements which could potentially be infringed upon by the

	proposed project, if mitigation is necessary should the proposed development impact on a heritage resource
Monitoring	In an environmental context, the repetitive and continued observation, measurement and evaluation of environmental data to follow changes over a period of time to assess the efficiency of control measures.
Negative impact	A resultant change due to an activity that reduces the quality of the environment (e.g. by reducing indigenous species diversity and the reproductive capacity of the ecosystem; by damaging health; property or by causing nuisance).
Noise	Any acoustic phenomenon producing any aural sensation perceived as disagreeable or disturbing by an individual or group. Noise may therefore be defined as any unwanted sound or sound that is loud, unpleasant or unexpected.
Pollutant	A substance that contaminates
Pollution	Defilement or unfavorable alteration of the surroundings, normally as a result of human actions. In the water environment, any foreign substance that impairs the usefulness of water.
Pollution Prevention	Complete prevention of releasing hazardous substances having polluting properties to any public stream or water body.
Positive Impact	A resultant change due to an activity that improves the quality of the environment (e.g. by restoring natural species diversity and the reproductive capacity of the ecosystem; by removing nuisances or improving amenities)
Rare and Endangered Species	Species, which have naturally small populations, or species which have been reduced to small (often unstable) populations by man's activities
Significant impact	Any impacts by its magnitude, duration, intensity and probability of occurrence may have a notable effect on one or more aspects of the environment.
Soil	A mixture of organic and inorganic substances, the composition and structure of the latter is derived from the parent rock material. Soil also contains bacteria, fungi, viruses and micro-arthropods, nematodes and worms

Solid Waste	Any solid, semi-solid, liquid or contained gaseous materials discarded from industrial, commercial, mining or agricultural operations, and from community activities. Solid waste includes garbage, construction debris, commercial refuse, sludge from water supply or waste treatment plants, or air pollution control facilities, and other discarded materials.
Surface Water	All water naturally open to the atmosphere (rivers, lakes, reservoirs, ponds, streams, seas, estuaries) and all springs, wells, or other collectors directly influenced by surface water.
Topography	Referring to natural features on the surface of the earth
Topsoil	The top few centimeter of soil that contains most of the soil organic matters and nutrients

EXECUTIVE SUMMARY

Project Title	TRAFFIC MANAGEMENT SOLUTION AT KASHMIR CHOWK MURREE ROAD ISLAMABAD
Description	The project includes the following major works: • Construction of Underpass (3-lane) along Club Road for traffic from Srinagar Highway i.e. Serena Chowk, diplomatic Enclave to Rawal Chowk/Faizabad bound • Construction of Road for Right turning Murree bound traffic • Construction of Approaching roads and auxiliary works
Objective/Scope of Construction	The proposed project presently is a Roundabout junction with Four (04) major movements. • Traffic coming from club road and moving right towards Barakahu, Murree and Kashmir. • Traffic coming from club road and moving straight towards Srinagar Highway i.e. Serena Chowk, diplomatic Enclave etc. • Traffic coming from Srinagar Highway i.e. Serena Chowk, diplomatic Enclave and vicinity areas and move towards Rawal Chowk and Faizabad. • Traffic coming from Barakahu, Murree and Kashmir move left on club Road towards Rawal Chowk and Faizabad. • The aforesaid junction facing severe congestion in the peak hours. The conflict between 1&3 aforesaid movements are the major conflicts and cause of traffic congestion and delays in peak hours.
Need Assessment	Traffic approaching from Murree Road (Club Road), Dhokri, and the Serena/Aabpara side must presently negotiate the Kashmir Chowk roundabout/signal to enter Srinagar Highway, a manoeuvre that has historically been a source of congestion for commuters, particularly daily travelers from Murree, Bhara Kahu, and adjoining areas. Residents also have access to the Serena Hotel, Pak-China Friendship Centre, Convention Centre, Aabpara Market, and the Sports Complex through roads converging at or near this intersection

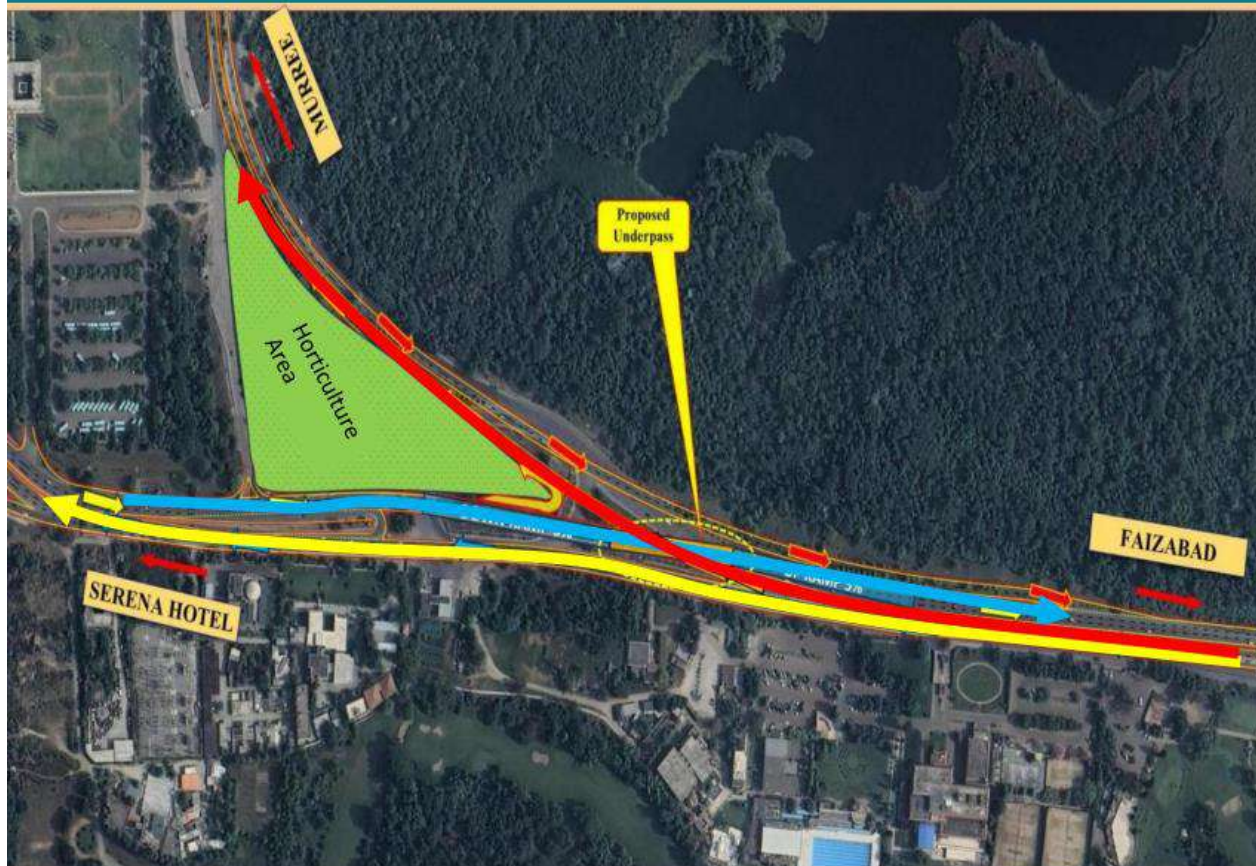


The traffic studies indicate that Kashmir Chowk currently experiences significant congestion, excessive delays, and operational inefficiencies, particularly during peak hours, due to the high traffic demand and multiple conflicting traffic movements. As a key gateway linking the city center, the Red Zone, and regional transport corridors, congestion at this intersection adversely affects mobility, travel time reliability, and overall network performance.

Project Proponent	Capital Development Authority
Project Consultant	NESPAK
Project Coordinates	Accessible through coordinates (33.707852, 73.105887)
Assessment Methodology to Ascertain Environmental Factors	During onsite assessment, four different Land-Use types/sensitive receptors were taken for assessment within AOI Spatial Scale. These following four environmental/social variables are considered as strongly associated: - Dense vegetative sites/afforestation/Dense Floral Composition Sites/pattern along Club and Murree road within the underpass and further extended to 100m spatial extent. - Nearby infrastructure/social amenities. - Ecological dynamics/alterations. - Arterial Route Linking the Red Zone.

Estimated Traffic	Total Junction Count : 107,880 Vehicles Per Day
Estimated Water Demand	30 Million Liters and for campsite 15 liters/person/day to meet toilet and washing requirement (refer sub-section 3.15.5).
Project Statutory Requirement: Projects falling under category “D” specified in Schedule II require the proponent to file an EIA with the provincial agency, which is responsible for its review and accordance of approval or request any additional information deemed necessary.	
Zone of Influence: The "Zone of Influence" for Environmental Management was selected to include commercial structures, amenities and utilities within spatial scale of 50-100m from Underpass and approach roads (Exhibit hereunder).	
Environmental and Design Alternative: In order to control, existing bottleneck/uninterrupted traffic flow, the CDA emphasized to build underpasses, roundabout, nullah bridge and retaining walls for barrel structure, to alleviate traffic congestion. This option was however under consideration, but the cost involved is too high and the probability of environmental and temporary inconvenience may also be high. This alternative would be most favorable during the during the frequent traffic flow from Faizabad, Rawal Chowk, Srinagar highway and Murree Expressway (E-75). This redesigning option will have contribution to improve the traffic flow. Landscaping and Horticultural works cost has been allocated (Rs. 26,539,115/-) to compensate the damaging of linear tree stands, landscaping plant and vegetation at CDA owned ROW.	
Overall Project Completion Outcomes: The project shall improve the infrastructure for economic transport and shall also improve the travelling standards and reduce accidental risks/Traffic Jams.	

UNDERPASS DESIGN LAYOUT



KEY PARAMETERS

Project Type	Grade-Separated Underpass
Underpass Alignment	Serena Hotel → Faizabad
Down Ramp Grade	5.5%
Up Ramp Grade	5%
Underpass Clearance height	5.1 m
Underpass Barrel Size	55 m x 12 m

Layout Map showing Underpasses, Re-alignment of Nullah and Flyover



OVERALL AERIAL TRANSFORMATION

BEFORE → AFTER



3D Aerial View - Construction Site of Underpasses





Location plan and highlighting the Tree density

Technical Parameters		
Standard/Specification: The project shall confirm to the following specifications:		
Key Parameters		
A. Underpass Along Club Road		
Through Length	:	410 m (Barrel Size)
Barrel Length	:	70 m
Ramps Length	:	340 m
Underpass Width (Typ)	:	12.5 m (3-Lane)
B. At Grade Road - Right-Turn Road (Murree Bound Slip Road)		
Asphalt Wearing Course	:	60 mm
Asphalt Base Course	:	90 mm
Water Bound Macadam	:	250mm
Sub-Base	:	200 mm
C. Underpass Barrel and Ramps		
Pavement Structure:		
Asphalt Wearing Course	:	50mm
Asphalt Base Course	:	60mm
Rigid Pavement (4000 Psi)	:	280mm
Subbase	:	200mm
Design Parameters		
Design Speed	:	100 km/hr
Design Standard	:	AASHTO 2018
Min. Curve Radius	:	125 m @ 4% e
Cross Slope	:	2%
Up ramp grade	:	5.5%
Paved Shoulder Outer	:	1.2 m
Subgrade CBR (Min)	:	8% @ 95% MOD

Land Use Category	Area (%)	Description
Commercial / Mixed Use	37%	Blue Area commercial corridor comprising corporate offices, banks, shopping plazas, restaurants, hotels, retail outlets, and mixed-use buildings.
Government & Institutional	24%	Federal Government offices, administrative buildings, public institutions, educational facilities, and associated infrastructure.

Transportation Infrastructure	18%	Kashmir Highway (Srinagar Highway), Jinnah Avenue, Ataturk Avenue, service roads, intersections, Metro Bus corridor, parking areas, pedestrian walkways, and traffic islands.
Green/Open Spaces	14%	Landscaped medians, roadside plantations, public parks, green belts, and ornamental vegetation maintained by CDA.
Residential	6%	Residential plots and apartment buildings located mainly in adjoining sectors G-6, G-7, F-6, and F-7.
Public Utilities & Miscellaneous	1%	Utility installations, small service facilities, and ancillary infrastructure.
Total	100%	

Summary of Proposed Mitigation Measures During Construction Intrevention

Associated Impact	Mitigation Measures
Pre-Construction/Design Phase Impacts	
Project Site, Land Use, and Design	• Consideration has been given to the stability of the sub-base, the base system to make all weather road. The sub-grade and the base will be sufficiently stable as per international standards. • Provision of appropriate storm water drainage works, retaining structures etc., are to be given in the road design. • Sign boards and road safety gadgets are to be given in the road design.
Visual Impact	Landscape/plantation plan has been proposed in the design.
Construction Phase	
Air Quality Deterioration.	• The project site should be monitored throughout to keep a record of air quality and any change in it. • Vehicular traffic will contribute to dust particle generation. Apply water to at least 80 percent of the surface areas of all open storage with chemical application.
Noise and Vibration.	Construction equipment and vehicles will have exhaust mufflers (silencers) to minimize noise generation.

Surface and Ground Water Impacts	• Incorporate rainwater harvesting pits or recharge wells near Murree road and landscaping sites to compensate for lost infiltration. • Use pervious pavement or infiltration trenches at service roads/parking areas. • Cement slurry or bentonite used in piling shall be collected, recycled, or disposed as per regulatory standards. • Conduct monthly water quality monitoring (pH, TSS, COD, Oil & Grease, Heavy Metals) of nearest drains and groundwater boreholes.
Soil and Land Contamination	• Storm water drainage structures or shifting utilities crossing the project site has been included in the detailed designs to offset the impact associated with the sub-structural works. • Other measures to mitigate the impact include retaining walls, footing beams and base slab, in which Portland cement sulfate resistant cement and slag cement will be utilized to offset the envisage impacts.
Impact on Biotic Environment	Record of species will be maintained, so that new plantation to be carried in accordance with the developed BOQ against the uprooted plants.
Ecological Alteration	Landscaping and horticultural works with beautification cost has been allocated in the cost estimate. The plan will be prepared by the assigned CC and consultant will oversee with onsite assessment and approve the plan accordingly.
Traffic and Accessibility	• Detours management will be ensured during the entire structural and reinforcement works of spans (20 Nos.); • Separate lane for existing traffic should be managed with management equipment (Signage placements). • Preparation and enforcement of Traffic Management Plan (TMP). • Adequate diversion routes with signboards and flagmen. • Scheduling of material delivery at off-peak hours.
Community Safety	• Continuous community liaison and disclosure of work schedule. • Provision of safe pedestrian crossings and temporary access routes. • Installation of barricades, reflective signage, and lighting. • Implementation of Grievance Redress Mechanism (GRM).

	• Deploy staff for daily checks to identify and promptly address road safety hazards.
Safety Hazards, Public Health and Nuisance.	• Before starting the excavation, utilities details study and soil investigations will be thoroughly conducted to develop understanding of the area. • Unnecessary excavation should be avoided; • Utility mapping and prior coordination with relevant departments. • Careful excavation with utility detection equipment. • Emergency response plan for accidental damages. • Advance intimation to public before planned work execution. • Restitution/Rehabilitation plan will be strictly implemented.
Sites of Archaeological or Historical Significance.	There are no reported sites of archaeological or historical significance at the land acquired for the project.
Hazardous and Non-Hazardous Management	• Hazardous waste will be initially stored on site at designated area and then handed over to CDA certified contractor to final disposal. The Construction Contractor will in consultation with the Supervision Consultant, select the environmentally and socially viable site for safe disposal. • The sewage system for camps will be properly designed (pit latrines or, as required, septic tanks) to receive all sanitary wastewaters.

Chapter

1

INTRODUCTION

1.1. Project Background

The Capital Development Authority (CDA), plays a crucial role in the planning, development, and management of Islamabad, including infrastructure projects, land acquisition, housing developments, and environmental protection, acting as a public benefit corporation responsible for municipal services.

Capital Development Authority (CDA) is developing important road links and resolving traffic congestion issues at various locations keeping in view the commuter and trade traffic on roads in the capital city. Kashmir Chowk is one of the most critical traffic junctions in Islamabad because it links two major city corridors, Club Road and Murree Road, which together serve government, residential, and inter-city mobility needs.

The importance of this intersection becomes more vital because traffic travelling towards Murree and Kashmir used this intersection.

This EIA report serves to assess the current environment of the project area, the proposed project activities, and their impact on the ambient environment. The report has assessed the potential impacts and addressed both the positive and negative impacts of the project.

1.2. Existing Landscape Context

The proposed project presently is a Roundabout junction with Four (04) major movements.

- i. Traffic coming from club road and moving right towards Barakahu, Murree and Kashmir.
- ii. Traffic coming from club road and moving straight towards Srinagar Highway i.e. Serena Chowk, diplomatic Enclave etc.
- iii. Traffic coming from Srinagar Highway i.e. Serena Chowk, diplomatic Enclave and vicinity areas and move towards Rawal Chowk and Faizabad.
- iv. Traffic coming from Barakahu, Murree and Kashmir move left on club Road towards Rawal Chowk and Faizabad.

The aforesaid junction facing severe congestion in the peak hours. The conflict between 1&3 aforesaid movements are the major conflicts and cause of traffic congestion and delays in peak hours.

1.3. Project Objective

The project aims to provide a smooth and congestion free travel from Serena hotel to Faizabad and Muree via Islamabad Club Road. The Srinagar Highway act as main connection which most of the people used to travel towards North and South. Development of this junction will provide ease of traffic on parallel roads.

1.4. Project Location and Accessibility

Kashmir Chowk Roundabout is located along Club Road, a key arterial route linking the Red Zone with the southern part of Islamabad near Rawal Lake. The locality consists of a mix of government and green recreational zones. The roundabout itself connects major city routes including Constitution Avenue, Murree Road making it a critical traffic node for commuters, government offices, and visitors accessing Serena Hotel, Diplomatic Enclave, and adjacent public facilities. The environment is characterized by wide road corridors, institutional land use, and significant daily traffic movement.

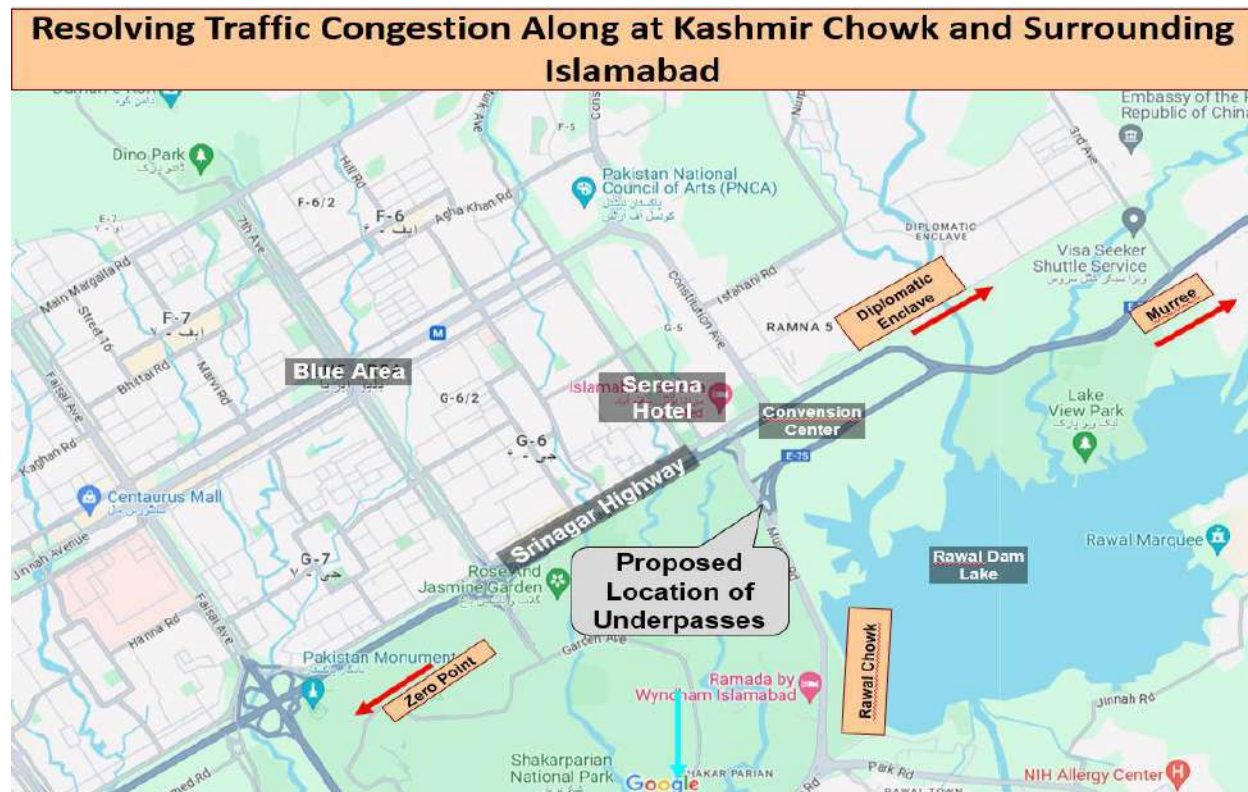


Figure 1: Proposed Underpass Location

1.5. Need of the Project

In the midst rapidly growing population, expanding urban areas, and increasing mobility needs, Islamabad faces the challenge of enhancing its transportation infrastructure to meet the demands of a modern and dynamic society.

Traffic approaching from Murree Road (Club Road), Dhokri, and the Serena/Aabpara side must presently negotiate the Kashmir Chowk roundabout/signal to enter Srinagar Highway, a manoeuvre that has historically been a source of congestion for commuters, particularly daily travelers from Murree, Bhara Kahu, and adjoining areas. Residents also have access to the Serena Hotel, Pak-China Friendship Centre, Convention Centre, Aabpara Market, and the Sports Complex through roads converging at or near this intersection.

Therefore, there is a dire need to resolve this traffic congestion issue. In this regard, grade separation solution (Underpass) at intersection has been proposed to make this junction signal

free. The proposed solution shall be beneficial for all movements of traffic thus creating a signal free zone in the instant area. This project will help in reducing traffic jams/congestion at the intersection. This will result in reduction in Vehicle Operating Cost (VOC) and Vehicle travel time (VTT) thus alleviating noise and air pollution to certain extent to address existing and future transportation challenges, a feasibility study has been undertaken. To evaluate the operational performance of Kashmir Chowk and identify suitable improvement alternatives. The study will provide a basis for selecting the most technically, economically, and environmentally viable option for improving traffic operations and accommodating future growth in the area.

1.6. Scope of the project

Kashmir Chowk receives traffic from Murree Road, Club Road, Srinagar Highway, and the surrounding Aabpara/Dhokri area, resulting in excessive delays and congestion, particularly at peak hours and during periods of heavy inter-city travel to Murree and AJK. Due to the bottleneck at this intersection, traffic movement becomes increasingly complex and time-consuming for commuters.

To address this, CDA intends to construct grade-separated infrastructure (underpass) at Kashmir Chowk to provide uninterrupted flow for through traffic while maintaining safe, signal-controlled movement for turning and local traffic. The project is expected to reduce travel time and fuel consumption for motorists and to complement other decongestion works already undertaken along Srinagar Highway and Murree Road, including the underpass constructed to link Murree Road directly with Srinagar Highway.

The project includes the following major works:

- i. Construction of Underpass (3-lane) along Club Road for traffic from Srinagar Highway i.e. Serena
- ii. Chowk, diplomatic Enclave to Rawal Chowk/Faizabad bound
- iii. Construction of Road for Right turning Murree bound traffic
- iv. Construction of Approaching roads and auxiliary works

1.7. Project Objective

Construction of the underpass at Kashmir Chowk will help reduce frequent traffic jams and congestion at the intersection. Consequently, major confounding environmental factors, i.e., noise and air pollution, are expected to be reduced at the intersection through a reduction in Vehicle Operating Cost (VOC) and Vehicle Travel Time (VTT).

1.8. Project Implementing Organization

- Capital Development Authority (CDA) intends the Feasibility Study and Detailed Design for Resolving Traffic Congestion Issues at Kashmir Chowk to make it an improved facility.
- M/s NESPAK have been awarded the contract through open competition for the Feasibility Study and Detailed Design, including the Environmental Impact Assessment Report.

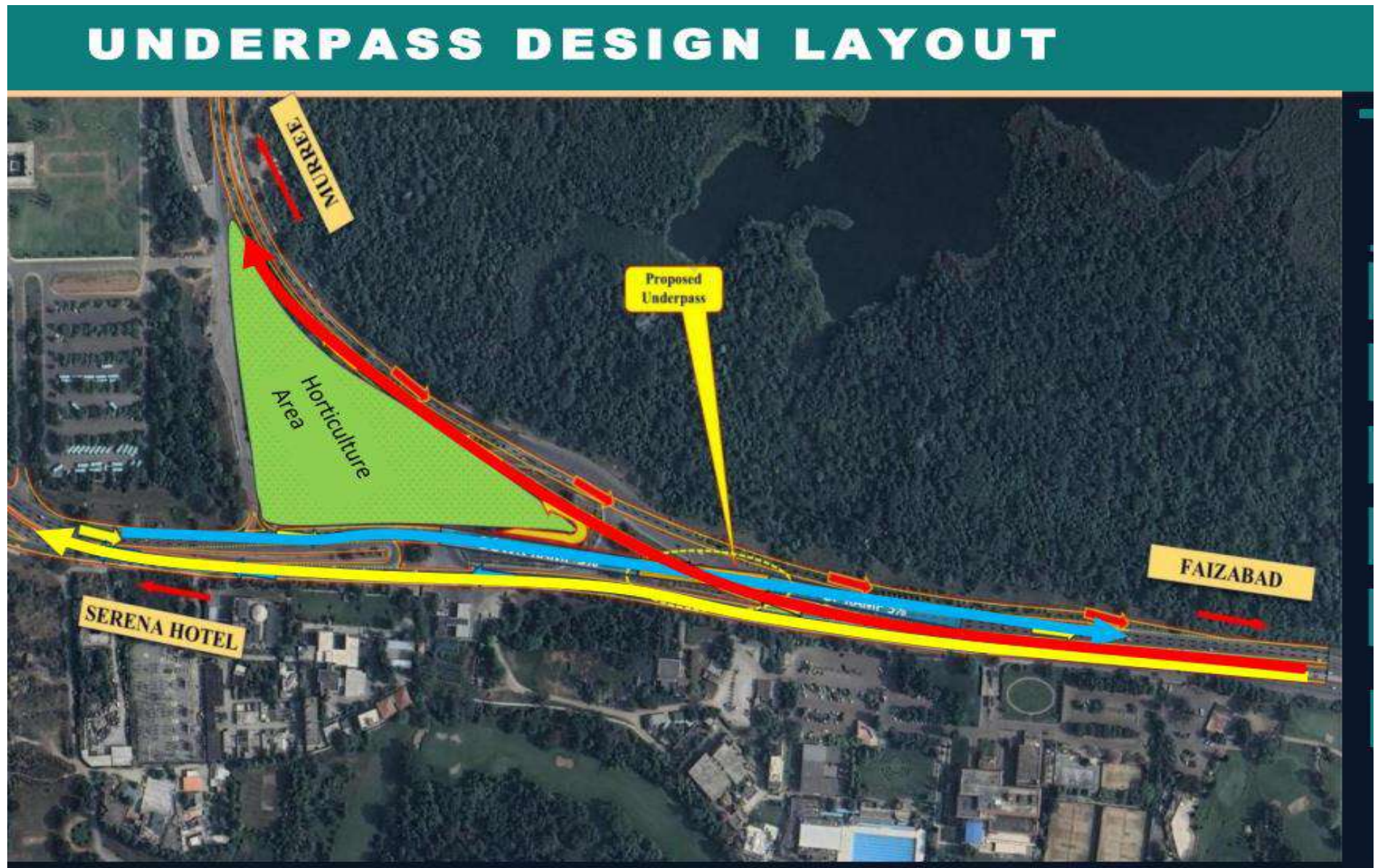


Figure-2: Lay out Map Showing the Location and Accessibility of the Project

1.9. Assessment Methodology

To establish the baseline data, the Area of Influence (AOI) was identified through baseline information collection within maximum 100~200m of Spatial Scale from the proposed underpasses for abiotic factors. To specify this, the spatial scale of 50m x 50m square along the proposed civil components are identified as Area of Influence (AOI) for biotic factors (predominantly reserved/densely populated vegetation sites) and nearby structure. Besides, ancillary works like temporary labor camps, storage and equipment yard also includes for assessment.

During onsite assessment, four different Land-Use types/sensitive receptors were taken for assessment within AOI Spatial Scale. These following four environmental/social variables are considered as strongly associated:

- v. Dense vegetative sites/afforestation/Dense Floral Composition Sites/pattern along Club and Murree road within the underpass and further extended to 100m spatial extent.
- vi. Nearby infrastructure/social amenities.
- vii. Ecological dynamics/alterations.
- viii. Arterial Route Linking the Red Zone.

These Land-Use types/landscape variables were extracted through onsite assessment conducted in July, 2026 and topographic mapping. Further, the impact on these landscape variables were correlated with the construction components for assessing the significance of impacts.

In a similar pattern, the main environmental variables were also taken for assessment, mainly including of air quality degradation and noise generation.

1.10. Purpose of the EIA Report

The major activities performed under the EIA study are as under:

- All major and minor positive or negative impacts on the immediate environmental setting due to the proposed DED implementation.
- Mitigation of negative impact as far as practically possible through modification in design and construction component.
- Apply appropriate engineering control measures to avoid construction related deterioration on adjacent areas mainly arterial route, Islamabad Club, dense vegetative portion along the Murree road or any residual short term or long-term negative impact.
- Further, clearly and made known to all stakeholders as well as those likely to be affected.
- A well developed and Site-Specific Environment Management Plan to be developed with inclusion of all components/parameters for controlling the ambient environment during construction and operation phase.

1.11. Study Team

A multidisciplinary team of experts was assigned to carrying out this study. The team includes:

Name	: Designation	Role
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Mr. Khurram Tariq	: Resident Engineer	Support in Provision of Relevant Data
Mr. Imran Ishaq	: Chief Engineer	Chief Engineer
Usman Haider Muhammadi	: Environmental Engineer	Drafted/Compiled Comments raised on EIA Report
Mr. Noshewan Naeem	: Civil Engineer	Design Engineer
Mr. Junaid	: Associate Engineer	Auto-Cad Operator

1.12. Approach and Assessment Methodology

1.12.1 Review of Project Activities

The EIA study starts with review of project activities using the information from the client. In a scoping session with the Proponent (Director CDA-Road), different aspects of the Project were discussed in terms of various environmental issues. Details of the past and proposed project activities were collected from the proponent. The impacts associated with the project were reviewed and mitigation measures were specified. In subsequent meetings with the proponent, the observations were communicated.

1.12.2 Review of Policy, Legislation and Guidelines

The relevant national legislations, guidelines were reviewed to set the environmental standards and environmental management plan that the project would be required to adhere to during the construction and operation phase of the project.

1.12.3 Review of Secondary Data

The team of experts to identify key areas of study and analysis/assessment reviewed the project related information provided by the client. Besides information from the proponent. Available secondary data including environmental studies on Resolving Traffic Congestion on “*Resolving Traffic Congestion Issues at Serena and Convention Centre Intersection, Islamabad*” was reviewed to ascertain the baseline environmental data and associated impacts. Available literature on project area was also reviewed to collect information for development of social and environmental baseline profiles for the subject EIA, summarizing the following:

- Physical environment: topography, geology, soils, water resources, ambient air and climate.
- Biological environment: habitat types, flora and fauna, habitats within the proposed site and its surroundings
- Socio-economic environment: settlements, socio-economic conditions, infrastructure and land use; and
- Wildlife and Heritage aspects: sites of cultural, archaeological or historical significance.

1.12.4 Identification and Assessment of Impacts

Potential impacts which may arise from underpass were identified. These include effects on excavation phase, material disposal, siting of ancillary works etc. along the Murree road and adjacent to club road. Impacts were also identified, notably on the ecology and hydrology of the project area and assessed on the basis of field data collected from intersection site. Besides this, secondary data, expert opinion, and monitoring results (from previous similar studies at nearby surrounding) were also extracted during impact assessment.

1.12.5 Recommendations for Mitigation and Monitoring Measures

Keeping in view the baseline data collected and impacts identified, mitigation measures were recommended to minimize, reduce, eliminate, or compensate for the potential environmental and social impacts on the identified project zone of influence (refer Sub-section 1.9). Mitigation measures were recommended on the basis of the engineering control measures adopted in “Resolving Traffic Congestion Issues at Serena and Convention Centre Intersection, Islamabad project and onsite assessment of experts.

1.12.6 Development of Environmental Management Plan (EMP)

EMP included suggested measures and management plan to minimize the identified negative impacts, and monitoring programme to monitor residual impacts, if any, during the construction and operation. The EMP includes the following:

- Mitigation and monitoring plan.
- Defining roles and responsibilities of the proponent and contractors
- Requirements for communication, documentation and training during implementation of the project.
- Site-Specific Management Plan to oversee the project progress by the SC.

1.13. Structure of The Report

Executive Summary explain about the project need, description and envisage impacts.

Section1 “Introduction” briefly presents the project background, objectives, methodology and need of the EIA study.

Section 2 “Policy, Legal and Administrative Framework” comprises policy guidelines, statutory obligations and roles of institutions concerning EIA study of the proposed Project.

Section 3 “Description of the Project” furnishes information about the location of the proposed Project, cost and size of the project, its major components and alternatives considered.

Section 4 “Environmental Baseline Profile” establishes baseline conditions for physical, biological and socio-economic conditions prevalent in the project area.

Section 5 “Public Consultation” identifies the main stakeholders and their concerns raised through scoping sessions, and deals with the measures to mitigate the social impacts.

Section 6 “Anticipated Environmental Impacts and Mitigation Measures” identifies, predicts and evaluates impacts of the project activities during the construction and operation stages and deals with the measures proposed to mitigate potential environmental impacts of the road project.

Section 7 “**Environmental Management and Monitoring Plan**” outlines institutional arrangements for the implementation of the proposed mitigation measures, training needs of the staff for implementation of the mitigation measures, monitoring requirements, monitoring cost etc.

Conclusion explain about overall impacts and severity, suggestive measures with roles and responsibility of contractor’s management.

Chapter

2

ENVIRONMENTAL POLICY, LAW AND ADMINISTRATIVE FRAMEWORK

In conformity with the statutory requirement, this Underpass project requires an EIA in accordance with the Pakistan Environmental Protection Act (PEPA), 1997 and review of IEE/EIA Regulation, 2000. Detailed description of filing EIA and other pre-requisites are described in the following sub-sections

As per regulatory requirement, the Transport sector projects like the Kashmir Chowk Underpass project fall under schedule I and require IEE/EIA submission to EPA. However, in conformity to the IEE/EIA regulations, 2000, the proposed project has been categorized into Schedule-II Category D: It states that Federal/Provincial Highway or major roads (except maintenance, re-building and reconstruction of existing roads) with total cost fifty million rupees and above.

2.1. Policy Framework

The Ministry of Climate Change and Environmental Coordination (MoCC and EC) is the responsible authority for policy making on environmental protection in Pakistan.

An overview of the key environmental issues facing Pakistan is as follows:

- Per capita water availability in Pakistan has been decreasing at an alarming rate. In 1951, the per capita availability was 5300 cubic meter which has now decreased to 1105 cubic meter just touching water scarcity level of 1000 cubic meter.
- Almost all fresh-water resources are severely polluted due to discharge of untreated industrial and municipal wastes. Pollution of coastal waters due to waste discharges and oil spills coupled with reduced freshwater flows is resulting in declining fish yields.
- About 55 percent of population has access to a relatively safe drinking water source. Potable water quality, assessed against WHO standards, fails to meet all the specified criteria, confirming evidence of extremely high pollutant loads.
- Approximately 35 percent of population has access to adequate sanitation facilities.
- Air pollution is on the rise, especially in urban areas. Recent surveys conducted by Pakistan Environmental Protection Agency (PEPA) revealed presence of very high levels of suspended particulate matter (about 6 times higher than the World Health Organization's guidelines). 'Smog' also seriously affects almost entire Punjab during December and January every year.
- Noise pollution has become a serious issue in major urban centres.
- Of about 54,850 tons of solid waste generated daily in urban areas, less than 60 per cent is collected. No city in Pakistan has proper waste collection and disposal system for municipal, hazardous or healthcare wastes.
- The deforestation rate has been estimated at 0.2-0.5 percent per annum. Forest cover, which was 4.8 percent of total land area in 1992, could hardly be increased substantially despite all efforts.
- Degradation and encroachment of natural forests, rangelands and freshwater and marine ecosystems are resulting in loss of biodiversity.

- Pakistan is a highly energy in-efficient country. It uses approximately same amount of energy to generate 1 dollar of GNP as the USA.

The situation just mentioned is the result of a number of constraining factors including high population growth rate, prevailing poverty, unplanned urban and industrial expansion, insufficient emphasis on environmental protection in the government policies, lack of public awareness and education and above all the ailing economy which has caused deficiencies in institutional capacity and resources for effective environmental management.

2.2. Administrative and Institutional Setup for Environmental Management

The Ministry of Climate Change and Environmental Coordination (MoCC&EC) administers environmental affairs at the federal level and oversees environmental governance across the country.

Pakistan Environmental Protection Council is the apex inter-ministerial and multi-stakeholders decision-making body, which is headed by Prime Minister.

While, Pakistan Environmental Protection Agency is meant for the enforcement of environmental laws in Pakistan. They have delegated powers to provincial environmental protection agencies for review, approval and monitoring of environmental examination/assessment projects. Federal EPA will be responsible for reviewing the report, issuing No Objection Certificate (NOC) and overall/broad based monitoring of the proposed project activities.

The proposed project is located in federal Capital. Hence, this EIA Report will be submitted to the Pak-EPA for review and issuance of environmental approval.

Table-1: Summary of Applicable Laws, Policies and Conventions at National & International Level

Applicable Laws & Policies	Year	Objectives	Applicability
<i>National Laws & Policies</i>			
National Environmental Policy	2005	The Government of Pakistan launched its National Environmental Policy, which provides an overarching framework for addressing the environmental issues Pakistan is facing, particularly air pollution, lack of proper waste management, deforestation, natural disasters (flash floods) and climate change. The Climate Change Division is the responsible authority for environmental protection policy making in Pakistan.	Direct
National Resettlement Policy	2002	Pakistan Environmental Protection Agency (Pak-EPA), GOP has issued its National Resettlement Policy, which	Direct

Applicable Laws & Policies	Year	Objectives	Applicability
		explains the basis for compensation, rehabilitation and relocation of the affectees. It also explains the requirements and implementation of Resettlement Action Plan (RAP). Based on the landscape context	
National Environmental Quality Standards (NEQS)	2000	Define maximum allowable discharge limits for Air, noise, water, and wastewater. The NEQS are uniform standards applicable to all kind of industrial and municipal effluents. Different Parameters are set showing permissible levels of pollutants in liquid effluent and gaseous emission.	Direct
Pakistan Environmental Protection Act.1	1997	The Pakistan Environmental Protection Act, 1997 (PEPA) is the fundamental legislation empowering the government to formulate regulations for protecting the environment. It is broadly applicable to air, water, soil, marine and noise pollution, as well as to the handling of hazardous waste. Penalties have been prescribed for those contravening the provisions of the Act.	Direct
Islamabad Environmental Improvement Act,	1995	Islamabad Environmental Improvement (Green Areas) Act, 1995 was proposed to (1) prevent the existing green area in the Islamabad Capital Territory from being used for purposes other than those for which they are reserved and (2) ensure that at least 20 % of the total area of any new scheme is reserved for the development of green areas. For the purpose of this Act, "green areas" means land in the Islamabad Master Plan, or other schemes, reserved exclusively for parks, playgrounds, forests, nurseries, vegetative	Direct

¹ <https://environment.gov.pk/SiteImage/Misc/files/Regulations/IEE%20EIA%20Regulation%202000.pdf>

Applicable Laws & Policies	Year	Objectives	Applicability
		cover, green belts and open spaces on which no construction is planned.	
Islamabad Wildlife Ordinance.	1979	The Islamabad Wildlife (Protection, Preservation, Conservation and Management) Ordinance 1979 provides the protection, preservation, conservation and management of wildlife in Islamabad Capital Territory. Main aim of this act is the preservation and conservation of wildlife, flora and fauna for sustainable development and also to comply with the concept of national parks internationally.	Direct
Cutting of Trees (prohibition) Act. ²	1992	The Cutting of Trees Act mandates that no person shall, without prior written approval from authorized officer shall cut, fell or damage trees growing in: First Zone (Area adjacent to and beyond the external frontier of Pakistan to a line at four kilometers measured from the external frontiers of Pakistan) if the number of remaining trees in any field falls short of the number to be calculated at the rate of fifteen trees per acre. Second Zone (Area adjacent to and beyond the first zone extending towards Pakistan to a line of four kilometers measured from the first zone) if the number of remaining trees in any field falls short of the number to be calculated at the rate off ten trees per acre.	
Land Acquisition and Act,	1894	This law regulates the acquisition of land for public purposes and provides compensation in the form of cash, an alternative land allocation, or through other equitable arrangements (Sec 31). ³	Direct

² https://na.gov.pk/uploads/documents/1334288481_985.pdf

³ <http://www.megrevenueadm.gov.in/act/land-acquisition-act-1894.pdf>

Applicable Laws & Policies	Year	Objectives	Applicability
Sectoral Guidelines	1997	Pakistan Environmental Assessment Procedure deals with general guidelines as well as sectorial guidelines for environmental assessment studies. The sectorial guidelines have been given for some categories of projects including road Projects.	Direct
Labor Laws (Amended) Ordinance, 1972.	1972	Construction and operational activities can affect the occupational health of the workers. Quantitative national standards with respect to these aspects are yet to be developed in Pakistan. However, guidance in qualitative terms can be obtained from the Labor Laws (Amended) Ordinance, 1972.	Direct
Canal & Drainage Act	1873	Prevention of pollution of natural or man-made water bodies ⁴	Indirect
Hazardous Substance Rules	2003	Safe handling of hazardous substances used in any workplace ⁵	Direct
Factories Act	1934	Regulating the working environment to accommodate the safety and wellbeing of labourers. . ⁶	Direct
Forest Act	1927	Safeguard of forests on state lands and private lands	Indirect
Antiquities Act 1975	1994	Protection of cultural resources in Pakistan	Indirect
Punjab Wildlife Protection Act	1972	To protect wildlife and to prevent /regulate hunting of birds and animals.	Indirect

⁴[http://www.cmsdata.iucn.org/downloads/thecanal and drainage act 1873.pdf](http://www.cmsdata.iucn.org/downloads/thecanal%20and%20drainage%20act%201873.pdf)

⁵<http://www.faolex.fao.org/docs/pdf/pak64438.pdf>

⁶<http://www.ilo.org/docs/WEBTEXT/35384/64903/E97PAK01.HTM>

Applicable Laws & Policies	Year	Objectives	Applicability
Highways Safety Ordinance	2000	This ordinance includes provisions for the licensing and registration of vehicles and construction equipment; maintenance of road vehicles; traffic control, offences, penalties and procedures; and the establishment of a police force for motorways and national highways charged with regulating and controlling traffic on the national highways, and keeping the highways clear of encroachments.	Indirect
Motor Vehicle Rules.	2013	Motor Vehicle Rules (MVR 1969) define powers and responsibilities of Motor Vehicle Examiners (MVEs). The establishment of MVE inspection system is one of the regulatory measures that can be taken to tackle the ambient air quality problems associated with the vehicular emissions during operation phase.	Direct
ICT Development Laws and Regulations		The CDA operations are governed generally by the provisions of the Islamabad Capital Territory Municipal Bye Laws, 1968 as amended from time to time; and specifically by the Islamabad Regulations 1979 (Upkeep of Cleanliness) as amended from time to time. Recently, some departments have been shifted to Municipal Corporation Islamabad (MCI) including Water, sanitation and environment and issues related to water, sewerage, and environment are now taken care by the relevant administration of MCI	
<i>International Conventions & Agreements</i>			
Ramsar Convention on Wetlands of International Importance	1971	Conservation and wise use of wetlands and their resources.	Not Applicable

Applicable Laws & Policies	Year	Objectives	Applicability
International Union for Conservation of Nature and Natural Resources	1963	Conservation of flora and fauna species that are at risk of extinction from the globe	Not Applicable
Convention on Migratory Species of Wild Animals (CMS)	1983	Protection of migratory species of animals by every state that lives or passes through their national jurisdiction.	Indirect
Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)		Safe and Sustainable trade of wild animals and plants without threatening to their survival	Not Applicable
Millennium Development Goals (MDGs)	2000	Development of nations by eradication of social and environmental issues	Indirect
Vienna Convention for the Protection of the Ozone Layer	1992	Vienna Convention for the protection of the Ozone Layer highlights the need to protect the Ozone layer for conserving environment for the present and future generations.	Indirect
United Nations Framework Convention on Climate Change (UNFCCC)	1994	This convention highlights the broad guidelines to protect the Climate of the Planet.	Direct
Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their disposal:	1994	Basel Convention deals with the controlled trans-boundary movement of Hazardous Wastes and their disposal.	Indirect
Convention Concerning the Protection of the	1972	Cultural heritage and the natural heritage are increasingly threatened with destruction not only by the traditional causes of decay, but also by changing	Currently not applicable as no cultural heritage site

Applicable Laws & Policies	Year	Objectives	Applicability
World Cultural and Natural Heritage		social and economic conditions which aggravate the situation with even more formidable phenomena of damage or destruction.	located within the prescribed boundaries proposed Margalla Orchards.
International Labor Organization (ILO)		The ILO aims to ensure that it serves the needs of working women and men by bringing together governments, employers and workers to set labor standards develop policies and devise programs.	Applicable

2.3. Pakistan Environmental Assessment Guidelines

The Federal EPA has prepared a set of guidelines for conducting environmental and social assessments. The guidelines derive from much of the existing work done by international donor agencies and NGOs⁷.

The EIA report submission and approval procedure is summarized below:

- Ten hardcopies of the EIA and two soft copies will be submitted together with a review fee and form included as Schedule V of the IEE-EIA Regulations.
- The EPA will conduct a preliminary scrutiny and reply within 10 days of the submittal of the report.
- If accepted, the EPA will set a date for public hearing and publish a notice in the print media. According the law, a minimum of 15-day notice is required for the public hearing.
- The EPA will review the EIA taking into account the any public comments received during the hearing or otherwise.
- The EPA is required to make every effort to complete the EIA review process within 90 days (03) months of the issue of confirmation of completeness under regulation 9.
- The approval granted at the end of the review process, is valid for three years to start construction.
- Once the project construction is complete, the proponent is required to submit a request to EPA for confirmation of compliance. An environmental management plan for the operation phase is to accompany the request.

⁷ https://fwegb.gov.pk/wp-content/uploads/2021/12/REVIEW_OF_IEE_EIA_REG_2000.pdf

- h. The Director General may, where he/she considers it necessary, shall constitute a committee to inspect the site of the project and submit its reports on such matters as may be specified.
- i. Decision: On Completion of the review, the decision of the Federal Agency shall be communicated to the proponent in the form of prescribed in Schedule-VI in the case of an EIA.

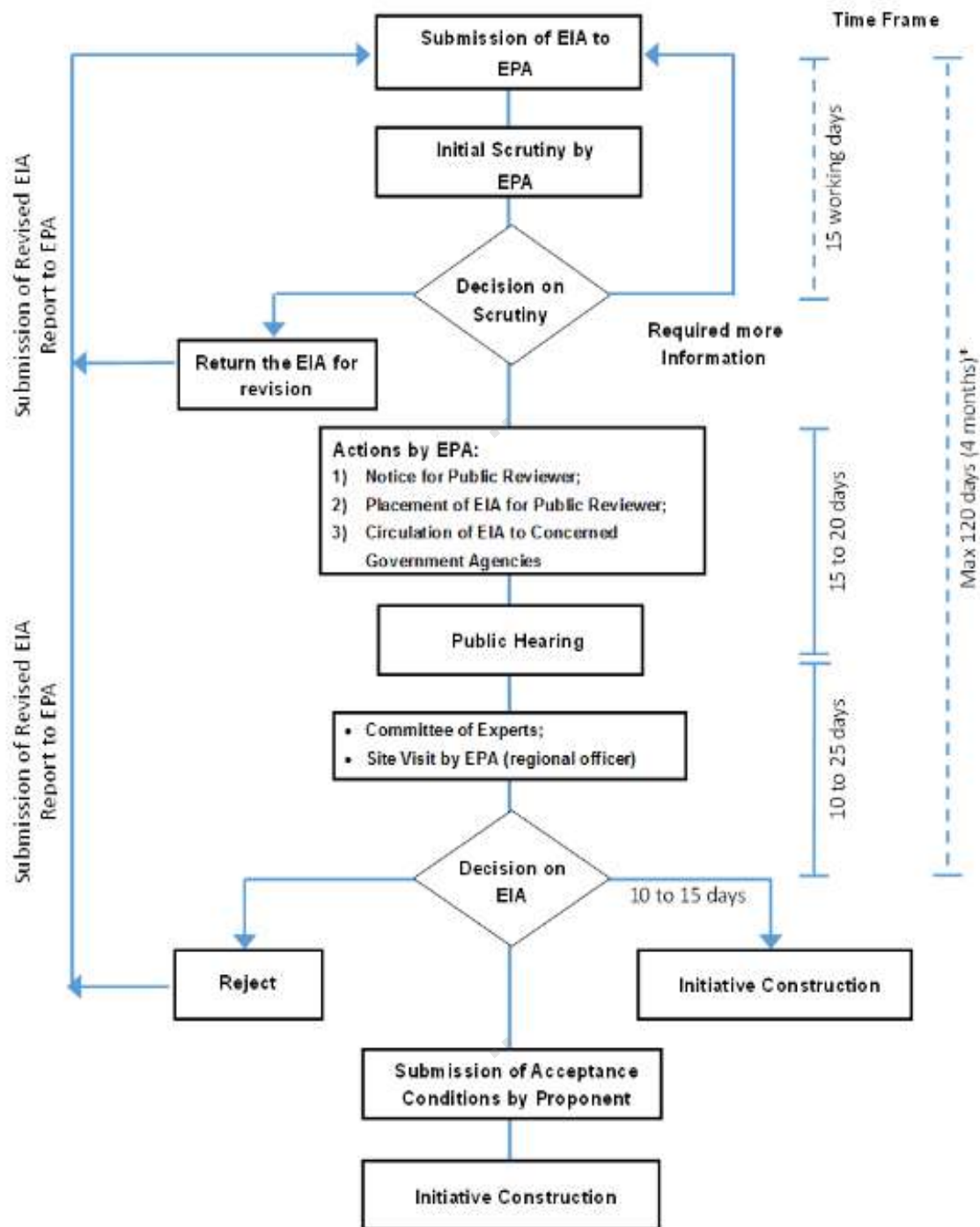


Figure 3: EIA Review and Approval Procedure

Chapter

3

PROJECT DESCRIPTION

3.1. General Project Description

Kashmir Chowk is located along Club Road and forms one of the busiest intersections on, serving as a major traffic node for vehicles traveling between Faizabad, Rawal Road, Islamabad, Murree Road, and Peshawar Road (N-5). The surrounding area within 300m to 500m spatial scale comprises recreational spaces (Islamabad Club), arterial route for diplomats, Convention Center and Serena Chowk. The proposed site serves as heavy traffic route throughout the day. Owing to persistent congestion and traffic conflicts at this existing Kashmir Chowk, the Capital Development Authority (CDA) has initiated the Kashmir Chowk Underpass Project to improve traffic flow and provide a signal-free corridor. The project location and cross section details is shown in **Annexure-A**

Therefore, keeping in view the traffic congestion issues, CDA along with the consultation of Consultant has formulated a signal free solution for all turning and through movements by constructing Underpass along Club Road (i.e. traffic coming from Srinagar Highway i.e. Serena Chowk, diplomatic Enclave and vicinity areas and move towards Rawal Chowk and Faizabad. With the provision of this underpass this junction will serve as signal free by eliminating the major right turning conflict of traffic coming from club road/ Rawal Chowk and moving towards Murree.

On the other hand, underpasses at Kashmir Chowk intersection project is also important for the city and Secretariat areas, as traffic rush on the main chowk wasted time and fuel of the motorists. The redesigning of this Kashmir Chowk intersection with provision of underpass would improve the traffic flow.

3.2. Scope of Work for the Proposed Underpass

Forgoing in view to this, a feasible solution is required to solve the traffic congestion problem at existing intersection (exhibit-Figure-4) by intending of underpass at Kashmir Chowk intersections.

The project includes the following major works:

- i. Construction of Underpass (3-lane) along Club Road for traffic from Srinagar Highway i.e. Serena.
- ii. Chowk, diplomatic Enclave to Rawal Chowk/Faizabad bound.
- iii. Construction of Road for Right turning Murree bound traffic.
- iv. Construction of Approaching roads and auxiliary works.

3.3. Alignment Details

The project location comprises of a Kashmir Chowk intersection in Islamabad Capital Territory. The approved alignment for the construction of an underpass from Serena hotel to Faizabad Interchange on main Club Road is shown in Figure 4 below:

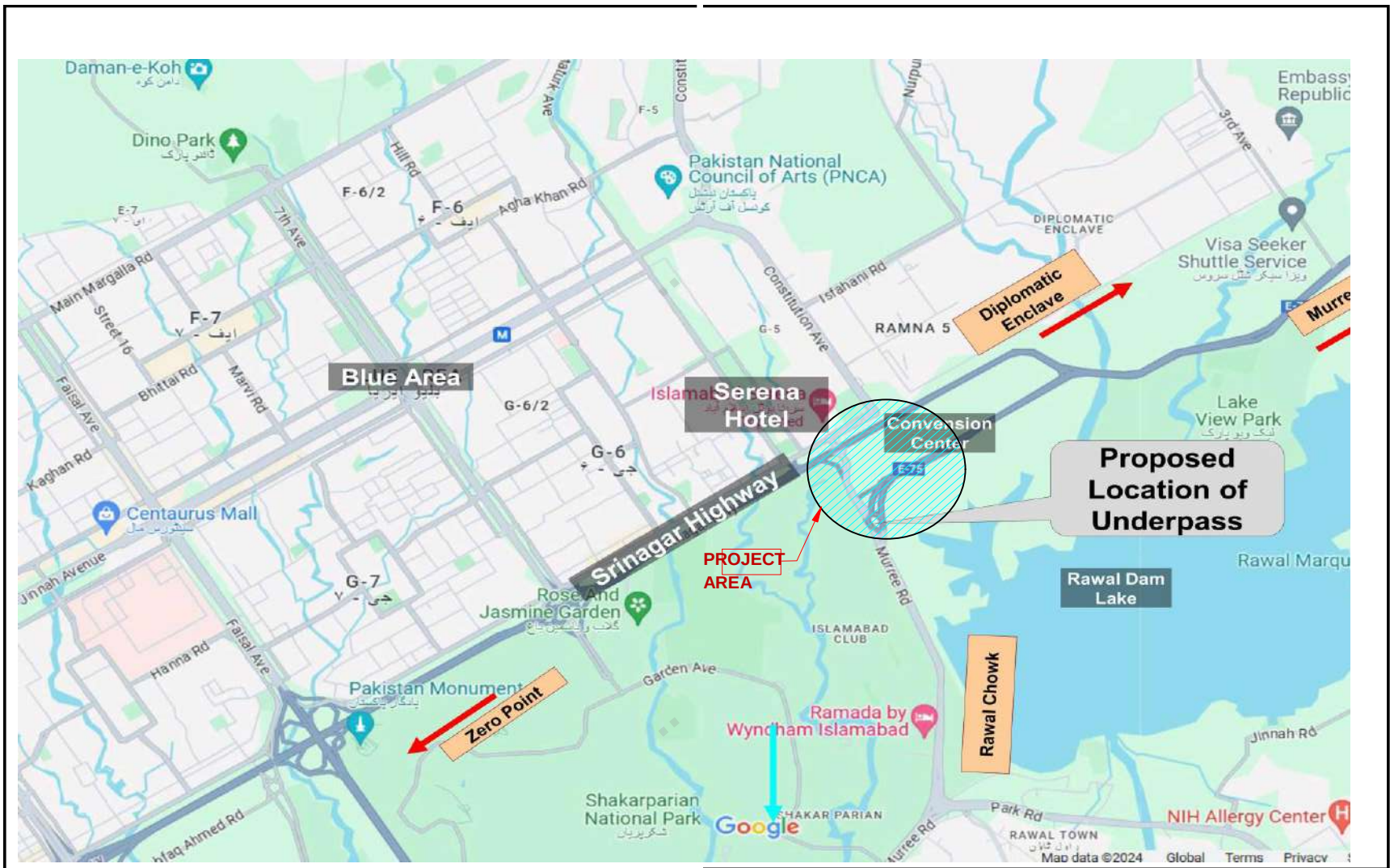


Figure 4: Map View of Project Site (Underpass Location at Kashmir Chowk)

3.4. Project Objective

The project aims to provide a smooth and congestion free travel from Serena hotel to Faizabad and Murree via Islamabad Club Road. The Srinagar Highway act as main connection which most of the people used to travel towards North and South. Development of this junction will provide ease of traffic on parallel roads.

3.5. Need/Objective of the Project

Capital Development Authority (CDA) is developing important road links and resolving traffic congestion issues at various locations keeping in view the commuter and trade traffic on roads in the capital city. Kashmir Chowk is a critical intersection linking the Red Zone, Serena Hotel area, Murree Road, Srinagar Highway, and the Islamabad Expressway through Faizabad. Due to high traffic volumes during peak hours, the intersection frequently experiences congestion, long vehicle delays, queuing, and travel time unreliability. The proposed underpass would provide a grade-separated movement for through traffic, reducing conflicts at the intersection and improving corridor capacity. CDA's approved design specifically aims to facilitate uninterrupted traffic movement from the Serena Hotel side towards Club Road and Murree Road while maintaining surface-level traffic operations.

The proposed project presently is a Roundabout junction with Four (04) major movements.

- i. Traffic coming from club road and moving right towards Barakahu, Murree and Kashmir.
- ii. Traffic coming from club road and moving straight towards Srinagar Highway i.e. Serena Chowk, diplomatic Enclave etc.
- iii. Traffic coming from Srinagar Highway i.e. Serena Chowk, diplomatic Enclave and vicinity areas and move towards Rawal Chowk and Faizabad.
- iv. Traffic coming from Barakahu, Murree and Kashmir move left on club Road towards Rawal Chowk and Faizabad.

Therefore, there is a dire need to resolve this traffic congestion issue. In this regard, grade separation solution (Underpass) at intersection has been proposed to make this junction signal free. The proposed solution shall be beneficial for all movements of traffic thus creating a signal free zone in the instant area.

3.6. Associated Benefits in Kashmir Chowk Underpass Construction

The proposed solution will be beneficial for all movements of traffic thus creating a signal free zone in the instant area. This project will contribute in reducing traffic jams/congestion at the intersection. This will result in reduction in Vehicle Operating Cost (VOC) and Vehicle travel time (VTT) thus alleviating noise and air pollution to certain extent to address existing and future transportation challenges, a feasibility study has been undertaken. To evaluate the operational performance of Kashmir Chowk and identify suitable improvement alternatives. The study will provide a basis for selecting the most technically, economically, and environmentally viable option for improving traffic operations and accommodating future growth in the area.

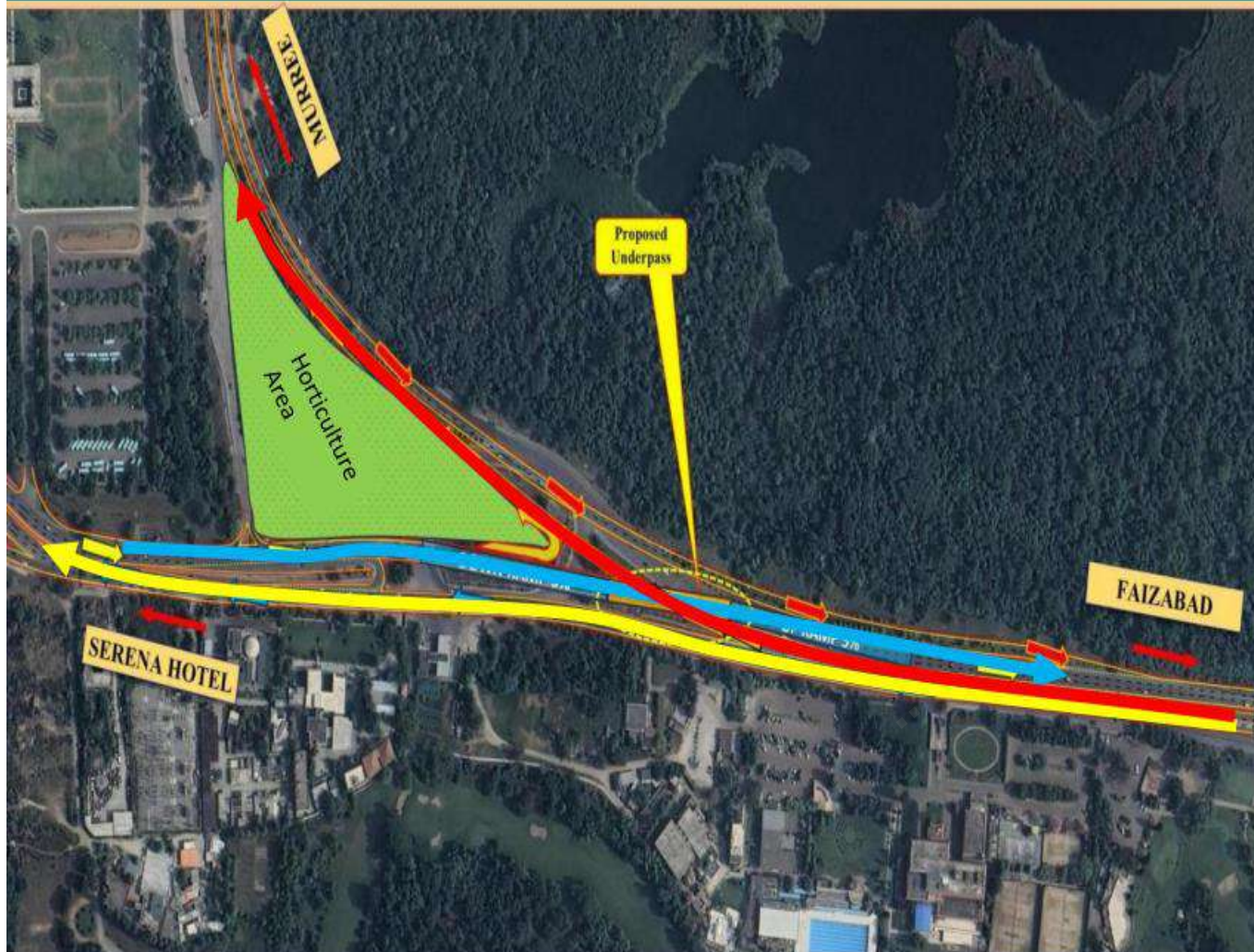
OVERALL AERIAL TRANSFORMATION

BEFORE → AFTER



Figure-5: Aerial View of the Project Site

UNDERPASS DESIGN LAYOUT



KEY PARAMETERS

Project Type	Grade-Separated Underpass
Underpass Alignment	Serena Hotel → Faizabad
Down Ramp Grade	5.5%
Up Ramp Grade	5%
Underpass Clearance height	5.1 m
Underpass Barrel Size	55 m x 12 m

Figure-6: Proposed Location of underpass

3.7. Land-Use Pattern of Existing Intersection (Kashmir Chowk)

Kashmir Chowk Roundabout is located along Club Road, a key arterial route linking the Red Zone with the southern part of Islamabad near Rawal Lake. The locality consists of a mix of government residential areas, institutional buildings, and green recreational zones.

The project influence area within a 1 km radius of Kashmir Chowk is predominantly characterized by commercial and institutional land uses, accounting for approximately 61% of the total area. Transportation infrastructure constitutes about 18%, reflecting the strategic importance of the intersection within Islamabad's road network. Landscaped green spaces occupy approximately 14%, while residential areas are limited to 6% and are primarily located within the adjoining planned residential sectors. No environmentally sensitive land uses, industrial zones, or agricultural lands were identified within the study area.

Landscape Context:

- Mainly confined to horticulture area at western end/Southern Western End, enclosed to 300-400m from project site.
- Tree mainly belongs to different taxonomic groups, planted by CDA, which is roadside landscaping/plantation and also confined at reserved dense vegetative land adjacent to Murree Road.

Built-up Area within 500 Spatial Extent

- The roundabout itself connects major city routes including Constitution Avenue, Murree Road making it a critical traffic node for commuters, government offices, and visitors accessing Serena Hotel, Diplomatic Enclave, and adjacent public facilities. The Built-up environment is characterized by wide road corridors, institutional land use, and significant daily traffic movement.

Commercial Zones:

- Blue Area: Islamabad's main business district is a short drive from the Kashmir Chowk, featuring a mix of office buildings, shopping centers, banks, and restaurants.

Residential Areas:

- Sector G-5: includes a mix of government offices and residential accommodations.
- Sectors (e.g., F-6, G-6): Predominantly residential with a mix of houses, apartments, and local markets are located at more than 500m spatial scale.

Recreational and Green Spaces:

- Rawal Lake and Lake View Park: Popular for outdoor activities such as boating, picnicking, and nature walks.
- Islamabad Club Located approximately 0.8–1.0 km southwest of Kashmir Chowk, Islamabad Club is situated along Murree Road (Jinnah Avenue/Club Road vicinity) within the planned institutional and recreational zone of Islamabad. The club is easily accessible from Kashmir Chowk via Srinagar Highway and Jinnah Avenue and is surrounded by other prominent landmarks, including the Convention Centre, Serena Hotel, and various

government and diplomatic establishments. Owing to its strategic location and extensive green landscaping, the club contributes significantly to the recreational and aesthetic character of the area surrounding Kashmir Chowk.

Table-2: Land Use/Land Cover (LULC) Analysis within 1 km Radius of Kashmir Chowk, Islamabad

Land Use Category	Area (%)	Description
Commercial / Mixed Use	37%	Blue Area commercial corridor comprising corporate offices, banks, shopping plazas, restaurants, hotels, retail outlets, and mixed-use buildings.
Government & Institutional	24%	Federal Government offices, administrative buildings, public institutions, educational facilities, and associated infrastructure.
Transportation Infrastructure	18%	Kashmir Highway (Srinagar Highway), Jinnah Avenue, Ataturk Avenue, service roads, intersections, Metro Bus corridor, parking areas, pedestrian walkways, and traffic islands.
Green/Open Spaces	14%	Landscaped medians, roadside plantations, public parks, green belts, and ornamental vegetation maintained by CDA.
Residential	6%	Residential plots and apartment buildings located mainly in adjoining sectors G-6, G-7, F-6, and F-7.
Public Utilities & Miscellaneous	1%	Utility installations, small service facilities, and ancillary infrastructure.
Total	100%	

Major Sensitive Receptors within 500 Radius of Proposed Kashmir Chowk



Figure-7: Land-Use Pattern at Enclosed Area



Figure 8: Existing Landscape Context at Kashmir Chowk Intersection

3.8. Scope and Design of Project

a. Alignment:

Scope of project is construction of Underpasses along with approaches. The plan showing the proposed location of underpass, exhibited at Figure-6 and Annexure-A. Figure-9 showing the typical cross sections, details are annexed at Annexure-B.

Scope of work of the proposed project is summarized below:

Table-3: Scope under the Proposed Underpasses

Detail of the technical parameters/inputs, scope and specification of the project are given below:

<u>Technical Parameters</u>		
<u>Standard/Specification:</u> The project shall conform to the following specifications:		
<u>Key Parameters</u>		
<u>D. Underpass Along Club Road</u>		
Through Length	:	410 m (Barrel Size)
Barrel Length	:	70 m
Ramps Length	:	340 m
Underpass Width (Typ)	:	12.5 m (3-Lane)
<u>E. At Grade Road - Right-Turn Road (Murree Bound Slip Road)</u>		
Asphalt Wearing Course	:	60 mm
Asphalt Base Course	:	90 mm
Water Bound Macadam	:	250mm
Sub-Base	:	200 mm
<u>F. Underpass Barrel and Ramps</u>		
<u>Pavement Structure:</u>		
Asphalt Wearing Course	:	50mm
Asphalt Base Course	:	60mm
Rigid Pavement (4000 Psi)	:	280mm
Subbase	:	200mm
<u>Design Parameters</u>		
Design Speed	:	100 km/hr
Design Standard	:	AASHTO 2018
Min. Curve Radius	:	125 m @ 4% e
Cross Slope	:	2%
Paved Shoulder Outer	:	1.2 m
Subgrade CBR (Min)	:	8% @ 95% MOD

Table-4: Key Parameters

Project Type:

Grade-Separated
Underpass

Underpass Alignment:

Serena Hotel → Faizabad

Down Ramp Grade:

5.5%

Up Ramp Grade:

5%

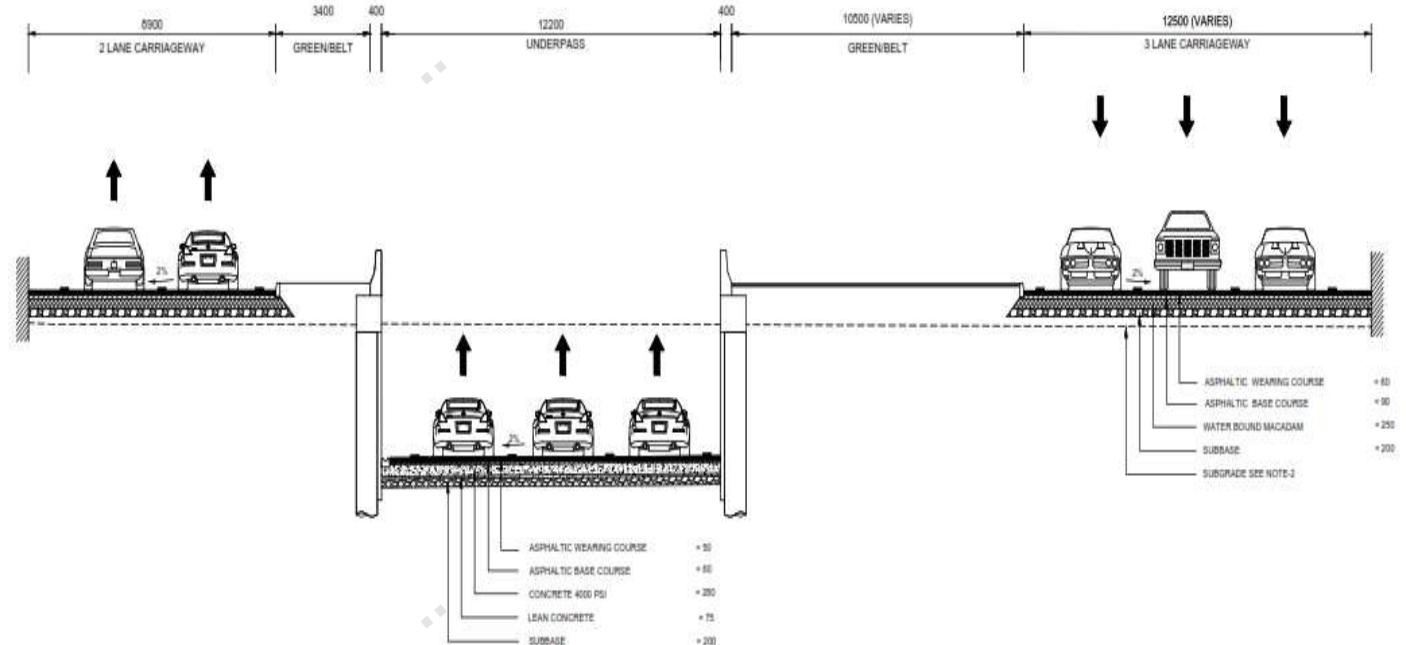
Underpass Clearance

Height:

5.1m

Underpass Barrel Size:

55 m x 12m



PROPOSED CROSS SECTION A-A

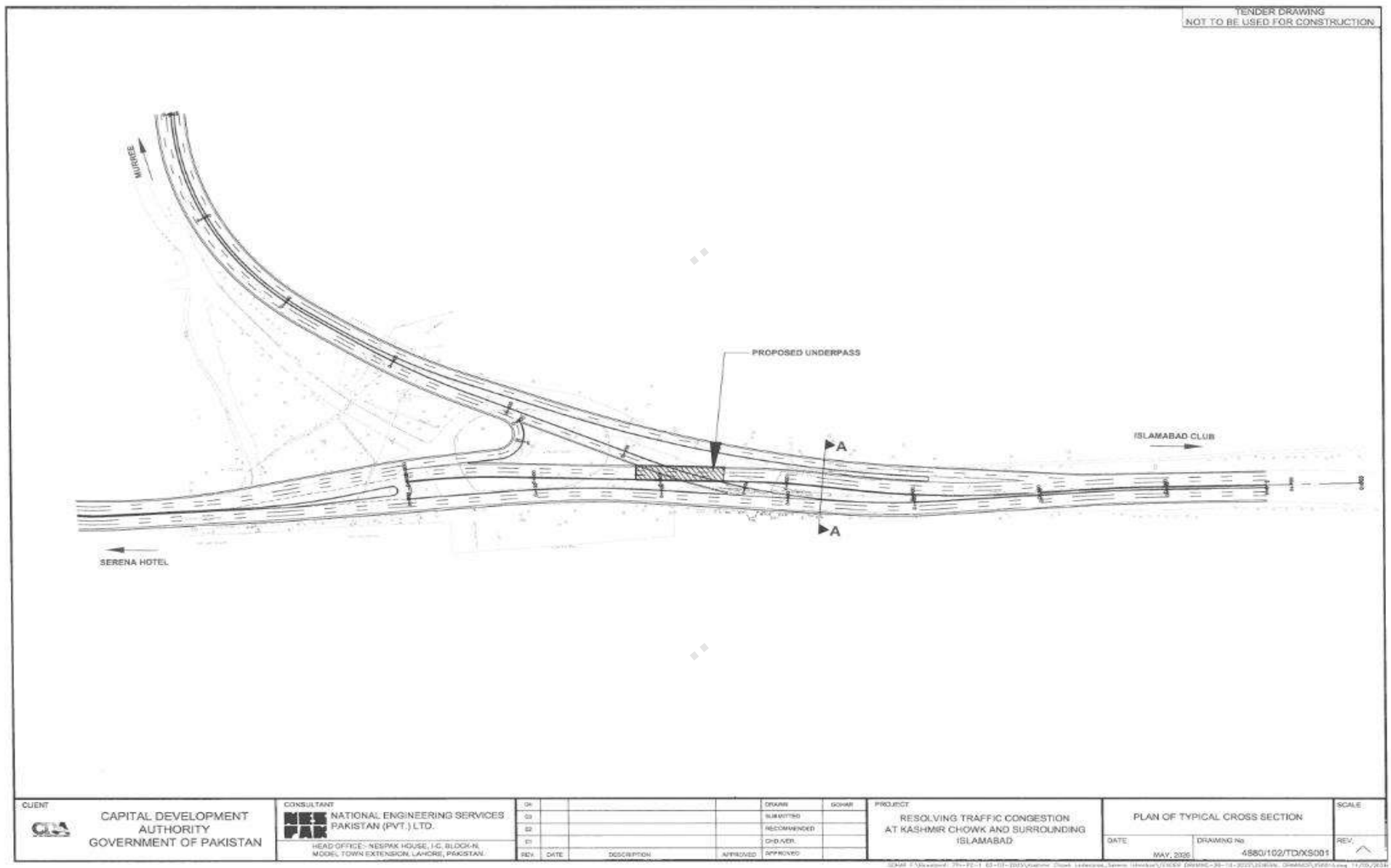


Figure-9: Plan of Typical Cross Section

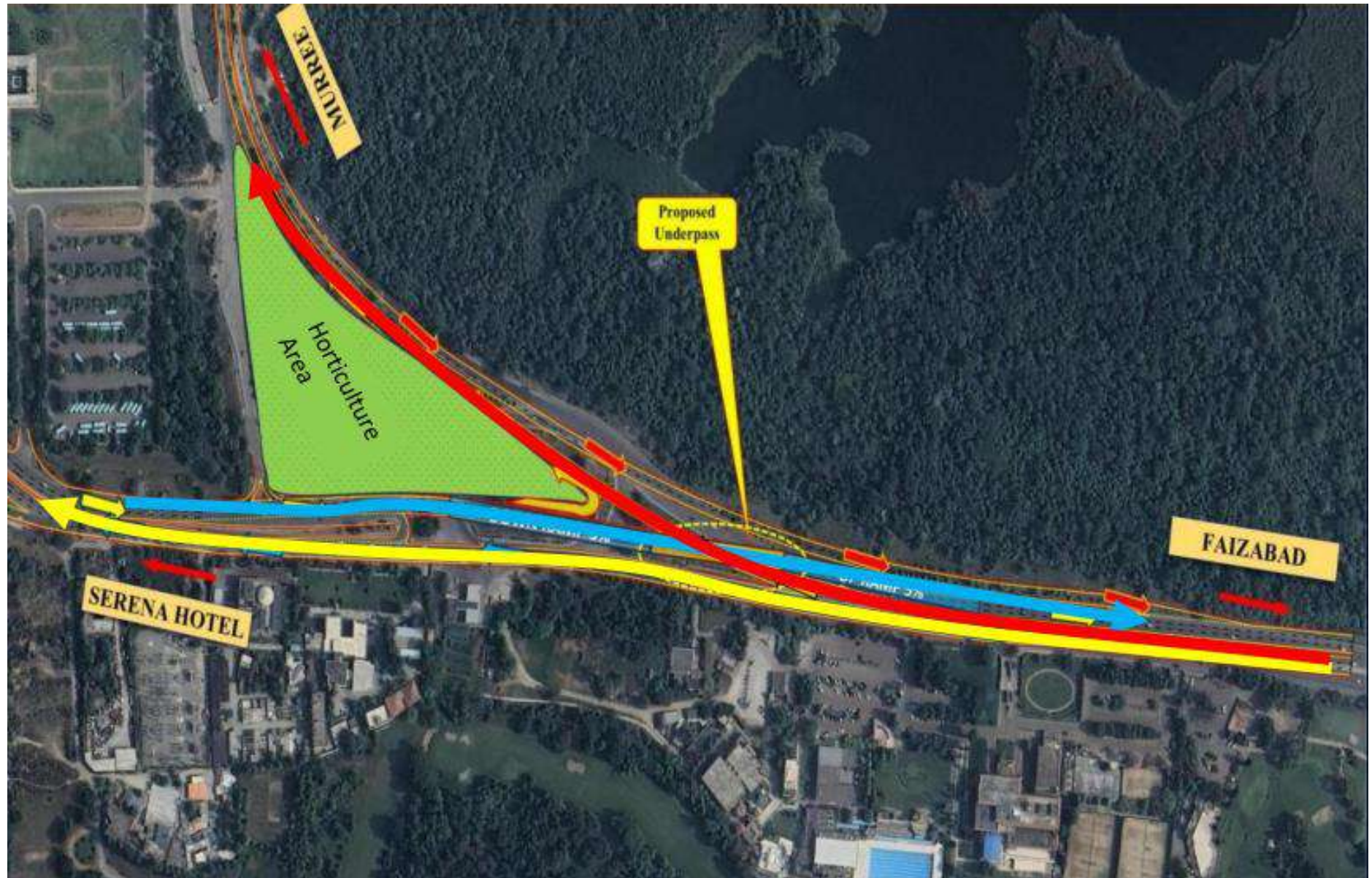


Figure-10: Aerial Design Review- Kashmir Chowk

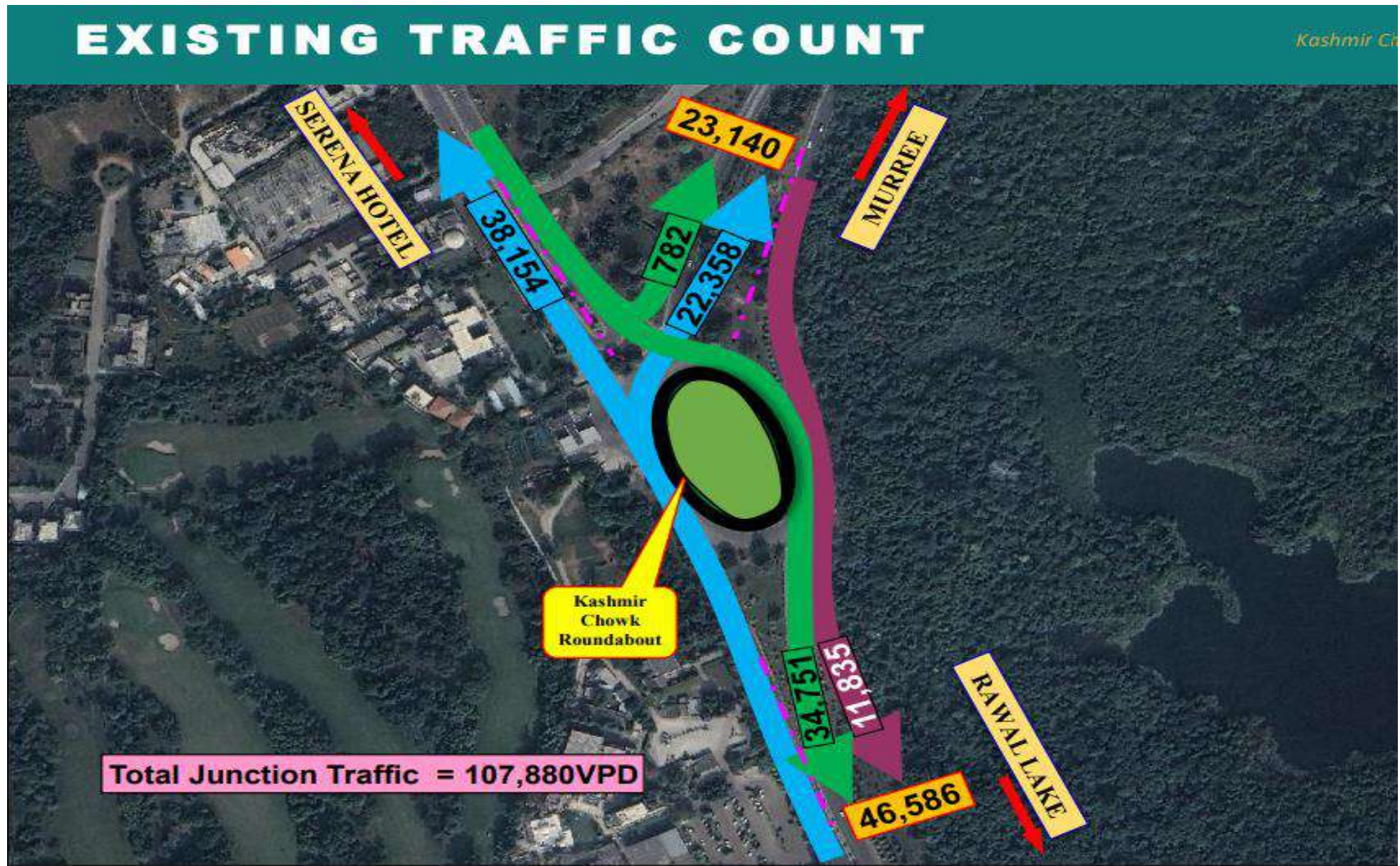


Figure-11: Traffic Circulation-Kashmir Chowk

3.9. Traffic Studies

The projected volumes of traffic are used to compute the expected future load of vehicles on the proposed geometry in future years.

3.9.1. Objective

The project aims to provide a smooth and congestion free travel from Serena hotel to Faizabad and Muree via Islamabad Club Road. The Srinagar Highway act as main connection which most of the people used to travel towards North and South. Development of this junction will provide ease of traffic on parallel roads.

3.9.2. Expected traffic on Kashmir Chowk Roundabout

In order to assess the traffic volumes on the project road, Manual Classified Survey (MCC) was performed on nearby road segments. This newly performed Manual Classified Count (MCC) data formed the basis of diverted and generated traffic likely to use Kashmir Chowk Roundabout.

3.9.3. Traffic projections

Traffic forecast for the project has been carried out on following basis:

- i. NESPAK took 24 Hours Manual Classified Count (MCC).
- ii. Total AADT is obtained after application of weekly variation factors and seasonal variation factor taken from National Transport and Research Council (NTRC) axle load study manual.
- iii. The traffic categories noted during count survey were; Cars/Jeeps/Taxis/; Loader Pickups; Suzuki Passenger Pickups; Buses; Mini Buses/Coasters; Tractors/Tractor Trolleys; Trucks 2–Axles; Truck 3– Axles; and 4-Axles and above trucks.
- iv. Determination of Average Annual Daily Traffic (AADT) was carried out. The traffic volume at Kashmir Chowk Islamabad is shown in Figure-11.

Traffic volume generating and projected volume is presented in Table 6: Kashmir Chowk (Projected Future 24 Hour Traffic Count Survey) Year 2026 and Projection until Year 2047)

Table-5: Annual Project Benefit Stream (Rs. Million)

Year	VOC Savings	VTT Savings	Fuel Savings	Time Savings	TOTAL
2027 (Yr 1)	176.34	37.54	60.69	45.63	320.20
2032 (Yr 6)	240.18	53.24	67.06	50.63	411.12
2037 (Yr 11)	328.56	78.09	73.35	55.62	535.63
2042 (Yr 16)	455.49	118.70	79.59	60.61	714.39
2047 (Yr 21)	660.51	194.35	85.80	65.61	1,006.27

Table 6: Kashmir Chowk (Projected Future 24 Hour Traffic Count Survey) Year 2026 and Projection until Year 2047

S.No	Description	Bicycle	Bike	Rickshaw	Car	Pajero/Jeep/Suzuki	Hiace/Wagon/Dastun	Medium Bus/Flying Coach	Bus	Loader/Pickup	Tractor/Trolley	Truck 2 Axle	Truck 3 Axle	Truck 4 Axle	Truck 5 Axle & above	Total
1	From Murree toward Faizabad	9	2922	7	7410	0	420	303	116	418	1	180	28	5	16	11835
2	From Faizabad toward Murree	53	8050	27	12694	0	513	201	159	374	12	164	58	7	46	22358
3	From Serena toward Faizabad	10	10685	0	21656	0	1016	341	153	689	4	89	75	0	33	34751
4	From Faizabad toward Serena	5	13175	0	23146	0	707	297	147	526	6	101	34	0	10	38154
5	From Serena toward Murree	25	330	43	273	0	31	16	9	45	2	8	0	0	0	782
	Total Traffic Volume	102	35162	77	65179	0	2687	1158	584	2052	25	542	195	12	105	107880

DIRECTION: TRAFFIC COMING FROM FAIZABAD SIDE

Year	MOTOR CYCLE	CAR/TAXI/JEEP	PAJERO/SUZUKI PICKUP	HIACE WAGON	MINI BUS / COASTER	BUS	LOADER PICKUP	TRACTOR TROLLY	Trucks			TRAILER / 5-AXLE & Above	Total Traffic
									2-AXLE	3-AXLE	4-AXLE		
2027	22102	36417	0	1255	512	315	933	19	273	95	7	58	61986
2032	26313	39190	0	1425	582	357	1100	22	312	108	8	66	69484
2037	30502	41892	0	1595	651	400	1271	25	353	123	9	75	76896
2042	34677	44535	0	1765	720	443	1449	29	395	137	10	84	84245
2047	38842	47130	0	1935	790	485	1634	33	439	153	12	93	91545

DIRECTION: TRAFFIC COMING FROM SEERENA SIDE

Year	MOTOR CYCLE	CAR/TAXI/JEEP	PAJERO/SUZUKI PICKUP	HIACE WAGON	MINI BUS / COASTER	BUS	LOADER PICKUP	TRACTOR TROLLY	Trucks			TRAILER / 5-AXLE & Above	Total Traffic
									2-AXLE	3-AXLE	4-AXLE		
2027	11496	22326	0	1077	367	167	761	6	100	77	0	34	36411
2032	13687	24026	0	1223	417	189	897	7	114	88	0	39	40687
2037	15865	25682	0	1369	467	212	1037	8	129	100	0	44	44913
2042	18037	27303	0	1514	516	234	1182	10	145	112	0	49	49102

Year	MOTOR CYCLE	CAR/TAXI/JEEP	PAJERO/SUZUKI PICKUP	HIACE WAGON	MINI BUS / COASTER	BUS	LOADER PICKUP	TRACTOR TROLLY	Trucks			TRAILER / 5-AXLE & Above	Total Traffic
									2-AXLE	3-AXLE	4-AXLE		
2047	20203	28894	0	1660	566	257	1332	11	161	124	0	55	53263

DIRECTION: TRAFFIC COMING FROM MURREE SIDE

Year	MOTOR CYCLE	CAR/TAXI/JEEP	PAJERO/SUZUKI PICKUP	HIACE WAGON	MINI BUS / COASTER	BUS	LOADER PICKUP	TRACTOR TROLLY	Trucks			TRAILER / 5-AXLE & Above	Total Traffic
									2-AXLE	3-AXLE	4-AXLE		
2027	3043	7529	0	432	312	119	434	1	185	29	5	16	12105
2032	3622	8103	0	491	354	135	511	1	212	33	6	19	13487
2037	4199	8661	0	549	396	152	591	1	240	37	7	21	14854
2042	4774	9208	0	608	438	168	673	2	269	42	7	24	16212
2047	5347	9744	0	666	480	184	759	2	298	46	8	27	17562

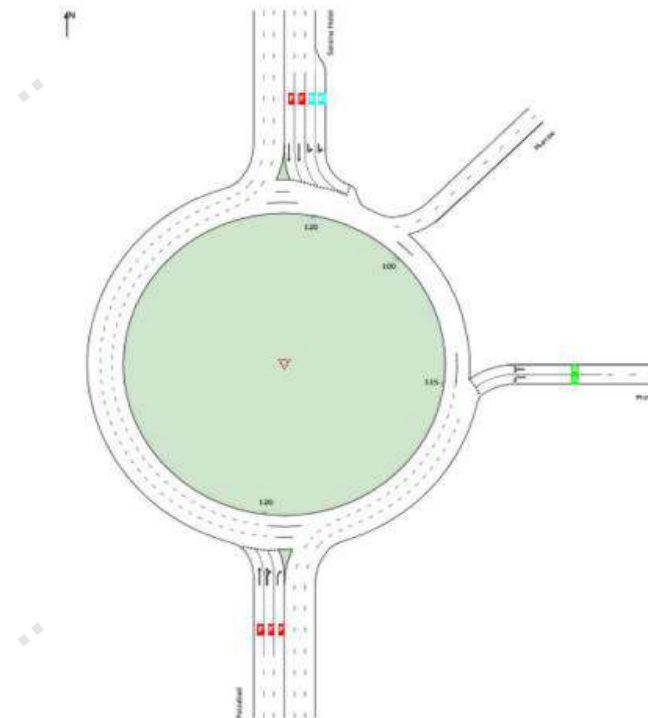
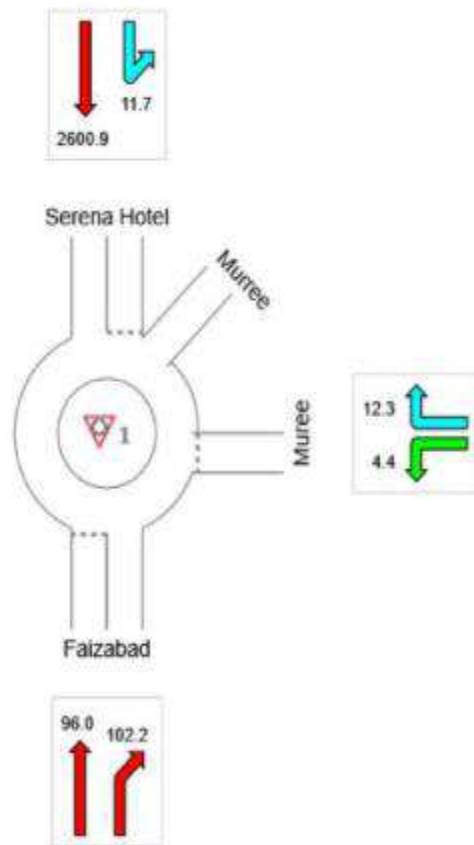
Table 7: Carbon Emission Estimation Based on Average Daily Traffic Counting and Projection until 2050.

Vehicle Type	ADT	Emission Factor	Km/day (Kashmir Chowk → Rawal Chowk → Serena Chowk)	Emission/day(kg)	Annual Emission(tons)	Projection(until 2050)
Motorcycle	3043	0.055	8	1338.92	482.02	11558.27
Car/Taxi	7529	0.192	7	10118.98	3642.84	87427.96
Hiace Wagon	432	0.251	5	542.16	195.18	4684.26
Mini Bus Coaster	312	0.60	4	748.8	269.57	6469.63
Bus	119	1.20	5	714	257.04	6168.96
Truck 2 axle	185	0.75	3	416.25	179.85	3596.4
Truck 3 axle	29	1.00	3	87	31.32	751.68
Articulated Truck	16	1.50	3	72	25.92	622.08

	Approaches			Intersection
	South	East	North	
Delay (Control)	98.3	5.1	2543.6	883.4
LOS	F	A	F	F

Roundabout with 1 & 2-lane approaches and circulating road
MUTCD (FHWA 2009) example number: 3C-4
Roundabout Guide (TRB 2010) example number: A-3
Site Category: (None)
Roundabout

	Approaches			Intersection
	South	East	North	
LOS	F	A	F	F



Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Lane LOS values are based on average delay per lane.
Intersection and Approach LOS values are based on average delay for all lanes.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.

Figure 12: Existing LOS (Level of Services)

Roundabout with 1 & 2-lane approaches and circulating road
 MUTCD (FHWA 2009) example number: 3C-4
 Roundabout Guide (TRB 2010) example number: A-3
 Site Category: (None)
 Roundabout

Intersection Performance - Hourly Values		
Performance Measure	Vehicles	Persons
Travel Speed (Average)	4.2 km/h	4.2 km/h
Travel Distance (Total)	10076.9 veh-km/h	12092.3 pers-km/h
Travel Time (Total)	2417.7 veh-h/h	2901.2 pers-h/h
Demand Flows (Total)	9191 veh/h	11029 pers/h
Percent Heavy Vehicles (Demand)	0.0 %	
Degree of Saturation	3.878	
Practical Spare Capacity	-78.1 %	
Effective Intersection Capacity	2370 veh/h	
Control Delay (Total)	2255.17 veh-h/h	2706.21 pers-h/h
Control Delay (Average)	883.4 sec	883.4 sec
Control Delay (Worst Lane)	2601.8 sec	
Control Delay (Worst Movement)	2600.9 sec	2600.9 sec
Geometric Delay (Average)	3.3 sec	
Stop-Line Delay (Average)	880.1 sec	
Idling Time (Average)	821.4 sec	
Intersection Level of Service (LOS)	LOS F	
95% Back of Queue - Vehicles (Worst Lane)	831.4 veh	
95% Back of Queue - Distance (Worst Lane)	5820.0 m	
Queue Storage Ratio (Worst Lane)	4.68	
Total Effective Stops	39606 veh/h	47527 pers/h
Effective Stop Rate	4.31	4.31
Proportion Queued	0.97	0.97
Performance Index	3058.9	3058.9
Cost (Total)	82957.48 \$/h	82957.48 \$/h
Fuel Consumption (Total)	3769.9 L/h	
Carbon Dioxide (Total)	8859.2 kg/h	
Hydrocarbons (Total)	1.001 kg/h	
Carbon Monoxide (Total)	6.263 kg/h	
NOx (Total)	1.725 kg/h	

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
 Roundabout LOS Method: SIDRA Roundabout LOS.
 Intersection LOS value for Vehicles is based on average delay for all vehicle movements.
 Roundabout Capacity Model: SIDRA Standard.
 SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
 Site Model Variability Index (Iterations 3 to N): 21.2 %
 Number of Iterations: 8 (Maximum: 10)
 Largest change in Lane Degrees of Saturation for the last three Flow-Capacity Iterations: 5.2% 2.3% 0.9%

Figure 13: Intersection Site (Demand and Control Value of Hourly vehicle)



3.10. Estimated PM_{2.5} AND PM₁₀ Emissions

Table 8: General Estimation of Exhaust Emission of Deployed Machinery

Sr. No.	Description	Qty	PM ₁₀ (µg/m ³)	PM _{2.5} (µg/m ³)
1	Graders	1	24	18
2	Tractors	3	60	45
3	Vibratory Rollers	2	44	32
4	Asphalt Mixing Plants	1	50	36
5	Stone Crushers	1	60	40
6	Batching Plants	1	44	32

7	Water Proposed Underpass site	2	32	24
8	Oil Tankers	1	18	13
9	Water Sprinkling Water Carrier	4	48	36
10	Haulage Trucks	4	104	76
11	Excavators/Loaders	2	48	36
12	Small Vehicles	3	30	21
13	Dozer D-9, D-10	1+1	56	42
14	Shift Roller	3	66	48
15	Asphalt Machine	2	80	60
	Total	33	764	559

3.11. Project Implementation Schedule

NESPAK, the consultant for Project will give project's feasibility and compatibility, hence, to alleviate congestion, the underpass with DED implementation (refer Table-3, Sub-section 3.8) will be executed after the commencement notification issued by CDA.

The execution would be started after receiving final consent/NOC from all in line departments.

3.12. Cost of the Project

The estimated PC1 cost of the proposed project is 160,9842,662/-. However, environmental mitigation and afforestation cost allocated is mentioned at Chapter-7 (EMMP).

3.13. Project Alternatives Considered

3.13.1 No Project Scenario

One of the options considered was no project i.e., not to proceed with the remodeling through of existing intersections. However, this option was dropped because of the serious problem associated with the traffic at Kashmir Chowk, and the fact the traffic coming to Rawal Chowk and flyover is expected to continue to grow, thereby exacerbating the problem.

3.13.2 Build Underpass Roads

The second alternative considered was to build underpasses (410 m) with allied structures (retaining walls, Nullah Bridge & drainage and erosion works and ancillary works) to alleviate traffic congestion. This option was however under consideration, but the cost involved is too high and the probability of environmental and temporary inconvenience may also be high. This alternative would be most favorable to achieve tangible benefits associated with smooth traffic flow and rapid accessibility. This redesigning option will have contribution to improve the traffic flow.

3.13.3 Redesign the Area

The third alternative considered was to redesign the area by diverting traffic alignment and putting new side roads to ease traffic flow into the area. However, this alternative is not feasible as it will only increase pressure on the new areas since the enclosed major infrastructure like Islamabad club road, arterial route and Srinagar highway access to Murree road is also enclosed. In that way, redesign will eventually lead to greater disruption of the area due to the demolition/removal

of structures that will allow new side roads. It will also lead to more structural damage. Furthermore, it will be more costly to execute. Consequently, this alternative cannot be socially viable.

3.13.4 Regulate Traffic

The fourth alternative considered is to stop vehicles from entering to the Club road from Srinagar highway. However, it was not feasible as it is the major road for entry and exit busy route flow coming from various Islamabad sectors and intersection on Srinagar Highway. Consequently, it is not possible to stop vehicular traffic in the area without impairing economic and social activities.

3.13.5 Analysis in Terms of Environmental and Social Context

In view to understand the alteration in ambient environment of the area, the options to ascertain the positive and negative are tabulated hereunder:

Table-9: Comparison of Considered Alternatives

Sr No.	Options	Content	Positive impact	Negative impact	Evaluation
1	Zero option	No change Scenario	No alteration in existing ecosystem, and land would be acquired.	Increasing bottleneck at Kashmir Chowk by increasing traffic flow pattern.	- -
2.	Linkage with build new alignment.	Utilize area outside of ROW/CDA for this purpose.	No net positive impact due to plan on this action	No new alignment possible at the present context.	+-
3.	Build Barrel Underpass 410m Lane Road with storm water drainage system	Proposed to give congestion free access to the commuters	i. Rapid access through main Srinagar highway to Rawal road and Faizabad, contribute to reduction of VTT and VOC. ii. Temporarily changes in landscape ecology across the F-9 park.	Temporarily disturbance (2months approx) due to inconvenience at intersection point.	+++

The option 3 is more probable to be chosen due to the following reasons:

- Attempt to connect with Islamabad Sectors through congestion free access.
- Traffic round the clock is more likely to be disturbed temporarily during construction intervention;

- The community enclosed to proposed site would be affected due to diversion creation;
- The average daily traffic more likely to be affected during peak time (9.am to 5.pm);
- No potential impact is envisaged in the habitat surroundings except vegetative land degradation merely during the excavation phase;
- The major positive impacts anticipate include the congestion free accessibility will be expedient to adjacent premises.

The following Positive impacts are anticipated:

- The construction of this alternative will reduce the travel times, from urban centers and residential settlements in the nearby areas, furthermore rapid accessibility will be achieved through this project alternative.
- Through traffic to different housing societies,
- Reduce the traffic jams and accidental risks

The following Negative impacts are possible:

- Probability to damage ecosystem sensitive areas due to changes in land-use pattern.
- Temporary disturbance to local roads and tracks during piling, excavation and material disposal/solid waste, and dust prevalence to Islamabad Club road and nearby areas.
- Indirect impact may occur due to contamination of water groundwater, if not managed adequately during structural works and excavation phase for barrel structures.
- The proper restitution plan and demolition/restoration plan for ancillary work after it completion with strict supervision as per direction Pak-EPA is mandatory for this project. The plan associated with the construction shall be the part of contractor's contractual agreement for timely compliance implementation.

3.14. Restoration and Rehabilitation Plan

Restitution of the project site and associated facilities including access tracks and stockpile and disposal sites, after construction activities is of utmost importance. Improper disposal of waste left at the end of the construction activities would lead to extensive disturbance to the aesthetics/ environment that may lead to deteriorate further with inadequate environmental management.

Following measures will be adopted for the intersections site:

- All equipment and machinery at the project site will be de-mobilized;
- All waste at the project site will be disposed-off according to the requirement of EIA and NOC approval;
- Septic Tank with soakage pit at contractor's camp shall be properly dismantled (a site specific dismantling plan for camps and ancillary will be prepared and complied accordingly);
- All temporary concrete structures at the project site will be dismantled, and construction and demolition material will be handed over to CDA for reuse or disposal at agreed sites;

- All the un-necessary pits at the project site will be backfilled immediately after the completion with compliance details and report to PAK-EPA accordingly.

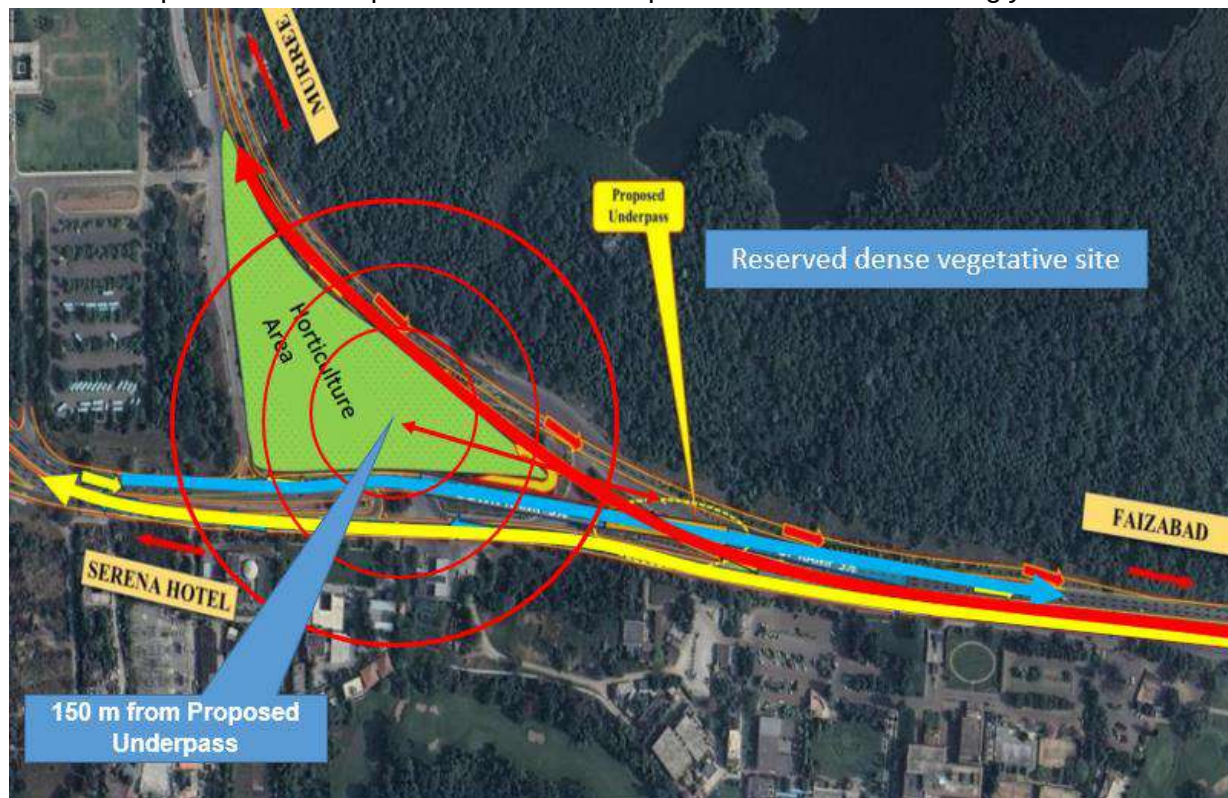


Figure 15: Highlighting the areas susceptible to Damage during Siting of Ancillary Facilities

3.15. Construction Requirement

3.15.1 Construction Material

The materials used in construction of the underpasses include: coarse aggregates (crush), fine aggregates (sand), steel, water, asphalt, reinforcement, cement etc. The probability of using fine aggregates is mainly through local vendors, while the soil, cement and steel will be procured from other sources. The construction material suitable for construction of may be obtained from Industrial area at 1-9.

3.15.2 Construction Camps

Campsites will be selected keeping in view the availability of adequate area for establishing campsites, including parking areas for machinery at an appropriate distance from sensitive areas in the vicinity. For minimizing the environmental and social disturbances, the best practice of establishing camps, material and equipment is to maintain a safe distance i.e., 300-500 away from reserved dense vegetative areas, horticultural site (highlight in Figure-14) and nearby infrastructures.

3.15.3 Manpower Requirements

The manpower requirement during construction phase is estimated to be around 80-100 people, including labor, skilled and managerial staff, while during operation phase CDA, traffic police staff would be sufficient by ensuring regular patrolling and traffic management.

Table-10: Skilled and Semi-Skilled Workforce

Sr.#	Designation	Required Estimated Staff
1.	Professional/Technical	10
2.	Administrative	05
3.	Clerical	05
4.	Skilled Labour	30
5.	Unskilled Labour	50
6.	Miscellaneous	50

3.15.4 Water Requirement

Source of Water During Construction Phase

Contractor will be responsible to arrange water for construction works. It is estimated that water tanker holds 2,000 gallon. The larger models of CDA tanker can hold upto 15,000 gallons. Thus, latest 2-3 tankers may deploy, for 2-3 trips are envisaged at site to cater construction demand. It is worth to note, this demand may vary for the ancillary works.

The water demand per capita during entire construction period would be estimated around 5 USD gallon/person/day.

The estimated 40 million liters required for construction purpose of underpasses. The estimated breakdown of this usage is tabulated below:

Table-11: Estimated Water Quantity

Estimated Requirement			
Construction Component	:	Meters	Feet
Through Length	:	410 m	1344
Barrel Height	:	5 m	16.4
Underpass Width	:	12.5	41
Total Estimated Quantity			=903,705.5
In Liters			903,705x28.31 = 2,558,906
For ancillary works + Sprinkling			6 Million Liters
			Approx=30 Million Liters

3.15.5 Estimated Water Quantity for Barrel Structure

- Barrel Length = **70 m**
- Barrel Width = **12.5 m**
- Barrel Height = **5 m**

Step 1: Calculate Volume

$$V = L \times W \times H$$

$$V = 70 \times 12.5 \times 5 = 4,375 \text{ m}^3$$

Step 2: Convert Meters to Feet

Using your supervisor's conversion:

$$1 \text{ m} = 3.28 \text{ ft}$$

$$4,375 \times 3.28 = 14,350 \text{ ft}$$

Converted Value = 14,350 ft (following your supervisor's method)

Step 3: Convert to Litres

Using the procedure mentioned:

$$14,350 \times 1,000 = 14,350,000 \text{ litres}$$

Step 4: Multiply by 10 Lacs (10,00,000)

$$14,350,000 \times 10,00,000 = 14,350,000,000,000 \text{ litres}$$

Step 5: Convert to Million Cubic Liters (MCL)

Since:

$$1 \text{ Million Cubic Liters (MCL)} = 1,000,000,000 \text{ litres}$$

$$\frac{14,350,000,000,000}{1,000,000,000} = 14,350 \text{ MCL}$$

3.15.6 Waste Generation

The estimated waste generated at the site would be around 25,000 m³ or above for each underpass might have been generated during structural excavations. At whole, 40,000m³ including surplus and suitable estimated for entire construction phase. Breakdown estimation this quantity tabulated hereunder:

Table 12: General Estimate for Construction Waste

Estimated Waste Quantity		
Construction Component	:	Meters
Through Length	:	410 m
Barrel Length	:	5 m
Underpass Width	:	12.5
Total Waste Quantity in m ³	:	25,625

3.15.7 Construction Space

The management will follow CDA guidelines for selection of environmentally viable (distant from the vegetation and planned reserved areas).

3.15.8 Site Restoration

Upon completion of the construction phase, the campsite shall be removed, and construction equipment shall be restituted with methodology-defined restitution. So that, the sites may return to its original condition after completion phase. The Construction Contractor will be responsible to develop such site and supervision consultant will approve and oversee the management measures as per restitution/restoration plan.

3.15.9 Solid Waste Management

The solid waste during construction activities will mainly be of hazardous type mainly including oil spills, steel waste and asphaltic material etc. Onsite segregation would be adopted by adhering hazardous and biodegradable waste (from campsite) through provision of separate waste collection methods (as per CDA guidelines). For effective management, Site Environmental Management Plan approved by Pak-EPA to be strictly adhered.

3.16. Major Project Construction Activities

This project includes construction retaining walls, drainage and erosion system, sub-base and rigid pavement for underpasses. These works may need environmental and social viability along with a congestion free space.

Most of the construction activities during the proposed project will be confined to the existing intersection on Srinagar Highway and crossing areas. But, the following activities/facilities, particularly location and safe operation should be considered at this feasibility stage:

- Traffic Diversion Facility to manage traffic influx during peak hours
- Contractor's camp, labor camp, equipment and material yards, and additional depots;
- Asphalt Machinery Assembly area;
- Stockpile area for suitable and surplus excavated materials and spoils;
- Obtaining earth, sand, coarse aggregates, and stone for rip-rap.

3.17. Environmental Management for Major Ancillary Works

The following ancillary activities/facilities, particularly location and safe operation should be considered at this feasibility stage:

- Temporary diversion Facility at main intersection points to manage traffic influx during peak hours.
- Environmental Management for Contractor's camp, labor camp, equipment and material yards, and additional depots.
- Environmental Management for Asphalt Machinery Assembly area;
- Separate vehicle route for loading and off-loading of construction material
- Borrowing areas for obtaining earth, sand, coarse aggregates, and stone for rip-rap at site approved by design supervision consultant.

Dismantling/Demotion and restoration plan of ancillary works and facilities is annexed at Annexure-C.

3.18. Contractor Camp, Material and Equipment Yard

It is envisaged that the Project will attract about 80-100 of skilled/unskilled labor. It should be ensured that maximum labor hired would be local who will return home in the evening. The contractor's campsite, project office and material yard selection shall be at least 500 meters away from the nearby infrastructure, overhead/underground utilities and horticulture sites along the road berms on club road/Murree road.

3.19. Construction Logistics

3.19.1. Contractor Camp

Since all work is restricted along the club road in flat terrain, the ideal would be to set up the contractor's camp at within cordon-off areas, where environmentally and socially viable site approved by supervision consultant staff.

The contractor will in consultation with Resident Engineer (RE) select the site for labour camp. The identified sensitive receptors must be protected and ensure that they are located at safe distance. The details must include drainage system (discharge of grey water and black water), waste segregation mechanism and adequate fencing at selected location. The finalized location and plan will be submitted to CDA for approval and subsequent process of obtaining NOCs from concerned departments/authorities

3.19.2. Asphalt/Batching Plant

Bathing plant location will proposed in with construction contractor and construction supervision consultant. As per current, the site is extensively utilized with horticultural strips along the road berm of rawal road/club road adjacent public and government office fences. So, in view to this, the proposed is suitable to look at around 8-10 km from the construction site. At site towards Bahara Koh would be recommended for Serena Chowk underpass construction project. In case the contractor prefers a location other than the one proposed, he/she either will arrange for additional arrangement through payment to the landowner or approved from Govt in consultation with consultant's environmentalist and CDA.



Figure-16: Proposed Location of Batching Plant

3.19.3. Construction Equipment Details

Table 13: List of Construction Equipment Required

SR. NO.	DESCRIPTION	QUANTITY
1	Graders	1
2	Tractors	3
3	Vibratory Rollers	2
4	Asphalt Mixing Plants	1
5	Stone Crushers	1
6	Batching Plants	1
7	Water BProposed Underpass sitesers	2
8	Oil Tankers	1
9	Water Sprinkling Water Carcass	4
10	Haulage Trucks	4
11	Excavators / Loaders	2
12	Small Vehicles	3
13	Dozer D-9, D-10 01+01	1 +1
14	Shift Roller	3
15	Asphalt Machine	2

3.19.4. Health Safety Equipment

It must be ensured that the labor engaged in mixing concrete or mixing and laying asphalt will have long boots, overall, goggles, gloves, ear muffers, safety jackets, safety hats etc. As an overall HSE measure all construction workers and anyone going into the construction area will use necessary PPE.

3.19.5. Signage

During construction, suitable signboards and traffic signs to be displayed on the construction site in particular and on the entire road length in general. This will help in forestalling any possible accidents.



3.20. Existing Landscape Context for Managing Construction Phase

3.20.1 Road and Accessibility

The existing intersection connects to Srinagar Highway from Easter End, and Murree Expressway (E-35) Western End. The site is readily approachable by all the primary roads of Islamabad i.e., Club road, Margalla road and Islamabad highway from Rawal Chowk flyover.

3.20.2 Sewerage System

Wastewater is generally disposed of through open drains to the nearby sewer system, to avoid water contamination and water borne diseases. At present, existing source is Nullah or water creeks crossing the project site. The sewerage system facility (Nullah Bridge) will be finalized upon receipt of approval from Capital Development Authority (CDA) and Water and Sanitation Agency (WASA). The environmentally viable option will be finalized and utilized after receiving formal approval from these concerned departments

3.20.3 Surface Drainage

At present, major source existing Nullah, instead a plan consisting of storm construction or concreted runoff will be developed and implemented upon approval of CDA and WASA.

3.20.4 Domestic Waste Collection

Currently, there is proper system of garbage to collect the waste materials by MCI and CDA management, and this would be helpful during construction phase of the project. However, there would be the requirement of transportation, collection and separation of waste. Hence, the consultation with concerned department (MCI in this case) for selecting the sound method of waste disposal should be considered prior to commencing the construction activities.

3.20.5 Availability of Water for Construction

Water for construction purposes is generally available through ground water, which is most suitable for all kind of construction activities. However, prior permission needs to be obtained from approving authorities after satisfying the suitability requirements of water. Contractor should make his own arrangements for obtaining water by any means. For proposed design structure works, mainly retaining structures and culverts, water may not be used directly if it consists of silt and fines in suspension.

3.20.6 Energy

The overhead utilities traversing from the Club Road which is accessible on the site and is connected to the project site.

3.20.7 Communication

The area is well covered by wireless communication facilities such as PTCL.

3.20.8 Vegetation Pattern at the Site

Ecologically, the proposed project is heterogeneous in terms of landscape context. The enclosed area around 300m is widely distributed area of reserved dense vegetation, afforestation strips

and horticultural land strip along the road berm. The area is also ecologically sensitive and important for conserving vegetation on highlighted environmental variables in Figure-10.







Figure 17: Existing Land-Use Pattern of the Proposed Underpass Area

Chapter 4

DESCRIPTION OF PROJECT ENVIRONMENT

4.1 Assessment Methodology

The project execution as per design is confined within existing club road. Therefore, the onsite assessment carried out within the ROW to assess environmental and social impact in the ambient surrounding. During the assessment, analysis was determined by keeping in view the nature of proposed civil works (Sub-section 3.8) and their direct/indirect impact on Land-Use type and environmental variables in the nearby areas. The land use type, considered for assessment includes the following landscape types:

- i. Dense vegetative sites/afforestation/Dense Floral Composition Sites/pattern along Club and Murree road within the underpass and further extended to 100m spatial extent.
- ii. Nearby infrastructure/social amenities (overhead and underground utilities).
- iii. Ecological dynamics/alterations.
- iv. Arterial Route Linking the Red Zone.

While abiotic factors mainly ambient noise and air quality had been considered for impact assessment.

4.1.1. Identification of Zone/Area of Influence

To establish the baseline data, the Area of Influence (AOI) was identified through baseline information collection within maximum 100~200m of Spatial Scale from the proposed underpass for abiotic factors. To specify this, the spatial scale of 50m x 50m square along the proposed earthworks and excavation sites (for piling and excavation for barrel structure) are identified as Area of Influence (AOI) for biotic factors (predominantly linear plantation patterns). Besides, allied activities like retaining walls, Nullah Bridge, rigid pavement structure and drainage works also includes for assessment.

4.1.2. Identification of Landscape Variables

During onsite assessment, the Land-Use types/landscape variables were taken for assessment within AOI Spatial Scale. The variables strongly associated with the underpass construction mainly including, horticultural strips, afforestation patterns, underground/overhead utilities are considered for landscape variables. The data on these Land-Use types/landscape variables were extracted through onsite assessment and topographic mapping. So, to simplify the methodology for assessment, the significant factor i.e., nearby structures and shifting of utilities was used as proxy of populated areas.

In a similar pattern, the main environmental variables were also taken for assessment, mainly including of emission generation due to deployed machinery and noise generation.

4.1.3. Major Identified Sensitive Receptors

As per onsite assessment, the area around the proposed underpass road is confined with boundary of Islamabad Club road fence areas, afforestation strips in median and horticultural land strips along the road berms of Rawal road/Murree. No other areas in terms of landscape context observed except linear tree patches (as tabulated below)

For further onsite assessment, the survey team will be mobilized for demarcation, utility survey and manual counting of trees.

Table-14: Identified Sensitive Receptors

Sr.#	Receptor Type	Location	Distance from Kashmir Chowk	Measures to be Applied	Action by
Sensitive Receptors on Underpass and Roundabout Structures					
i.	Government Offices/Social Amenities	Adjacent to Kashmir Chowk/Club Road	80-100 meters	• Timely Notification about Construction Intervention; • Dust suppression; • GRM implementation to resolve immediate concerns. • Detour's Development and Adequate Management	Construction Contractor and Supervision Consultant
ii.	Underground Electrical Distribution Lines /IESCO Utilities	Treversing Kashmir Chowk/Club Road	Within 30-50 meters.	• Proceed to NOC prior to the construction intervention; • Utility Survey for underground utilities	CDA & DSC will conduct survey and demarcate areas.
iii.	Cutting and removal of trees (Upto 2.5' (150-760mm) girth.	Within ROW along the road berm of Murree Road	100ft (8-10m)	• Replantation as per defined plan/mechanism.	CDA & DSC will conduct survey and demarcate areas.
iv.	Landscaping and Ornamental Plantations	Within ROW along the road berm of Murree Road	100ft (8-10m)	• Replantation as per defined plan/mechanism. • Careful selection of select fill sites, further approved by SC.	CDA & DSC will conduct survey and demarcate areas.
v.	Afforestation Pattern at Median and either side.	Within ROW along the road berm of Murree Road	150ft (15-20m)	• Replantation as per defined plan/mechanism. • Careful selection of select fill sites.	CDA & DSC will conduct survey and demarcate areas.



Figure-18: Major Identified Sensitive Receptors



Figure 19: Identified Areas more Susceptible to Affect during Underpass Construction Intervention within Radius of 100, 200 and 300 meter





Figure 20: Traversing Overhead and Underground Utilities





Figure 21: Horticultural Strips along the Road Berm (Murree Road)



Figure 22: Islamabad Club Fenced Area

4.2 Geographical Patterns

Keeping in view the Master planning concept of CDA. The Proposed underpass site lies on Murree Road at Kashmir Chowk. It is accessible through coordinates: 33.707852, 73.105887 at start end connecting to E-75 and Srinagar Highway. Proposed site at northern end covered is connecting to Serena Chowk underpass and Eastern and Weestern end is confined with reserved dense vegetative land. The site at southern end connecting with Faizabad and Rawal Chowk Flyover.



Figure 23: Geographical Patterns

4.3 Topographical Features

In general, the terrain in the city has significant variation in its terrain such that the elevations differences may reach up to 1175m. The roundabout is designed at existing grade, while barrel underpass design features has been compromised with grade separation.

The site is consisting of gently undulating alluvial fans sloping SE from Margalla Hills, variable overburden thickness, lateral variability in soils (gravels/sands/silts).

The proposed Kashmir Chowk underpass become topographic lows, which is probable to inherent flood receptors. In this view, the storm water drainage system and Nullah Bridge has been included in the design to cater flooding impact.

4.4 Geology and Soils

A recent study suggests that subsurface strata of Islamabad are mainly covered with layers of lean clay (CL) in medium stiff state. The presence of silt, gravel and sand are also observed in quiet good percentage⁸.

Clay soils in the area exhibit five strata, from bottom to top:

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

4.5 Hydrological Features

A number of streams originating from the Margala Hills join and form the Lai Nullah, the principal watercourse in Islamabad. It winds north to south through developed areas of the city and finally joins the Soan River. Lai Nullah carries rain runoff and sewage from a large part of Islamabad, and it also collects untreated local sewage. Domestic solid waste is also dumped in the nullah. It is a perennial surface water channel with occasional flooding during monsoon season.

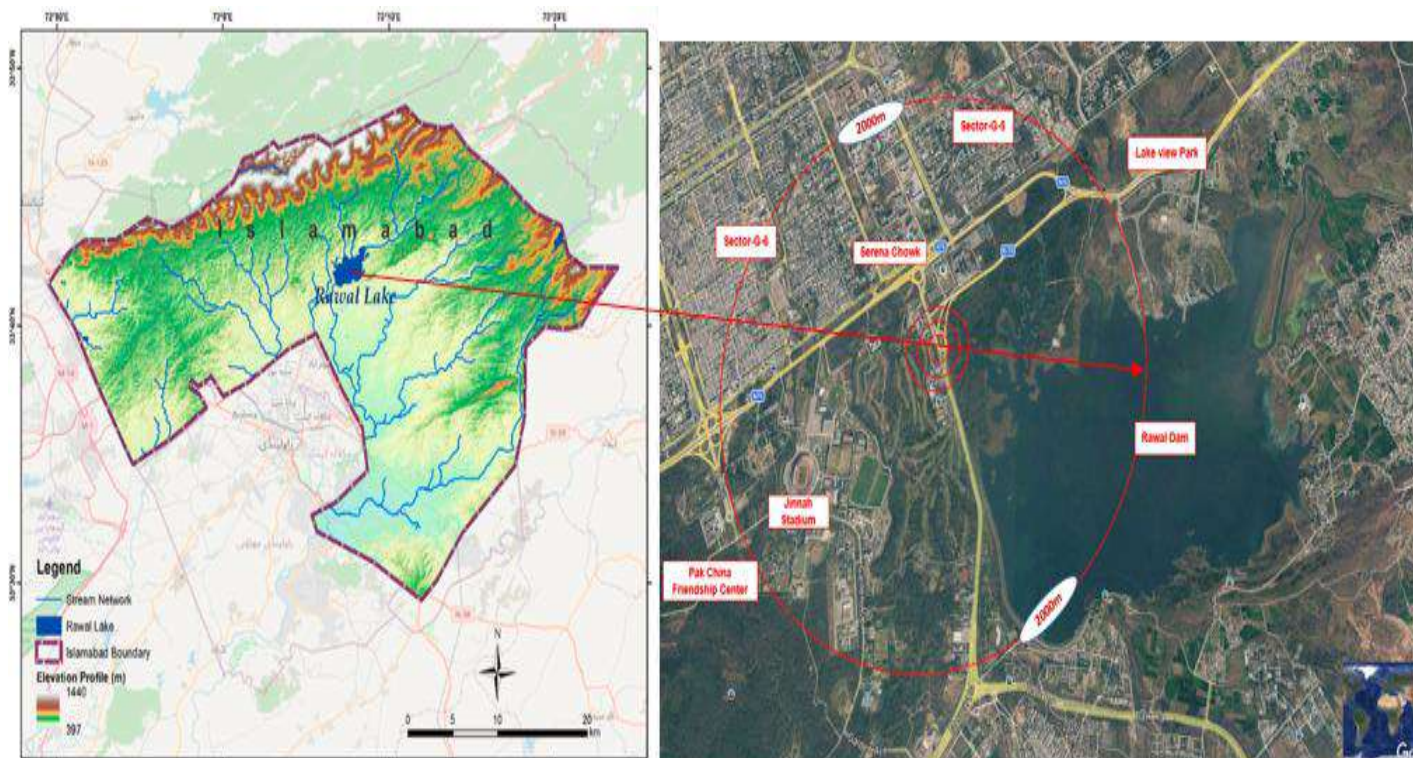


Figure 24: Hydrological Features of the Area

⁸ Geotechnical Characteristics of Sub-soil for Different Sectors of Islamabad.

Reservoir of the Rawal Dam is the major surface water body locating within the 2000m radius of the Kashmir Chowk underpass, and it serves about 40% of present water demand. The hydrogeological study of Islamabad has highlighted the occurrence of some shallow aquifers and some deeper aquifers in the subsurface. The shallower aquifers are composed of Holocene and the upper units are Pleistocene alluvium.

4.6 Sub-Surface Geology

Depth of groundwater table in the project area ranges is around 60 feet. The aquifer layers lying under the thick and impermeable layers of limestone store a huge amount of groundwater. These important areas of recharge are however, being rapidly lost as a result of their being sealed by the forces of urbanization and emergence of residential colonies and building of streets, houses and industries at Islamabad Sectors.

4.7 Seismicity of Project Area

Proposed underpass exist in Zone 2B as per the Seismic Zone Map of Pakistan. This implies, there would be minor to moderate damage to property due to earthquakes; Peak Ground Acceleration (PGA) at anticipated probability of 10% in 50 years varying from 1.6 to 2.4.

Therefore, basic earthquake intensity is recommended to be minor to no damage with $PGA=0.14g$ for current design of the proposed project⁹.

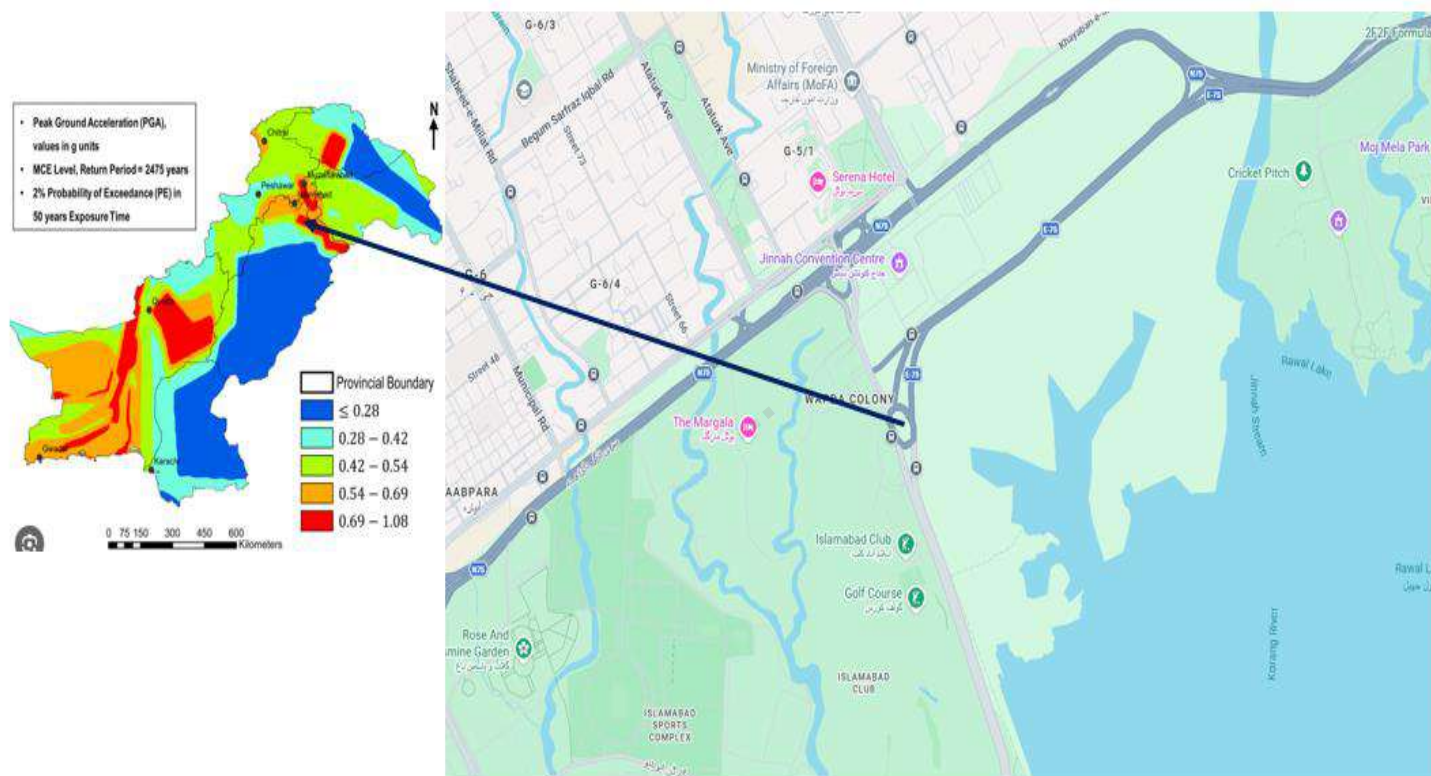


Figure 25: Seismic Zone of Proposed Kashmir Chowk Underpass

⁹ Impacts of urbanization, LULC, LST, and NDVI changes on the static water table with possible solutions and water policy discussions: A case from Islamabad, Pakistan

4.8 Climate and Meteorology

Temperature

The site is marked by wide variation in Temperature, hot summer and cold winters. The coldest month is January when the mean maximum temperature is 17.7°C and the mean minimum temperature is 2.6°C. June is the hottest month with mean maximum temperature around 40°C and mean minimum temperature 24°C.

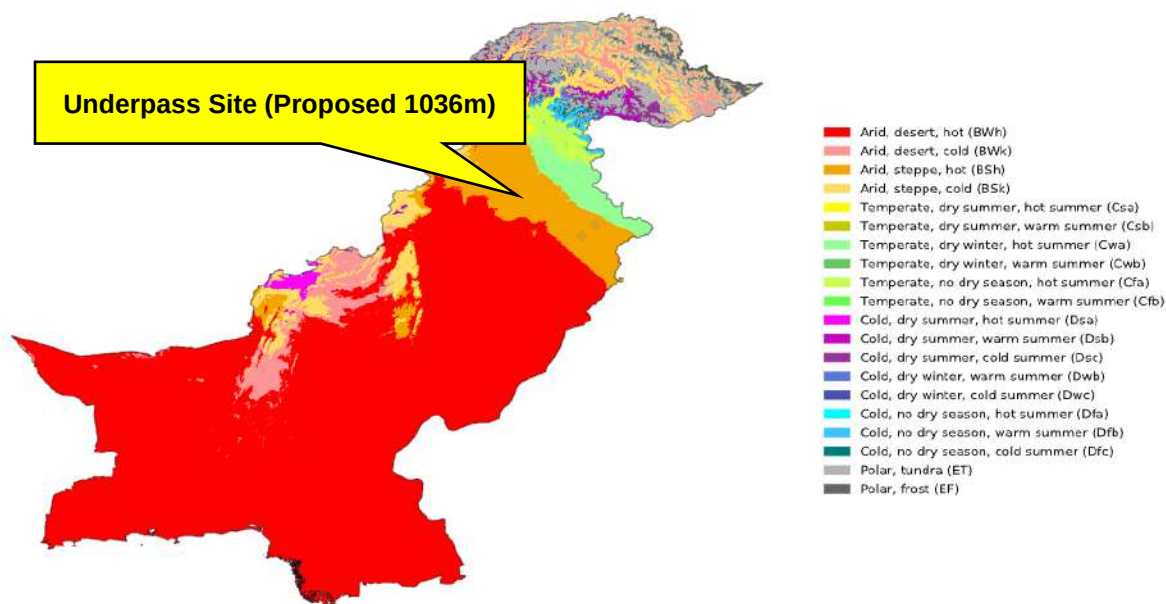


Figure 26: Showing the Temperature Categories in Pakistan and Proposed Underpass Site

Rainfall

The project area around project site has a humid subtropical climate, and is characterized by five well-marked seasons: winter (November – February), spring (March – April), summer (May – June), onset of rainy monsoon (July –August) and autumn (September – October). The wettest month is July due to onset of monsoon event, with heavy rainfall. Thunderstorms with the possibility of cloudburst is also probable due to changing weather events since decades. The monsoon rains usually start in June and peak in August. A much smaller winter monsoon peaks in March. Apart from the four monsoon months, the other months are mostly dry.

Table 15: Rainfall distribution Pattern

Month	Rainfall Pattern
January–April	Low to negligible rainfall
May	Start of increasing precipitation
June	Rising rainfall—onset of monsoon
July–August	Peak monsoon months—maximum rainfall

September	Decline in precipitation
October–December	Return to dry season

Humidity

The mean relative humidity in summer is 60 - 80% while the mean relative humidity during winter is 70 - 90%. No such data obtained through secondary underpass site.

Table-16: Wind Velocity and Direction at Margalla Hills.

Month	Direction in Degrees	Velocity in Knots	Steadiness %
January	283	1.4 to 1.7	49
February	290	2.3 to 2.7	59
March	306	2.7	48
April	304	2.4 to 2.5	36
May	321	2.7 to 3.1	18
June	159	2.5 to 3.0	32
July	150	2.2 to 2.4	67
August	148	1.4 to 1.7	40
September	191	1.1 to 1.3	20
October	303	0.8 to 1.1	22
November	292	0.6 to 1.0	49
December	296	0.7 to 1.3	56
30 Year Average	266	1.8 to 2.0	41

Wind Speed

Over the course of the year, typical wind speeds vary from 0 m/s to 10 m/s (calm to fresh breeze), rarely exceeding 18 m/s (gale) as shown in Figure-17. The *highest* average wind speed of 5 m/s (gentle breeze) occurs around June, at which time the average daily maximum wind speed is 10 m/s (fresh breeze). The *lowest* average wind speed of 1 m/s (light air) occurs around December, at which time the average daily maximum wind speed is 5 m/s (gentle breeze). The wind rose for Islamabad area shows how many hours per year the wind blows from the indicated direction. Example SW: Wind is blowing from South-West (SW) to North-East (NE).



Figure 27: Wind Speed and Diversion

4.9 Water Supply system

The residential areas generally receive water supply from installed water supply and CDA water supply systems. To compensate for water shortage, water demand is also met through installation bore water and to some areas via private tanker service at fixed rates.

4.10 Wastewater Drainage System

The wastewater disposal system in project area comprises a network of installed drainage system that collects and discharges the storm water runoff to the main outlet.



4.11 Solid Waste Management

Solid waste management is the issue of concern during disposal of suitable and surplus material. However, the issue will be sort out with CDA consultation and safe disposal will be opted to manage Solid Waste (Concrete, Excavated and Domestic Waste).

4.12 Flooding

The underpass site is not enclosed with riverine area which is susceptible to flood during monsoon season. No record or observation also found at the project site as similar to other natural disasters that occurred in August, 2022¹⁰.

In spite to this, the storm water drainage system has been included in the design to offset flooding impact.

Islamabad lies in the foothills of the Margalla range, intersected by natural storm drains and seasonal nullahs (e.g., Nullah Lai). Monsoon (July–September) is characterized by high-intensity, short-duration rainstorms, often exceeding the design capacity of conventional roadside drains.

Due to topographic depressions, the underpass at proposed location, making natural collection points for runoff, hence high flood vulnerability zones is anticipated.

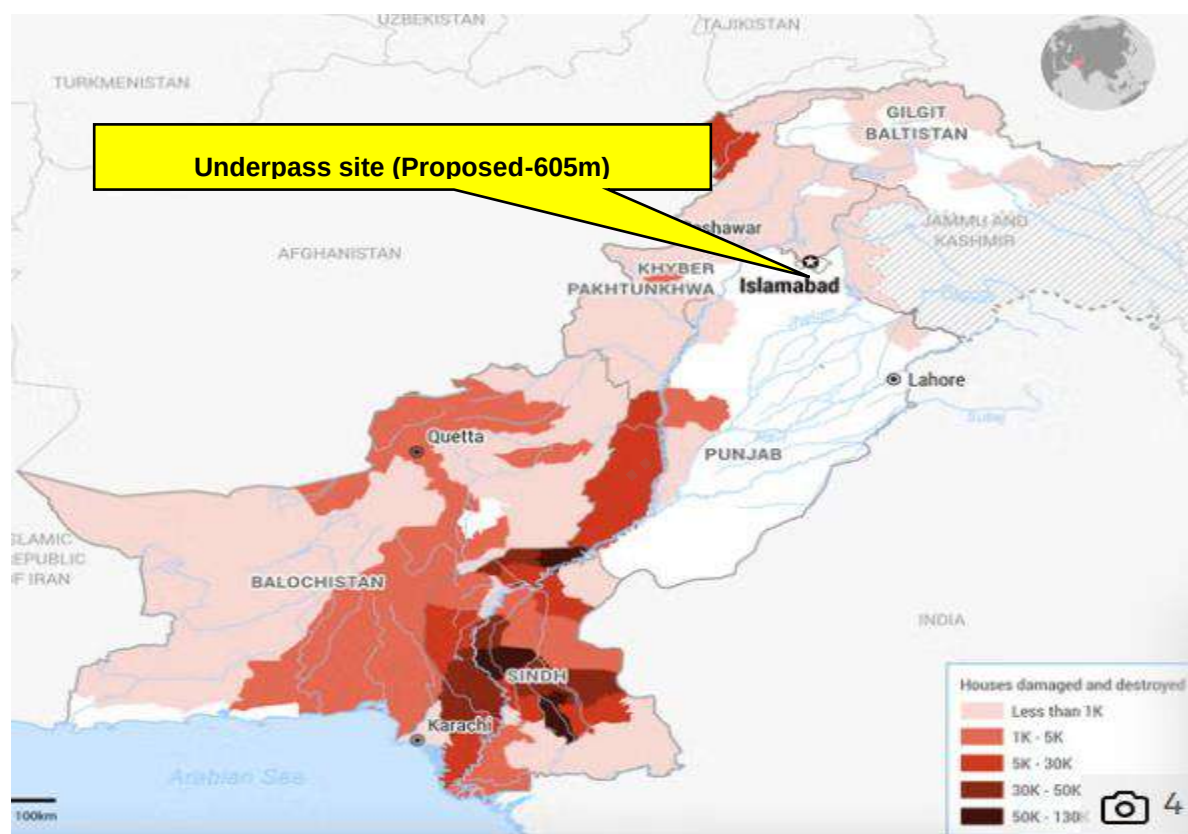


Figure 28: Flood devastation due to flooding in August, 2022

¹⁰ District disaster management plan, 2017.

4.13 Biotic Environment

4.13.1. Tree Dominated Area

The nature reserved site i.e., Rawal Dam Reserved areas has led the area most significant for conservation of ecological diversity concerns. That is the reason why, most of tree species are still confined with the species belonging to different taxonomic groups. The population at ambient areas within AOI are highlighted in the Figure-19.

Based upon the observations, majority of floral compositions directly observed by site inspectors in the project area includes linear planted trees with (Upto 2.5' (150-760mm) girth along the Murree road.

4.13.2. Faunal Composition

Faunal of the area around proposed roundabout road, observed with the similar pattern and site of floral composition¹¹. However, there exist small organisms and small animals on low vegetation (grass) such as rodents and abundance and richness of small species at grass land ecosystem.

a) Sensitive Habitats

There were no sensitive or fragile habitats on the study area with respect to the magnitude and extent of the project being proposed that could cause a serious ecological upset in the stability of the existing ecosystem.

b) Species of Commercial Importance

The study site had no significant species of fauna or flora that could be exploited for commercial purposes.

c) Endangered Species

No endangered floral and faunal species were observed as well as in the Area of Influence (AOI) during the field observations. However, it is expected that common birds may temporarily disturbed during construction but likely to become used to over time.

d) National Parks/ Wildlife Sanctuaries/Forest

No national park, wildlife sanctuary or notified forest lands exists within or in the vicinity of project area.

4.13.3. Present Status of Ecological Resources and Biodiversity

Ecologically, the project area only consists of designated land for horticultural land/reserved dense vegetative land adjacent to Murree Road. Margalla Hills located at around 5-km from proposed underpass site. It consists of dry and semi-evergreen vegetation and is a habitat to numerous species of animals and birds because it combines three types of landscapes. The vegetation type of the Margalla Hills National Park is the type found in subtropical dry semievergreen zones. Acacia and Olive (*Olea ferruginea*) are dominant. The overall vegetation is

¹¹ IUCN (1991). Management Plant: Margalla Hills National Park.

scrub forest dominated by certain shrubs as *Dodonaea viscosa*, *Justicia adhatoda* and *Carissa opaca*¹² (GoP, 1999).

Islamabad Club Located approximately 0.8–1.0 km southwest of Kashmir Chowk, Islamabad Club is situated along Murree Road (Jinnah Avenue/Club Road vicinity) within the planned institutional and recreational zone of Islamabad. The club is easily accessible from Kashmir Chowk via Srinagar Highway and Jinnah Avenue and is surrounded by other prominent landmarks, including the Convention Centre, Serena Hotel, and various government and diplomatic establishments. Owing to its strategic location and extensive green landscaping, the club contributes significantly to the recreational and aesthetic character of the area surrounding Kashmir Chowk.



Figure 29: Reserved dense vegetative Land

¹² GoP (1999). Biodiversity Action Plan for Government of Pakistan. IUCN P/WWF-P. pp 79.

4.13.4. Flood Sensitivity Factors

Due to topographic depressions, the underpass at proposed location, making natural collection points for runoff, hence high flood vulnerability zones is anticipated. By this assessment, the storm water drainage (Nullah bridge) with rigid pavement structure has been included in Detailed Engineering Design (DED).

Based on this historical record, the area around the spatial scale of 500m is least vulnerable in the above said context¹³.

Major Flood Sensitivity Factors include topography, hydrology and climate variability. The details are described hereunder:

Topography

- Natural gradient funnels runoff from Margalla Hills towards the city core and Nullah Lai basin.
- Local depressions (underpasses, low-lying intersections) act as flood pockets.

Hydrology

- Peak discharges in Nullah Lai and its tributaries rise rapidly during cloudbursts.
- Tributaries such as Sowan River, Kurang River, Saidpur Kas, and Tenawali Kas create multiple flood-prone corridors.

Climate Variability

- Intensifying cloudburst events under climate change scenarios are increasing flood recurrence.
- Historical records show repeated flash floods in Rawalpindi/Islamabad, particularly along Nullah Lai (2001, 2008, 2020, 2022).

4.14 Socio-Economic Baseline

Socioeconomic baseline has been developed for the project through a review of secondary data as well as primary data collected using questionnaires and discussion with the locals in project area. Secondary data used included census reports and previous research work /studies done in Islamabad by government as well as research institutes.

4.14.1. Cultural Values and Ethnicity

Islamabad symbolizes and exhibits the true culture of Pakistan. People live in Islamabad, move to this city from the different areas and belong to different wake of life. At present, this is city of aristocratic class people and hosting the headquarters of government, private companies and different embassies. All famous Pakistani educational institutes are also located within the city and serving the educational facilities to local communities. Around 99% population is Muslim belonging to either Sunni or Shiya sect. Other minority groups include Christians and Hindus etc.

¹³https://pdma.punjab.gov.pk/system/files/Rawalpindi%20Final%20District%20Disaster%20Management%20Plan%202021%28Final%29.pdf?utm_source=chatgpt.com

4.14.2. Population Density

Islamabad has an estimated population of 2,006,572 persons million as per recent census results. Annual growth rate of the city has been significant at 4.9%. The city is estimated to have around 336,182 households. Most of the houses are well constructed. The average household size is 6 persons as per the census results.

4.14.3. Occupation

The project area comprises mainly Government offices, and offices of national and international firms. Most of the population is either employed in Federal Government offices or in private organizations. Remaining portion of population is self-employed and businesses of different magnitude. Over the years, Islamabad has become a very important financial and business city with lots of local and foreign banks and ever expanding private business. In the last decade there has been vast change in the city's traditional reputation.

4.14.4. Tourist attractions

The city is an attraction for the tourists from all across the country particularly the southern part due to scenic landscapes in Surrounding areas. It has become livelier with lots of international food chains opening businesses and shopping mall open till late. It also serves as a base camp for people from the south and coastal areas like Karachi, visiting valleys like Swat and Kaghan and northern areas like Gilgit, Skardu and Chitral located in the Hindu Kush Mountains.

4.14.5. Social Infrastructure

Education

The literacy ratio in Islamabad Capital Territory has increased from 47.8 per cent in 1981, to 77.3 per cent in 1998. The literacy ratio for males is 83.2 per cent against 69.7 per cent for females. The ratio is much higher in urban areas when compared with rural areas both for male and female.

Health Facilities

There are six hospitals with 1,660 beds available to meet the growing health needs of the growing population of Islamabad Capital Territory. The hospitals are namely, Federal Government Service hospital with 337 beds, Capital Hospital with 261 beds, Pakistan Institute of Medical Sciences (PIMS) with 745 beds, Children Hospital with 230 beds, National Institute of Health with 50 beds and Shifa International Hospital (Private) with 37 beds.

Agriculture

No such area is confined with arable patches within and outside of project site along the Murree Road/Club Road.

Drinking water Supply

The project site is facilitated by Society water Supply System. But, area is facilitated with water CDA water supply system.

Religious and Archaeological Sites

There are no religious or cultural site around the project site to be affected by the project (refer Figure-19).

4.15 Baseline Data of Environmental Samples

4.15.1. Ambient Air Quality Monitoring

The data for the baseline of environmental samples (tabulated hereunder) is extracted from the monitoring of Serena Chowk Underpasses Construction Project. The Laboratory results for this Kashmir Chowk Underpass project will be further added after receiving the official results of monitoring interventions.

In general, ambient air quality is affected mainly due to the excavation and construction vehicular movements. Apart from this, no other anthropogenic sources of air pollution e.g., industrial emissions exist in the immediate surrounding. For assessment in variation of following parameters, the monitoring period for 24 hours was selected for each sampling point. The results obtained are tabulated under Table-3.

Table 17: Chemical Analysis for Ambient Air at Serena Chowk.

Sr.#	Parameters	Limit Values NEQS-24 hours	Concentration	Method Equipment Used	Remarks
1.	Carbon Monoxide (CO)	5 mg/m ³ (8 Hours)	0.7 mg/m ³	Non-Dispersive Infrared Absorption	Within Prescribed Limits
2.	Sulfur Dioxide (SO ₂)	120 µg/m ³	10.3 µg/m ³	UV Fluorescence	Within Prescribed Limits
3.	Ozone (O ₃)	130 µg/m ³	19.3 µg/m ³	Non-Dispersive UV Absorption	Within Prescribed Limits
4.	Oxides of Nitrogen as NO	40 µg/m ³	13.2 µg/m ³	Chemiluminescence Detection	Within Prescribed Limits
5.	Oxides of Nitrogen as NO ₂	80 µg/m ³	23.6 µg/m ³	Chemiluminescence Detection	Within Prescribed Limits
6.	Particulate Matter PM _{2.5}	35 µg/m ³	48.3 µg/m ³	Particulate Sensor	Exceeding Limits
7.	Particulate Matter PM ₁₀	150 µg/m ³	157 µg/m ³	Particulate Sensor	Exceeding Limits
8.	Suspended Particulate Matter	500 µg/m ³	508 µg/m ³	Particulate Sensor	Exceeding Limits

A comparison was made between the measured concentrations and the established limits set by NEQs. The above analysis reveals that excavator's movement are the primary contributors (60-70%) to the slight increase in PM₁₀ and PM_{2.5} concentrations. The emissions are exacerbated by

factors such as daytime hours of vehicular movement. Additional contributing factors include; current excavated areas and dumper's movement along the Kashmir highway.

4.15.2. Ambient Noise Quality Monitoring

The prevailing noise levels have also been monitored at the project during day and nighttime, to ascertain noise levels. The analysis was performed by comparing with limit values of NEQS. The results indicate that noise levels at the location point indicate that the ambient noise are exceeded to permissible level as shown in given table:

Table 18: Analysis of Ambient Noise Quality

ANALYSIS FOR AMBIENT NOISE				
Sr.#	Measurement Point	Limit Values (NEQS-Commercial)	Noise Level dB (A) Leq	Remarks
1.	Kashmir Highway – GPS: 33.698788°N, 73.037298°E) - Day Time	65 dB (A)	75 dB (A)	Exceeding Prescribed Limits
2.	Near Office Site (GPS: 33.698788°N, 73.037298°E) - Night Time	55 dB (A)	72 dB (A)	Exceeding Prescribed Limits

4.15.3. Drinking Water Quality Monitoring

For establishing baseline conditions, water samples were collected from adjacent water resource. The analysis was made to assess the concentration of microbiological and chemical parameters with limit values of NEQS. According to the results, the testing parameters are found well within the NEQS limits.

Table 19: Chemical Analysis of Drinking Water Quality

S.#	Parameters	Limit Values (NEQS)	Concentration	Method/Equipment Used	Remarks
1.	Total Coliform	----	ND	SMWW 9222 B	---
2.	Faecal Coliform Bacteria	Must not be detectable in any 100mL sample	ND	SMWW 9222 H	Within Prescribed Limits
3.	E Coli	Must not be detectable in any 100mL sample	ND	SMWW 9222 H	Within Prescribed Limits
4.	Taste	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Prescribed Limits
5.	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Prescribed Limits
6.	pH*	6.5-8.5	7.8	MWW 4500H*B	Within Prescribed Limits
7.	Turbidity	<5 NTU	0.2 NTU	MWW 2130B	Within Prescribed Limits
8.	Color	≤15 TCU	ND	SMWW 2120 C	Within Prescribed Limits
9.	Total Dissolved Solids (TDS)*	<1000 mg/L	144 mg/L	SMWW 2540C	Within Prescribed Limits

S.#	Parameters	Limit Values (NEQS)	Concentration	Method/Equipment Used	Remarks
10.	Total Hardness as CaCO_3^*	<500 mg/L	108 mg/L	SMWW 2340C	Within Prescribed Limits
11.	Residual Chlorine	0.2-0.5 mg/L	ND	SWW 4500-Cl G	Within Prescribed Limits
12.	Chloride (as Cl^-)*	<250 mg/L	5 mg/L	SMWW 4500Cl ⁻ B	Within Limits
13.	Fluoride (F^-)*	≤1.5 mg/L	0.1 mg/L	U.S. EPA 9214	Within Prescribed Limits
14.	Cyanide (CN^-)	0.05 mg/L	0.1 mg/L	SMWW 4500 CN^- F	Within Prescribed Limits
15.	Nitrate (NO_3^-)	≤50 mg/L	4.2 mg/L	SMWW 4500 NO_3^- B	Within Prescribed Limits
16.	Nitrite (NO_2^-)	≤3 mg/L	ND	SMWW 4500 NO_2^- B	Within Prescribed Limits
17.	Phenolic Compounds (as Phenols)	NGVS	ND	SMWW 5530 C	Within Prescribed Limits
18.	Aluminum (Al)	≤0.2 mg/L	ND	SMWW 3111	Within Prescribed Limits
19.	Antimony (Sb)	≤0.005 mg/L	ND	SMWW 3111	Within Prescribed Limits
20.	Arsenic (As)	≤0.05 mg/L	ND	SMWW 3114 B	Within Prescribed Limits
21.	Barium (Ba)	0.7 mg/L	ND	SMWW 3111	Within Prescribed Limits
22.	Boron (B)	0.3 mg/L	ND	SMWW 4500-B B	Within Prescribed Limits
23.	Cadmium (Cd)	0.01 mg/L	ND	SMWW 3111	Within Prescribed Limits
24.	Chromium (Cr)	≤0.05 mg/L	ND	SMWW 3111	Within Prescribed Limits
25.	Copper (Cu)	2.0 mg/L	ND	SMWW 3111	Within Prescribed Limits
26.	Lead (Pb)	≤0.05 mg/L	ND	SMWW 3111	Within Prescribed Limits
27.	Manganese (Mn)	≤0.5 mg/L	ND	SMWW 3112	Within Prescribed Limits
28.	Mercury (Hg)	≤0.001 mg/L	ND	SMWW 3111	Within Prescribed Limits
29.	Nickel (Ni)	≤0.02 mg/L	ND	SMWW 3111	Within Prescribed Limits
30.	Selenium (Se)	0.01 mg/L	ND	SMWW 3114 B	Within Prescribed Limits
31.	Zinc (Zn)	5.0 mg/L	0.1 mg/L	SMWW 3111	Within Prescribed Limits

Chapter

5

ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

This chapter outlines the anticipated environmental and social impacts of the proposed activities, evaluates their magnitude and significance, proposes mitigation measures to reduce adverse effects, and identifies any residual impacts that may remain after implementation of these measures.

5.1 Impact Assessment Methodology

The significance of potential impacts was assessed using the following assessment methodology:

Project Area of Influence: Include structures/universities, utilities within spatial scale of 10m to 50m from underpass approaches. For abiotic factors, the maximum spatial scale of 100~200m from the project activities are identified as AOI.

Impact Categories: Land-Use type and environmental variables on the existing barrel excavation, Nullah Bridge, rigid pavement structure were taken for assessment and impacts on Physical, Biotic and Social Environment.

Impact Magnitude: Significance of impacts identified in light of its magnitude (Slight, Low, Medium and High).

Sensitivity of receptors: Major receptors identified within (ROW) and around proposed underpass (exhibit figure below) with sensitivity analysis; Very severe, Severe, Mild and Low.

Mitigation hierarchy: To ascertain the impacts requiring; avoidance, minimization, mitigation, and compensation.

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Mitigation Hierarchy
Major Identified Impacts	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

5.2 Environmental Screening

The impacts are broadly classified as physical, biological and socio-cultural, and then each of these broad categories is further divided into different aspects. The potential impacts, thus predicated, are characterized as follows:

- High negative (adverse) impacts (HN);
- The low negative impact (LN);
- Insignificant impact (I);
- High positive (beneficial) impacts (HP);
- Low positive impact (LP);
- No impact (N).

The environmental screening matrix (unmitigated) is provided in Table-20 & 21.

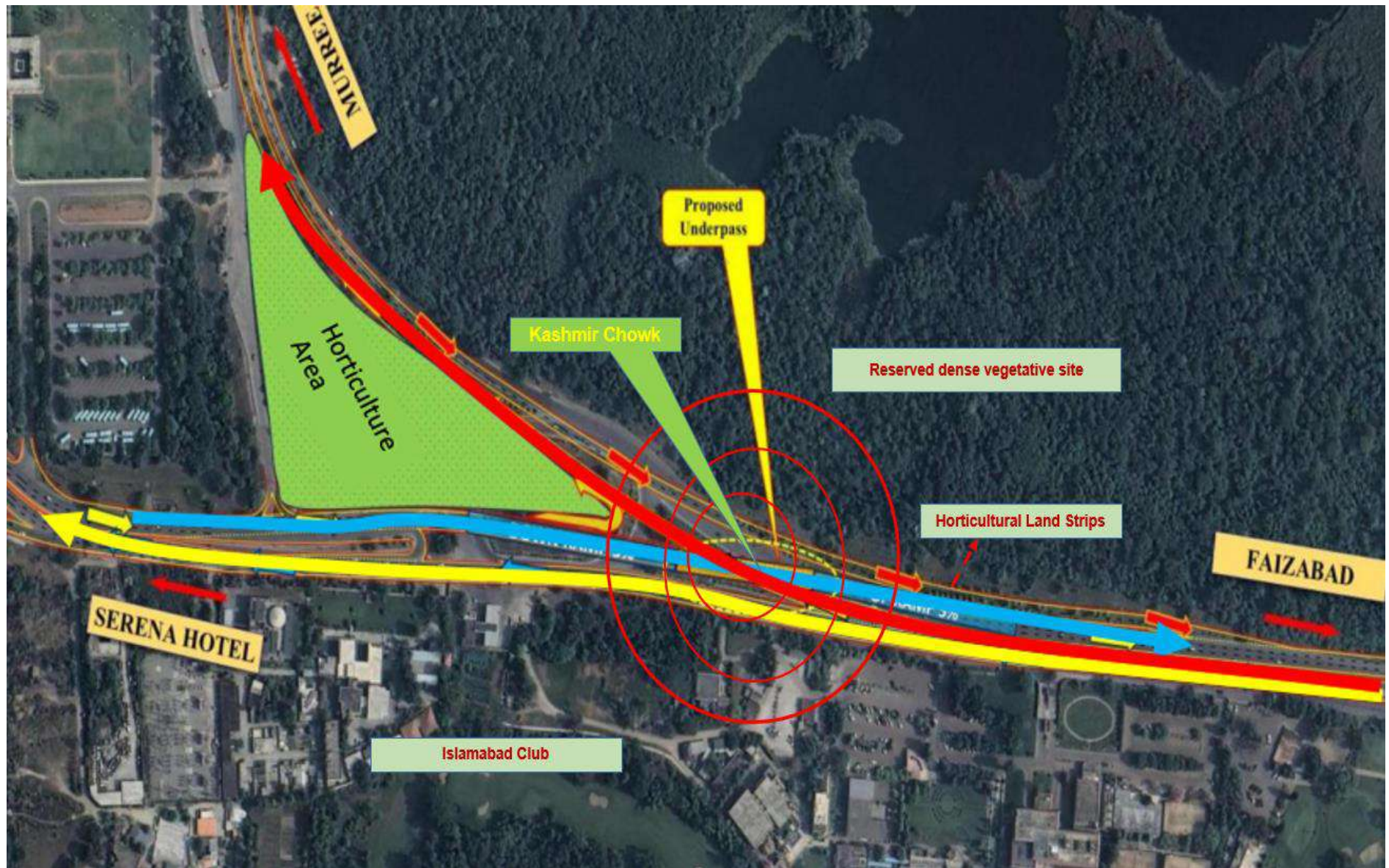


Figure 30: Major Significant Impact Areas – For Adequate Mitigation

Table 20: Impact Screening Matrix

DED-Description	Physical				Biological		Socio-economic				Post Construction	
	Air Quality	Noise and Vibration	Surface and Ground Water	Soil and Land Resources	Biotic Environment	Habitat Fragmentation	Accessibility Impacts	Public Safety and Community Structures	Utilities Infrastructure	Safety Hazard, Public Health and Nuisance	Waste Management	Visual and Landscape
Project Design Phase												
Project Location, Land-Use Pattern and Design	LN	N	I	LN	LN	N	LN	LN	LN	LN	HP	N
Visual Impacts	LN	LN	I	LN	LN	HN	HN	N	HN	HN	LP	N
Construction Phase												
Emission of Particulates and gaseous emissions	HN	N	N	N	N	N	N	N	N	HN	N	N
Disposal of Unusable Road Pavement Structures	LN	LN	LN	N	I	HN	LN	HN	HN	HN	HN	LN
Clearing, Grubbing; Cutting and vegetation removal at 30m distance.	LN	LN	LN	HN	HN	N	LN	N	N	N	N	HN
Excavation, piling and sub-structural works	HN	HN	LN	LN	LN	LN	LN	N	HN	LN	LN	LN
Construction Material Handling and Transportation	HN	HN	HN	HN	N	HN	HN	N	HN	HN	HN	LN

DED-Description	Physical				Biological		Socio-economic				Post Construction	
	Air Quality	Noise and Vibration	Surface and Ground Water	Soil and Land Resources	Biotic Environment	Habitat Fragmentation	Accessibility Impacts	Public Safety and Community Structures	Utilities Infrastructure	Safety Hazard, Public Health and Nuisance	Waste Management	Visual and Landscape
Nullah Bridge	LN	LN	LN		HN	HN	HN	LN	HN	HN	LN	N
Earthwork and Allied Activities	LN	LN	LN		HN	HN	HN	LN	HN	HN	HN	N
Structural works (Retaining Wall)	LN	LN	LN		HN	HN	HN	HN	I	HN	HN	N
Deployment of Machinery and auxiliary facilities.	LN	LN	LN		HN	HN	HN	LN	I	HN	HN	N
Ancillary Works	LN	LN	LN		LN	I	LN	LN	I	HN	HN	N
Landscaping and Horticultural Works	N	LN	HN		HP	HP	LN	N	N	N	N	N
Restitution of Works	I	LN	I		I	I	LN	LN	I	LN	LP	N
Operation Phase												
Increasing CO ₂ Emission	N	LN	I		LN	LN	LN	LN	N	N	HP	N
Increase of Average Daily Traffic	N	LN	I		N	N	LN	LN	N	N	N	N
Domestic Waste Handling and Disposal	HN	LN	I		LN	LN	N	N	N	N	I	N
Waste Effluent Disposal	HN	LN	I		LN	LN	N	N	N	N	I	N
Key Words: HN (Highly Negative), LN (Low Negative), I (Insignificant), N (No impact), HP (Highly Positive), LP (Low Positive)												

Table 21: Activity Wise Screening of Impact during Construction Phase

Impacts	AOI		Impact Magnitude				Sensitivity of receptors				Mitigation Hierarchy		
	100 m	50m	Magnitude	Duration	Likelihood	Significance	Very Severe	Severe	Mild	Low	Avoidance	Mitigation	Compensation
Air Quality Degradation.	●	●	High	Short term	Likely	Highly significant		●				●	
Noise and Vibration	●	●	High	3-Months	Very Likely	Moderately significant		●				●	
Impact on Existing Surface and Ground water	--	--	High	Short term	Likely	Moderately significant			●			●	
Soil and Existing Land Resources		●	High	3-Months	Probable	Moderately significant		●				●	
Impact on Existing Floral Composition		●	Medium	Short term	Very Likely	Highly significant	●						●
Habitat Fragmentation	●		Medium	Short term	Likely	Moderately significant		●					●
Traffic and Accessibility Issue		●	Medium	Short term	Likely	Highly significant	●					●	

Public safety and Community Disturbances		●	Medium	Short term	Likely	Highly significant		●				●	
Utilities and Infrastructure		●	High	Short term	Likely	Highly significant		●				●	
Occupational Health and Safety		●	High	Short term	Likely	Highly significant		●				●	
Hazardous and Non-Hazardous Management	--	--	High	Short term	Likely	Highly significant		●				●	
Impact on Existing Landscape Pattern			Medium	Short term	Likely	Highly significant		●					●

5.3 Pre-Construction/Design Phase Impacts

5.3.1 Project Siting Impacts

The impacts associated with the project sitting are those which relate to its location at the designated site. These impacts are different from those which are associated with the project's construction and operational phases. The siting impacts are associated with the activities such as clearing and grubbing, waste disposal, piling/excavations. Irrespective of project siting, the impacts with degradation of air quality, noise and handling and transportation of material are widespread and not correlate with the project siting.

For the proposed project, the following two aspects of the project sitting were considered:

- The project site, land use and design;
- Visual Affects (aesthetic value).

5.3.2 Project Site, Land Use, and Design

The project site is located in seismic Zone II, where II represents a high hazard with moderate damage zone. An earthquake can cause damages to the retaining and barrel structures, retaining walls, surface courses and pavements.

Consideration like the provision of culverts, storm water drainage system etc., is crucial, any fault may result in possible traffic accident, road damage, water accumulation and other operational complexities.

Table 22: Impact Screening on Project Siting

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Project Site, Land-use and Design	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation Measures:

- Ensure that road has been designed in accordance with international standards and guidelines for road development (AASHTO).
- Consideration shall be given to the stability of the sub-base, the base system to make all weather underpass road. The surface course and pavement will be sufficiently stable as per international standards.
- Provision of nullah bridge, storm water drainage and retaining walls etc., are to be given in the road design.
- Sign boards and road safety gadgets are to be given in the road design.

Residual Impact

As a result of the above mitigation measures, the project sitting impact of the proposed project will be greatly reduced. There will be some residual impact; improper restitution of sites after progress completion of clearing/grubbing and sub-base course and Substructure (Foundations, Raft, Strip and Footing Beams and Base Slab), however, its significance is expected to be low.

5.3.3 Visual Impacts

Underpass with its allied structure is being constructed in an urbanized landscape pattern. It is indeed a valuable asset of the area. It is thus likely that an impact of highly negative will occur, as a result of the project construction time i.e., 3 months of physical works (construction schedule)

Table 23: Impact Screening on Visual Impacts

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Visual Impacts	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

5.3.4 Natural Hazard Risks (Flooding, Earthquakes, etc.)

Rainfall in moon-soon time mainly in July is the main significant abiotic factor due to changing in climatic fluctuation and its foreseeable impacts.

Mitigation Measures

Similarly, design to be made by keeping in view the Flood and Seismic Resistant Design.

Significance Criteria

Due to this most significant abiotic factor, the significant impact is envisaged on all four land-use types/sensitive receptors. Therefore, the sensitivity of these notable receptor in response to natural hazard is severe while the magnitude of impact is considered as major.

Residual Impact

The seismic and flood devastation impacts not expected to be significant with the implementation of mitigation measures outlined above. Therefore, residual impact is expected to be not significant.

Table 24: Impact Screening on Natural Hazards Risks

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Visual Impacts	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

5.4 Assessment during Construction Phase

The construction phase will be the most significant part of the project with respect to environmental considerations since most of the impacts are likely to take place during this period.

Various construction activities will invariably create environmental disturbances, which may have impacts on the identified environmental and social receptors of the area (highlighted in Figure-19). Such impacts include the following:

Physical Environment

- i. Air quality deterioration;
- ii. Noise and Vibration;
- iii. Water Resources;
- iv. Soil and Land.

Biological Environment

- i. Biotic Environment
- ii. Habitat Fragmentation

Social Environment

- i. Traffic congestion and Accessibility issues;
- ii. Public Safety and Community Disturbance;
- iii. Utilities and Infrastructure;
- iv. Safety hazards, Public health and nuisance issues

These impacts and their respective mitigation measures are discussed hereunder:

5.4.1 Air Quality Deterioration

The Construction machinery and vehicles will release exhaust emissions, containing Carbon Monoxide (CO), Oxides of Sulfur (Sox), Oxides of Nitrogen (NOx) and Particulate Matter (PM). The details tabulated in “Table 8: General Estimation of Exhaust Emission of Deployed Machinery”.

Impacts of air emissions may be prevalent outside of underpass sites at spatial range of 100m from premises, with increasing the wind speed, direction, temperature of the surrounding air and atmospheric stability. The installation of auxiliary facilities within spatial range of 3-Km will also contribute emission of PM₁₀, PM_{2.5}, aggregate and additives dust.

These emissions can deteriorate the ambient air quality in the immediate vicinity of the project site. Furthermore, construction activities such as excavation, land levelling, filling and vehicular movement on the Murree Road and Club Road may also cause fugitive dust emissions.

The civil works will involve earthworks , transporting and dumping of dry material. This will likely lead to an increase in Suspended Particulate Matter (SPM) and Respirable Particulate Matters (RPM), enclosed to construction zones.

Table 25: Impact Screening on Air Quality Deterioration

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on the ambient Air Quality	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Table 26: Control Measures for Fugitive Dust Emissions.

Source	Control Measures
Earth Moving	For any earth moving that is to take place in the immediate vicinity from the site boundary, watering must be conducted as required to prevent visible dust emissions.
Disturbed Surface Areas	Areas that cannot be stabilized, such as wind driven dust, must have an application of water at least twice a day.
Unpaved roads	Periodic sprinkling on all roads used for any vehicular traffic at least twice per day during active operations and restrict vehicle speed to 20 kmph.
Open Storage Piles	Apply water to at least 80 percent of the surface areas of all open storage piles on a daily basis when there is evidence of wind driven fugitive dust or install an enclosure all along the storage piles. Tarpaulin sheet should be provided on the storage piles to avoid dust emissions.
Track-out control	Wash down of construction vehicles (particularly tyres) prior to departure from site.
Deployed Machinery	Use of low-sulfur fuels and emission-compliant machinery.
Air Quality Monitoring	Air quality monitoring at baseline and during peak construction. Risk Assessment and Climatic Impact Assessment to be carried out on monthly basis to control the activities prone to dust particle emissions

Residual Impacts

The above measures will reduce the magnitude of the adverse impacts on ambient air quality. The significance of the residual impacts on air quality envisages during material transportation, borrow area excavation, dismantling and removing road pavement, and disposal of existing unusable road pavement structures/scarified materials.



Figure 31: Traffic Flow Pattern in Normal Hours

5.4.2 Noise and Vibration

The movement of heavy vehicles, loading, transportation and unloading of construction materials, excavation, raft and footing beams through piling machines produces significant noise during the construction stage. Other construction activities which may result in intermittent noise and vibration include:

- i. Piling – boring steel and concrete support structures below ground to support 20 Nos. of Spans at entire length of 1036 meters;
- ii. Vibratory rolling – used to compact fill material in order to reach required compaction levels, used during the installation of piling pads and during road reinstatement as required
- iii. The use of air compressors, concrete plants, generators and light towers;
- iv. Dismantling cement concrete during erosion and drainage works;

It is therefore worth these aforesaid activities will be carried in enclosed settlement thus controlling noise pollution is the primary factor to reduce with installation of acrylic barriers (or material achieving (STC-Sound Transmission Class 25–35.) around the university road strips.

Table 27: Target Noise Level at Construction Phase

Category	Daytime (Leq)	Nighttime (Leq)
Residential Area (A)	75	60
Commercial Area (B)	85	85
Industrial Area (C)	85	85
Silence Zone (D)	60	50

Table 28: Impact Screening on Noise Generation

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on Envisage on Ambient Noise.	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

5.4.3 Surface and Ground Water Impacts

5.4.3.1 Surface Water Impacts

At the present context, the underpass site is not enclosed with nearby drains, nullahs, or storm water channels, hence construction is susceptible in increasing sediment load during Nullah Bridge construction, retaining walls, storm water drainage and manhole works.

However, temporary diversion or blockage of storm water channels constructed along the Murree road is envisaged during piling, scaffolding, or material storage. The probability of waterlogging during rainy events may also be foreseeable or residual impact during excavation phase.

5.4.3.2 Ground Water Impacts

The most probable impacts during the physical works are as follows:

- **Lowering of Groundwater Table:** Continuous dewatering during piling and foundation works may lower local water tables, affecting nearby boreholes/wells.
- **Contamination Risk:** Seepage of cement slurry, oils, greases, and construction wastewater can infiltrate soil, causing localized groundwater contamination.
- **Reduced Recharge:** Impervious structures (surface courses and asphalt pavements) reduce rainwater infiltration, affecting groundwater recharge in urban aquifers.
- **Salinity or Chemical Alteration:** In cases of poor drainage management, accumulated wastewater may leach chemicals into aquifers, altering groundwater quality.

Table 29: Impact Screening on Surface and Ground Water Impacts

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on the existing road drainage and Sewerage system.	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation Measures:

- Install silt traps, sedimentation basins, geotextile sheets, and check dams at drainage outfalls.
- Stabilize exposed soil surfaces through compaction, mulching, or temporary turfing to reduce erosion.
- Maintain uninterrupted flow of natural storm drains by providing temporary diversions and periodic desilting.
- Design temporary drainage channels lined with stone pitching to minimize scouring.
- Provide oil–water separators at machinery fueling/maintenance yards.
- Store cement, admixtures, and chemicals in covered and impervious enclosures to avoid contact with rainwater.
- Prohibit direct discharge of concrete washout into surface drains; designate lined soak pits for collection.
- Incorporate rainwater harvesting pits or recharge wells near underpass and green belt along the club road to compensate for lost infiltration.
- Use pervious pavement or infiltration trenches at service roads/parking areas.
- Cement slurry or bentonite used in piling shall be collected, recycled, or disposed as per regulatory standards.
- Conduct monthly water quality monitoring (pH, TSS, COD, Oil & Grease, Heavy Metals) of nearest drains and groundwater boreholes.

Residual Impacts

- Runoff containing cement slurry, oils, lubricants, paints, and construction chemicals can contaminate the drainage systems.
- Permanent reduction in infiltration due to increased impervious surface area (barrel road surface, despite inclusion of recharge pits or permeable pavements).

5.4.4 Soil and Land Degradation

The impact pertains include soil erosion and soil contamination. These may be caused by land earthwork and allied structures, excavation in foundation of barrel and rigid pavement structures and maintenance of equipment/vehicles.

The soil may also be contaminated as a result of percolations during improper handling of fuel, oil, chemical and a solid waste or untreated wastewater from the equipment, TMs movements from batching plant and ancillary facilities. Underpass structural works (foundations, raft, strip, footing beams) may potentially lead to soil erosion.

This contaminated soil may not adversely affect the arable land in the area. Indirect affect include, affecting road stability, create natural passage during rainy season (moon soon).

Table 30: Impact Screening on Soil and Land Contamination

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Soil and land Contamination Impacts.	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation Measures

- Drainage structures, earthwork and allied activities, ancillary works and shifting utilities crossing the project site has been included in the detailed designs to offset the impact associated with the sub-structural works.
- Other measures to mitigate the impact include retaining walls, footing beams and base slab, in which Portland cement sulfate resistant cement and slag cement will be utilized to offset the envisage impacts.
- Regular inspections will be carried out to detect leakages in construction vehicles and equipment and all vehicles will be washed in external commercial facilities.
- Appropriate arrangements, including shovels, plastic bags and absorbent materials to be kept in oil storage areas.
- Good management of topsoil should be done by selecting the select fill sites for suitable material;
- It will be ensured that spill prevention trays are provided and used during refueling.
- For the domestic sewage from the campsite, septic tanks with soaking pits will be constructed having adequate capacity. Waste oils (if any) will be collected in drums and sold to the recycling contractor;
- Dedicated storage to be utilized for purpose to handle hazardous and non-hazardous waste.

Residual Impacts

Structural works i.e., Drainage and erosion works and retaining walls for underpass will significantly reduce the risk of erosion. Provided the proposed mitigation measures are implemented, the soil contamination and erosion during construction phase will be short term. Therefore, no significant adverse residual environmental impacts are likely to occur.

5.4.5 Impact on Biotic Environment

The proposed underpass site is located on ecological sensitive area, with the trees (medium sized with up to 2½ ft. (150 - 760 mm girth) and vegetative cover across the Murree Road (patches of green areas/saplings (Exhibit figure-30).

The impact on dense vegetation and wildlife is expected since plantation (CDA planted trees) are expected to remove during earth work and allied activities, storm water drainage and manhole works and extension of culverts with reconstruction.

Table 31: Impact Screening on Biotic Environment

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on Existing Tree Patterns.	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation Measures

- Record of species must be maintained, so that new plantation to be carried in accordance with the developed BOQ against the uprooted plants.

Residual Impact

Provided the proposed mitigation measures are implemented, the vegetation and wildlife loss during construction phase will be short term and low. Therefore, no significant adverse residual environmental impacts are likely to occur.

5.4.6 Habitat Fragmentation

Onsite construction work of earthwork and allied structures, sub structural-works, and pavement layering work (subbase, base and surface courses) on proposed underpass is more probable to contaminate. But the impacts is significantly high due to area largely confined with planted vegetation and tree densities. Hence, highly negative impacts is envisaged.

The site is abundant with species (floral and ornamental species composition) along the road berm of Murree road of different taxonomic groups. Hence, the impact due to construction activities is envisaged and replantation works must be the part of contractual agreement with dedicated clause for reforestation/replanting of loss/damaging to sensitive ecosystem.

Indirect effect on exceeding to spatial scale include smoke, chemicals, dust particles, and noise generated by heavy machinery are likely to be scaring factor for wildlife.

Impacts on wildlife may arise from the following project activities:

- Noise generated from project activities;
- Movement of TMs, personnel and construction vehicles;
- Clearing and grubbing; and
- Improper disposal of wastes.

Mitigation Measures

Landscaping and horticultural works is included in PC-1 (cost of Rs. 26,539,115/-) with beautification cost. The plan will be prepared by the assigned CC and consultant will oversee with onsite assessment and approve the plan accordingly.

5.4.7 Impact on Social Environment

5.4.7.1 Traffic & Accessibility (Local and Freight Traffic)

Severe congestion due to partial road closures is anticipated. Further to this, the interlink factors due to activities are mainly linked with increased accident risk due to diversions and narrowed lanes. Presently, the Kashmir Chowk roundabout is uninterrupted due to frequent traffic movement in peak hours i.e., 8am to 11pm and 4pm to 7pm.

The traffic bottleneck during entire construction period i.e., 6months is envisaged during sub-structural works (Foundations, barrel structural excavation, surface course and pavements) and extension of culvert works, storm water drainage and manhole works.

A proper traffic management may pose a challenge at structural works and allied works of roundabout and underpass. As per onsite assessment, the observed issue include peak traffic times. Hence, diversion will cater this solution with adequate space for safe access to the local traffic with adequate detour's management.



Figure 32: Traffic Flow Pattern in Normal Hours

Table 32: Impact Screening on Traffic and Existing Commuting

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on Commuter belt and freight movement	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation

	High	Low	Probable	Irreversible	Compensation
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Mitigation Measures

- Detours management to be ensured during the entire structural, reinforcement work, piling and excavation works with deploying flagmen at entire underpass length i.e., 410m.
- Separate lane for existing traffic should be managed with management equipment.
- Preparation and enforcement of Traffic Management Plan (TMP).
- Adequate diversion routes with signboards and flagmen.
- Scheduling of material delivery at off-peak hours.
- Coordination with traffic police for real-time management.
- Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the residents.
- Coordinated planning of traffic diversions by the traffic police and the Transport Department in accordance with the construction program with advance warnings to the affected commuters/road users.
- Traffic diversion plan should be communicated with traffic police at least one week before the commencement of work.

Residual Impacts

The residuals to comply with TMP are foreseen, due to improper and lack of supervision against detour's management plan for controlling this impact.

5.4.7.2 Public Safety & Community Disturbance

Deployment of machinery according to scope of work will be utilized for underpass structural works at thorough length of 410 meters. This impact increased the risk of unsafe accessibility to local users and haulage movement. Thus, a number of precautionary measures will be necessary to minimize the risk of possible accidents. Community Health & Safety may be compromised during road travel particularly in peak hours if adequate barriers and signage is not provided at construction sites.

The civil works mainly, earthen and allied works will involve the use of considerable heavy machinery at the project site along with posing the risk to the commuters and workers. In addition, the risk to commuters on the road during the construction works will be significant and thus a number of precautionary measures will be necessary to minimize the risk of possible accidents. Community Health & Safety may be compromised if adequate barriers and signage is not provided at construction sites

Other anticipated impacts including:

- Restricted access to businesses and residential properties.
- Dust, noise, and vibration nuisance for nearby communities.

- Increased risk of accidents for pedestrians, as no pedestrian bridge installed in the nearby surroundings.

Table 33: Impact Screening on Public Safety and Community Disturbance

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on Public Safety and Commercial Activities	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation Measures

- Continuous community liaison and disclosure of work schedule.
- Provision of safe pedestrian crossings and temporary access routes.
- Installation of barricades, reflective signage, and lighting.
- Implementation of Grievance Redress Mechanism (GRM).
- Deploy staff for daily checks to identify and promptly address road safety hazards such as improper barricades, connect barriers with warning tapes to prevent overturning and deputing flagmen to redirect traffic.
- The sign warning lights, sign warning drivers and reflective construction barrels must be installed at all five diversion. Noteworthy, ensure that all barrels and water barriers are connected with warning reflective tapes to restrict vehicle to overturn.
- The sign warning lights, sign warning drivers and reflective construction barrels should be placed at diversion routes. Noteworthy, it must be ensured that all barrels and water barriers are connected with warning reflective tapes to restrict vehicle to overturn.
- All the working platforms must be cordon off with special care by well-trained skilled workers.
- Contractor will prepare construction management plan which will include the hazard prevention and safety plan, which will address health and safety of the people in the project area.
- The project In charge should ensure the contractor staff working in the project are well trained and educated in the Health, Safety and Environment (HSE) hazards associated with their duties, and that of the public, in the project area.

Residual Impact

The foreseeable residual impact is only envisaged, due to lack of community safety inspection and accountability of budgets allocated of HSE adherence. Provided the proposed mitigation measures

are implemented, the community health and safety impacts due to construction works will be moderate in nature.

5.4.7.3 Utilities & Infrastructure

Public utilities, primarily the electricity distribution lines (overhead lines), have been identified as the key utility requiring timely relocation/shifting to facilitate uninterrupted progress of the underpass structural works.

The surrounding structures are likely to be affected during sub-structural works (Foundations, Raft, subbase, surface courses and rigid pavement structures. The effect on surrounding structures mainly Islamabad Club Fencing, WAPDA rest house and social amenities is envisaged on the activities undertaken on during excavation, foundation, nullah bridge and storm water drainage.

In parallel to construction effect on spans, the impact also foreseen during retaining walls, drainage and erosion works if not properly cardon-off the sites prior to carry out the construction activities.



Figure 33: Structures more susceptible to damage during underpass construction and allied activities

Table-34: Impact Screening on Utilities and Infrastructure

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on Public Utilities and Infrastructure	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation Measures

- Before starting the excavation, utilities details study and soil investigations should be thoroughly conducted to develop understanding of the area.

- Unnecessary excavation should be avoided;
- Utility mapping and prior coordination with relevant departments.
- Careful excavation with utility detection equipment.
- Emergency response plan for accidental damages.
- Advance intimation to public before work execution.
- Restitution/Rehabilitation plan to be strictly implemented.
- NOCs from relevant departments should be arranged during onset of construction activities.

5.4.7.4 Occupational Health & Safety (OHS)

Only construction labor and construction staff hired during the civil works will be subject to occupational health and safety risks. So, a well-developed implementation plan is always the requirement of this nature of project, to eliminate or reduce the issues pertaining to Health and Safety of both workers and community. The major OHS hazards expected during the proposed scope of work are as follows:

- High risk of falls from height, struck-by objects, electrocution, and equipment accidents hazards associated with the barrel structural reinforcement works.
- Exposure to dust, chemicals, and high noise levels.
- Heat stress and fatigue among workers.

Table 35: Impact Screening on Occupational Health & Safety

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on Public Utilities and Infrastructure	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation Measures

- The Contractor will be required to prepare and implement an effective Worker Health and Safety Plan that is supported by trained first aid personnel and emergency response facilities. Construction contracts will include standard Worker Health and Safety measures and contractors will be bound to implement these fully.
- Contractor will hire Safety Engineer, prepare and implement HSE plan and will be monitored by third party;
- Contractor shall be contractually bound to submit HSE report on monthly basis.
- HSE engineer will be authorized to stop the work in case of unsafe conditions.
- Obligatory insurance against accidents for labourers/workers.

- Monitoring will be required to ensure that the health and safety plan based on contract specifications is followed.
- Layout plan for camp site, indicating safety measures taken by the contractor, e.g. fire-fighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- The Contractor shall submit to the Engineer of CSC for approval a site layout plan, identifying work areas, accommodation, kitchen, dining area, sanitary facilities, location of generators, plant and vehicle parking, transport routes through the camp, pedestrian routes through the camp, evacuation routes, emergency exits, batching plants, storage areas, waste facilities etc.
- An adequate and reliable supply of safe drinking water shall be made available at readily accessible and suitable places including at all camps.
- Public sensitization training should be provided to workers to avoid social conflicts between residents and the construction contractor, Occurrence of any such impacts can be avoided by community sensitive project planning and implementation and through effective involvement of local administration.
- Site personnel will be provided appropriate type of personal protective equipment (PPEs). Contractor will ensure consistent use of PPEs.

Residual Impact

The Construction Contractor must be mandated as per contractual clause for community and worker's health and safety adherence during the construction time. The safety management will therefore be controlled, short term and minor.

5.4.8 Hazardous and Non-hazardous Waste Management

- During construction/civil works potential sources of waste may include; potential sources of waste generation during earth work, base & sub-base, surface course and pavement, drainage and erosion works. Waste from the deployed machinery include; fuel or oil leakages or spills, onsite effluents from vehicle wash & cleaning, and cement (Pre-Mix Material) from the Transit Mixers.
- Waste disposal of materials containing contents of both hazardous and nonhazardous nature such as scrap wood, bricks, concrete, asphalt, plumbing etc. can potentially become a serious environmental issue, particularly with the local contractors.
- Domestic wastes generated during construction of road will include sewage, grey water (from kitchen, laundry, and showers), kitchen wastes, combustible wastes and recyclable wastes from contractor camps.
- The most notable receptors likely to be affected include nearby horticultural and afforestation strips in median and road berms of Murree Road.

Table 36: Impact Screening on Hazardous and Non-Hazardous Management

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Hazardous and Non-Hazardous Management	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation Measures

- A waste management plan and restoration plan shall be developed prior to the start of construction. This plan will cater to sorting of hazardous and non-hazardous materials prior to disposal, placing of waste bins at the project sites for waste disposal and an onsite hazardous waste storage facility i.e., designated area with secondary containment.
- Fuel and hazardous material storage points must be included in camp layout plan to be submitted for approval. Hazardous material storage areas shall include a concrete floor to prevent soil contamination in case of leaks or spills.
- Fuel tanks will be checked daily for leaks and all such leaks will be plugged immediately.
- Hazardous waste will be initially stored on site at designated area and then handed over to CDA certified contractor to final disposal. The Construction Contractor will in consultation with the Supervision Consultant, select the environmentally and socially viable site for safe disposal.
- The sewage system for camps will be properly designed (pit latrines or, as required, septic tanks) to receive all sanitary wastewaters.
- Construction workers and supervisory staff should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste for disposal.
- The contractors must be bound by contractual obligations to take care of the waste generated from the construction activities.

Residual Impacts

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

5.4.9 Existing Landscape Pattern

Aesthetic degradation anticipated due to construction materials (debris, muck material and stockpiles). The area around the proximity is viable (environmentally and socially) for disposal of muck material and select fill/suitable material. This site for disposal must be located within 3-Km at open space/less vegetative place. The suitable alternative for managing onsite waste are as follows:

- Municipal solid waste or inert material dumping yards officially notified by the Capital Development Authority.
- Ensures legal compliance and avoids disputes with the community.
- Abandoned quarries, borrow pits, or unused depressions that require backfilling.
- Avoid land unauthorized dumping.
- Efforts must be made to identify suitable land leveling sites, whereby the excavated material may be provided to private landowners for beneficial utilization in commercial and residential access developments.
- Mucking material may also be reused for road shoulders, embankments, or noise bunds after meeting geotechnical suitability criteria.

Mitigation Measures:

- Ensure selection of environmentally and socially viable disposal sites in consultation with supervision consultant and engineer's representative.
- Proper housekeeping and removal of construction debris immediately after completion of works.
- Landscaping and plantation after completion.

5.4.10 Disruption of Existing Public Utilities/ Infrastructure

Impact Assessment

There may be some disruption to the already existing utilities like electricity poles, underground telephone lines, water supply lines, gas pipelines and power transmission lines etc. along the Murree Road. Deep excavation for the construction may damage the structure stability of the surrounding building/service roads and may result in foundation collapse of the structure.



Figure 34: Traversing Overhead Utilities

Table 37: Impact Screening on Existing Public Utilities

Impact	Magnitude	Sensitivity of Receptors	Likelihood	Duration	Significance
Impact on Public Utilities and Infrastructure	Slight	Very Severe	Unlikely	Short term	Avoidance
	Low	Severe	Likely	Medium Term	Minimization
	Medium	Mild	Very likely	Long term	Mitigation
	High	Low	Probable	Irreversible	Compensation

Mitigation, Management and Monitoring: Mitigation measures will include rehabilitation of existing utilities before construction to avoid any inconvenience to the residents of the project area or provide them with alternate arrangement during the construction period. Before starting the excavation, utilities details study and soil investigations shall be thoroughly conducted to develop understanding of the area. Furthermore, following shall be considered:

- Unnecessary excavation should be avoided;
- Excavations shall be carried out carefully to avoid damaging infrastructure in the surroundings of the project area;
- Restitution/Rehabilitation plan to be strictly implemented;
- Temporary retaining structures shall be provided; and
- NOCs from relevant departments should be arranged.

Residual Impact

The residual impacts are likely to be occurred on existing public/underground utilities, if restitution is not undertaken timely. Moreover, lack of supervision may also lead to contribute this factor.

Chapter

6

PUBLIC CONSULTATION & PARTICIPATION

This chapter provides the details of the consultation process involving the stakeholders as part of the Environmental Impact Assessment (EIA) process requiring information disclosure and sharing. For this purpose, consultation meetings were held with Capital Development Authority at the outset for scoping the EIA study.

Public Participation in the inception stages is a mandatory requirement of the Environmental Impact Assessment, exercise under the Pakistan Environmental Assessment Procedures, Pakistan Environmental Assessment Protection Act 1997 and the rules & regulations framed thereunder.

Purpose of Public consultation and participation is to ensure that the EIA process is open, transparent and robust, characterized by defensible analysis to attain sustainability in the design, implementation, operation & management before the project interventions.

The key objectives of consultations are to:

- Share information with the stakeholders about the proposed project;
- Inform the stakeholders of the project features, relevant details and the environmental issues likely to emerge while the Project is in the pre-construction, construction and operation stages;
- Interact with the stakeholders to share information on significant physical, biological and socioeconomic environment that must be taken into consideration during the different stages of the Project, and measures to be adopted to minimize the severity of impact;
- Acquire the feedback of the stakeholders regarding the project including any concerns /suggestions that may need to be addressed/incorporated in the project plans.

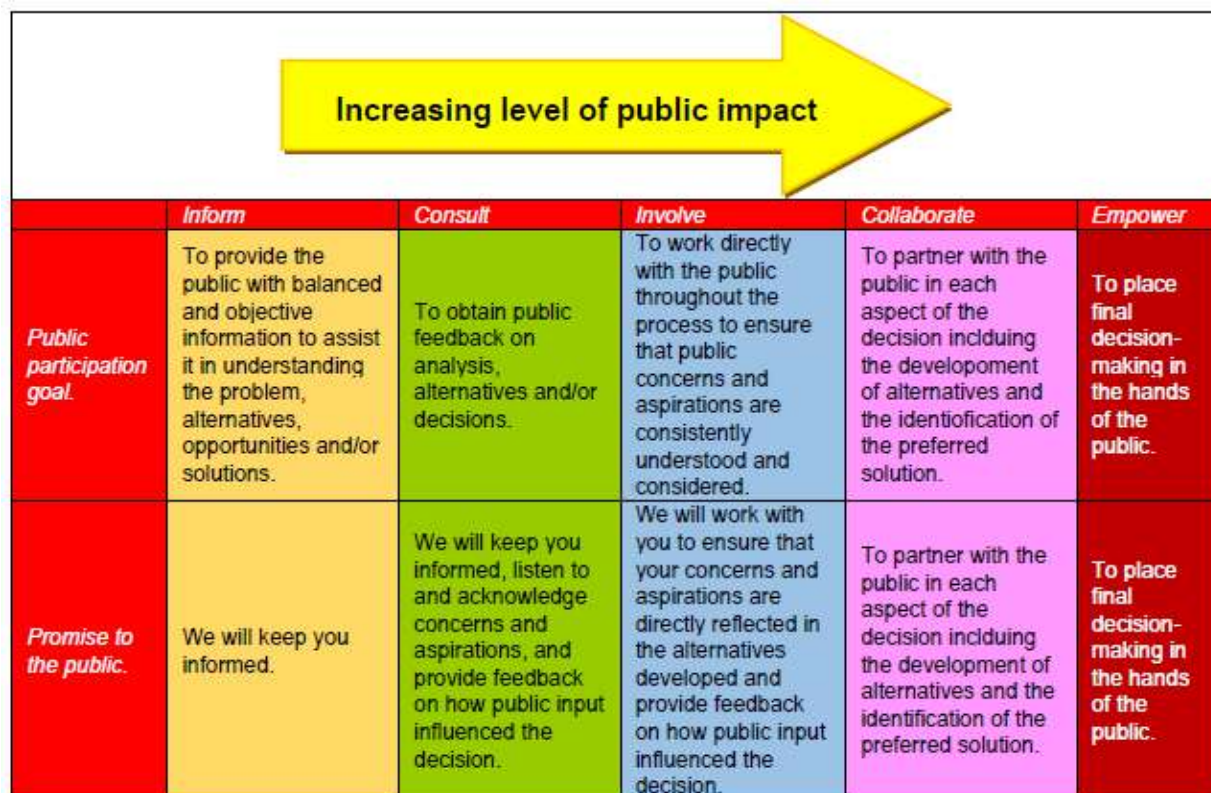
6.1. Consultation Framework

The consultation framework adopted for the Project is elaborated in the table below:

Table 38: Consultation Framework

Project Phase	Proposed Tool	Stakeholders Consulted/to be Consulted	Responsibility
Pre-Construction	Formal and informal meetings with stakeholders.	Institutional stakeholders; Grass root stakeholders, Including road users during the Project Implementation Stage	Proponent

Construction	i. Formal and informal contact and liaison with the concerned stakeholders and other relevant stakeholders (e.g. Pak-EPA).	i. Institutional stakeholders ii. Grass root stakeholders, including road users and ITP;	Supervision Consultant, Proponent
	ii. Grievance Redress	Affected offices and public utilize social structures (PSO pump) during Project Implementation Stage.	Supervision
	iii. Consultations with communities during environmental compliance & Impacts monitoring		Consultant, Proponent
	iv. during external monitoring/ site visits by EPA		
Operation	Liaison with concerned departments.	As and when required.	Supervision Consultant, Proponent



6.2. Categories of Stakeholders

Efforts were made to contact with all type of road users, but outline below traffic available at Kashmir Chowk were considered for on spot consultation:

Sr.#	Stakeholder Category
1.	Residents
2.	Pedestrian
3.	Bicycle riders – Bykea
4.	Taxi drivers
5.	Carpooling Users
6.	4-wheel car users.

Due to interrupted traffic, it was not possible to consult or share the project related information. Hence, the deployed ITP staff suggested to keep liaison with the concerned organization.

Following stakeholders have been engaged during consultation for the project:

- i. **Capital Development Authority:** Guidance and direction of DD-Road were followed to determine the site-specific context for traffic management during execution.
- ii. **Water and Sanitation Department:** for provision of waste skips and waste-water recharge mechanisms.
- iii. **Islamabad Traffic Police:** for approval and information dissemination regarding temporary diversions (Figure-35).



Figure 35: Meeting with ITP Staff and Local Commuters

6.3. Consultation Process

The stakeholders were briefed during scoping meetings about the objectives of the project and the brief overview of the project activities including project area, location, construction activities, project duration, arrangements made by the proponent for utilities etc. Concerns and suggestions of the participants were noted and have been incorporated into the EIA document.

6.4. Outcome of Consultation

Table below provides summary of the entire consultation process initiated for the project.

Mr. Sajjad Haider Sub-Inspector (ITP) In charge of Kashmir Chowk Intersection. Contact# 0333-5212236.	Mr. Waqas suggested that the EIA study should include the following key issues: • Provide a safe and sperate route to facilitate the traffic approach Kashmir chowk from E-75, Srinagar Highway and Rawal Chowk. • The impact due to project related traffic should be assessed and addressed in the report. • Provide proper diversions, where required, for the traffic during construction to avoid traffic congestion, related hazards, and dust emissions; • Traffic Diversion Plan should be developed and approved by SSP-ITP, Faizabad.
Capital Development Authority.	• Traffic Diversion Plan should be developed before commencing project activities. • Strict implementation of restoration and rehabilitation plan immediately after completion;



Chapter 7

ENVIRONMENTAL MANAGEMENT PLAN

7.1. Scope of EMMP

The EMP provides mitigation and management measures for the following phases of the project:

a. Design and Construction Phase

EMP at this stage provides management principles during Detailed Engineering Design (DED) implementation. During this phase, the Environmental actions, procedure and responsibilities as required with the construction phase are specified to comply by the Construction Contractor.

Noteworthy, mitigation measures outlined in EIA must be included in the bidding/ contract documents and their compliance must be ensured as per Contractual Clause of the Notice for Investing Tender and contract award conditions. The document “Contractor’s Guidelines” prepared by the Capital Development Authority will be handed over along with the EMMP, and the conditions stipulated by the EPA in the NOC will further be incorporated into the revised contract document.

b. Operation and Maintenance Phase

During operational period, the Proponent (CDA-Environment Section) will be responsible for technical /maintenance as per the Environmental Actions/Contexts required for improving and controlling the landscape and ecological alterations.

7.2. EMMP Implementation Arrangements

Capital Development Authority has the overall responsibility of implementation of Environmental Management and Monitoring Framework (EMMP).

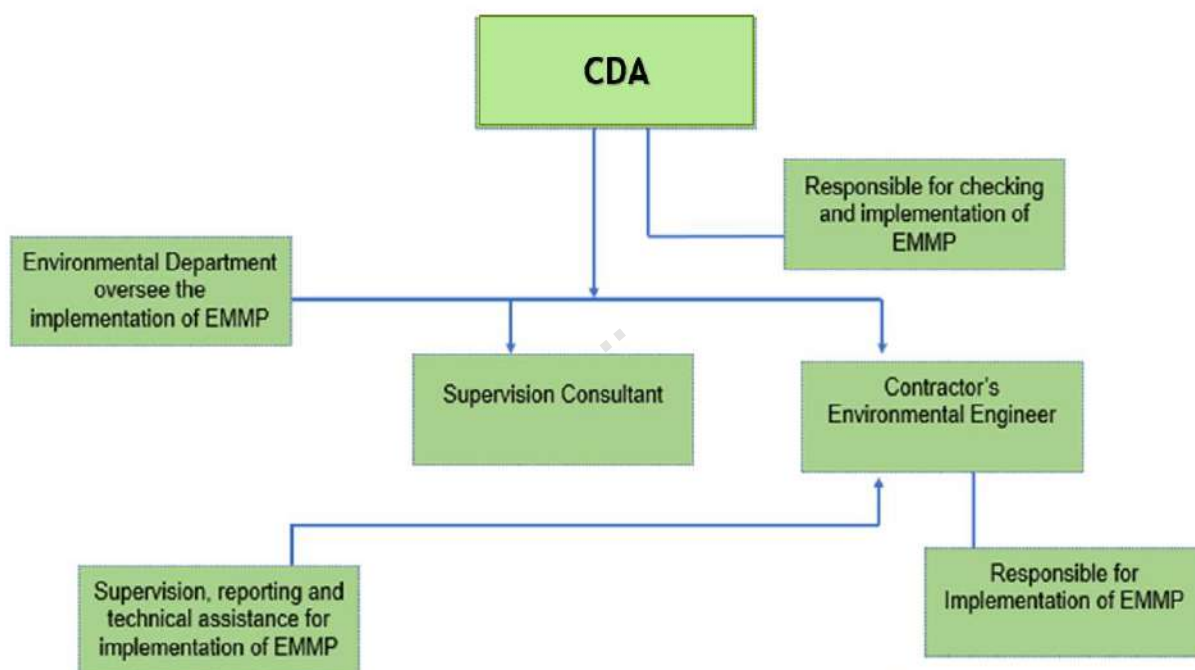
The proposed site inspections by the Consultant’s Environmentalist and the Environmental Section of CDA will be carried out on regular basis as per monitoring frequency to oversee the implementation during entire project completion cycle.

Table 39: Monitoring Plan of Supervision Staff

Sr.#	Project phase	Project Monitoring plan
1.	Design Phase	- One visit to main disposal site, ecological degraded sites (tree density affect areas), Borrow site, campsite, material depot site, proposed machinery yard and other proposed sites by the CDA-Environment Section and Supervision Consultant. - Afterwards, Identify suitable location of batching plant, material and equipment yard etc., according to EPA’s condition in this regard. In general, it is mandatory for the contractor to create buffer zone

Sr.#	Project phase	Project Monitoring plan
		or location of such activities at least around 300-500m away from the identified receptors-
2.	Construction	- Contractor's Environmentalist will remain at site and will ensure the compliance as per EMMP on daily bases. - Supervision Consultant's and Environment Specialist will remain at site and will report on to CDA regular basis. - Visits to main project site at 20%, 50%, 75% and 100% completion stage will be carried out by Supervision Consultant and report to CDA. - Two visits per quarter by the CDA team or in response to any GRM complaints at Stage-2.
3.	Post Construction	CDA-Environment Section as per Defined Methodology.

After the development of Management Hierarchy, the management strategy to manage the active construction areas and EMMP may include the following checklist and Site-Specific Environmental Management Plan for affective implementation.



Management Hierarchy for Implementation of EMMP

Figure 36: EMMP Implementation Hierarchy

7.3. Specific Implementation Responsibilities

Contractor	The contractor will be responsible to implement the mitigation measures and other aspects of the EMMP as applicable. The contractor through his fulltime environmentalist for monitoring/inspection of environmental and social components, will provide training in implementation of EMMP to his qualified and technical staff.
Supervision Consultants	The Consultant through a fulltime environmental expert will be appointed at site for to entire exercises of the contractor in implementation of EMMP. He/She will ensure effective onsite implementation of EMMP.
CDA (Environment Section)	The concerned staff of Environment as part of CDA will maintain top supervision to ensure effective the compliance of the EMMP.
General Assistance to all above agencies in their respective tasks	Resident Engineer of the Project will facilitate staff and convene meeting to address environmental and social constraints and non-compliances during physical progress.

7.4. Reporting and Feedback Mechanism

The contractor's environmental unit will manage the daily activities to comply the site works with the EMMP compliance and will be responsible for weekly and monthly reporting. While SC would be responsible for monthly inspecting and monitoring report, and submit to CDA. The concerned section will submit that report to PAK-EPA as per conditions stipulated in environmental approval.

Table 40: Environmental Management and Monitoring Report (EMMR) Requirements

EMMR Responsibility	Reporting Requirement	Submission
Contractor	Weekly EMMR Report	SC
Supervision Consultant (SC)	Monthly EMMR Report Quarterly EMMR Report	SC
CDA	Submission of Monthly and Quarterly EMMR Report	Pak-EPA

7.5. Specific Implementation Responsibilities

This section describes the implementation and supervision responsibilities of the personnel assigned for the implementation of EMMP.

a. Design Phase / Pre-Construction Phase

The Director (Environment) and his staff with the assistance of SC (Design Supervision Consultant) will be responsible for ensuring that the proposed Project design and specifications adequately reflect the EMMP.

The responsibilities of the Director (Environment) may be briefly described as follows:

- To coordinate with regulatory agencies including Pak-EPA, that assist CDA in independent reviews of environmental compliance.
- To supervise environmental assessment reports and provide substantial inputs and guidance to Supervision Consultant.
- To ensure that the Design Consultant has incorporated all the mitigation measures proposed for the design phase and included in the contract documents.

b. Construction Phase

- CDA will appoint Supervision Consultant, who along with the Environment Specialists and Director (Environment) will oversee the working of the Contractor.
- Supervision Consultant will liaise with the Project staff and the Director (Environment) of CDA to monitor environmental compliance during construction.
- SC will supervise the construction activities and get technical support, where necessary, from concerned environment staff of CDA to ensure compliance with the EMMP.

c. Federal Environmental Protection Agency

PAK-EPA Team may be responsible for:

- Reviewing the status of implementation of EMMP.
- Conducting periodic site visits and supervision mission for detailed review for projects to deal with significant impacts.
- Reviewing of environmental management plan.
- Reviewing the periodic safeguard monitoring reports to ensure compliance as planned.
- Resolution of grievances, especially, directly received from residents and other concerned authorities.

7.6. Project Site Specific Management Plan for Onsite Implementation

These plans are site-specific and where applicable, contract-specific and will be prepared by the contractor(s) prior to the commencement of construction activities. The Plans to be prepared by the contractors for various aspects of the environmental management. The plans mainly include the detailing of the measures included in Mitigation Plans. A brief description of each of these plans is provided below:

Drainage Control Plan will be prepared by the contractor on the basis of the mitigation measures given in EMMP. The Plan will be submitted to consultant staff for review and approval before contractor mobilization.

Pollution Prevention Plan will be prepared and implemented by the Contractor on the basis of guidance and direction of Pak-EPA, as well as the mitigation plans given in EMMP. The Plan will be submitted to the CDA for review and approval before contractor mobilization.

Waste Disposal and Effluent Management Plan will be prepared and implemented by the Contractor on the basis of guidance and direction of Pak-EPA, as well as the mitigation plans given in EMMP. The Plan will be submitted to the CDA for review and approval before contractor mobilization.

Traffic Management Plan will be prepared by the Contractor, in accordance with guidance and direction of ITP. The Plan will be submitted to the CDA for review and approval before contractor mobilization.

Borrow Area Management and Restoration Plan for management and restoration of borrow areas will be prepared by the Contractor on the basis of requirements described in the mitigation plans. This Plan will aim at minimizing the environmental and social impacts during borrowing activities and restoring as much as possible the original natural situation of these sites by various measures (refill, leveling or smoothening). Restoration methodologies will be included in the Plan. The Plan will be approved by the CDA. The decision will be made on the basis of assessment which may include the parameters i.e., protection of local lives, protection of tree stands and nearby landscape context.

Occupational Health and Safety Plan will be prepared and implemented by the Contractor on the basis of relevant standards. The plan also includes management system of control hazards, safe system of work and engineering control measures to control HSE issues. The Plan will be submitted to the CDA for review and approval before contractor mobilization.

Drinking Water Supply and Sanitation Plan: Separate water supply and sanitation provisions will be needed for the temporary facilities, labor camps and workshops, in order prevent littering and surface water contamination. A plan will be prepared by the Contractor based on the guidance and direction of MCI and CDA Guidelines. The Plan will be submitted to the CDA for review and approval before contractor mobilization.

Construction Camp Management Plan will be prepared by the Contractor on the basis of the mitigation plans given in EMMP. The Plan will include the camp layout, details of various facilities including supplies, storage, and disposal. The Plan will be submitted to the CDA for review and approval before camp establishment.

Fuel and Hazardous Substances Management Plan will be prepared by the Contractor on the basis of the mitigation plans given in EMP and in accordance with the standard operating

procedures, relevant guidelines, and where applicable, material safety data sheets. The Plan will include the procedures for handling oils and chemical spills. The Plan will be submitted to the CDA for review and approval before contractor mobilization.

Emergency Preparedness Plan will be prepared by the Contractor after assessing potential risks and hazards that could be encountered during construction of road.

Site Restoration and Rehabilitation Plan: The main areas to be considered for site restoration & rehabilitation include the construction area, campsite area, temporary tracks; land used for vehicles, material stores etc. A proper restitution will be required with the maximum possible effort. The restoration work comprises the removal of temporary construction works, removal of any precinct developed and levelling of the area (wherever required) etc. The following procedures will be adopted for the restoration of the project sites:

- All temporary construction built for the site development will be removed;
- Site for construction camps will be restored to its original (pre-construction) condition as much as possible;
- All the toxic and hazardous chemicals/materials will be completely removed from the site. It must be ensured that all oils and chemical spills which occurred during the construction stage are properly removed;
- Any debris from the construction site will be removed properly from the site and disposed of in an environmentally friendly manner;
- All fencing will be removed and pits will be backfilled; and
- Whole of the site will be covered with the original soil and plantation will be done, wherever required.
- To achieve the above objectives, the Contractor will prepare a Site Restoration & Rehabilitation Plan well before the completion of the construction activities and submit to CDA through the SC for approval.

Disposal Area Management and Restoration Plan: The plan for dumping sites of suitable and surplus material will be prepared by the Contractor and submit to SC for approval. The Plan will describe the procedures for spoil management, transportation and disposal at the selected site; the procedures for systematically disposing the spoil at the disposal site; further aiming at minimizing the environmental and social impacts during disposal activities and restoring as much as possible the original natural situation of these sites by various measures (landscaping, leveling or smoothening).

7.7. Environmental Technical Assistance and Training Plan

The Environmental Specialist of DSC with support of Construction contractor Environmental officer will be primarily responsible to provide all the necessary trainings to all Project personnel. The training modules will include air, noise and water pollution monitoring, social awareness,

Environmental Laws, “National Environmental Quality Standards (NEQS)”, use of personal protection equipment, and health and safety related issues on the construction site. Moreover, the contractor will train all construction workers in basic sanitation and health care issues. The proposed training plan is tabulated below:

Table 41: Environmental Training Plan for Workforce Induction

Sr.#	Participant	Contents	No. of Trainees/Duration	Cost
1.	Contractor Staff	Environmental Laws and Risks associated with construction phase	Three Seminars/3 Days	60,000/-
2.	Contractor Staff	Adherence of Occupational Health and Safety	Two seminars for Contractor's Staff/2 days	60,000/-
3.	Managerial Staff	Environmental Mitigation Implementation of IEE on field.	One Seminar for Supervision staff of consultant and contractor/1 day	60,000
Total				180,000/-
In Quarterly Period				360,000/-

7.8. Budget Estimation of EMMP Implementation

Budget for the Monitoring activities has been provided hereunder:

Table 42: Budget Estimate for SSEMP Cost (For Construction of Underpass)

Items	Associated Cost	Months	Road Section	Remarks
			Underpass Site	
Training (Planned and Onsite)	360,000	6	360,000	During the entire project period
Consultation, Reporting and Communication	200,000	6	200,000	--do--
Contractor's Environmental Engineer	120,000	6	720,000	--do--
HSE Supervisor	120,000	3	720,000	--do--
Drinking Water Quality Monitoring	72,000	Once in Quarterly Period	144,000	2 samples, Quarterly
Surface Water Quality Monitoring	22,000	Once in Quarterly Period	44,000	One time

Noise Monitoring	12,000	Once in Quarterly Period	24,000	2 samples, Quarterly
Ambient Air Monitoring	180,000	Once in Quarterly Period	360,000	2 samples, Quarterly
PPEs and Safety Arrangement for 120 persons approx.-replaced annually	560,080	6	560,080	Manageable as per staffing schedule
Tree Plantation & Landscaping and Horticultural Works		After Completion	26,539,115	With inclusion of Maintenance Cost
Total Estimated Cost			29,671,195	
Note: The Plan can be amended on the basis of changing in design and exceeding the project implementation schedule after one Year.				

Table 43: Environmental Management Measures on Major Component during Construction Period

Aspect	Mitigation Measure	Pre-Construction	Construction Phase	Post-Construction	Responsibility	Monitoring Indicator
Air Quality	Water sprinkling, tarpaulin covering, vehicle maintenance	–	Continuous	–	Contractor	Dust suppression records, AQ monitoring
	Baseline air quality monitoring	✓	–	✓ (post-construction validation)	Contractor / Consultant	Air quality test reports
Noise & Vibration	Restrict noisy activities to daytime, install barriers	–	Continuous	–	Contractor	Noise level monitoring reports
	Baseline & vibration monitoring of nearby structures to ascertain the noise level.	✓	✓ (periodic checks)	✓ (post-construction audit)	Contractor / Consultant	Vibration monitoring logs
Water Resources	Fuel containment, silt traps, controlled water use	–	Continuous	–	Contractor	Site inspection checklists
	Water quality monitoring	✓ (baseline)	✓ (monthly/quarterly)	✓ (final validation)	Contractor / Consultant	Water sampling reports
Soil & Land	Topsoil preservation, safe disposal	✓ (stockpile setup)	Continuous	–	Contractor	Soil reuse records, disposal receipts
	Spill prevention training	✓	Refresher trainings	–	Contractor / HSE Officer	Training attendance sheets

Aspect	Mitigation Measure	Pre-Construction	Construction Phase	Post-Construction	Responsibility	Monitoring Indicator
Horticultural and Afforestation strips	Maximum avoidance or tree transplantation & compensatory plantation at damaged areas	✓	✓ (as construction progresses)	✓ (post-construction plantation program)	Contractor / Client	Plantation survival rate, maintain tree cutting logs for developing BOQ.
Traffic & Accessibility	Traffic Management Plan (TMP), diversions, signage	✓ (TMP preparation)	Continuous	–	Contractor / Traffic Police	TMP compliance checks, traffic flow monitoring
Community Safety	Barricades, temporary diversion/ crossings, GRM setup	✓ (before mobilization)	Continuous	–	Contractor / Client	GRM records, and record of community complaints resolved/unresolved
Utilities & Infrastructure	Mapping utilities, relocation with minimal disruption	✓ (pre-survey, coordination)	✓ (relocation works)	–	Contractor / Utility Dept.	Utility mapping records, incident reports
OHS	HSE Plan, PPE enforcement, trainings, drills	✓ (HSE Plan approval)	Continuous	–	Contractor / HSE Officer	Accident logs, PPE compliance, training reports
Waste Management	Segregation, recycling, safe disposal	–	Continuous	✓ (final clearance)	Contractor	Waste disposal records, site clearance certification
Visual & Landscape	Housekeeping during works, landscaping afterward	–	Continuous housekeeping	✓ (final landscaping & plantation)	Contractor / Client	Site inspection reports, completion certificates

Table 44: Management and Monitoring Plan during Onsite Monitoring and Reporting to SC

Aspect	Potential Impact	Mitigation Measures	Responsibility	Monitoring Indicator
Air Quality	Dust emissions, vehicular & machinery exhaust	- Regular water sprinkling- Cover trucks with tarpaulin- Maintain equipment, use low-sulfur fuel- Enforce “no idling” policy	Contractor	Ambient air quality (PM10, PM2.5) Vehicle/equipment maintenance logs
Noise & Vibration	High noise from piling & machinery; vibration impact on nearby office and ecological alterations.	- Restrict works to daytime- Install noise barriers- Use silencers- Monitor vibration near sensitive structures	Contractor	Noise levels (dB) vs NEQS, Vibration monitoring reports
Water Resources	Contamination from runoff, oil/fuel spills	- Secondary containment for fuel- Silt traps/sedimentation basins- Controlled water use- No wastewater discharge to drains	Contractor	Water quality monitoring & Inspection of containment systems
Soil & Land	Erosion, topsoil loss, improper waste disposal	- Stockpile topsoil for reuse- Safe disposal at approved sites- Training in spill prevention	Contractor	Disposal records, Soil erosion signs and Stockpile management
Flora & Fauna	Tree cutting, disturbance to birds/fauna	- Compensatory plantation (3:1)- Transplantation where feasible- Avoid unnecessary clearance	Contractor / Client	Plantation survival rate, No. of trees cut vs planted.

Aspect	Potential Impact	Mitigation Measures	Responsibility	Monitoring Indicator
Traffic & Accessibility	Congestion, accident risks, delays	- Traffic Management Plan (TMP)- Diversion routes & signages- Coordination with traffic police- Night works in critical areas	Contractor / Traffic Police	TMP compliance reports and Traffic flow surveys
Public Safety & Community Disturbance	Restricted access, dust/noise nuisance, accident risks	- Maintain access to properties- Pedestrian crossings & barricades- Signage & lighting- Stakeholder consultations- GRM in place	Contractor / Client	Grievance records, Community feedback and Safety inspection reports
Utilities & Infrastructure	Damage to underground utilities	- Pre-construction utility mapping- Careful excavation- Emergency response plan- Advance intimation to public	Contractor / Utility Dept.	Utility coordination records and Incident reports
Occupational Health & Safety (OHS)	Worker injuries, accidents, exposure to hazards	- Implement site-specific HSE Plan- Mandatory PPE- Toolbox talks & training- First aid stations- Emergency drills	Contractor / HSE Officer	Accident/incident reports, PPE compliance, training staff regarding EMMP, and strict adherence and reporting to CDA.
Waste Management	Construction debris, hazardous waste, camp waste	- Segregation & reuse/recycling- Disposal at approved dumps- Prohibit unauthorized dumping	Contractor	Waste disposal records and site inspection checklists.
Visual & Landscape	Aesthetic degradation, long-term urban impact	- Maintain housekeeping- Remove debris timely- Landscaping/plantation post-construction	Contractor / Client	Visual inspection and completion of landscaping works.

Chapter

8

GRIEVANCE REDRESS MECHANISM

8.1. General

The Grievance Redress Mechanism is an institutional arrangement to provide a platform to primary stakeholders to address their grievances in response to construction works. The key aim is to resolve grievances in a timely, transparent, and predictable manners. It will also provide a public forum to the aggrieved to raise their objections and through conflict resolution, address these issues adequately.

In the GRM process, it is, however necessary to ensure that procedure is gender responsive, culturally appropriate, and readily accessible to the stakeholders at no cost and without retribution

8.2. Objective of GRM

The main objective of GRM is to implement and develop a procedure for handling environmental and social concerns of the project stakeholders. The procedure will include a redressal mechanism with the aim to record and receive complaint through various means/modes. This may include placement of complaint register at project offices and GRM boxes at an accessible location (built-up areas, camp offices, masjid and project offices).

Table 45: Grievance Redress Mechanism Process

Stage	Process	Timeline
Receipt	Complaints via helpline, written register at site office, through onsite project staff.	Ongoing
Acknowledgement	Written acknowledgement to complainant	Within 5 working days
Investigation	Site inspection and assessment	Within 7 working days
Resolution	Corrective action or compensation; documented	Within 21 working days
GRM Committee Resolution	Unresolved complaints to GRC / PAK-EPA	After 30 days if not resolved

8.3. Grievance Redressal Committee

CDA-Project Director will constitute a Grievance Redress Committee (GRC) at project site. The committee will look into grievance cases related to social, environmental and rehabilitation. For effective implementation and possible resolution, GRC will consist of the following members:

Table-46: Field Level Grievance Redressal Committee (GRC)

Sr.#	Designation	Position in GRC
i.	Project Director- CDA	Chairman
ii.	Resident Engineer-CSC	Secretary
iii.	Affected Person/s	Member
iv.	EE (CSC)	Member
v.	EE (CC)	Member

The Committee will locally resolve the grievance/complaints within seven days. If it fails to address the complaint within seven days, it will refer the complaint to the project level committee along with a brief report.

The following project level GRC will also be notified to promptly address the grievance.

Table-47: Project Level Grievance Redressal Committee (GRC)

Sr.#	Designation	Position in GRC
i.	Project Director	Chairman
ii.	Deputy Director	Member
iii.	Resident Engineer	Member
iv.	Affected Person/s	Member
v.	EE (DSC)	Member
vi.	EE (CC)	Member

8.4. Procedure of Complaint Registration

The procedure will include the following step wise process to resolve grievances:

Stage 1: When a grievance arises, the aggrieved person may contact directly with the contractor/PIU/CSC to resolve the issue of concern. If the issue is successfully resolved, no further follow-up is required.

Stage 2: If the complaint not addressed adequately at Stage 1, the affected person(s) may proceed complaint to the GRC at site level. The designated person or GRM Focal Person/s note down the complaint along with relevant details in the community complaint register. The affected person(s) can also approach GRC without going through the Stage 1 described above. For each complaint, the GRC must investigate the complaint, ascertain its appropriateness/eligibility and identify an appropriate solution. It will provide formal acknowledgement within seven working days to the complainant. During the complaint investigation, the GRC will work in close consultation with the Contractor, CSC, and higher management. The designated person should implement the redress solution and convey the outcome to the GRC within seven working days.

Stage 3: In case of dissatisfaction of the complainant at stage 2, he/she can approach to GRC stage 3 at PIU level. Here, the GRC is headed by the Project Director. The GRC at Project Management level will resolve the complaint/grievance and the agreed action thus determined

should be implemented within twenty-one days (if additional time is needed to implement the corrective action, it should be discussed and decided during the meeting). In case of failure to address the complaint, the complainant can approach to final tier, stage 4.

Stage 4: If the affected person/complainant is still not satisfied with the reply in Stage-3, he or she can pursue judicial proceedings.

Implementing the GRC's decision will be a contractual binding on the contractor.

8.5. Creating Awareness about GRM

All information about grievance procedures, grievance forms will be distributed through GRM consultation sessions with the community. If there are several languages, then ensure that information is available in all of them.

8.6. Transparency and Record Keeping

The Project Director and Consultant office will maintain all complaint received from complaint register and Boxes.

8.7. Acceptable Grievance

The following are some of the environmental issues could be subject for grievance from the affected people, concerned public and NGOs:

- Dust, noise, and air pollution from construction activities.
- Intensive schedule of construction activities.
- Inappropriate timing of construction vehicle flow.
- Traffic Movement.
- Water Pollution and pollution through Waste disposal.
- Disturbances to flora and fauna.
- Health and safety and community safety/amenities safety.
- Failure to comply with standards or legal obligations.

Pak-EPA may also provide the details of environmentally and socially acceptable grievances to the project team for onsite resolution as per GRM defined mechanism (refer sub-section 8.4).

8.8. Unacceptable Grievance

The following type of complaint shall not be taken up for consideration as grievances:

- Anonymous Complaint.
- Issues not related to the project activities.
- Any type of complaint in which the complainant has been affected directly or indirectly.
- Complaints about corruption

The flow chart of the proposed redress mechanism is shown below:

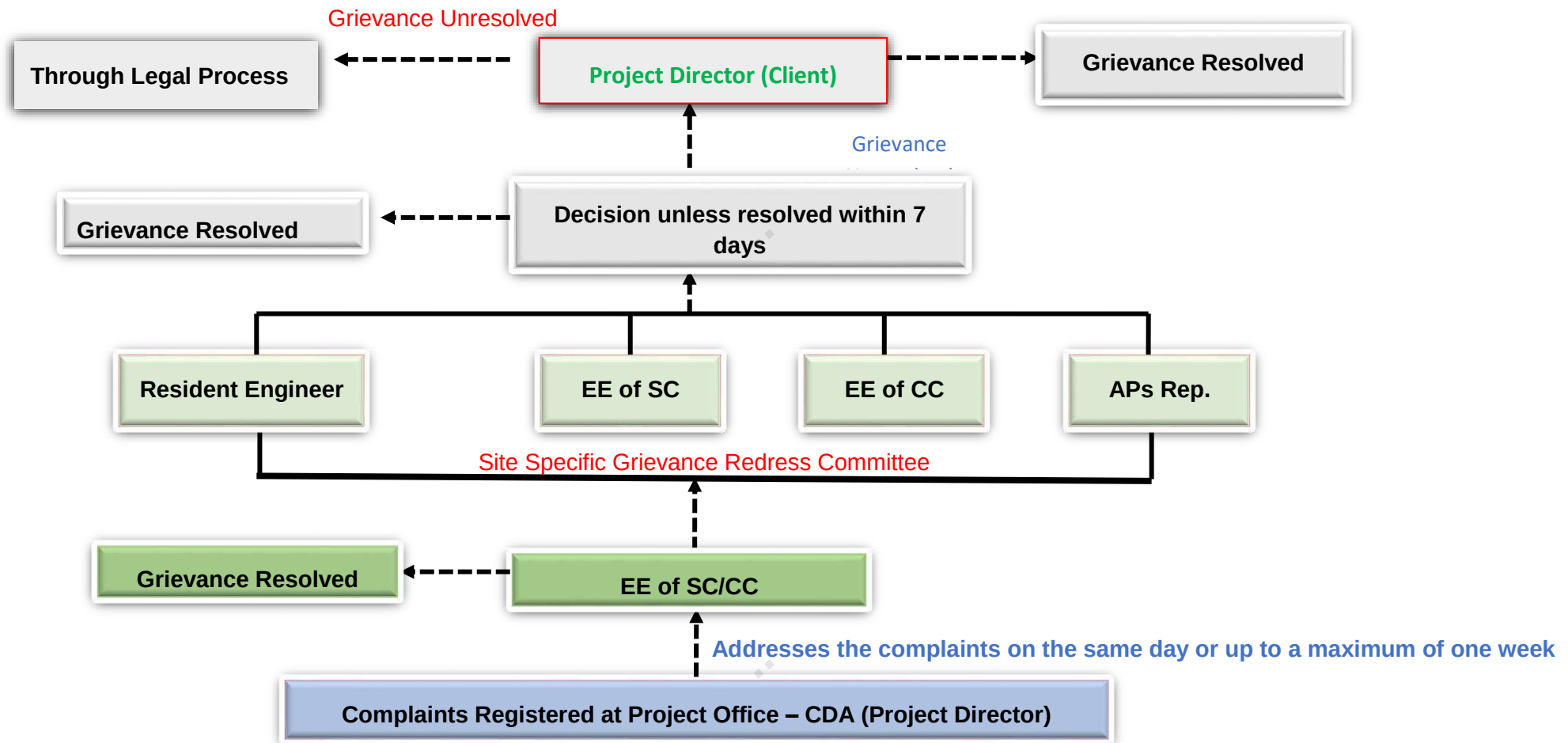


Figure 37: GRM Mechanism for effective Implementation

Table 48: Grievance Redress Mechanism Form

Grievance Redress Mechanism Form	
Contact Details	Name:
	Address:
	Contact Number:
	Email
Alternative Contact	Name:
	Relationship:
	Contact Number:
Written Documents Provided	List of Provided Documents:
What is the nature of your grievance (State the problem, impact scale, who are involved and other details)?	
Suggestion to resolve the grievance	

Chapter

9

CONCLUSION AND RECOMMENDATIONS

Based on the traffic surveys and analyses conducted at Kashmir Chowk, the intersection has been identified as a critical transportation node within Islamabad's urban road network. Located at the junction of major arterial routes connecting Serena Hotel, Murree Road, Srinagar Highway, and Faizabad, the intersection accommodates substantial traffic volumes comprising private vehicles, public transport, commercial vehicles, and heavy goods traffic.

The traffic studies indicate that Kashmir Chowk currently experiences significant congestion, excessive delays, and operational inefficiencies, particularly during peak hours, due to the high traffic demand and multiple conflicting traffic movements. As a key gateway linking the city center, the Red Zone, and regional transport corridors, congestion at this intersection adversely affects mobility, travel time reliability, and overall network performance.

The proposed Kashmir Chowk Underpass is therefore essential to facilitate uninterrupted movement along the dominant traffic corridor by providing grade separation and reducing traffic conflicts at the surface intersection. The project is expected to significantly improve traffic flow, enhance intersection capacity, reduce vehicle delays and queuing, and improve road safety for all road users. Implementation of the underpass will contribute to the development of a more efficient and sustainable transportation system by reducing travel times, fuel consumption, and vehicle operating costs, while supporting economic activity and improving connectivity between central Islamabad, Murree Road, Srinagar Highway, and the Faizabad corridor. Overall, the project will play a vital role in accommodating future traffic growth and enhancing the operational performance of Islamabad's road network.

Major Key Variable for Onsite Compliance

These following four environmental/social variables are considered as strongly associated with the underpasses construction and allied works:

- i. Dense vegetative sites/afforestation/Dense Floral Composition Sites/pattern along Club and Murree road within the underpass and further extended to 100m spatial extent.
- ii. Nearby infrastructure/social amenities.
- iii. Ecological dynamics/alterations.
- iv. Arterial Route Linking the Red Zone.

Ecological dynamics/alterations in response to construction of civil design components (as described in Sub-section 3.8). The frequent envisaged negative impacts associated are given hereunder:

- Air pollution due to particulate matters on account of dust, emissions from machinery, etc.
- Noise issues due to working of construction machinery on the project;
- Impacts related to Machinery Assembly area, material and equipment yard;
- Damage/loss of afforestation strips, horticultural land strips and fence of Islamabad club;
- Accident risks;

- Community and Occupation Health and safety of workmen and amenities (public and private);

EIA study concludes that project does not involve any long-term irreversible negative impacts. Most of the negative impacts identified in the study are temporary and manageable through:

- Implementing Environmental Management Plan; and
- Providing monitoring arrangements and resources during design, construction and operation stages of the project.

Associated Benefits for Underpass Construction

The proposed solution shall be beneficial for all movements of traffic thus creating a signal free zone in the instant area. This project will contribute in reducing traffic jams/congestion at the intersection. This will result in reduction in Vehicle Operating Cost (VOC) and Vehicle travel time (VTT) thus alleviating noise and air pollution to certain extent to address existing and future transportation challenges, a feasibility study has been undertaken. To evaluate the operational performance of Kashmir Chowk and identify suitable improvement alternatives. The study will provide a basis for selecting the most technically, economically, and environmentally viable option for improving traffic operations and accommodating future growth in the area.

Recommendation:

- CDA's/Consultant Obligation: The CDA through its consultant will ensure that implementation of Environmental Management Plan is achieved so as to minimize the negative impacts of the project during its implementation; therefore proper monitoring would be necessitated. In addition, the Pak-EPA will frequently monitor that the management is working as prescribed.
- Contractor's Obligation: The obligations of the contract which would be part of contract stipulation include:
 - i. **Environmental Mitigation Measures:** The contractor should carry out the mitigation measures according the guidelines and satisfaction of CDA/its consultant. In addition, the environmental management and monitoring will be achieved as per Environmental Management and Monitoring Plan;
 - ii. **Existing Infrastructure/utilities:** The contractor shall make necessary arrangement to protect the existing planned infrastructure / utilities if not avoidable should make good at his own expanse damage done to the existing utilities.
 - iii. **First Aid Facilities:** The contractor shall arrange first aid facilities at site for emergency purpose. Contractor should designate one of the staff members to act as a lead person for emergency response and safety issues.
 - iv. **Health and Safety of Workers:** The contractor shall arrange for the health and safety of workers and general public by; providing safety equipment such as helmets, gloves, safety shoes and harness etc.; erection of safety signage at potential dangerous working areas, making proper lighting arrangement for night shift working, provide insurance against accidental death and injuries of workers and public; restricting public and animal access to construction site by providing fence on the periphery.

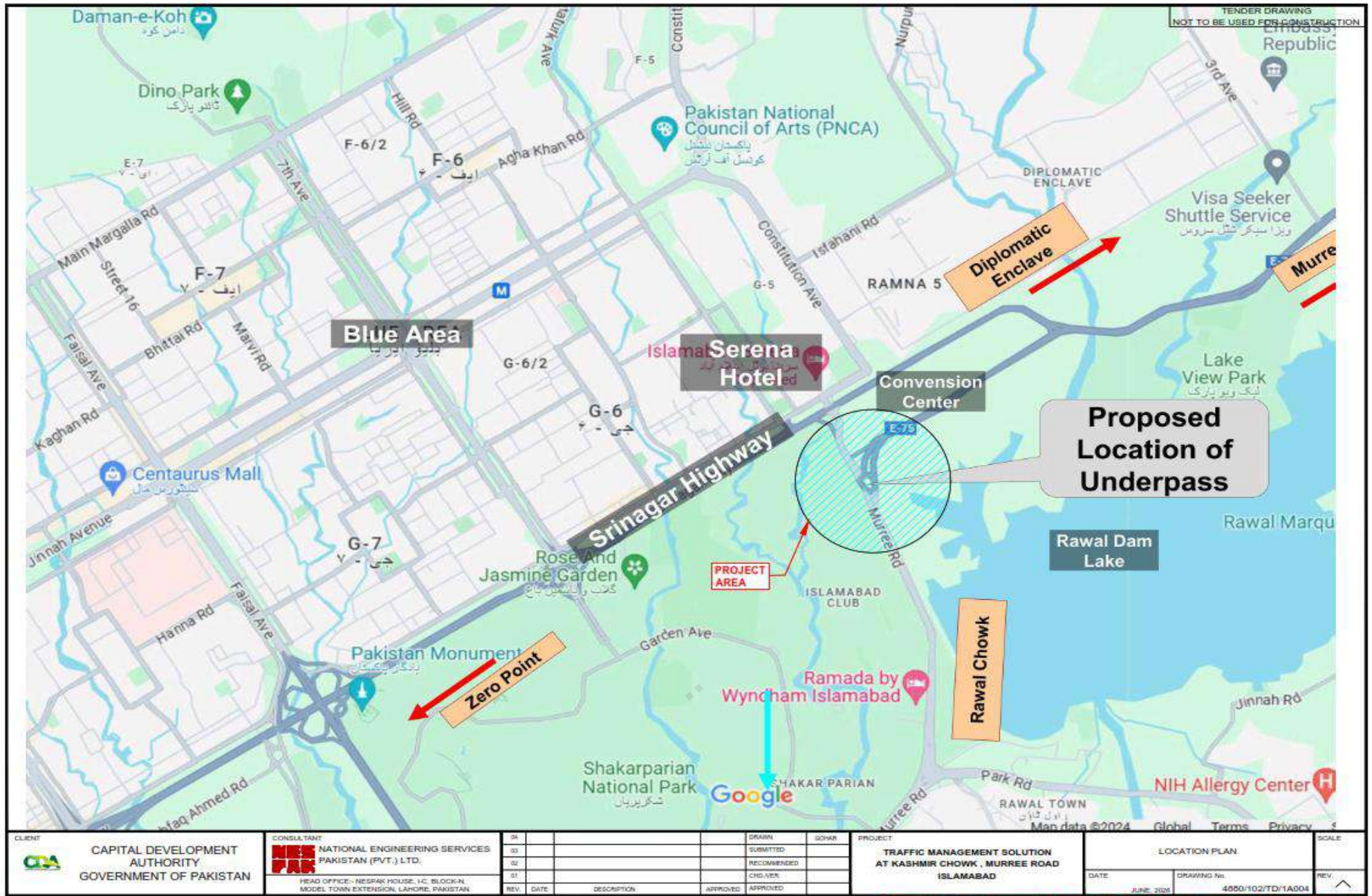
- v. Employment of Local Personnel:** The contractor shall subject to availability and workability, employ maximum number of workers from local area.
- vi. Disposal of Waste:** The contractor in consultation with the approval of Resident Engineer (RE) shall abide by the selection, sites for disposal of waste construction material, solid waste and wastewater.
- vii. Location of Camps:** The contractor shall locate labor camps, material depots, equipment and machinery yards, approach roads and routes etc. As per the site situation, that does not affect the life of the end users.
- viii. Socio-economic and Cultural Values:** The contractor is required to:
 - a. Ensure that no damage or disruption is caused to the social infrastructure or public services presently available to the people e.g., Islamabad club fence area along the Club road, horticultural land strips, afforestation strips and amenities locating within 300m radius (highlighted in Figure-19).
 - b. Ensure the existing ownership of land around the project is respected;
 - c. Ensure that if some construction material, has to be procured from or through a member of local community, it must be a proper Social Framework Agreement.



ANNEXURES

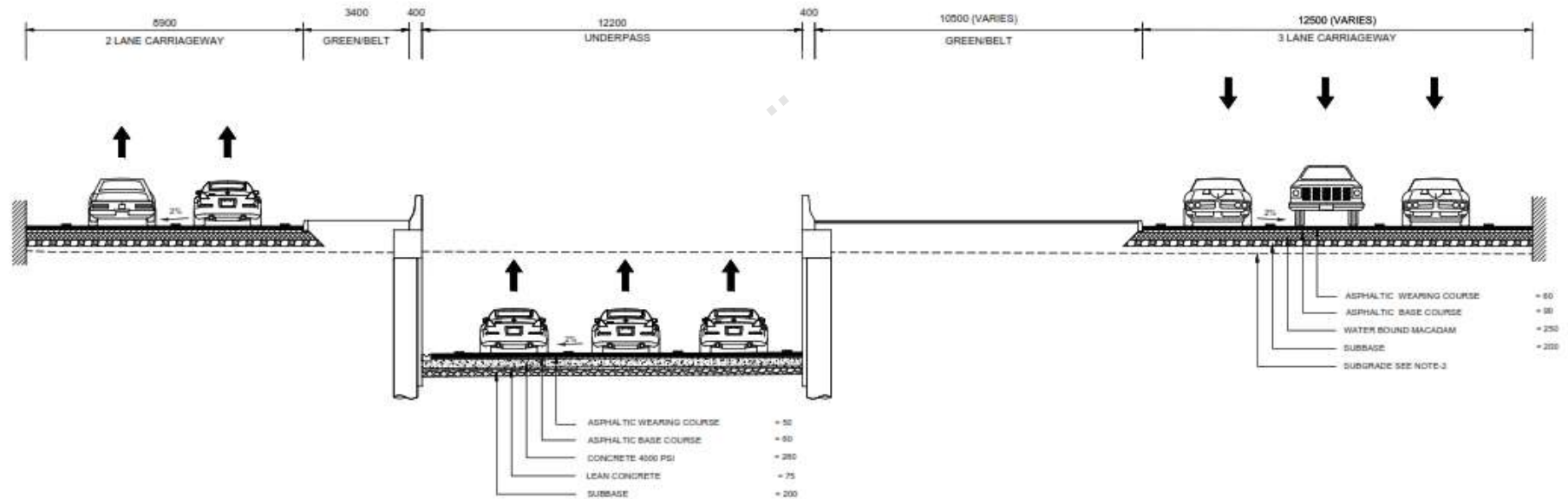
Annexure- A

CROSS SECTIONS





2020-2021 Financial Year: 01-01-2020 to 31-12-2020



PROPOSED CROSS SECTION A-A

NOTES:-

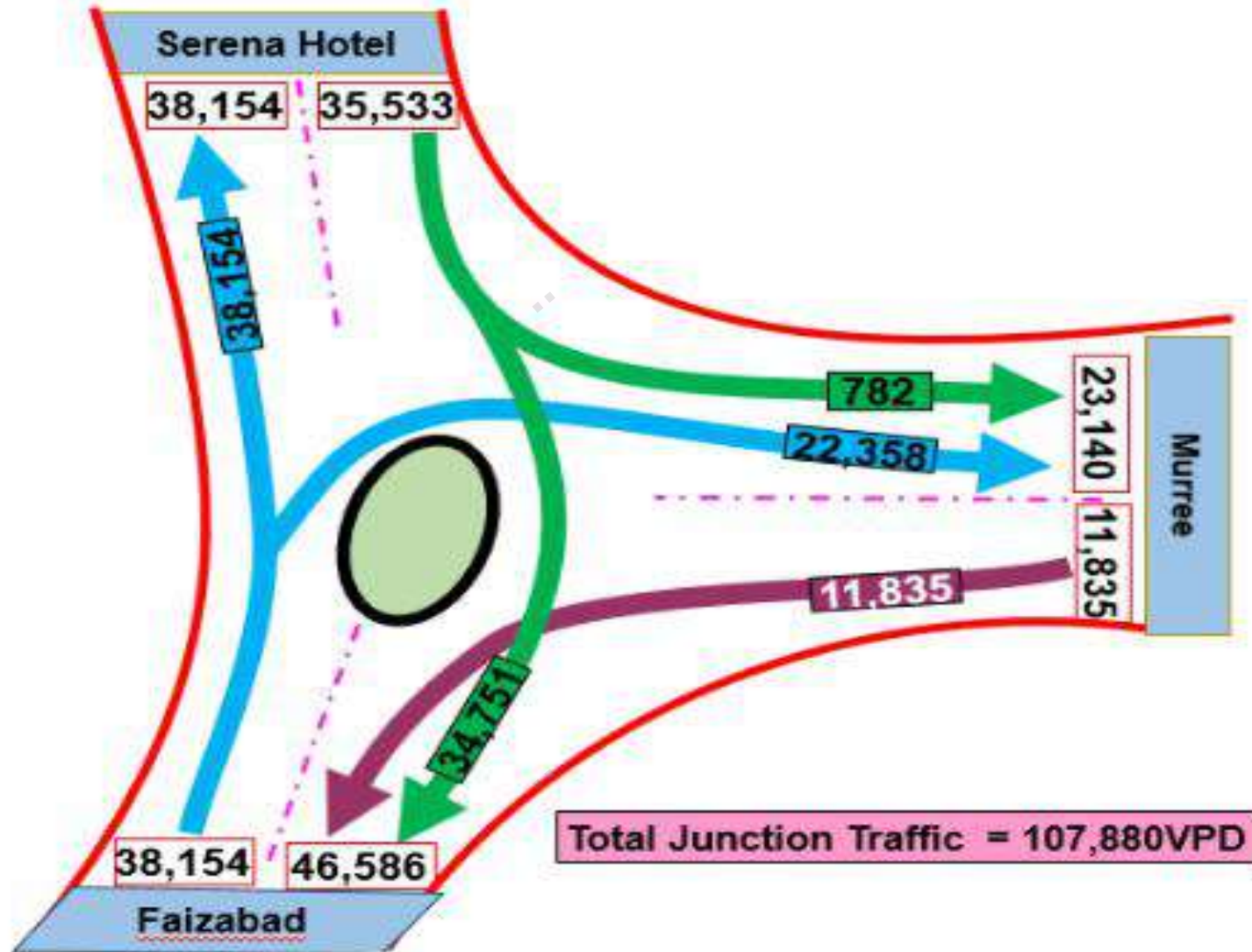
1. ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.
2. SUBGRADE SHALL HAVE MINIMUM SOAKED CBR 8% @ 95% MDD.

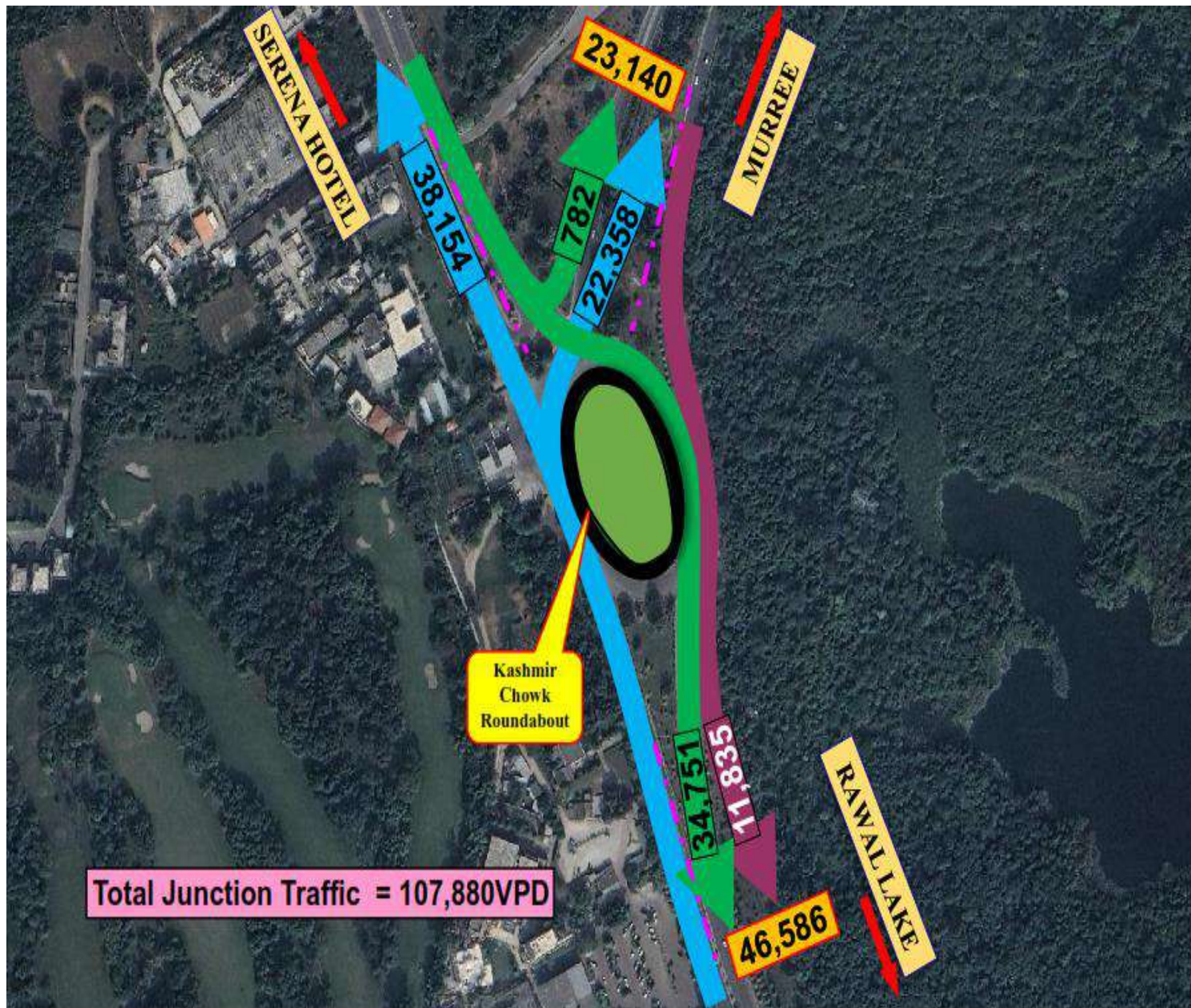
CLIENT  CAPITAL DEVELOPMENT AUTHORITY GOVERNMENT OF PAKISTAN	CONSULTANT  NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE:- NESPAK HOUSE, 1-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.	04			DRAWN	SCWR	PROJECT TRAFFIC MANAGEMENT SOLUTION AT KASHMIR CHOWK , MURREE ROAD ISLAMABAD	TYPICAL CROSS SECTION		SCALE
		03			SUBMITTED					
		02			RECOMMENDED					
		01			CHD JVER					
		REV	DATE	DESCRIPTION	APPROVED	APPROVED				DATE
							JUNE 2020	4000/102/TD/X5002	1	

C:\HW\T\Y\asaphd\71h-PC-1 02-07-2020\Kashmir Chowk underpass_Sereno\bin\mod\TENDER DRAWING-28-10-2022\GENERAL DRAWING\X5002.dwg 14/06/2020

Annexure- B

TRAFFIC DATA





Manual Classified Count (MCC) Traffic Count Data

Total Junction Count : 107,880
Vehicles Per Day

1st Highest Traffic Volume

Faizabad ~ Serena : 38,154 VPD

2nd Highest Traffic Volume

Serena ~ Faizabad : 34,751 VPD

3rd Highest Traffic Volume

Faizabad ~ Murree : 22,358 VPD

First Highest Volume is already through, Underpass is provided along second highest traffic volume

Annexure- C

SITE SPECIFIC MANAGEMENT PLAN

Tree Plantation Plan

Plantation Guidelines and Strategy

At Kashmir Chowk Underpass (Murree Road, Islamabad), a total of 896 ornamental plants will be planted in two rows along the road berms of the underpass corridor. Only ornamental plants (flowering trees and ornamental strips) will be used for this plantation, consistent with the “Landscaping and Ornamental Plantations” category identified within the ROW along the road berm of Murree Road.

Plant number calculation: Underpass through length (barrel size) = 410 m = 1,344 ft (per EIA Table-11 conversion). At 3 ft plant-to-plant spacing: $1,344 \text{ ft} \div 3 \text{ ft} = 448$ plants per row. For two rows (one along each road berm of the corridor): $448 \times 2 = \mathbf{896 \text{ ornamental plants}}$.

Estimated procurement cost: Nursery-grown ornamental plants of the recommended species typically cost Rs. 50 to Rs. 150 per plant, depending on age and height at the time of purchase. For the 896 plants required, the estimated procurement cost therefore ranges from approximately **Rs. 44,800 ($896 \times \text{Rs. } 50$)** to approximately **Rs. 134,400 ($896 \times \text{Rs. } 150$)**, exclusive of transport, planting and maintenance costs. This range should be confirmed against current nursery quotations at the time of procurement.

Guideline for Plantation and Selection of Species

The species, being ornamental flowering trees suited to avenues, medians and roundabouts, will be selected in consultation with CDA's Environment Wing and Parks & Horticulture staff, keeping in view Islamabad's subtropical highland climate (cold winters with occasional frost and hot, monsoon-fed summers), the soil conditions along Murree Road, and their ornamental/aesthetic value, as identified for the road berm and median at Kashmir Chowk in the EIA.

The plantation, being ornamental in nature, will follow a nursery-stock/sapling planting approach at the following parameters:

- Spacing will be 3 to 5 ft. between plants, with 3 ft. adopted for the Kashmir Chowk berm rows (see plant count calculation above);
- Plants to be procured should have a minimum height of 1 to 2 ft., supplied in poly-bags from a reputed nursery;
- Species selected are ornamental flowering trees, adapted to Islamabad's climate, and tolerant of roadside/urban conditions (dust, vehicular emissions, limited soil volume), including but not limited to the following (Recommended Species):

Table-1: Recommended Ornamental Species for Kashmir Chowk, Islamabad

Scientific Name	Common Name	Site Suitability
<i>Bauhinia variegata</i>	Kachnar	Medians, roadside verges, pedestrian areas

Scientific Name	Common Name	Site Suitability
<i>Cassia fistula</i>	Amaltas (Golden Shower)	Avenues, medians, landscape beautification
<i>Lagerstroemia speciosa</i>	Queen's Crape Myrtle (Jarul)	Urban parks, sidewalks, medians
<i>Jacaranda mimosifolia</i>	Jacaranda	Wide medians, boulevards, parks
<i>Tabebuia rosea</i>	Pink Trumpet Tree	Medians, roundabouts, open green spaces
<i>Callistemon viminalis</i>	Bottlebrush	Medians, roadside planting, ornamental strips
<i>Polyalthia longifolia</i>	Ashoka (False Ashoka)	Narrow medians, boundaries, screening
<i>Delonix regia</i>	Gulmohar	Large open spaces, parks, wide road verges
<i>Lagerstroemia indica</i>	Crape Myrtle	Landscape beds, pedestrian plazas
<i>Magnolia grandiflora</i>	Southern Magnolia	Institutional landscapes, parks, entrances

Suitable Season

Islamabad experiences four distinct seasons: spring (March–April), a hot, dry summer (May–June), the monsoon (July–September), and a cold winter (November–February) with occasional frost and near-freezing night temperatures, particularly in January.

- Best planting season: pre-monsoon to monsoon onset (July–August), when rainfall provides natural moisture and reduces irrigation demand;
- Secondary season: late winter/early spring (February–March), using irrigation support, before the onset of summer heat;
- Peak winter (December–January) and peak summer (May–June) should generally be avoided for transplanting frost- or heat-sensitive ornamentals.
- These seasons are considered best for the establishment and overall growth of the ornamental species recommended for Kashmir Chowk.

Species-wise Suitable Season for Kashmir Chowk, Islamabad

- **Bauhinia variegata (Kachnar)**
Best season: February–March or July–August.
Semi-deciduous and moderately frost tolerant; spring planting also allows establishment before its characteristic pre-monsoon flowering.
- **Cassia fistula (Amaltas)**
Best season: July–August (monsoon) or February–March.
Deciduous and tolerant once established; monsoon planting suits its natural growth flush.
- **Lagerstroemia speciosa (Jarul)**

Best season: July–August.

Prefers consistent soil moisture during establishment; monsoon rainfall reduces early irrigation demand.

- **Jacaranda mimosifolia (Jacaranda)**

Best season: February–March or July–August.

Frost sensitive while young; avoid planting in peak winter (December–January).

- **Tabebuia rosea (Pink Trumpet Tree)**

Best season: February–March or July–August.

Moderate cold tolerance; benefits from irrigation support if planted outside the monsoon.

- **Callistemon viminalis (Bottlebrush)**

Best season: February–March or July–August.

Very hardy and tolerant of a wide range of soil and moisture conditions.

- **Polyalthia longifolia (Ashoka)**

Best season: February–March or July–August.

Needs regular watering while young; moderate frost sensitivity in the first winter.

- **Delonix regia (Gulmohar)**

Best season: February–March or July–August.

Frost sensitive when young and needs full sun; avoid planting in peak winter.

- **Lagerstroemia indica (Crape Myrtle)**

Best season: February–March or July–August.

Deciduous and cold hardy; among the more forgiving species for planting timing.

- **Magnolia grandiflora (Southern Magnolia)**

Best season: February–March or October–November.

Prefers cooler establishment temperatures and consistent moisture; avoid transplanting in peak summer heat.

Plantation Strategy

		
Recommended plant size examples		Not recommended plant size example

The arrangement of the plantation will be linear, in two rows along the road berms of the underpass corridor (410 m through length). The height of the ornamental plants at the time of planting will be 1 to 2 ft., and the spacing will be 3 ft. Row-to-Row Plant distance, consistent with the Guideline for Plantation.

The site suitability along each stretch will be evaluated by CDA's Environment Wing/horticultural staff, and each site-specific plan would provide and update the below site suitability requirements:

- The Contractor will ensure the availability of all necessary manpower and equipment/machinery resources at the plantation site. Manpower will include a gardener/horticulturist and skilled/unskilled labour for on-site plantation, care and maintenance;
- At one site more than 5 to 8 peoples of Manpower and 03 machinery will be ensured for the plantation drive.

The contractor will provide the required hand tools for plantation, including 10 grub hoes, 10 Pulaski hoes, 10 sharp shooter shovels, 5 heavy-duty shovels, and 5 dibble bars (40 tools in total). A water bowser will also be arranged for irrigation of the newly planted vegetation

Planting Stock (Procurement, Transport & Storage)

- The Contractor will ensure that the planting stock for the tree species to be planted is procured from well reputed nurseries;
- The planting stock type i.e., poly-bags will be used. Planting stock will be inspected for its type and quality during procurement. It will be lightly watered before leaving the nursery;
- The vehicle carrying the plants, will be covered by a mat or a tarpaulin to prevent them from drying out by the wind;
- If the stock has to be stored a few days before planting, it will be kept in a dark and cool place, a cool storage room or elsewhere in shade. It should be inspected for its quality before plantation and if required.

Plantation Procedures

Following plantation procedure will be followed:

Backfill recipe (by volume)

- 50% good topsoil/loam;
- 30% well-rotted farmyard manure/compost;
- 20% sand/silt (only if the topsoil is heavy);
- Plus: bone meal or DAP ≤50 g mixed uniformly in the top half only (optional, species-dependent);
- For very alkaline rubble, add agri-gypsum 250–500 g mixed through the backfill.

Planting & Finishing

- If the root ball is wrapped in burlap, simply untie it and leave it at the bottom of the hole (the burlap will disintegrate into organic matter over time);

- Each ornamental plant will have a root ball of approximately 2 ft. (≈60 cm) diameter; the pit will be dug slightly larger, about 2.5 ft. (≈75 cm) diameter and 1.5–2 ft. deep, to accommodate the backfill mixture;
- Place the plant in the hole and fill the area around the 2 ft. root ball with backfill soil mixture, making sure there are no air pockets left;
- Set the root collar at surrounding ground level; backfill in 10–15 cm lifts, tamping gently to remove voids;
- Form a raised watering berm sized to the root ball (diameter ≈45–60 cm; height 6–8 cm);
- Mulch 3–5 cm (chips/straw), keeping a 5 cm air gap around the stem;
- Build the soil up in a mound around the plant's base, slightly taller than the surrounding earth, so there is extra soil to cover the vulnerable roots even after some soil washes away during watering.

Irrigation

- Moderate-to-high water-demand species (*Lagerstroemia speciosa*, *Jacaranda mimosifolia*, *Tabebuia rosea*, *Polyalthia longifolia*, *Magnolia grandiflora*): initial drench of 20–25 L; water every 2–3 days for the first 4 weeks, then weekly for a further 4–6 weeks;
- Adjust frequency to rainfall and wind exposure; avoid overwatering once established.

Use of Fertilizers

- Fertilizer (e.g., Diammonium Phosphate (DAP), Green Manure) will be added to plants depending upon its physical health, if required. Normally, 50 grams will be added after every month to each newly planted ornamental plant.
- It will be continued till completion of 01 year of new plantation. After that the plant roots will be strong enough to take up underground water for its further growth and nourishment.
- Fertilizers will be used in an efficient manner to avoid any detrimental impacts (like eutrophication) on the surrounding environment. Training on safe use of fertilizers will be provided to labor.

Care and Maintenance Strategy

Care and maintenance provided by the Contractor will be as follows.

- Planting stock will be inspected for its type and quality during procurement as well as before plantation;
- Care and maintenance of the plantation (i.e., for two years).

Watering Strategy

- The Contractor will be responsible for arrangement of water source for watering the newly developed ornamental plantation along the road berm, which can be done through water bowser.
- Plants are relatively sensitive to moisture stress during the establishment stage compared with their ability to withstand their root systems are fully developed. The critical stage for most plants is in the first two years of establishment.
- The proposed ornamental species, being adapted to arid/semi-arid urban conditions, require approximately 80 to 90 irrigations a year (every 0.5 or 1 week) during initial years.

- New plants should be watered daily for the first week, especially if the weather gets hot and there is no rain. After completion of works, the plants will be handed over to CDA and will be maintained as per its usual practice of maintaining trees/plantation.
- Survival rate after two years' proper maintenance of the plants is **80 to 85%**.

Source and Quantity

As per the EIA (Section 3.15.4, Water Requirement), the main source of water for the project is a tube well, supplemented by water tankers procured by the Contractor from CDA-approved/private sources (standard tankers of 2,000-gallon capacity, with larger CDA tankers holding up to 15,000 gallons). The same source arrangement will be used for irrigating the Kashmir Chowk ornamental plantation.

For the 896 ornamental plants proposed, the initial drench (at an average of ~10 L/plant across species) requires approximately 9,000 liters roughly one standard 2,000-gallon tanker load, consistent with the tanker capacity referenced in the EIA. During the peak establishment period (first 8-10 weeks), the estimated requirement is approximately 1,500-2,000 liters/day, tapering thereafter as the species establish. These figures are indicative and should be verified/adjusted against actual site monitoring and seasonal rainfall before finalization.

OHS MANAGEMENT PLAN

Occupational Health and Safety Management System is essential for the care of OHS issues which should outline mitigation measures and best management practices. This management system recommends carrying out a complete assessment, evaluation, monitoring, identifying and control all potential hazards and risks that arise during the construction and operation phases of the proposed project. OHS Plan will be developed by construction contractor, by keeping in view the following HSE measures, to ensue:

- Health Safety and Environment (HSE) induction/orientation shall be provided to all workforce at the project site;
- Assembly point will be established for the gathering of workforce regarding daily HSE Tool Box Talk at the project site;
- HSE TBT Meeting will be held by HSE Officer on a weekly basis or daily when required;
- Special education/Training session shall be conducted properly at the site;
- The daily walkthrough will be conducted at the project site;
- The mandatory PPEs (safety helmet, safety shoes, safety jacket, coverall, full body harness, safety goggles, earplug, earmuff, dust mask/special, safety gloves. Masks etc.)
- Proper inspection (Pre-Use checkup) of heavy machinery at site;
- Warning and instructive signage at the project site;
- Generated food Waste shall maintained properly with segregation mechanism;
- HSE sign board shall be installed at the project site for an Emergency response at Site Notice Board;
- Regular first aid center along with all required medicines 24/7 shall be available at the project site;

The contractor will develop his HSE policy, roles and responsibilities of HSE Manager and staff. It also provides information about HSE objectives, Personal Protective Equipment (PPEs) to be used at the site, first aid training and communication and documentation regarding HSE.

- **First Aid Boxes:** First aid boxes will be provided at all active construction sites to cope up the emergency situations. Usually, a typical first aid box mainly contains antibiotics, basic medicines, cotton, bandages, sunny plast, healing balms, pyodine, spirit and painkillers, etc.
- **Dispensaries:** Medical facilities will be established by the contractor. A dedicated room will be established as a dispensary and first aid services at the campsite;
- **PPEs:** Site Engineer and HSE Manager will be responsible for providing PPE to all workers;
- **Safety Signs:** Relevant safety sign boards will be displayed on the work sites and labour camps to make aware / train workers about safety rules. Mainly safety signs of speed limits, electric spark, etc.

- **TBTs:** Tool Box Talks (TBTs) will be delivered on a regular basis and when a new team of workers start a new activity like shuttering, steel fixing, steel cutting, steel bending, scaffolding, concrete pouring, mechanical works, electrical works, etc. at sites to promote safety culture;
- **Water Sprinkling:** Dust pollution will be controlled with water sprinkling and minimizes the risk of adverse impact of dust on workers and surrounding areas. Water sprinkling will be carried out regularly to minimize dust pollution and avoiding creating slush.
- **Barricading:** The contractor will put up barricade tape at all the active work sites. Hard barricading (scaffolding pipes) will be used to cover exposed areas where is more than 10 feet.
- **Training:** Training will be delivered by HSE Manager to achieve its objectives. Training will be conducted for capacity building of employees/workers/labour/sub-contractors to make them well effective to respond to any kind of emergency.

Table-1: Estimated Cost for Worker's Safety

Items	Quantity	Cost/Item (Rs.)	Total cost (Rs.)
Dust masks	2/person/Week	10	115,200
Safety shoes	120	2000	240,000
Gloves	2/Month	200	576,000
First Aid Box	2	5000	10,000
Ear Plugs	1/person/Week	30	172,800
Safety helmets	120	500	60,000
Safety Jackets (Hi Vis)	120	500	60,000
total			1,234,000

Time Required for Construction Period = 24 Months;

Number of Labor Required for Construction = 120;

Personal Protective Equipment PPEs;

Dust Mask: 1 Dust mask to be used in a week by each labor;

Safety Shoes: 1 safety shoe for twelve months;

Gloves: A pair of gloves for each laborer for a week

First Aid Box: 2 first aid box at active construction sites at each proposed road section.

Ear Plug: 1 set of the earplug to be used for 1 week for each driver.

Safety Helmet: 1 helmet to be used for 6 months for each labor.

Safety Jackets: 1 safety Jacket (Hi-Vis) for each labor for 12 months

Dust Bin: Rough Estimate

Water Sprinkling the whole for each construction period.

(The calculations are made by considering the average number of workers working at a time. Besides of this, contractor will in consultation with Supervision Consultant and Client EE, develop a plan for labor accommodation according to number of labors. The cost will be allocated on the basis of number of washrooms, kitchen and rooms).

WASTE MANAGEMENT PLAN

During construction/civil works potential sources of waste will include spoils generated during excavation activities, excavation waste for other civil works, domestic wastes (solid & wastewater), fuel or oil leakages or spills, onsite effluents from vehicle wash & cleaning, and cement spills.

Waste disposal of materials containing contents of both hazardous and non-hazardous nature such as scrap and asphaltic materials etc. can potentially become a serious environmental issue, particularly with the local contractors. To avoid any potential issue, the Management (Engineer In charge) in collaboration with focal agencies will need to impose adequate internal controls.

Domestic wastes generated during construction of road will include sewage, grey water (from kitchen, laundry, and showers), kitchen wastes, combustible wastes and recyclable wastes from contractor camps.

Management Methodologies

- A waste management plan will be developed prior to the start of construction. This plan will cater to sorting of hazardous and non-hazardous materials prior to disposal, placing of waste bins at the project sites for waste collection and an onsite hazardous waste storage facility i.e., designated area with secondary containment.
- Licensed waste contractors will be engaged to dispose off all non-hazardous waste material that cannot be recycled or reused.
- Excavated material from trenches will be stored at site and it will be used as fill/cover material after laying of pipelines while excess spoil shall be transported to spoil disposal site if required.
- Excavated material generated during construction of road will be used as a fill material at site and excess spoil shall be transported to spoil disposal site if required.
- All types of combustible and non-combustible waste including plastic or glass bottles and cans will be temporarily stored on site and later sold/handed over to a waste/recycling contractor who will utilize these wastes for recycling purposes.
- Waste management training for all site staff to be included in Contractor's training plan.
- Fuel storage areas and generators will have secondary containment in the form of concrete or brick masonry bunds. The volume of the containment area should be equal to 120% of the total volume of fuel stored.
- Fuel and hazardous material storage points must be included in camp layout plan to be submitted for approval. Hazardous material storage areas shall include a concrete floor to prevent soil contamination in case of leaks or spills. Fuel tanks will be checked daily for leaks and all such leaks will be plugged immediately.
- Designated vehicles/plant wash down and refueling points must be included in camp layout plan to be submitted for approval.

- Hazardous waste will be initially stored on site at designated area and then handed over to EPA certified contractor to final disposal.
- Spill kits, including sand buckets (or other absorbent material) and shovels must be provided at each designated location.
- At the time of restoration, septic tanks will be dismantled and backfilled with at least 1m of soil cover keeping in view landscape of surrounding natural surface.
- It will be ensured that after restoration activities, the campsite is clean and that no refuse has been left behind.
- Training shall be provided to the personnel, for identification, handling and segregation of waste.



SITE RESTORATION AND REHABILITATION PLAN

The main areas to be considered for site restoration and rehabilitation include construction areas, campsite area, temporary tracks, land acquired for material, equipment and storage yard. The restoration & rehabilitation plan should be included in the contract agreement and must be restored to the original condition. The following practices will be adopted for restoration of all road section sites:

- All temporary construction built for the site development will be removed.
- Site for the construction camps will be restored to its original condition.
- Ensure that all the toxic and hazardous materials are completely removed from the site.
- Ensure that any debris from the construction site are properly removed from the proposed road sites, and dispose-off in an environmentally friendly manner.
- All fencing along the campsite and material storage yard and site offices shall be removed and pits and septic tanks shall be backfilled.
- In Whole, all the proposed road sites must be return to the original condition with the backfilling of original soil profile and further improve the site with afforestation.

To achieve these measures, the contractor will prepare a site restoration plan in consultation with the supervision consultant before completion of construction activities. The proposed plan will be submitted to Project Director through Supervision Consultant for approval. After completion of restoration process Project Director and Supervision consultant will inspect the site and give the restoration clearance to the contract.

SANITATION AND LIQUID WASTE MANAGEMENT PLAN

Sanitation in general means safe management and disposal of human excreta/domestic wastewater. The process involves safe collection, safe storage/disposal and recycling/reuse of domestic wastewater.

The major objectives of sanitation are:

- Providing access to safe sanitation systems.
- To promote appropriate management and disposal of domestic wastewater.
- To promote treatment and reuse of domestic wastewater.

Waste management during construction will be responsibility of contractor. The domestic and construction waste will be separately handled by the contractor to ensure the recyclable waste is segregated and reused where possible. The hazardous waste including oily rags, containers, chemicals bottles/cans etc. are recommended to be handled through EPA approved waste collection sites.

1. Classification of Toilets and Sanitation

Toilets can be classified into two major categories:

- A. Dry Toilets: Such toilets are mainly non-flushing toilets or waterless toilets with minimal or no use of water. They are also termed compost toilets as the recycle/compost waste for its reuse.
- B. Flush Toilet: Toilet which utilize water for flushing of waste. Flush toilets can be pour flush or cistern flush.

Sanitation facilities can be classified as on-site and off-site depending on disposal of waste.

- A. On site sanitation: Such system aim to contain wastewater at the point of generation. Septic tank, pit and soak pit toilets, which do not require sewer/transportation etc are types of onsite sanitation systems. Septage in septic tank, however, is transported through mechanical means at frequent intervals.
- B. Off-site sanitation: Systems which require transportation of wastewater to another location for disposal, treatment or reuse are termed as off-site sanitation systems. Normally, such systems require sewer system or mechanical transportation of waste. The off-site sanitation can be centralized (at single point in town/village) or decentralized (at communal level).

2. About Liquid Waste/Domestic Wastewater

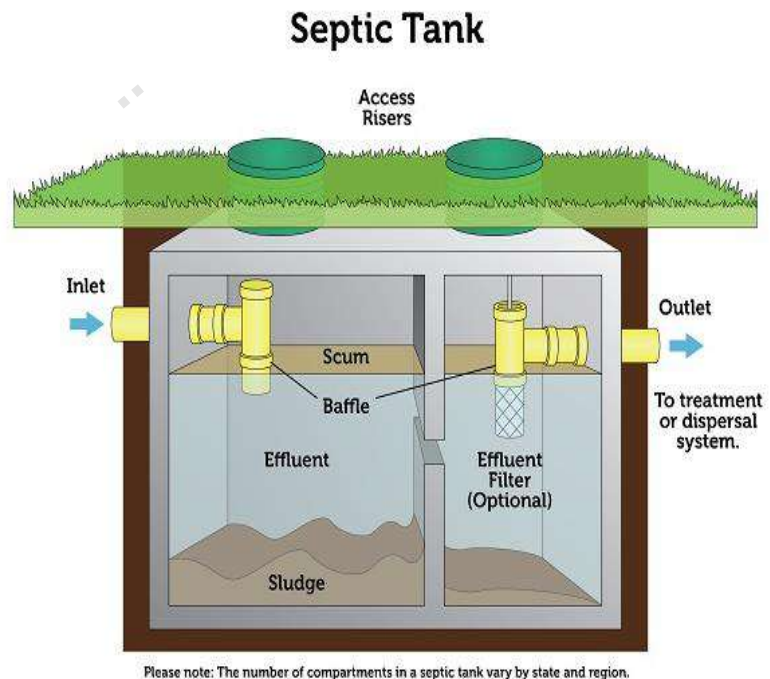
- Liquid waste is used and unwanted water which cannot be used for human consumption or other domestic purpose.
- Two types of Liquid waste/domestic wastewater will be generated from campsite:

- a. **Grey Water:** Wastewater generated from bathing, washing, general cleaning, laundry, as well as from community stand post, well, hand pumps etc.
- b. **Black Water:** Wastewater generated from toilet containing faecal matter. Such water contains very high amount of pathogen compared to grey water.

As per the site context, Grey and black water can be collected separately and treated/disposed separately, as greywater does not require very high treatment as black water. However, both can be collected and treated/disposed together before entering the sewage channels.

Once the waste is collected in pit, septic tank etc., it further disintegrates and can be termed as follow:

- a. **Sludge:** It is the settled solid matter in semi-solid condition in any collection/storage system. The term sewage sludge is generally used to describe residuals from centralised wastewater treatment, while the term septage is used to describe the residuals from septic tanks. Solids or settled content in pit latrines and septic tanks are also called faecal sludge.



- b. **Scum:** Impure matter like oil, hair, grease and other light material that float at the surface of the liquid in septic tank.
- c. **Effluent:** Wastewater that flows out of a treatment system (septic tank in this module). It is partially treated.

Generally, 80 percent of total water supplied is expected to be discharged as wastewater. In urban areas sewers are designed for minimum 100 litres/capita/day discharge (Source: CPHEEO). Thus, it can be assumed that a household (5-6 people) generate approximately 4-5 USG wastewater/day where there is adequate piped water supply.

Site Waste Management Plan

Objective: To manage waste during the excavation and asphalt milling through loading of via conveyor system and disposal at appropriate place as approved by engineer Incharge:

Step	Activity	Description	Responsibility	Remarks
1.	Segregation of Waste	Segregate waste into Re-usable and non-reusable materials.	Construction Manager	Separate asphalt, aggregate, subbase, and base materials for different uses.
2.	Stockpiling Reusable Material	Create stockpiles of reusable materials (e.g., aggregate, subbase, and base materials).	Site Supervisor, Labor Team	Stockpiles to be clearly marked and secured to prevent contamination.
3.	Reutilization of Stockpiled/Select fill Material	Utilize reusable material for back filling.	Construction Manager	Ensure proper compaction and testing before reuse.
4.	Asphalt Management	Collect asphalt debris during excavation; Transport it through dumpers with covering and to designated stockpiling sites.	Supervision Consultant	Re-use at campsite and concrete batching plant site.
5.	Utilization at Camp, Concrete, and Asphalt Batching Plant Sites	Use debris and suitable material for leveling or paving internal paths and camp access site.	Construction Manager, Camp Manager	Avoid overstocking;
6.	Transportation of Waste	Transport waste to designated disposal or reuse sites using safe and covered vehicles.	Environmental Specialist, Site Manager	TBT to be conducted to ensure compliance with safety and environmental standards during transport.
7.	Regular Monitoring	Monitor stockpiles, disposal sites, and reuse processes to ensure compliance with the waste Management plan.	HSE Team	Conduct weekly and monthly inspections.

LIQUID WASTE MANAGEMENT PLAN CONSTRUCTION OF UNDERPASS



SAFE COLLECTION

Contain and collect all liquid waste



TREATMENT

Proper treatment at source



SAFE DISPOSAL

Discharge only at approved outlet



ENVIRONMENTAL PROTECTION

Zero discharge to Rawal Lake



Saddar Rd

ISLAMABAD CLUB

Ankara Park
انقرہ پارک

SEDIMENTATION POND - 1

UNDERPASS CONSTRUCTION AREA

SEDIMENTATION POND - 2

Islamabad High Court
اسلام آباد ہائی کورٹ

LEGEND

- Construction Area (Underpass)
- Perimeter Drainage Trench
- Temporary Diversion Drain
- Silt Trap / Check Dam
- Sedimentation Pond
- Wastewater Collection Pit
- Oil & Grease Trap
- Dewatering Pump
- Flow Direction
- Approved Discharge Outlet

KEY NOTES

- All liquid waste shall be contained and managed within the site.
- No discharge of untreated liquid waste to Rawal Lake or storm drains.
- Regular desilting of ponds and maintenance of traps and drains.
- Compliance with EPA, SEPA and NHA guidelines.

Rawal Lake
راول جھیل

WASTEWATER COLLECTION PIT
(Concrete wash water, equipment cleaning)

OIL & GREASE TRAP
(Oily equipment maintenance water)

DEWATERING PUMP
(Discharge to Sedimentation Pond - 1)

DISCHARGE TO STORM DRAIN (APPROVED OUTLET) AWAY FROM RAWAL LAKE

0 125 250 375 500 m

Dismantling of Septic Tanks at Campsite

It is envisaged that proper management is required for restoring and rehabilitation of campsites mainly septic tank sites. The Dismantling a septic tank from a campsite requires careful planning and execution to ensure safety, prevent environmental contamination, and comply with regulations. The contractor, will in consultation with SC (Supervision Consultant), develop plan specifically for purpose to restore campsite with a specific focus on the dismantling of septic tanks.

During Pre-Dismantling Phase

- Inform relevant authorities mainly DHA-Waste Management Department about the septic tank dismantling plan;
- Deploy technical expert and dedicated team to remove all wastewater and sludge from the tank;
- Disconnect and cap water, electricity, and other utility lines connected to the septic system.

During Dismantling Phase

- Carefully excavate the soil around the septic tank using a backhoe or excavator;
- Take out the lid and access pipes to prevent any accidental openings;
- Use a hydraulic excavator or a demolition saw to break the septic tank into manageable sections.
- Carefully lift and remove the broken tank sections from the excavation site;
- Inspect the site for any remaining debris, wastewater, or contaminants. Clean the site as needed.

Post-Dismantling Phase

- Fill the excavation site with compacted soil to prevent settling or collapse.
- Restore the campsite to its original condition, including any landscaping or other features;
- Properly dispose of the septic tank materials, following local regulations and guidelines.
- Keep records of the dismantling process, including before-and-after photos, for future reference.

DISMANTLING AND DEMOLITION PLAN OF ANCILLARY WORKS AND FACILITIES

General

The proposed Kashmir Chowk Underpass is being constructed within an existing, fully operational urban road corridor at one of Islamabad's busiest signalised intersections. As no permanent structures or buildings fall within the approved construction footprint, the demolition works associated with this project are, by their nature, limited to the removal, dismantling and, where required, relocation of existing ancillary road infrastructure, utilities and street furniture that presently occupy the alignment of the proposed underpass, approach roads and associated works. This section sets out the scope, methodology, equipment, waste management arrangements and environmental and social safeguards governing these activities, and is to be read in conjunction with the Construction Requirement (Section 3.11), Construction Equipment Details (Section 3.14) and Environmental Management Plan presented elsewhere in this EIA.

The dismantling works have been planned in accordance with the requirements of the Pakistan Environmental Protection Act, 1997, the Pakistan EPA (Review of IEE/EIA) Regulations 2022, the applicable National Environmental Quality Standards (NEQS), the engineering and construction practices of the Capital Development Authority (CDA), and internationally recognised environmental management principles consistent with the practices of multilateral lending agencies. The Contractor shall be required to develop a detailed, site-specific Dismantling and Demolition Method Statement prior to mobilisation, consistent with the framework set out in this section, for review and approval by the Engineer and, where applicable, Pak-EPA.

Scope of Dismantling Works

Based on a review of the available engineering drawings and the existing condition of Kashmir Chowk (Club Road), the following categories of ancillary infrastructure fall within the construction footprint of the underpass, approach roads and associated works and are reasonably expected to require dismantling, either in full or in part, to accommodate construction. The extent of dismantling under each category shall be finalised by the Contractor with reference to the approved for-construction drawings and Bill of Quantities.

Existing asphalt pavement and base courses: The existing carriageway surfacing and, where required, the underlying granular base and sub-base layers within the footprint of the existing Kashmir Chowk Roundabout will require removal prior to excavation, typically by cold milling of the wearing course followed by mechanical breaking of the underlying pavement structure.

Road medians and traffic islands: Raised concrete medians, channelizing islands and associated kerbing at the Kashmir Chowk intersection will be dismantled to permit reconfiguration of the at-grade approaches and construction of the underpass ramps.

Kerbs and channels: Precast and cast-in-situ concrete kerbstones and drainage channels running along the existing carriageway edges within the construction limits will be lifted or broken out ahead of roadway reconstruction.

Footpaths and pedestrian paving: Existing footpath slabs along the Islamabad Club, interlocking pavers and associated sub-base within the construction corridor will be removed to facilitate excavation and subsequent reinstatement of pedestrian facilities.

Road furniture: Miscellaneous fixed street furniture, including benches, planters, bollards and delineator posts situated within the works area, will be dismantled and, where in serviceable condition, set aside for reuse in the restored layout.

Traffic signs and sign gantries: Ground-mounted and overhead traffic signage, together with their foundations, will be dismantled in coordination with the Islamabad Traffic Police (ITP) to ensure continuity of driver information through temporary or relocated signage.

Traffic signals and associated poles/cabling: The existing signal poles, controller cabinets and associated underground cabling at the Kashmir Chowk junction will be decommissioned by a qualified electrical contractor in coordination with CDA's Traffic Engineering Directorate prior to physical removal, with temporary signal or traffic-marshall arrangements established beforehand to avoid a gap in junction control.

Street lighting: High-mast and standard street-lighting poles, luminaires and associated underground cabling within the footprint will be de-energised, disconnected and dismantled in coordination with the Islamabad Electric Supply Company (IESCO).

Storm-water drains and appurtenances: Existing surface drains, cross-drainage culverts, catch pits and manholes within the construction limits may also be removed, with temporary drainage arrangements provided to maintain surface water conveyance during the transition period.

Utility chambers and ducts: Manholes, valve chambers, cable chambers and associated ducting belonging to water supply, sewerage, telecommunications and power utilities within the footprint will be exposed, protected or removed in accordance with the utility relocation procedures.

Landscaping and horticulture within construction limits: Ornamental planting, shrubbery, turf and any non-protected trees falling strictly within the approved construction footprint will be cleared in accordance with the tree management and compensatory plantation provisions of the project's Environmental Management Plan; trees outside the confirmed footprint will be protected in place.

Quantities of material to be dismantled under each category shall be established from the approved for-construction drawings and the project Bill of Quantities and are not reproduced here; this section describes the categories and methodology of dismantling only.

Utility Identification and Relocation

Given the density of buried and overhead utility infrastructure typical of a major urban intersection such as Kashmir Chowk, utility identification and relocation constitute a critical precursor activity to demolition and excavation. The Contractor shall implement the following sequence prior to commencement of any dismantling works within the underpass footprint:

Joint utility survey: A joint walk-through and record survey shall be conducted with representatives of CDA, IESCO, the Water and Sanitation Agency/CDA Water Wing, Sui Northern Gas Pipelines Limited (SNGPL, where applicable) and telecommunication operators to confirm the horizontal and vertical alignment of all utilities within and adjacent to the construction footprint against available record drawings.

Underground utility detection: Non-intrusive detection methods, including ground-penetrating radar and electromagnetic cable/pipe locators, supplemented by manual trial pits at critical crossing points, shall be used to verify the position and depth of buried utilities prior to any mechanical excavation, in line with good international utility-avoidance practice.

Coordination with utility agencies: Formal written coordination shall be maintained with each affected utility agency to obtain no-objection certificates, agree relocation alignments and schedules, and confirm responsibility for disconnection, relocation and reconnection works, consistent with CDA's standard utility coordination procedures for road projects.

Protection measures: Utilities that are to remain in service but lie in proximity to the works, such as trunk water mains or high-voltage cabling outside the immediate footprint, shall be protected by measures such as trial-pitting ahead of mechanized excavation, temporary shoring, sleeving, or hand excavation within a defined safety envelope around the utility.

Relocation procedures: Utilities requiring relocation shall be diverted to alignments agreed with the respective agency, generally outside the permanent underpass footprint, with new works constructed, tested and commissioned prior to disconnection of the corresponding existing service wherever operationally feasible, to minimise service interruption.

Service continuity: A service continuity plan shall be prepared for each affected utility identifying interim supply or bypass arrangements, notification procedures to affected consumers, and emergency contact protocols, so that planned interruptions are limited in duration and communicated in advance to CDA and the public.

Demolition Methodology

Dismantling of ancillary works shall proceed in a planned and sequenced manner to minimise disruption to traffic and utility services at Kashmir Chowk and to ensure worker and public safety. The general methodology, from site establishment through to handover of the cleared site for construction, is outlined below:

- i. Mobilisation and site establishment, including erection of hoarding/barricading around the demarcated work zone, installation of warning signage, and setting up of a temporary site office and equipment laydown area at a location approved by CDA.
- ii. Verification of the demolition footprint against approved drawings and physical marking of the limits of dismantling on the ground.
- iii. Completion of the joint utility survey, detection and marking of all buried services, and confirmation of clearances or relocation status for utilities within the marked footprint.
- iv. Disconnection and isolation of live services, including street lighting, traffic signals and any active utility connections within the footprint, carried out by or under the supervision of the respective utility agency.
- v. Removal of above-ground road furniture, signage, guardrails, bollards and signal/lighting poles by manual unbolting or localised breaking of foundations, with salvageable items segregated for reuse or return to CDA stores as directed.
- vi. Cold milling of the asphalt wearing course, where applicable, followed by mechanical breaking of the underlying pavement, kerbs, medians, footpaths and drainage structures using hydraulic breakers and excavators.

- vii. Concurrent or sequential removal of storm-water drains, catch pits and utility chambers within the footprint, with temporary drainage diversions provided to maintain surface water flow.
- viii. Loading and haulage of demolition debris to the designated temporary stockpile or waste management area, with continuous dust suppression during breaking, loading and transport.
- ix. Progressive housekeeping of the cleared area, including removal of loose debris and fines, to leave a clean, graded surface ready for excavation and construction of the underpass structure.
- x. Joint inspection and handover of the cleared site to the construction team, with photographic and written records maintained of the site condition at handover.

Demolition Equipment

The plant and equipment anticipated for the dismantling works are summarized in sub-section 3.18 & 19. The Contractor shall mobilize equipment of appropriate capacity based on the final approved methodology, and all plant shall be maintained and operated in accordance with manufacturer specifications and applicable NEQS noise and emission limits.

Table-1: Anticipated Demolition Equipment and Application

Equipment	Purpose	Typical Application
Hydraulic Excavator	Bulk excavation, loading and demolition support	Breaking out pavement, kerbs and foundations; loading debris into trucks
Hydraulic Breaker (excavator-mounted)	Concentrated breaking of concrete and masonry	Demolition of medians, kerbs, chambers and drainage structures
Wheel Loader	Material handling and stockpiling	Loading and moving segregated demolition debris
Dump Trucks	Haulage of demolition waste	Transport of debris to temporary stockpile and approved disposal sites
Water Bowser	Dust suppression	Wetting of debris, exposed surfaces and haul routes during breaking and loading
Mobile Crane	Lifting of poles, gantries and heavy fixtures	Removal of lighting/signal poles, sign gantries and salvaged steel elements
Asphalt Milling Machine	Controlled removal of asphalt wearing course	Cold milling of pavement surfacing ahead of base course breaking
Plate Compactor	Localised compaction of exposed subgrade	Temporary stabilisation of cleared surfaces prior to handover

Demolition Waste Management Plan

Demolition waste shall be managed in accordance with the waste management hierarchy of avoidance, reduction, reuse, recycling and, only as a last resort, disposal, consistent with NEQS requirements and CDA's solid waste management practices. Waste streams shall be segregated at source to the extent practicable to maximise recovery and minimise the volume requiring final disposal. The anticipated waste streams and their management are summarised in Table 3.18-2.

Table-2: Demolition Waste Management Summary

Material	Expected Source	Reuse Potential	Transportation	Final Disposal
Concrete	Medians, kerbs, chambers, footings	Crushed for use as sub-base/fill where quality permits	Covered trucks to crushing/stockpile area	Licensed inert-waste disposal site if not reused
Asphalt (RAP)	Milled pavement surfacing	High; suitable for recycled asphalt pavement (RAP) in base courses	Covered trucks to stockpile/RAP plant	Recycling preferred; residual to inert disposal site
Steel	Guardrails, signal/light poles, reinforcement	High; scrap steel is fully recyclable	Segregated loading, secured transport	Sale to licensed scrap dealer
Kerbstones	Road kerbing	Moderate; reusable if undamaged	Manual/mechanical loading, palletised where feasible	Reuse in restoration; damaged units to inert disposal
Paving blocks	Footpaths, pedestrian areas	Moderate; reusable if undamaged	Manual/mechanical loading	Reuse in restoration; damaged units to inert disposal
Excavated mixed material	General breaking/excavation residue	Low to moderate; usable as engineered fill subject to testing	Covered trucks	CDA-approved fill/disposal site
Vegetation/green waste	Cleared landscaping within footprint	Low; chipping for mulch where feasible	Open trucks with covering	Municipal green-waste facility or CDA-approved site
Municipal/general waste	Site office and workforce waste	Nil	Covered bins, regular collection	Islamabad Metropolitan Corporation collection system
Hazardous waste (if encountered)	Contaminated soil, old lighting ballasts/lamps, fuel-contaminated material	Nil	Segregated, labelled, sealed containers	Licensed hazardous waste handler per NEQS and Pak-EPA requirements

All debris shall be segregated at the point of generation to the extent practicable, with dedicated stockpile areas designated for inert, recyclable and hazardous materials. Records of waste quantities generated, reused, recycled and disposed of shall be maintained by the Contractor and made available to the Engineer and Pak-EPA on request. Any hazardous or contaminated material encountered unexpectedly during dismantling shall be isolated immediately, characterised, and managed by a suitably licensed contractor in accordance with NEQS and the Pakistan Environmental Protection Act, 1997.

Environmental Protection Measures

Dust suppression: Water sprinkling shall be carried out on demolition debris, exposed surfaces, stockpiles and unpaved haul routes at a frequency sufficient to visibly control dust, particularly during breaking, loading and transport activities and during periods of high wind.

Noise control: Demolition equipment shall be maintained in good operating condition and fitted with manufacturer-standard silencing; noisy activities shall, to the extent feasible, be scheduled to avoid late-night hours, and ambient noise levels shall be monitored against NEQS limits at sensitive receptors.

Air quality: Equipment exhaust emissions shall be controlled through routine servicing, and idling of plant shall be minimised; ambient air quality monitoring shall be conducted periodically in accordance with the project's Environmental Management Plan.

Water pollution prevention: Wash-water and any water used for dust suppression shall be managed to prevent uncontrolled discharge to surface drains; sediment shall be allowed to settle in designated areas prior to any controlled release.

Drainage protection: Temporary drainage diversions shall be provided ahead of removal of existing storm-water infrastructure to maintain conveyance of surface runoff and avoid localised flooding of the work area or adjoining properties.

Waste handling: Debris shall be handled and stockpiled in accordance with the waste management plan in Section 3.18.6, with stockpiles located clear of drainage paths and covered where necessary to prevent windblown dust and material loss.

Fuel and chemical storage: Fuel, lubricants and any chemicals used in connection with plant operation shall be stored in designated, bunded areas away from drainage channels, with spill kits maintained on site at all times.

Spill response: A site-specific spill response procedure shall be maintained, with trained personnel and absorbent materials available to promptly contain and remediate any accidental spillage of fuel or lubricants.

Protection of surrounding vegetation: Trees and landscaping outside the confirmed demolition footprint shall be protected by physical barriers where they are in proximity to plant movement, and no stockpiling or vehicle parking shall be permitted within their root zones.

Protection of public utilities: Utilities that are to remain in service shall be protected in accordance with Section 3.18.3, with excavation in their vicinity carried out under close supervision and, where appropriate, by hand.

Housekeeping: The work area shall be kept in a tidy condition throughout the dismantling works, with debris cleared progressively rather than allowed to accumulate, and access routes kept clear for emergency vehicles and pedestrians.

Traffic marshals: Trained traffic marshals shall be deployed at critical points to guide vehicles through the work zone, particularly during transitions between phases of the works and at temporary diversion points.

Signage: Standard advance warning signs, lane-closure signs and speed-restriction signage shall be installed in accordance with CDA and ITP requirements, positioned to give road users adequate advance notice.

Site Restoration

On completion of dismantling activities within each work phase, the cleared area shall be restored to a safe and orderly condition prior to commencement of permanent underpass construction. Site restoration shall include:

Cleaning: Removal of all loose debris, fines and demolition residue from the cleared footprint and adjoining surfaces affected by the works.

Debris removal: Final clearance and transport of all stockpiled demolition waste from the site to the designated reuse, recycling or disposal destinations identified in Section 3.18.6.

Drain restoration: Reinstatement or provision of temporary drainage arrangements to ensure continued conveyance of surface water pending construction of the permanent drainage system for the underpass.

Surface stabilisation: Grading and, where required, compaction of the exposed subgrade to prevent erosion, ponding and dust generation prior to the commencement of excavation works.

Temporary access restoration: Reinstatement of any temporary access routes used during dismantling to a safe and trafficable condition, or their formal closure if no longer required.

Protection of remaining utilities: Confirmation that utilities retained in service remain adequately marked, protected and accessible for maintenance prior to handover of the site.

Landscape reinstatement: Where dismantling has extended beyond the immediate construction footprint, disturbed areas outside the permanent works shall be reinstated with topsoil and, where appropriate, temporary planting or turfing, pending final landscaping under the project's restoration and rehabilitation plan.

A joint site inspection shall be carried out with representatives of CDA, the Contractor and the Engineer to confirm satisfactory completion of restoration works, with photographic records maintained, before the cleared site is formally handed over for commencement of permanent underpass construction.

BASELINE ENVIRONMENTAL & SOCIAL PROFILE						
Drainage & Watercourses		Adjacent to Project Boundary				
Watercourses		Not Exist				
Roadside trees		Widely Confined				
Existing traffic Context		Uninterrupted during peak hours.				
Attributes		Environmental Impacts				
		Nil	Low	Med	High	Unknown
Land Use						
Existing Population		✓				
Adverse use of natural resources	✓					
Effect on existing vegetation pattern				✓		Afforestation strips along the club road.
Construction camps			✓			
Land clearing				✓		Existing barrel length and entire length of 410m.
Alter local drainage	✓					
Change soil character				✓		Whole length will be converted to urbanized landscape.
Borrow pit sitting	✓					
Water quality and related issues						
Contamination from accidental spills				✓		
Alter physical / chemical / biological state of water		✓				
Ecological Balance				✓		Envisage due to changing in landscape context. More study required to understand the ecosystem dynamics. Mainly Biodiversity Impact Assessment Study
Air and Noise Pollution						
Air Pollution / Dust				✓		
Noise Pollution				✓		
Flora and Fauna						
Green belt Management Plan	✓					
Traffic and Transportation						
Dislocation of traffic during construction				✓		Traffic Management through detours management is required and acrylic sheet to minimize dust and noise generation. The details will be provided when required.

Adequate Planning for safe operation			✓			
Socio-Economic						
Impacts on the local and regional economy		✓				
Changes in cultural patterns		✓				Not anticipated
Dislocation of population	✓					
Health						
New diseases pathway e.g., water borne diseases		✓				
Changing natural environment				✓		
General						
Amenity Impacts				✓		

Annexure- D

Climate Impact Assessment



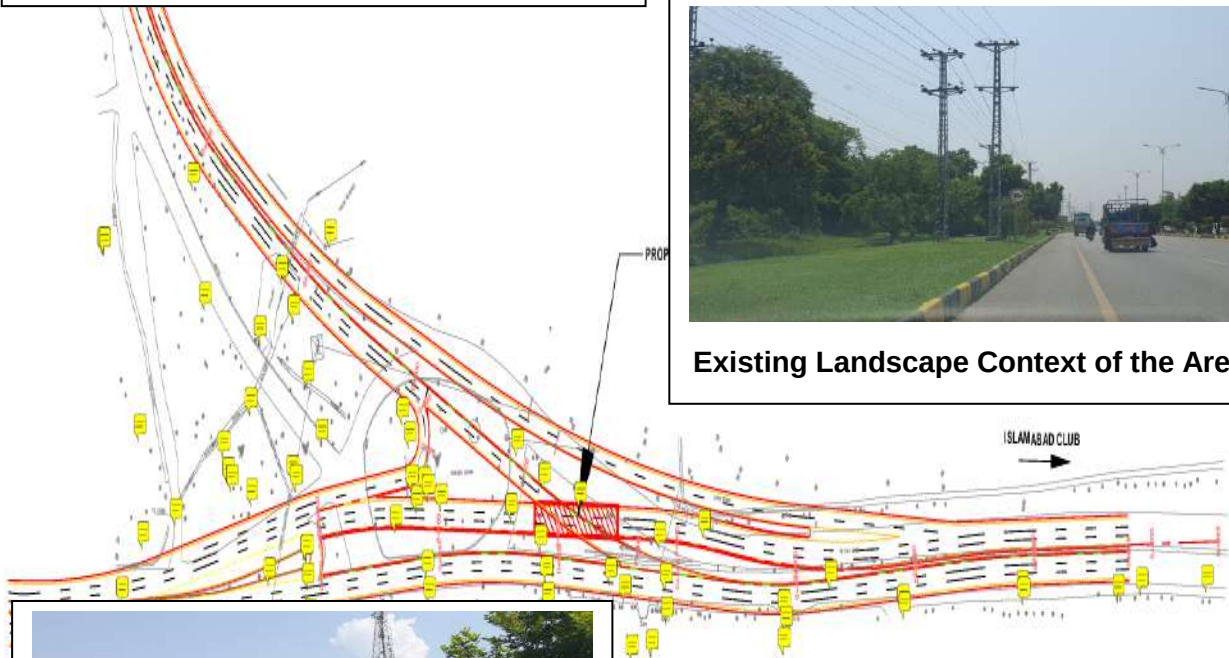
CLIMATE IMPACT ASSESSMENT REPORT
ON
RESOLVING TRAFFIC CONGESTION ISSUES AT KASHMIR
CHOWK



Normal Traffic Hours



Existing Landscape Context of the Area



**Vegetation Pattern Enclosed to
Proposed Site for Underpass**

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Annexure

1. Climate Risk Screening Table
2. Location & Layout Map of the Project;
3. Salient Features/Scope under the of the proposed underpasses;
4. Design View

1. Introduction & Methodology

As the capital city, Islamabad contributes to national GHG emissions through energy consumption, transportation, industrial activities, and waste management. While specific data for Islamabad is limited, urban areas typically have higher per capita emissions due to increased energy use and transportation demands. Implementing localized GHG inventories would provide more accurate data for targeted mitigation strategies.

This Climate Change Impact Assessment (CCIA) evaluates the potential climate-related risks and mitigation measures for the proposed underpass and ramp at Kashmir Chowk Intersection. The assessment considers local climatic trends, greenhouse gas (GHG) emissions, and the project's resilience to changing extreme weather events during monsoon events and temperature variations.

Additionally this report provide information to support the design team to carry out in a manner to apply the climatic measures during the design implementation of scope/design of project and furthering the achievement of objective set out globally for controlling climate during the construction (barrel length 70m and thorough length of 410m) for proposed Kashmir Chowk underpass.

The physical climate risk, which may affect the performance of the proposed Kashmir Underpass project during its expected lifetime, have been identified through a climate risk screening (exhibit Section-3.1). Due to changing trends/patterns in climate, future scenarios are now imperative to examine for controlling the climate and structural stability of the project.

2. Project Description

The project involves the construction of an underpass to improve traffic flow and reduce congestion. The construction activities include excavation, concrete works, drainage installation, and landscaping. The estimated project duration is 3 months.

The project includes the following major works:

- Construction of underpass Kashmir Chowk Roundabout
- Construction of a grade-separated slip road (Right-Turn Road) for Faizabad to Murree bound turning traffic.
- Auxiliary works.

3. Land-Use Pattern of Existing Intersection (Kashmir Chowk)

The area surrounds the proposed underpass is heterogeneous, characterized by a diverse land use pattern that includes government, commercial, residential, and recreational zones. Here are the main land use categories in the vicinity of proposed underpass location at Serana/convention Centre Intersection:

i. **Landscape Context:**

- Mainly confined to reserved dense vegetation area at western end/Southern Western End, enclosed to 300-400m from project site.
- Tree mainly belongs to different taxonomic groups, planted by CDA, which is roadside landscaping/plantation.

ii. **Arterial Route**

- Convention Centre: The Convention Centre in Islamabad, also known as the Jinnah Convention Centre, is a prominent venue for conferences, exhibitions, and other large-scale events. Located in closed proximity to project site.



Figure-1: Existing Landscape Context

iii. **Recreational and Green Spaces:**

- Rawal Lake and Lake View Park: Popular for outdoor activities such as boating, picnicking, and nature walks.
- Islamabad Club Located approximately 0.8–1.0 km southwest of Kashmir Chowk, Islamabad Club is situated along Murree Road (Jinnah Avenue/Club Road vicinity) within the planned institutional and recreational zone of Islamabad. The club is easily accessible from Kashmir Chowk via Srinagar Highway and Jinnah Avenue and is surrounded by other prominent landmarks, including the Convention Centre, Serena Hotel, and various

government and diplomatic establishments. Owing to its strategic location and extensive green landscaping, the club contributes significantly to the recreational and aesthetic character of the area surrounding Kashmir Chowk.

4. Climate Risk Screening

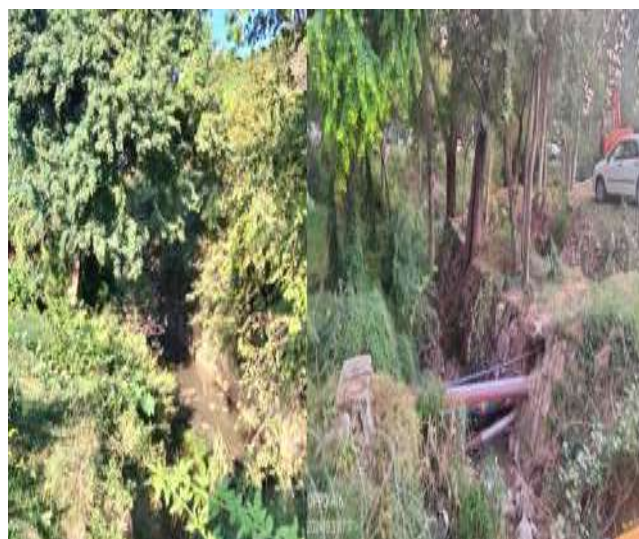
To assess the vulnerability of the proposed development with underpasses to climate change, a climate risk screening was conducted based on key risk factors:

4.1. Risk Factors

- i. **Risk of Flooding:** Low risk due to increased rainfall and inadequate existing nullah/drainage system.
- ii. **Man-Made Hazard:** Moderate risk due to potential alteration in landscape context, leading to change the ecosystem imbalance.
- iii. **Storm Damage:** Low to moderate risk based on wind intensity and storm frequency in the project area.
- iv. **Moon Soon Event:** Potential risk due to prolonged heavy precipitation leading to flooding/water intrusion at underpasses.

4.2. Risk Management Strategies

- **High-Risk Areas:** Implement adaptive measures in underpasses design/scope such as advanced drainage systems and further upgradation of existing water bodies.
- **Moderate-Risk Areas:** Use climate-resilient materials and implement regular maintenance programs.
- **Low-Risk Areas:** Monitor climate trends in coordination with Pakistan Meteorological Department (PMD) and apply mitigation strategies as needed.



Existing Water Body/Nullah

5. Climate Impact Assessment

Islamabad contributes to national GHG emissions through energy consumption, transportation, industrial activities, and waste management. While specific data for Islamabad is limited, urban areas typically have higher per capita emissions due to increased energy use and transportation demands. Implementing localized GHG inventories would provide more accurate data for targeted mitigation strategies.

5.1. National GHG Emissions Overview:

- i. **Total Emissions:** In 2021, Pakistan emitted approximately 481 million metric tonnes of CO₂ equivalent (MtCO₂ e), making it the world's 17th largest GHG emitter.
- ii. **Emission Growth:** Between 1990 and 2021, Pakistan's GHG emissions increased at a compound annual growth rate of 3.6%.
- iii. **Per Capita Emissions:** The per capita GHG emissions in Pakistan were approximately 2.1 tonnes in 2021.

5.2. Greenhouse Gas Emissions

- i. **Construction Phase:** GHG emissions will result from heavy machinery, transportation of materials, and energy use at the site.
- ii. **Operational Phase:** Resolving congestion through underpass may lower vehicle emissions in the long term.
- iii. **Mitigation Measures:** Adoption of fuel-efficient machinery, sourcing materials locally, and use of alternative energy sources where feasible.

5.3. Climate Resilience

- i. **Flood Risk Management:** The underpass is designed with adequate drainage systems to prevent waterlogging during heavy rainfall events.
- ii. **Heat Stress Mitigation:** Landscaping and shaded areas will be integrated to counteract urban heat island effects.
- iii. **Seismic Considerations:** The design will adhere to seismic standards to enhance structural resilience.

5.4. Methane Emission Source During Underpass Construction

- i. **Underpasses excavation:** Methane is produced as microorganisms break down organic matter in the soil.

- ii. **Dewatering and groundwater pumping:** Methane can be released from groundwater as it is pumped out during construction.
- iii. **Fuel combustion:** Methane is emitted from fuel combustion during equipment operation, such as generators, pumps, and heavy machinery.
- iv. **Spoil disposal:** Methane is produced as organic waste decomposes in landfills and spoil disposal areas.
- v. **Underground utility installation:** Methane can be released during the installation of underground utilities, such as gas pipelines

6. Environmental and Social Impact

- i. **Air Quality:** Dust and emissions control measures (e.g., water sprinkling through monthly sprinkling plan, low-emission equipment at batching/asphalt) will be implemented.
- ii. **Water Management:** Runoff control and sediment traps will be installed during construction to minimize water pollution.
- iii. **Biodiversity Impact:** Measures to protect nearby green spaces and dense vegetation area and habitat formation of species on trees along Srinagar Highway and Kahayban--e Suhrwardy roads (Exhibit Location Map-Annexure-1).
- iv. **Community Engagement:** Public consultations will ensure transparency and address concerns regarding noise, air pollution, and accessibility.

7. Greenhouse Gas (GHG) Emissions Assessment

7.1. Construction Phase

- i. Heavy machinery and transportation contribute to CO₂ emissions. Adoption of low-emission equipment, pre-use check/maintenance of equipments and installation of dust chamber/collector on batching and dust air extraction system on asphalt plant can reduce the carbon footprint.
- ii. The use of recycled materials and sustainable sourcing can further mitigate environmental impact.

7.2. Operational Phase

- i. Indirect emissions may arise from increased vehicular movement through the underpasses during peak hours/office hours.

- ii. Effective traffic flow management can reduce idling emissions, thereby contributing to a decrease in overall greenhouse gas (GHG) emissions.
 - Implementation of adaptive traffic signal control systems to optimize vehicle movement and reduce congestion;
 - Use of intelligent transportation systems (ITS) for real-time monitoring and traffic pattern analysis;
 - Construction of dedicated lanes for public transport and high-occupancy vehicles to enhance efficiency;
 - Integration of pedestrian and cycling infrastructure to promote sustainable mobility and reduce vehicular dependency;
 - Deployment of dynamic signage and real-time traffic information systems to guide commuters and minimize travel delays.

8. Climate Resilience Strategies

8.1. Drainage and Flood Control Measures

- Installation of high-capacity drainage systems in a manner to prevent water accumulation along the underpasses
- Upgradation of existing water bodies/Nullahs with hydrological assessments.

8.2. Sustainable Material Use

- Utilize light-colored asphalt and concrete that reflect more solar radiation.
- White or Reflective Coatings: Applied on roads and sidewalks to increase solar reflectance.
- Durable, weather-resistant construction materials to enhance longevity.

8.3. Energy Efficiency

- Incorporation of LED lighting and solar-powered systems to minimize energy consumption.
- Integration of smart traffic management systems to optimize vehicular flow and reduce congestion.

9. Climate Change Considerations

9.1. Temperature Variability

- Rising temperatures may impact the structural integrity of materials used in the underpasses, leading to thermal expansion and contraction.
- High temperatures can also affect asphalt and concrete durability, requiring enhanced material specifications.

9.2. Precipitation and Flooding

- Increased rainfall intensity may lead to waterlogging and localized flooding within the underpass, necessitating robust drainage systems.
- The project must integrate climate-resilient management solutions, including drainage system to control flooding during moon soon events.

9.3. Extreme Weather Events

- High winds and storms may damage infrastructure and signage, necessitating reinforced structures.
- The project should incorporate the wind-resistant design elements as outlined below to withstand potential extreme weather conditions:
 - Use of high-strength concrete and steel to withstand wind pressure.
 - Anchored signage, traffic signals, and lighting poles designed to withstand high winds.
 - Flexible Expansion Joints – Allow for movement and stress absorption during high-wind events.

10. Mitigation Strategies/Measures

- **Use of Sustainable Materials:** Incorporation of low-carbon concrete and recycled aggregates.
- **Renewable Energy Integration:** Solar-powered lighting for the underpass.
- **Green Infrastructure:** Addition of rainwater harvesting systems and permeable pavement.
- **Implement efficient excavation techniques:** Use efficient excavation techniques, such as piling machines, to minimize soil disturbance and reducing methane emissions.

- **Implement fuel-efficient equipment:** Use fuel-efficient equipment and optimize equipment usage to reduce fuel combustion emissions.
- **Monsoon Event Mitigation Measures (Construction Phase):**
 - Temporary Drainage Management: Establishing temporary drainage channels and sediment control structures during construction to prevent site flooding.
 - Reinforced Retaining Walls: Strengthening retaining walls to prevent erosion and collapse due to excessive water flow.
 - Water Pumping Systems: Installing high-capacity water pumps to quickly remove excess water from the construction site.
 - Weather Monitoring & Early Warning Systems: Implementing real-time weather monitoring systems to anticipate and respond to extreme rainfall events.
 - Scheduling Adjustments: Planning construction activities around monsoon seasons to minimize weather-related disruptions.
 - Erosion Control Measures: Using geotextiles, silt fences, and vegetation cover to stabilize soil and reduce runoff.
 - Emergency Response Plan: Developing contingency plans for site evacuation, worker safety, and infrastructure protection in case of severe flooding.
- **Monsoon Event Mitigation Measures (Operational Phase):**
 - Automated Flood Detection Systems: Installing real-time sensors to detect rising water levels and trigger immediate drainage responses.
 - Enhanced Drainage Capacity: Regular maintenance and desilting of storm-water drainage to prevent clogging during heavy rains.
 - Backup Power for Pumps: Ensuring all water pumps have backup power supply to remain functional during extreme weather events.
 - Traffic Diversion Plans: Pre-planned alternative routes and automated signaling to redirect traffic in case of waterlogging.
 - Emergency Response Coordination: Collaboration with local disaster management authorities for rapid flood response and recovery.
 - Public Alert System: Integration of digital alert systems to inform commuters about flood risks and alternative routes.

- **Structural Reinforcements:** Periodic assessment and reinforcement of tunnel walls and entry points to withstand water pressure.

11. Conclusion

The proposed underpasses must integrate climate adaptation and mitigation measures to ensure sustainability and resilience. Adopting green construction practices, effective drainage solutions, and energy-efficient technologies will enhance the project's long-term viability while minimizing its environmental impact.

This proposed underpass have both positive and negative environmental implications. While short-term emissions and construction disturbances are inevitable due to shorter time span of construction, whereas long-term benefits include improved traffic efficiency and reduced vehicular emissions. By implementing the recommended mitigation measures, the project can align with climate resilience goals and contribute to sustainable urban development.

12. Recommendations

- **Conduct a Local GHG Inventory:** Assess emissions from key sectors such as energy, transportation, industry, and waste.
- **Promote Sustainable Transportation:** Encourage public transit, cycling, and walking to reduce vehicular emissions.
- **Improve Waste Management:** Adopt waste reduction, recycling, and composting programs to lower methane emissions from landfills.
- **Implement efficient excavation techniques:** Use efficient excavation techniques, such as piling machines, to minimize soil disturbance and reducing methane emissions.
- **Implement fuel-efficient equipment:** Use fuel-efficient equipment and optimize equipment usage to reduce fuel combustion emissions.

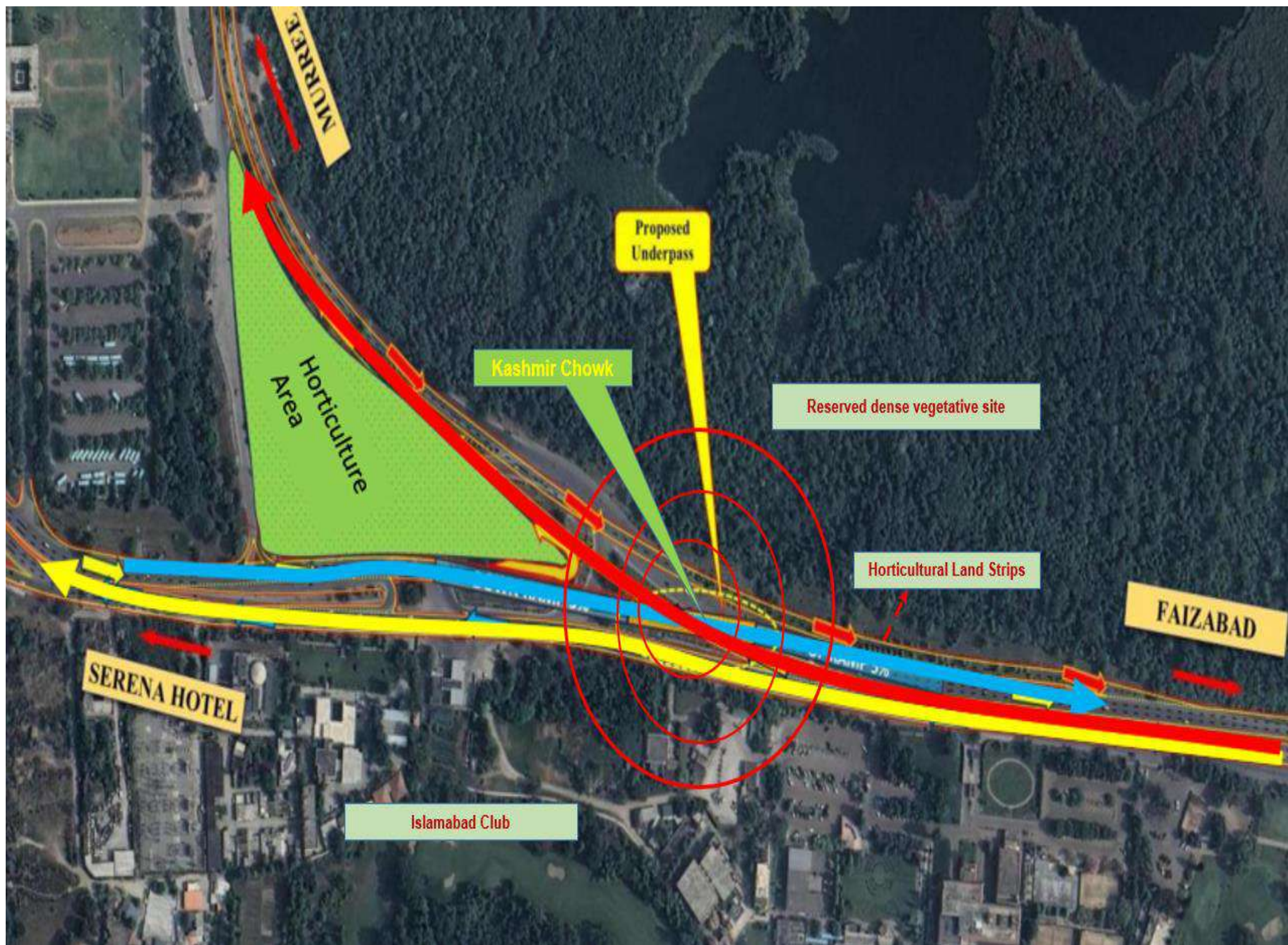


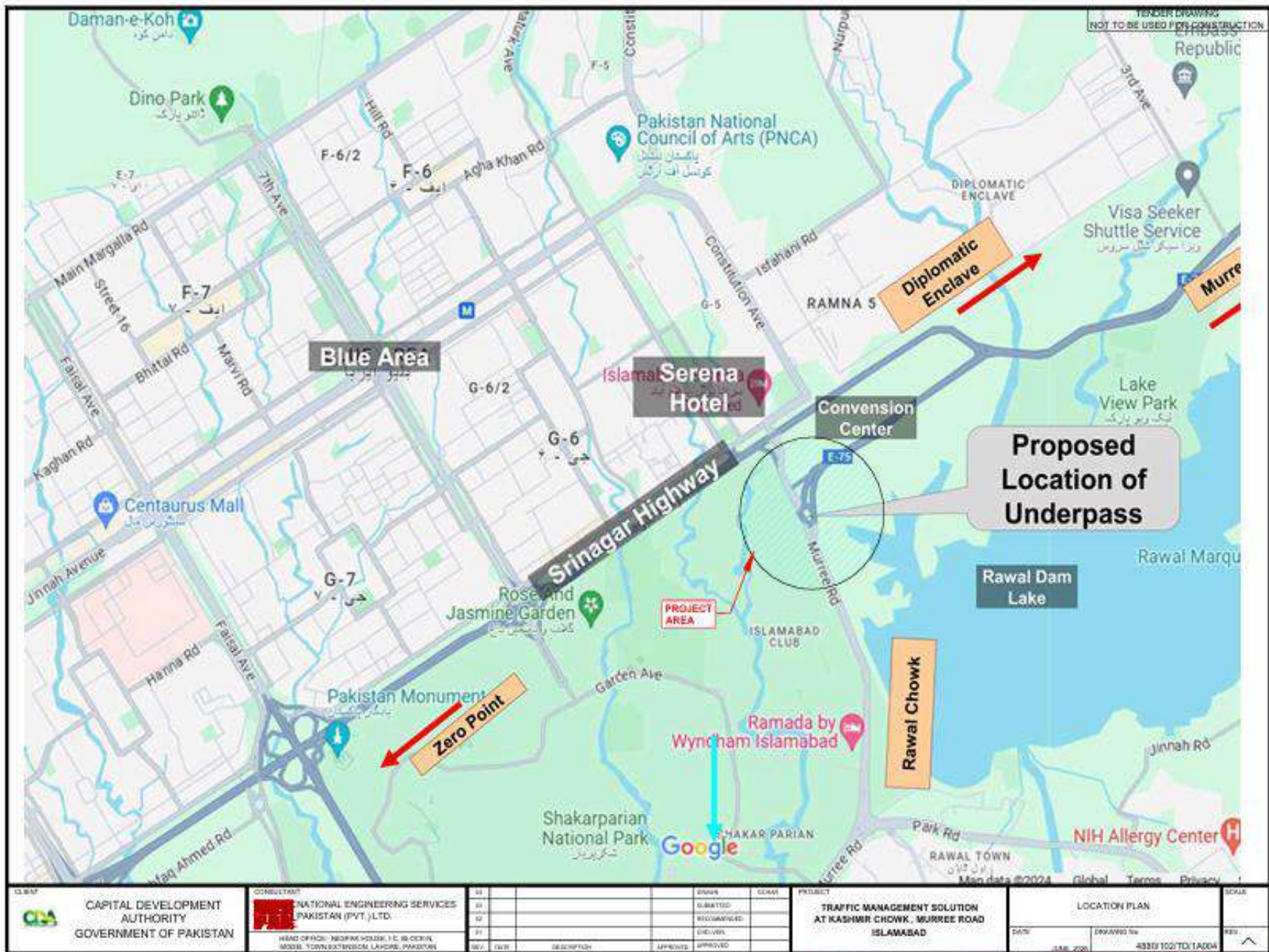
Annexure – I.1: Climate Risk Screening Table

Risk Factor	Livelihood	Impact Severity	Mitigation Measures
Flooding	High	Severe	Advanced Upgrade Drainage, retention basins
Man-Made Hazard	Moderate	Low	Alteration on landscape context, ecosystem imbalance
Storm Damage	Low	Moderate	Wind Resistant design, reinforced signage
Moon soon Events	Moderate	Moderate	Flood resistant design

Annexure – I.1: Green House Gas Emission Estimates

Activity	Emission Source	CO ₂	CH ₄	N ₂ O	Mitigation Strategies
Construction	Machinery and Transport	xx	xx	xx	Low-Emission equipment, efficient logistics
Operation	Traffic Flow	xx	xx	xx	Emission Monitoring with smart traffic control system.





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NO	DATE	DESCRIPTION	APPROVED	APPROVED
01				
02				
03				
04				

PROJECT
TRAFFIC MANAGEMENT SOLUTION
AT KASHMIR CHOWK, MURREE ROAD
ISLAMABAD

LOCATION PLAN
DATE: 11/08/2024
DRAWING No: 4335/102/TO/1A/04

SCALE
1:1000



Salient Features/Scope under the Proposed Underpasses

Detail of the technical parameters/inputs, scope and specification of the project are given below:

Technical Parameters		
Standard/Specification: The project shall conform to the following specifications:		
A. Underpass Along Club Road		
Total Length	:	410 m
Barrel Length	:	70 m
Ramps Length	:	340 m
Underpass Width (Typ)	:	12.5 m
B. Design Parameters		
Pavement Structure (At Grade Roads)		
Asphalt Wearing Course	:	60 mm
Asphalt Base Course	:	90 mm
Water Bound Macadam	:	250 mm
Subbase	:	200 mm
Pavement Structure (Underpass Barrel & Ramps)		
Asphalt Wearing Course	:	50 mm
Asphalt Base Course	:	60 mm
Rigid Pavement (4000 Psi)	:	280 mm
Subbase	:	200 mm