



GOVERNMENT OF PAKISTAN
NATIONAL HIGHWAY AUTHORITY
ISLAMABAD

**CONSULTANCY SERVICES
FOR
FEASIBILITY STUDY AND DETAILED DESIGN
FOR
CONSTRUCTION OF 4 – LANE FLYOVER AT
BARA – KAHU (N-75)**



**ENVIRONMENTAL IMPACT ASSESSMENT
(EIA) REPORT**

JULY 2020

Submitted by :

Associated Consultancy Centre (Pvt.) Ltd., Islamabad.

in association with

Associated Consulting Engineers Limited, Lahore.

Finite Engineering (Pvt.) Limited, Islamabad.

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LIST OF ABBREVIATIONS

CAR	Crude Activity Rate
CDA	Capital Development Authority
CMR	Complaints Management Register
CTMP	Construction Traffic Management Plan
EA	Environmental Approval
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPC	Environmental Protection Council
GFPs	Grievance Focal Points
GoP	Government of Pakistan
GRC	Grievance Redress Committee
HSE	Health Safety Environment
IEE	Initial Environmental Examination
LAA	Land Acquisition Act
M&E	Monitoring and Evaluation
MVEs	Motor Vehicle Examiners
NCS	National Conservation Strategy
NGOs	Non–Government Organizations
NOC	No Objection Certificate
O&M	Operation and Maintenance
OHS	Occupational Health and Safety
OHSAS	Occupational Health and Safety Assessment Series
OPRP	Operational Prerequisite Program
OSHA	Occupational Safety and Health Administration
Pak–EPA	Pakistan Environment Protection Agency
PEPA	Pakistan Environmental Protection Act
PIU	Project Implementation Unit
PKR	Pak Rupees
PPE	Personal Protective Equipment
PSQCA	Pakistan Standards Quality Control Authority
RAR	Refined Activity Rate
SH & E	Safety Health & Environment
UNCED	United Nations Conference on the Environment and Development

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EXECUTIVE SUMMARY

TITLE OF PROJECT

Construction of 4 – Lane Flyover at Bhara – Kahu N–75 (3.5 Km.)

LOCATION OF PROJECT

Bara – Kahu is situated in Islamabad, Pakistan; its geographical coordinates are 33°44'0" North, 73°11'0" East. The proposed site for construction of 04–lane of flyover located at Bara – Kahu on National Highway N–75 (Islamabad – Satra Mile – Lower Topa – Kohala) which is 8.6 Kms. from Zero Point of N–75. Bara – Kahu city is part of Islamabad Capital Territory.

The start point of flyover is at Km 6+500 near Jillani Town, Bara – Kahu and end point is at Km 10+000 near Qaziabad, Bara – Kahu. The length of overhead bridge is about 3.5 km (approximately). The proposed site for said flyover is located on N–75 having high traffic volume.

A BRIEF OUTLINE OF THE PROPOSAL

National Highway Islamabad – Satra Mile–Lower Topa Kohala (N–75) is a strategic road. Its length upto Kohala is about 90 km. It connects Azad, Jammu & Kashmir (AJ&K) with Pakistan at Kohala further it moves towards Muzaffarabad which is capital of Azad Jammu & Kashmir. NHA has upgraded it up to Lower Topa. Murree is famous city for tourism which is located on offset of this N–75 alignment at Km 55 (approx.) which attracts tourists in summer and winter seasons. Therefore, traffic volume on this road considerably increases during these seasons and especially on holidays. A great no. of times traffic blockage has been observed on this road due to high traffic volume. Bara – Kahu city is a well–populated and congested point on N–75 which is located at only 8.6 Kms from Islamabad. The Bara – Kahu is a bottle neck for smooth traffic flow. There is a built–up area having big shopping malls on both sides of this road at Bara – Kahu. Therefore, widening of National Highway at Bara – Kahu seems costlier and there will be a problem for resettlement due to commercial area.

Therefore, to resolve the traffic congestion problems appropriately and to ensure smooth traffic flow on N–75 and safety of people crossing the road and to avoid frequent accidents at this location, NHA intends to construct 4–lane flyover / overhead Bridge at Bara – Kahu on N–75 and that found economic viable after feasibility and details design study.

The objectives of the project are to :

- (a) To keep traffic flow smooth and uninterrupted from Islamabad to Murree and vice versa thus promoting tourism.
- (b) To remove all the existing congestion of the Bara – Kahu road.
- (c) To reduce Travel time.
- (d) Job Opportunities for local people would be created.
- (e) Safe movement of pedestrian across the road would be possible

THE MAJOR IMPACTS AND THEIR MITIGATION MEASURES DURING CONSTRUCTION PHASE

Impacts

- ❖ The main impact during the construction will be the clearing of ROW, cutting and filling of borrow pits including erosion of topsoil cover.
- ❖ Soil erosion due to Construction activities, earthwork, and cut and fill, stockpiles etc.
- ❖ Contamination of soil due to leakage / spillage of oil, bituminous and non-bituminous debris generated from demolition and road construction
- ❖ Dust Generation due to construction activities and transport, storage and handling of construction materials.
- ❖ Noise from construction activities and operation of equipment and heavy machinery
- ❖ Sourcing of water during Construction
- ❖ Construction waste and debris may affect local people.
- ❖ Safety of Workers and accident risk from construction activities
- ❖ Approach / hindrance problems for the local resident's / business owners and movement of the people will be disturbed during construction activities.
- ❖ Construction will pose burden on the existing natural resources

Mitigation

- ❖ Low embankments will be protected by planting vetiver grass that can flourish in relatively dry conditions.
- ❖ Soil contamination by asphalt will be minimized by placing all containers in caissons
- ❖ Construction vehicles and equipment will be maintained and refueled in such a fashion that oil / diesel spillage does not contaminate the soil.
- ❖ Unloading of loose and fine materials through covered vehicles.
- ❖ All equipment to be timely serviced and properly maintained
- ❖ Arrangements shall be made by contractor that the water availability and supply to nearby communities remain unaffected
- ❖ Dumping sites will be selected away from residential areas and water bodies
- ❖ Dumping sites must be having adequate capacity equal to the amount of debris generated.
- ❖ Safe work practices will be followed and applied by the contractor.
- ❖ At construction site fluorescent and retro refractory signage will be used
- ❖ Timely completion of the construction work and provision of alternate routes for the areas where the construction is being carried out
- ❖ One strategy for conserving aggregate resources and reducing the demand for virgin aggregate is to recycle and reuse materials in road construction

THE MAJOR IMPACTS AND THEIR MITIGATION MEASURES DURING OPERATIONAL PHASE

Impacts

- ❖ Accident risks associated with traffic movement

- ❖ Lack of maintenance during operational phase can cause harm
- ❖ Noise generation

Mitigation

- ❖ All safety features provided in the main approach roads such as guide rails, speed bumps, will be maintained and kept in good condition.
- ❖ Traffic control measures, including speed limits, will be forced strictly
- ❖ Implementation of HSE Plans during the maintenance period.
- ❖ Strict implementation of PPEs.
- ❖ Ban on use of pressure horns;
- ❖ Proper implementation of inspection and maintenance program for vehicles

POSITIVE IMPACTS DURING OPERATIONAL PHASE

- ❖ Air quality will improve due to smooth flow of traffic
- ❖ Noise level will decrease because of smooth traffic flow

PROPOSED MONITORING PLAN

The monitoring program is designed to assess effective implementation of the Environmental Impact Assessment (EMP). Monitoring Program (MP) provides important information that allows for more effective planning and an adaptive response based on the assessment of effectiveness of mitigation measures. The monitoring of various parameters will help to determine the extent to which project operation activities causes' environmental disturbance.

Sr. No.	Monitoring Parameter	Monitoring Location	Frequency
CONSTRUCTION PHASE			
1.	Ambient Air Monitoring for PM ₁₀ , CO, NO _x , SO ₂ , O ₂ , O ₃ , etc	Construction site	Quarterly
2.	Noise Levels	Construction site	Monthly
3.	Drinking Water Quality	Construction site	Quarterly
4.	Occupational health & safety	Construction site	Daily basis
OPERATIONAL PHASE			
1.	Ambient Air Monitoring	Bara Kahu flyover	Quarterly
2.	Water Quality	Bara Kahu flyover	Quarterly & End of summer before the onset of Monsoon every year
3.	Noise Level	Bara Kahu flyover	Quarterly

1.0 INTRODUCTION

1.1 BRIEF DESCRIPTION OF NATURE, SIZE AND LOCATION OF PROJECT

This Environmental Impact Assessment (EIA) Study being carried out for the construction of 4-Lane Flyover at Bhara – Kahu N-75 (3.5 Km). Bhara – Kahu is situated in Islamabad, Pakistan; its geographical coordinates are 33°44' 0" North, 73°11' 0" East. The proposed site for construction of 04-lane of flyover located at Bhara – Kahu on National Highway N-75 (Islamabad – Satra Mile – Lower Topa – Kohala) which is 8.6 Kms. from Zero Point of N-75. Bara – Kahu city is part of Islamabad Capital Territory. The start point of flyover is at Km 6+500 near Jillani Town, Bhara – Kahu and end point is at Km 10+000 near Qaziabad, Bhara – Kahu. The length of overhead bridge is about 3.5 km (approximately).

Highway projects are generally undertaken to improve the economic and social welfare of the people. At the same time, they may also create adverse impacts on the surrounding environment. People and property in the direct path of the road works are affected. Highway development and operation should, therefore, be planned with careful consideration of the environmental impact. To minimize these adverse effects that may be created by highway development projects, the techniques of EIA become necessary. Identification and assessment of potential environmental impact should be an integral part of the project cycle it should commence early in the planning process to enable a full consideration of alternatives and to avoid later delays and complications.

In view of the above, an EIA will be carried out for the Environmental aspects of all stages of the projects i.e. preconstruction, construction and post construction with the following objectives:

- ❖ Establishing the environmental baseline in the study area and identifying any significant environmental issue.
- ❖ Assessing these impacts and providing for the requisite avoidance, mitigation and compensation measures
- ❖ Integrating the identified environmental issues in the project planning and design
- ❖ Developing appropriate management plans for implementing, monitoring and reporting of the environmental mitigation and enhancement measures suggested.

1.2 PURPOSE OF REPORT

This EIA report is being prepared to fulfill the legal requirements of the Pakistan Environment Protection Act 1997 for obtaining the Environmental Approval (EA) for the subjected project. The other relevant regulations and guidelines considered while preparing this EIA report include:

- (a) Policy and procedures for filing, review and approval of environmental assessments.
- (b) Guidelines for the preparation and review of environmental reports
- (c) Guidelines for public participation.

- (d) Guidelines for sensitive and critical areas.
- (e) Detailed sectoral guidelines.

Different environmental aspects like, physical, biological and other related features of the project during regular occupancy are highlighted in this EIA report. The necessary measures to be adopted to mitigate negative environmental impacts on any segment of the environment in and around are also described. All the important project related information is also provided as desired by the Guidelines for the Preparation of IEE / EIA reports–1997, based on which present report has been prepared. This report will also help the decision makers to issue the desired Environmental Approval (EA) / No Objection Certificate (NOC).

1.3 NEED OF THE IEE / EIA STUDY

Government of Pakistan in the year 2000 has adopted the regulations for the Review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA), under these review regulations, the Environmental Protection Agency (EPA) stipulated relevant procedures for the proponents to be compliance with environmental quality requirements for the preparation of environmental assessment studies (either IEE or EIA). These environmental studies are planning instruments that aim to contribute to design phases of the development as well as functions as management tools to minimize potential negative impacts and maximize benefits during operational phases of a project. To be effective in this role the IEE or EIA needs to form an integral part of the project design process. In this way the environmental implications of various design alternatives can be evaluated and the cost benefits of different trade-offs assessed. The result is the potentially negative impacts can often be avoided and almost always reduced, without compromising the real cost of the project. Conversely, positive environmental outcomes associated with the project can be enhanced.

Moreover, it is also a legal requirement of the Pak EPA, Section 12, which requires that no proponent of a project can commence work on ground, even capacity enhancement, unless he has filled the IEE / EIA Report, as the case may be, and obtained the Environmental Approval.

1.4 OBJECTIVE OF THE REPORT

Objectives to conduct EIA are as following :

- ❖ A legal binding in accordance to Pakistan Environment Protection Act–1997.
- ❖ To identify the potential environmental issues pertaining to the project site.
- ❖ To evaluate the ability of the site in view of social acceptance and environmental soundness.
- ❖ To provide the maximum information to the proponent and other stakeholders about the existing environmental conditions and the implications of the present project.
- ❖ Collection of available data, reports, drawings and other relevant information about area of subjected project.
- ❖ Review of applicable existing environmental legislation and Environmental Standards.

- ❖ Propose mitigation measures to eliminate or to reduce the negative impacts to an acceptable level.
- ❖ Development of well-resourced environmental management and monitoring plans to identify mitigation strategies targeted towards avoidance, minimization and rehabilitation of the impacts.

1.5 METHODOLOGY

The methodology adopted to carry out the EIA study of the subjected project was as follow :

- ❖ Orientation
- ❖ Planning of Data Collection
- ❖ Data Collection
- ❖ Site Reconnaissance
- ❖ Literature Review
- ❖ Desk Top Research
- ❖ Public Consultations
- ❖ Field Studies
- ❖ Laboratory Analysis
- ❖ Evaluation of Impacts and their analysis
- ❖ Categorization of impacts based on their potential environmental significance and prescription of preventive / mitigation measures

In addition to the evaluation and review of the available records, data and the facts for the previous project, detailed discussions were held with the concerned members of the project management as well as other project stakeholders.

Notes and proposals for measures to be taken to mitigate and compensate for any determined / detrimental environmental impacts are contained in the Environmental Management Plan (EMP) as well as a Monitoring Plan, including all parameters that need to be measured and the frequency of monitoring actions.

A comprehensive qualitative and quantitative methodology was adopted to conduct this study inter-alia in due compliance with the EIA requirements. The study included collection of both primary and secondary data regarding environmental status and other relevant factors. This EIA report has been accomplished after carrying out thorough visit to the subjected site and detailed investigation to identify the following Environmental areas of concern:

- ❖ To achieve the desired environmental compliance standards; as per the national & provincial environmental regulatory requirements; as applicable to the project.
- ❖ Plans and activities to prevent / mitigate any potential impacts and the gaps that could probably remain after implementation.
- ❖ Any other points / steps to be taken which could be beneficial to mitigate environmental adverse impacts that may accrue both during regular operation of the project.

A View of Methodology for Environmental Assessment is given in the following Table – 1.1.

TABLE – 1.1 : ENVIRONMENTAL AND SOCIAL ASSESSMENT PROCESS

Phase	Activities	Status	Responsibility
Screening and Scoping	Reconnaissance and initial site: visit and consultations, identification of environmental issues & applicable safeguard environment policy, categorization and working out an action plan.	Carried out during the present EIA	Environment Consultant
Impact Assessment	Identification of potential environmental and social impacts through site visits, stakeholders consultations, review of drawings, alternatives etc.	during the present EIA	Environment Consultant
Impact categorization	The significant potential impacts were tabulated and mitigation / preventive measures were prescribed	during the present EIA	Environment Consultant
EMP Preparation	Stakeholders Consultation	Carried out during / prepared as part of the present EIA	Environment Consultant
	EMP		
Final EMP	Final version of EMP produced	Included in the present EIA	Environment Consultant

2.0 POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

This chapter provides an overview of the policy framework, national legislation, regulation and standards applicable to the project. The proposed “Construction of 4– Lane Flyover at Bhara – Kahu N–75 (3.5 Km)” Project is required to comply with the national legislation relating to environment in Pakistan and to obtain all regulatory clearances in accordance to the environmental law. The relevant Laws and regulations that are expected to apply in this project are discussed in this chapter.

The proposed project, like other development projects, requires an EIA in accordance with the Pakistan Environmental Protection Act (PEPA), 1997 and IEE / EIA Regulation, 2000.

2.1 POLICY FRAMEWORK

The Ministry of Environment is the responsible authority for policy making on environmental protection in Pakistan.

2.1.1 National Environment Policy, 2005

In March 2005, Government of Pakistan (GOP) launched its National Environmental Policy, which provides an overarching framework for addressing the environmental issues. Section 5 of the policy commits for integration of environment into development planning as instrument for achieving the objectives of National Environmental Policy. It further states in clause (b) of subsection 5.1 that EIA related provisions of Environmental Protection Act, 1997, will be diligently enforced for all development projects. It also provides broad guidelines to the federal government, provincial governments, federally administered territories and local governments to address their environmental concerns and to ensure effective management of their environmental resources.

2.2 LEGAL FRAMEWORK

2.2.1 Pakistan Environmental Protection Act, 1997

The Act was enacted on December 06, 1997 by repealing the Pakistan Environmental Protection Ordinance 1983. It provides the framework for implementation of the Pakistan National Conservation Strategy, 199, establishment of provincial sustainable development funds, protection and conservation of endangered floral and faunal species, conservation of renewable resources, and establishment of Environmental Tribunals, appointment of Environmental Magistrates, Initial Environmental Examination and Environmental Impact Assessment. Section 12 of the Act provides for environmental assessment study: Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) prior to commencement of construction or operation of a Project. The key features of the law that have a direct bearing on the proposed project relate to the requirement for an initial environmental examination (IEE) and environmental impact assessment (EIA) for development projects. Section 12(1) requires that :

“No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an Initial Environmental Examination (EIA) or, where the subproject is likely to cause an adverse environmental effect, an environmental impact assessment (EIA), and has obtained from the Federal Agency approval in respect thereof.”

Under section 12 of PEPA, no project involving construction activities or any change in the physical environment can be undertaken unless an EIA report is submitted to the concerned EPA and an Environmental Approval to be obtained.

2.2.2 Pakistan Environmental Protection Agency (Review of IEE / EIA) Regulations, 2000

These regulations provide lists of the Projects requiring IEE and EIA. They also briefly describe the preparation and review of environmental reports. In accordance with Regulation 4 of these Regulations, an EIA for the proposed project satisfying the requirements of the Section 12 of PEPA Act of 1997 needs to be submitted to concerned EPA, Environmental Protection Department (EPD), for reviewing environmental approval. A majority of proposals having less significant impacts or no impacts would be screened out of EIA study; however, only few having significant impacts would go for further EIA. EIA including detailed EMP would be carried out by the project proponent and the report would be submitted to EPA for review and decision for its approval. In case, approval is granted, the implementation of the EIA and conditions of approval would be followed. For the projects which are not approved, the project should be redesigned and EIA should be resubmitted for review and approval. As per IEE / EIA Regulations, 2000 the review time period required for IEE is 45 days and for EIA is 90 days.

2.2.3 Environmental Assessment Guidelines

Pak-EPA has also published environmental assessment procedures and guidelines in October, 1997, which contains the following sets of information relevant to the proposed project :

- ❖ **Guidelines for Policy and Procedures for Filing, Review and Approval of Environmental Assessment Reports.**

It describes environmental policy and administrative procedures to be followed for filing of environmental assessment reports by the proponents and its review and approval by the concerned environmental protection agency / department.

- ❖ **Guidelines for the Preparation and Review of Environmental Reports**

These guidelines are developed to facilitate both the proponents and decision makers to prepare reports (inclusive of all the information contained therein) and carry out their review so as to take informed decisions. Following are the major areas, which are covered by these guidelines:

- The EIA Report (scope, alternatives, site selection, format of EIA Report)
- Assessing impacts (identification, analysis and production, baseline data, significance)
- Mitigation and impact management (and preparing an environmental management plan)
- Reporting (drafting style, main features, shortcomings, other forms of presentation)
- Review and decision making (role, steps, remedial options, checks and balances)
- Monitoring and auditing (systematic follow up, purpose, effective data management)
- Project Management (inter-disciplinary teams, programming and budgeting)

❖ **Sectoral Guidelines 1997 : Major Roads**

These guidelines represent issues / impacts commonly arising due to the road projects, the mitigations to reduce / eliminate these impacts and the need for environmental management plan and monitoring plan to protect the environment

❖ **Guidelines for Public Consultation**

These guidelines deal with possible approaches to public consultation (PC) and techniques for designing an effective program of consultation that reaches out to all major stakeholders and ensures the incorporation of their legitimate concerns in any impact assessment study. These guidelines cover:

- Consultation, involvement and participation of Stakeholders
- Techniques for public consultation (principles, levels of involvements, tools, building trust)
- Effective public consultation (planning, stages of EIA where consultation is appropriate)
- Consensus building and dispute resolution
- Facilitation involvement (including the poor, women, building community and NGO capacity)

❖ **Guidelines for Sensitive and Critical Areas**

These guidelines identify sensitive and critical areas in Pakistan, in relation both to the natural environment and the cultural aspects.

❖ **National Resettlement Policy and Ordinance**

At this point, the only legislation relating to land acquisition and compensation is the Land Acquisition Act (LAA) of 1894. Following a national consultative process, a national resettlement policy and a related ordinance were drafted. The

draft policy and the ordinance are presently being reviewed by the provinces, and have yet to be approved and notified by the government. The salient applicable features of the Draft Resettlement Policy are given below :

- The Pak–EPA will be responsible for both environment–related as well as resettlement–related matters,
- The responsibilities for implementation at a provincial level are to be delegated to the concerned provincial EPAs with overall control of the provincial Planning and Development (P&D) Departments.
- All categories of ‘loss’ arising from development projects that entail resettlement, need to be addressed: these include not only loss of land, built–up property, other infrastructure, and crops and trees, but also loss of income, job opportunities, and access to natural resources, etc.
- Vulnerable groups whose issues need to be addressed in particular include: women, children, destitute persons, tribal communities, squatters, those with usurper rights, and landless groups.
- There should be a special emphasis on consultation with affected groups when preparing a Resettlement Action Plan (RAP).

2.2.4 Pakistan National Conservation Strategy

The Pakistan National Conservation Strategy (NCS) was approved by federal cabinet in March 1992 and is the principal policy document on environment issues in the country. The Policy outlines the country's primary approach towards encouraging sustainable development, conserving natural resources and management of resources. NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for preservation of Pakistan's natural and physical environment. The core areas that are relevant in the context of the proposed Project are pollution prevention and abatement, conserving biodiversity, protecting the wildlife sanctuary and preservation of cultural heritage.

2.2.5 Provincial Local Government Ordinance, 2001

These ordinances, issued following the devolution process, establish regulations for land use, the conservation of natural vegetation, air, water, and land pollution, the disposal of solid waste and wastewater effluents, as well as matters related to public health and safety.

2.3 NATIONAL ENVIRONMENTAL REGULATORY / LEGAL REQUIREMENTS

Hereunder, the major national applicable laws applicable for the project are given in Table – 2.1.

TABLE – 2.1 : KEY ENVIRONMENTAL LAWS

LEGAL INSTRUMENT	SCOPE AND APPLICABILITY	RELEVANCE
Pakistan Penal Code, 1860	In the context of the environment, the Penal Code empowers local authorities to control noise, toxic emissions and disposal of effluents.	The project activities will have to be carried out in spirit of this ordinance.
Land Acquisition Act 1894	Empowers the government to acquire private land for projects of national importance and lays down the acquisition procedure.	If the land for the project is acquired through the government, the acquisition process shall comply with this law.
Forest Act 1927	Regulates forest resources. Empowers the government to declare any forest area reserved or protected.	Not relevance as there is no reserve or protected forest in the Project area.
National Conservation Strategy (NCS)	The NCS outlines the country's primary approach towards encouraging sustainable development, conserving natural resources, and improving efficiency in the use and management of resources	For a sustainable development the project must follow the spirit of NCS.
Pakistan Environmental Protection Act, 1997	PEPA, 1997 is a fairly comprehensive legislation and provides protection, conservation, rehabilitation and improvement of the environment. It contains concrete action plans and programs for the prevention of pollution and promotes sustainable development	The Apex Environmental law for the protection of environment whole project cycle shall follow this law.
Standards for Drinking Water	The Pak EPA has published a set of standards for drinking water quality for the protection of public health and for sustainable development.	The project is required to show the compliance with the standards for drinking water at site and during the whole project cycle.
Standards for Liquid Waste Water	The Pak EPA has published a set of standards 35 various parameters for waste water quality for the protection of natural drainage and for sustainable development.	The project is required to show the compliance with the standards for waste water before the final discharge of effluent from the site and during the whole project cycle.
Standards for Ambient Air	The EPA has published the standards for ambient air applicable for the whole province.	The project has to show the compliance with the Ambient Air Quality Standards during its whole project life
Standards for Noise	The EPA has published the set of standards related with the noise levels of the area in respect to the various zones like Construction Site.	The project falls in Transport (Major Roads) hence shall follow the standards of noise related with the Construction Site of roads.

2.4 OTHER RELEVANT LAWS

2.4.1 Cutting of Trees (Prohibition) Act, 1975

This act prohibits cutting or chopping of trees without permission of the concerned forest department.

2.4.2 The Antiquities Act, 1975

Archaeological sites and monuments are specifically protected under this Act.

2.4.3 Pakistan Penal Code, 1860

This defines the penalties for violations concerning pollution of air, water bodies and land.

2.4.4 Land Acquisition Act, 1894

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

2.4.5 Explosives Act, 1884

Under the Explosives Act, 1884, the Project contractors are bound by regulations on handling, transportation and using explosives during quarrying, blasting, and other purposes.

2.4.6 Provincial Wildlife (Protection, Reservation, Conservation and Management) Act, Ordinances and Rules

In addition to empowering the Provincial Wildlife Departments to establish game reserves, parks, and wildlife sanctuaries, these acts regulate the hunting and disturbance of wildlife. While reviewing an EIA, the Provincial EPD may consult the Provincial Wildlife Department in case the project has an impact on wildlife. EPD may require IPD to coordinate the implementation and monitoring of project impacts with the Provincial Wildlife Departments.

As there is no game reserve, parks and wildlife sanctuary in the project area so the project will not governance by the above Act, ordinance and rules.

2.4.7 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

2.4.8 Motor Vehicle Rules, 1969

Motor Vehicle Rules 1969 (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

2.4.9 Building Code of Pakistan

The provision of Building Code of Pakistan shall apply for engineering design of building like structure and related components. The construction in violation of the Building code shall be deemed as violation of professional engineering work. Moreover, a certificate for the propose action will be obtained from Capital Development Authority (CDA).

2.4.10 National Climate Change Policy, 2012

The National Climate Change Policy provides a framework for addressing the issues that Pakistan faces or will face in future due to the changing climate. It was formulated in September 2012. The goal of this policy is to ensure that climate change is mainstreamed in the economically and socially vulnerable sectors of the economy and to steer Pakistan towards climate resilient development. The transport sector has shown the highest emission growth rate of all sectors and accounts for about a quarter of carbon dioxide emissions in Pakistan. Managing emissions in the transport sector is therefore crucial for tackling climate change.

3.0 DESCRIPTION OF PROJECT

Describes type & category of project, its objectives location & layout, features of site related to vegetation, project schedule of implementation and complete description of project related to its process and steps. Restoration plan its rehabilitation is also mentioned in this chapter.

3.1 TYPE AND CATEGORY OF PROJECT

According to the review of the Initial Environmental Examination (IEE) / Environmental Impact Assessment (EIA) Regulation 2000, this project falls in **Schedule-II, Section-D “Transport”, Sub-Section-2 “Federal or Provisional highways or major roads (except maintenance, rebuilding and re-construction of existing roads) with total cost of Rs. 50 million and above”** for which Environmental Impact Assessment (EIA) Report is required.

Therefore, to fulfill the legal requirements of Section-12 of the Pakistan Environment Protection Act-1997, the client is required to submit the EIA Report in the Environmental Protection Agency, Government of the Pakistan, Islamabad to obtain the required Environmental Approval (EA).

3.2 OBJECTIVES OF PROJECT

The objectives of the project are to :

- (a) To keep traffic flow smooth and uninterrupted from Islamabad to Murree and vice versa thus promoting tourism.
- (b) To remove all the existing congestion of the Bhara – Kahu Road.
- (c) To reduce Travel time.
- (d) Job Opportunities for local people would be created.
- (e) Safe movement of pedestrian across the road would be possible

3.3 ALTERNATIVES CONSIDERED, AND REASONS FOR THEIR REJECTION

The alternatives for the project and their relative potential impacts on the environment were considered to evaluate the best project option. The following alternatives were considered for the project :

- ❖ Project Requirement
- ❖ Alternative Site Option

3.3.1 Project Requirement

Bara – Kahu city is a well-populated and congested area on N-75 which is located only 8.6 Km from Islamabad. The Bara – Kahu is a bottle neck for smooth traffic flow along National Highway N-75 because there is also built up area having big shopping malls on both sides of this road at Bara – Kahu. Therefore, widening of National Highway at Bara

– Kahu will involve heavy financing along with here will be an issue of resettlement being commercial area along N-75. Therefore, to resolve the traffic congestions problems appropriately and to ensure smooth traffic flow on N-75 & safety of people crossing the road and to avoid frequent accidents at this location, NHA intends to construct 4-lane flyover / overhead Bridge at Bara – Kahu on N-75.

3.3.2 Alternative Site Option

An extensive reconnaissance survey is conducted to assess the feasibility of alternative alignments to bypass the urban area / built-up area of Bara – Kahu to avoid the construction of proposed Flyover / Overhead Bridge, if possible. General topographic features including terrain, land use properties, availability of land, agriculture, geotechnical, geological characteristics and length of alternate route are assessed in the reconnaissance survey of the project alignment alternatives.

This survey is also based on the study of maps and other available data identified during the inception phase. Existing lower-resolution contour maps published or developed from photogrammetric mapping, are sufficient only for planning purposes.

Three (03) alignment alternatives are considered to be a bypass on North for the existing alignment. Details of these three consider alignment alternatives are discussed in Chapter “**ANALYSIS OF ALTERNATIVES**”, however based on the site visit, it is recommended to use existing alignment (N-75) by constructing elevated bridge / flyover for the through traffic due to following reasons:

- ❖ No land acquisition is required as minimum 31.5-meter ROW is available and construction of flyover / overhead bridge on the center line of existing facility is quite possible.
- ❖ No major resettlement related issues shall be encountered while accommodating dual carriageway flyover / overhead bridge in built-up area of Bara – Kahu.
- ❖ Shortest possible way between the start and end point of the project.
- ❖ Existing alignment (N-75) is almost straight having a single sharp curve (Minimum radius is 125 meters) which fulfills the design speed of 60 Kph. However, efforts shall be made to improve the existing alignment to meet the minimum design speed of 70 kph as per TOR.
- ❖ Maximum longitudinal grade is 4% on the existing alignment. However, criteria of maximum 3% longitudinal grade shall be followed in detail design of flyover / overhead bridge as per the required design parameter in TOR.
- ❖ Local traffic will utilize the existing road after rehabilitation and through traffic shall ply on new flyover / overhead bridge hence elimination of congestion shall be achieved.
- ❖ Vehicle operational cost shall be reduced due to enhancement in the level of service and reduction of travel time in built-up area of Bara – Kahu.
- ❖ Safety of pedestrians and traffic shall be enhanced.
- ❖ Difficulties in land acquisition and very high land cost in Islamabad justify the option of fly over on the existing alignment.

3.3.2.1 Comparison of Three Alignment Alternatives of N-75 Bypass with Existing Alignment

An alignment comparison has been made on Google Earth to better understand the existing (N-75) alignment with the suggested Alternatives (1, 2 & 3). Following Map (Figure – 3.1) shows the comparison of three different alignments of Bara – Kahu Bypass with the Existing Alignment.

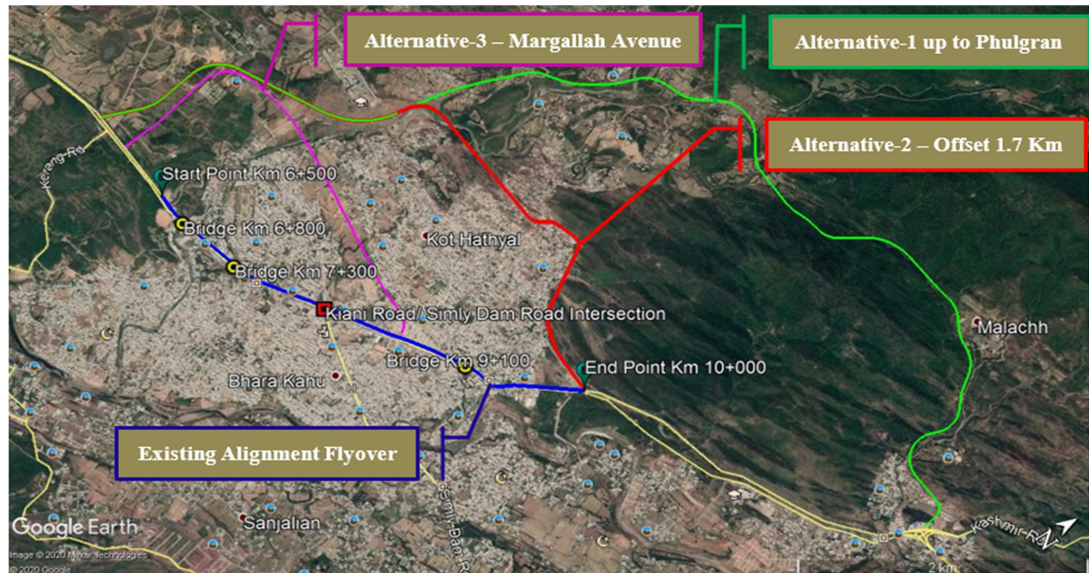


FIGURE – 3.1 : COMPARISON OF THREE (03) ALIGNMENT ALTERNATIVES WITH EXISTING ALIGNMENT

Following Table – 3.1 shows the comparison of all alignments with route length, minimum curve radius and maximum longitudinal grade :

TABLE – 3.1 : DETAILS OF ALTERNATIVE ALIGNMENTS OF (N-75)

SR. NO.	ALIGNMENT DESCRIPTION	LENGTH (KM.)	MINIMUM RADIUS (M)	MAXIMUM GRADE (%)
1.	Existing Alignment – Flyover	3.5	≈ 135	≤ 3 %
2.	Alternative 1 – Bypass	9.3	≈ 80	≤ 6 %
3.	Alternative 2 – Bypass	5.4	≈ 40	≤ 6%
4.	Alternative 3 – Bypass & Flyover	5.0	≈ 135	≤ 3 %

3.4 LOCATION AND SITE LAYOUT OF PROJECT

Bara – Kahu is situated in Islamabad, Pakistan; its geographical coordinates are 33°44'0" North, 73°11'0" East. The proposed site for construction of 04-lane of flyover located at Bara – Kahu on National Highway N-75 (Islamabad – Satra Mile – Lower Topa – Kohala) which is 8.6 Kms from Zero Point of N-75. Bara – Kahu city is part of Islamabad Capital Territory.

The start point of flyover is at Km 6+500 near Jillani Town, Bara – Kahu and end point is at Km 10+000 near Qaziabad, Bara – Kahu. The length of overhead bridge is about 3.5 km (approximately). The proposed site for said flyover is located on N-75 having high traffic volume.

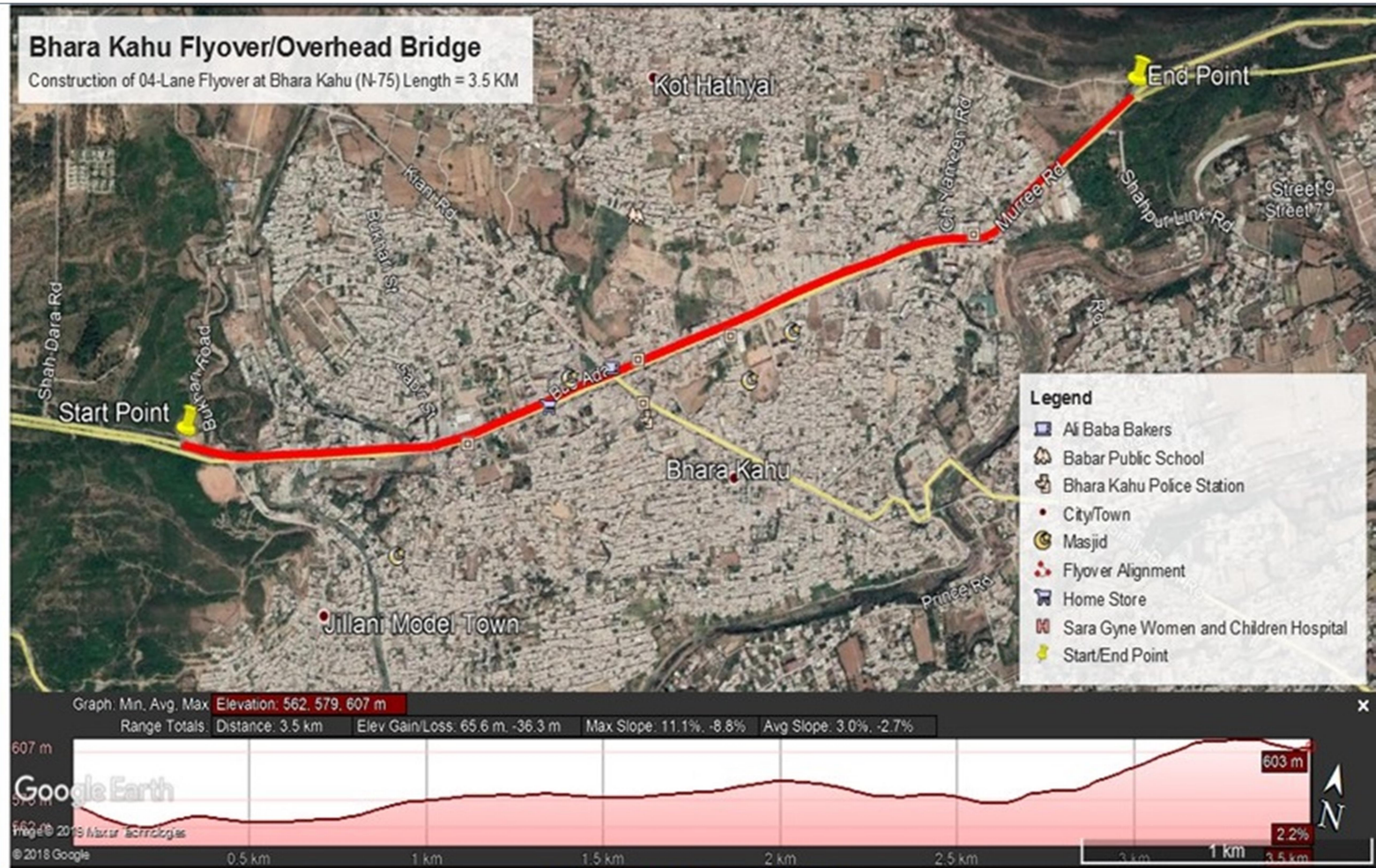


FIGURE – 3.2 : PROJECT LOCATION FOR FLYOVER ON N-75

Project Site

The project is located in capital territory of Islamabad. The project alignment mostly passes through rolling terrain. Following plan in Figure – 3.3 shows the proposed alignment of flyover / overhead Bridge.

Location/Route Map



Road Classification

National Highway (N-75)

Terrain Type

Rolling

Operational Speed

80 - 100 Km/hr. (Rolling Terrain)

Town Traversed

Islamabad - Bhara Kahu - (Total Length = 3.5 Km)

FIGURE – 3.3 : PROJECT SITE OF BARA – KAHU FLYOVER / OVERHEAD BRIDGE

3.5 LAND USE ON THE SITE

No land acquisition is required as minimum 31.5 m ROW is available and construction of flyover / overhead bridge on the center line of existing facility located at Bara – Kahu on National Highway N-75 (Islamabad – Satra Mile – Lower Topa – Kohala) which is 8.6 Kms. from Zero Point of N-75.

3.6 ROAD ACCESS

This project is itself a road project that is located at Bara – Kahu on National Highway N-75 (Islamabad – Satra Mile – Lower Topa – Kohala) which is 8.6 Kms. from Zero Point of N-75.

3.7 VEGETATION FEATURES OF THE SITE

There is no vegetation, as the current project has already existing road facility of National Highway (N-75) of Bara – Kahu.

3.8 COST AND MAGNITUDE OF OPERATION

The project cost has been estimated as above 7.6 Billion Rupees and this is 4-lane flyover. The total length of the flyover / overhead bridge is about 3.5 km including approaches. The project involves rehabilitation of the existing road and construction of elevated flyover / overhead bridge for the through traffic.

3.9 SCHEDULE OF IMPLEMENTATION

The project will be implemented according to National Highway Request for Proposal for Feasibility Study and Detailed Design for Construction of 4-Lane Flyover at Bhara – Kahu (N-75) 3.5 Km. (**Tender No. 6(492) October 2019**).

3.10 DESCRIPTION OF THE PROJECT

National Highway, Islamabad – Satra Mile – Lower Topa Kohala (N-75) is a strategic road. Its length upto Kohala is about 90 km. It connects Azad, Jammu & Kashmir (AJ&K) with Pakistan at Kohala further it moves towards Muzaffarabad which is capital of Azad Jammu & Kashmir. NHA has upgraded it up to Lower Topa. Murree is famous city for tourism which is located on offset of this N-75 alignment at Km 55 (approx.) which attracts tourists in summer and winter seasons. Therefore, traffic volume on this road considerably increases during these seasons and especially on holidays. A great No. of times traffic blockage has been observed on this road due to high traffic volume. Bara – Kahu city is a well-populated and congested point on N-75 which is located at only 8.6 Kms from Islamabad. The Bara – Kahu is a bottle neck for smooth traffic flow. There is a built-up area having big shopping malls on both sides of this road at Bara – Kahu. Therefore, widening of National Highway at Bara – Kahu seems costlier and there will be a problem for resettlement due to commercial area.

Therefore, to resolve the traffic congestion problems appropriately and to ensure smooth traffic flow on N-75 and safety of people crossing the road and to avoid frequent accidents at this location, NHA intends to construct 4-lane flyover / overhead Bridge at Bara – Kahu on N-75 and that found economic viable after feasibility and details design study.

3.10.1 Project Scope of Work:

The project is construction of 04-lane flyover / overhead Bridge at Bara – Kahu on existing road N-75 from Jillani Town (Km 6+500) to Qaziabad (10+000). The total length of the flyover / overhead bridge is about 3.5 km including approaches. The project involves rehabilitation of the existing road and construction of elevated flyover / overhead bridge for the through traffic. Minor improvements in the existing alignment shall be required to fulfill the standard geometric design criteria.

3.10.2 Existing Alignment:

Project is located in Capital Territory of Islamabad. The project alignment mostly passes through rolling terrain. The start point of proposed Bara – Kahu Flyover / Overhead Bridge is at Km 6+500 on N-75 near Jillani Town, Islamabad. Single span bridge over mullah exists at Km 6+800 near Dhok Jillani Bus Stop.

Existing Alignment

The existing alignment of project runs through Bara Kahu town almost all of its length. Existing road is metaled, 7.5 m wide (North Bound & South Bound Carriageway) with 2.0 meter outer and up to 1.0 meter inner shoulders on both sides all along its length and new jersey barrier at the middle.

Start Point

At **Km. 8+000** two collector roads from both sides of N-75 are intersecting with the main carriageway. Simly Dam road from right side and Kiani road on left side intersect at this location. Pedestrian overhead bridge is provided at this location for the cross movement of pedestrians, as this point is busiest location where traffic congestion is often observed.

End Point

End Point of proposed Bara – Kahu Flyover / Overhead Bridge is at Km 10+000. At this location Qaziabad link road from left side and Shahpur link road from right side intersect N-75 at this location. Islamabad Police check post is also situated at the proposed end point from here on wide raised median separates both carriageways.

Main Link Roads

Following main link roads also connect the main carriageway (N-75) from Km 6+500 to Km 10+000 :

Right Side : Kohsaar Town Road
Left Side : Kernal Amanullah Road

Main Nullahs

There are three main Nullahs cross the existing alignment of N-75 where bridges are provided.

Single Span Bridge : at Km. 6+800 near Dhok Jillani Bus Stop

Five Span Bridge : at Km. 7+300 near Kernal Amanullah Road (Mangu Town)

Single Span Bridge : at Km. 9+100 near Bhaira Pul Bus Stop

Main Bus Stops

- ❖ Dhok Jillani Bus Stop @ km 6+700
- ❖ Bus Adda @ Km 8+000 (Intersection of Simly Road / Kiani Road)
- ❖ Bara – Kahu (Jhugi) Bus Stop @ Km 8+500
- ❖ Bhaira Pul Bus Stop @ Km 9+000

Figure – 3.4 shows the existing alignment of Bara – Kahu Flyover / Overhead Bridge project.

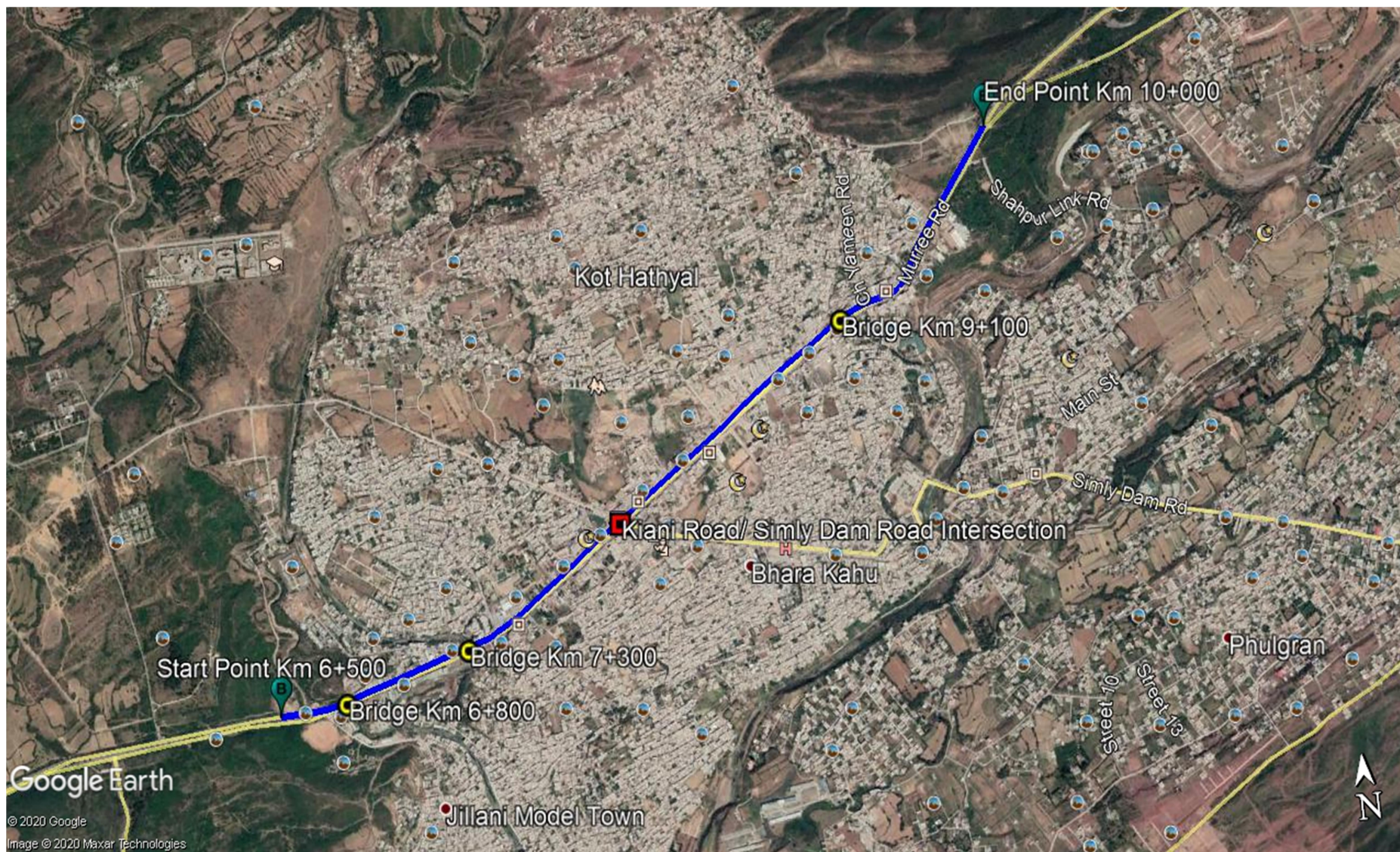


FIGURE – 3.4 : EXISTING ALIGNMENT OF BARA – KAHU FLYOVER

From Jillani Town to Qaziabad the alignment runs in the middle of built-up / urban area of Bara – Kahu. In addition to three bridges, one curve having sharp curvature is encountered on the existing alignment / route at Km 9+400. Difference in the profile of both carriageways of existing alignment is observed in some reaches of the existing alignment.

3.10.3 Technical Parameter

Table – 3.2 shows the technical parameter of proposed project 04-lane flyover overhead Bridge at Bara – Kahu on N-75.

TABLE – 3.2 : TECHNICAL PARAMETER OF PROJECT

Length (Tentative)	3.5 KMs (including approaches)
Start Point	At Km 6+500 Jillani Town
End Point	At Km 10-000
Existing Road	4.0 Lanes with New Jersey Barrier
Build up Area	2.5 Km length on both sides
Link Roads	❖ Kernal Ammanullah Road ❖ Simly Dam Road ❖ Kyani Road

3.10.4 ROW Status

Right of Way (ROW) status of proposed project is given below in Table – 3.3.

TABLE – 3.3 : ROW STATUS OF PROJECT

(a)	Carriageway North Bound	7.5 m
(b)	Open Space from Edge of Road up to Building Line (Left Side)	10.0 m
(c)	New Jersey Barrier	0.5 m
(d)	Carriageway South Bound	7.5 m
(e)	Open space on Right Side	1.5 m
TOTAL		27 m

3.10.5 Typical Road Cross Section

Bara – Kahu Flyover / Overhead Bridge typical cross section is prepared along with existing road. Typical cross section is given below in Figure – 3.5.

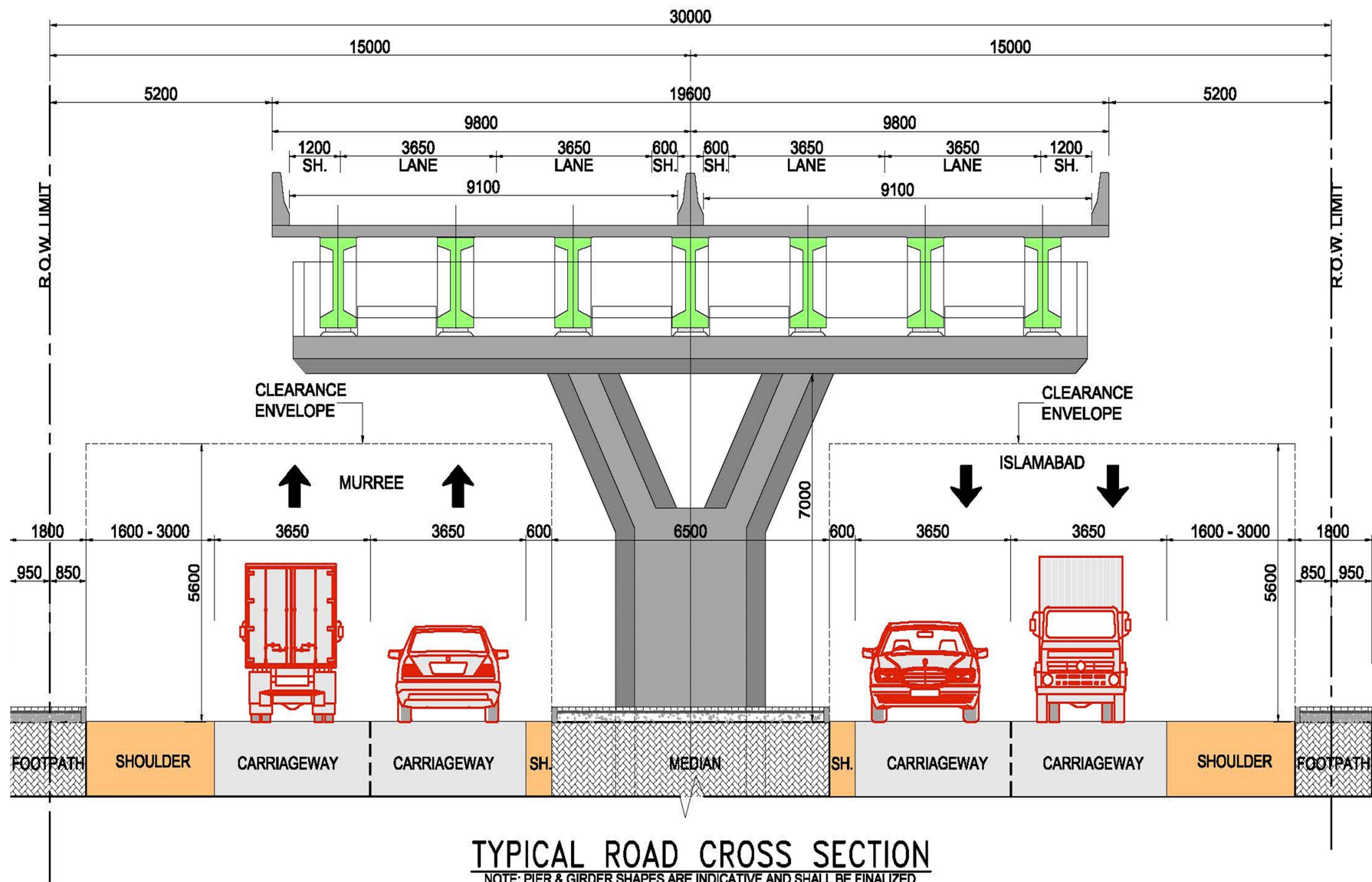


FIGURE – 3.5 : TYPICAL ROAD CROSS SECTION OF PROJECT

3.10.6 Construction Camp

Camp sites will be selected keeping in view the availability of adequate area for establishing camp sites, including parking areas for machinery, stores and workshops, access to local markets, and an appropriate distance from sensitive areas in the vicinity. Final locations will be selected by the contractor after approval from NHA.

The area requirement for construction camps will depend upon the deployed manpower and the type and quantity of machinery mobilized. In view of the area required, the contractors will have to acquire land on lease from private landowners, unless the appropriate area would not be possible to locate camp sites within the ROW.

3.10.7 Construction Equipment

The List of Machinery and Equipment required for the proposed project is provided in Table – 3.4.

TABLE – 3.4 : MACHINERY AND EQUIPMENT REQUIRED FOR PROJECT

SR. NO.	MACHINERY & EQUIPMENT
1.	Dump Truck
2.	Front End Loader
3.	Dozer
4.	Grader
5.	Vibratory Roller
6.	Water Tanker
7.	Aggregate Spreader
8.	Three Wheel Rollers
9.	Asphalt Plant
10.	Paver

SR. NO.	MACHINERY & EQUIPMENT
11.	Asphalt Distributor
12.	Batching Plant
13.	Concrete Transit Truck
14.	Concrete Pump
15.	Excavator
16.	Water Pump
17.	Cranes
18.	Vibrator
19.	Generator
20.	Concrete Mixer

3.11 GOVERNMENT APPROVALS

The environmental approval according to the Section 12 of Pakistan Environmental Protection Act is the mandatory requirement of the project.

4.0 DESCRIPTION OF ENVIRONMENT

This chapter describes the baseline conditions, which cover the existing physical, ecological, and socio-economic environment of the Study Area. Information on these aspects has been derived from the desk study of available data, field visits to the project area as well as information obtained through visits to the Government departments and other agencies namely Health Department, Irrigation Department, Meteorological Department, Forest offices and prevailing environmental laws and environmental quality standards etc.

4.1 GENERAL

This chapter defines the prevailing environmental and socio-economic settings within the proposed project area, and details the importance of these resources. The project area in this document is defined as the area where the project related activities to be carried out which include the proposed project site and surroundings, and the area that can interact with the project's positive and negative externalities in the long run. The environmental impact of any activity or process will be assessed on the basis of a deviation from the baseline or normal situation. Followings are the main components of the baseline :

- ❖ Physical Environment
- ❖ Biological Environment
- ❖ Socioeconomic Environment

The description provided in this section is based on followings :

- ❖ Desktop study and literature review
- ❖ Baseline data gathered from field activities
- ❖ Baseline data from relevant departments
- ❖ Government released publications such as Provincial and Federal Census Reports.
- ❖ Meetings and data collection from the proponent.

The main components of environment as mentioned above is broadly covers following environmental features :

- ❖ Surface water resources
- ❖ Ground water quality
- ❖ Ambient Air quality
- ❖ Soil Characteristic
- ❖ Noise
- ❖ Flora and Fauna
- ❖ Local communities and their concerns

4.2 PROJECT SITE

The city of Bara Kahu is included to the province Islamabad Capital Territory and to the district Islamabad. Some detail facts about project site is given below in Table – 4.1.

TABLE – 4.1 : SOME IMPORTANT FIGURES ABOUT PROJECT SITE

FIGURES OF BARA KAHU	
Locality	Bara – Kahu
Country	Pakistan
Administrative Area 1	Islamabad Capital Territory
Administrative Area 2	Islamabad District
Country Code	PK
Latitude	33.7380556
Longitude	73.1851121
SURROUNDING TOWNS OF BARA KAHU	
Rawalpindi	20 Km.
Bani Gala	04 Km.
Sector 2	17 Km.
Taramari	12 Km.
Tarlai Kalan	11 Km.
Nurpur Shahan	07 Km.
Kot Hatyal	01 Km.
Ali Pur	11 Km.
Jhang Sayedan	11 Km.
Malot	04 Km.

Reference Site : <https://wiki.city/en/pakistan/islamabad-capital-territory/islamabad-district/Bara-kahu> (Accessed on 03.04.2020)

Location Map of Project Site is given below in Figure – 4.1.



FIGURE – 4.1 : LOCATION MAP OF PROJECT SITE

Site image of Project Site is shown in Figure – 4.2 below :



FIGURE – 4.2 : SITE IMAGE OF PROJECT SITE

4.3 PHYSICAL ENVIRONMENT

The physical environment includes topography, regional geology and soils, climate, hydrology and drainage, seismology, surface water, groundwater, ambient air quality and noise levels.

4.3.1 Topography

Islamabad is located on the north most edge of the track known as Potohar plateau. The site is an uneven table and land is gradually rising in elevation from 500 to 600 meters above sea level. In the extreme north the hills rise more steeply. The highest point is 1600 meter above sea level. Most of the Margalla range in the north–west is composed of hill series belonging to the Eocene division of the tertiary period and are about 60 million years old. Some of the earliest Stone Age artifacts in the world have been found on the plateau, dating from 100,000 to 500,000 years ago. Rudimentary stones recovered from the terraces of the Soan River testify to the endeavors of early man in the inter–glacial period. The terrain in the metropolitan area of Islamabad Rawalpindi consists of plains and mountains whose total relief exceeds 1,175 m. The northern part of the metropolitan area lies in the mountainous terrain of the Margalla Hills, a part of the lower and outer Himalayas, which also includes the Hazara and Kala Chitta Ranges the Margalla Hills, which reach 1,600–m altitude near Islamabad, consist of many ridges of Jurassic through Eocene limestone's and shales that are complexly thrust, folded, and generally overturned. Margalla Hills Range acts as a wall forming the boundary of the Nullah Lai basin. The foot of Margalla range stands at an elevation of about 620 m and the top of the mountain is about 1,200 m. Four major tributaries, namely Saidpur Kas, Tenawali Kas, Bedarawali Kas, and Johd Kas, originate from Margalla Hills. After this Chaklala Bridge, the Nullah Lai becomes steeper with many downfalls eventually falling in the River Soan, which is a tributary of the River Indus. Figure – 4.3 represents the topography of the area. However, the project areas consist of flyovers.

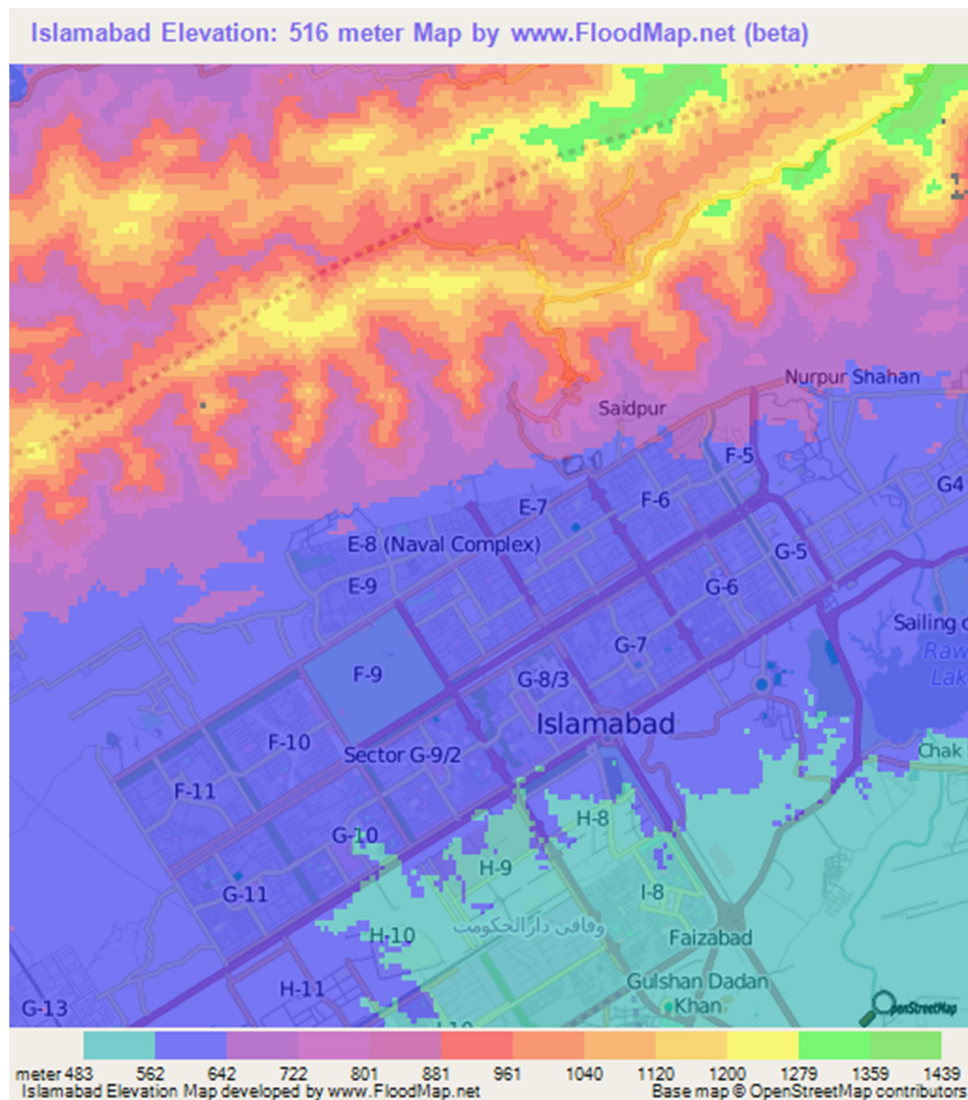


FIGURE – 4.3 : TOPOGRAPHY OF AREA

4.3.2 Regional Geology and Soil

The area in and around Islamabad has a complex geological history of mountain formation, alluvial-loessic deposition and erosion cycles. In the west of the Potohar Uplands, the main depositions of loess are from the Pleistocene period. Streams and ravines cut the loess plain, affected by gully erosion and steep slopes. This type of land is unsuitable for cultivation. The areas are composed of either alluvium (clay or silt) or of gravel caps. The plains are formed of alluvial deposits laid by undulating and at various places it is badly dissected by gullies and ravines. A large part of the stream has been dammed at a place named Rawal to the Rawal Lake and another built on Soan River to form The Silmy Lake.

The gravel and loess are especially important to the environmental geology because they form most of the building foundations and because gravel is the primary groundwater aquifer

Important minerals like limestone, marble, and fireclay are found in the area. Limestone is found abundantly in Margalla Hills and marble in the western section of Margalla range. Clay soils in the District exhibit five strata, from bottom to top :

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

Figure – 4.4 shows the Generalized composite stratigraphic section of consolidated rocks in the Islamabad Rawalpindi study area. See text for exact ages and generalized lithological descriptions. Dashed boundaries are approximate.

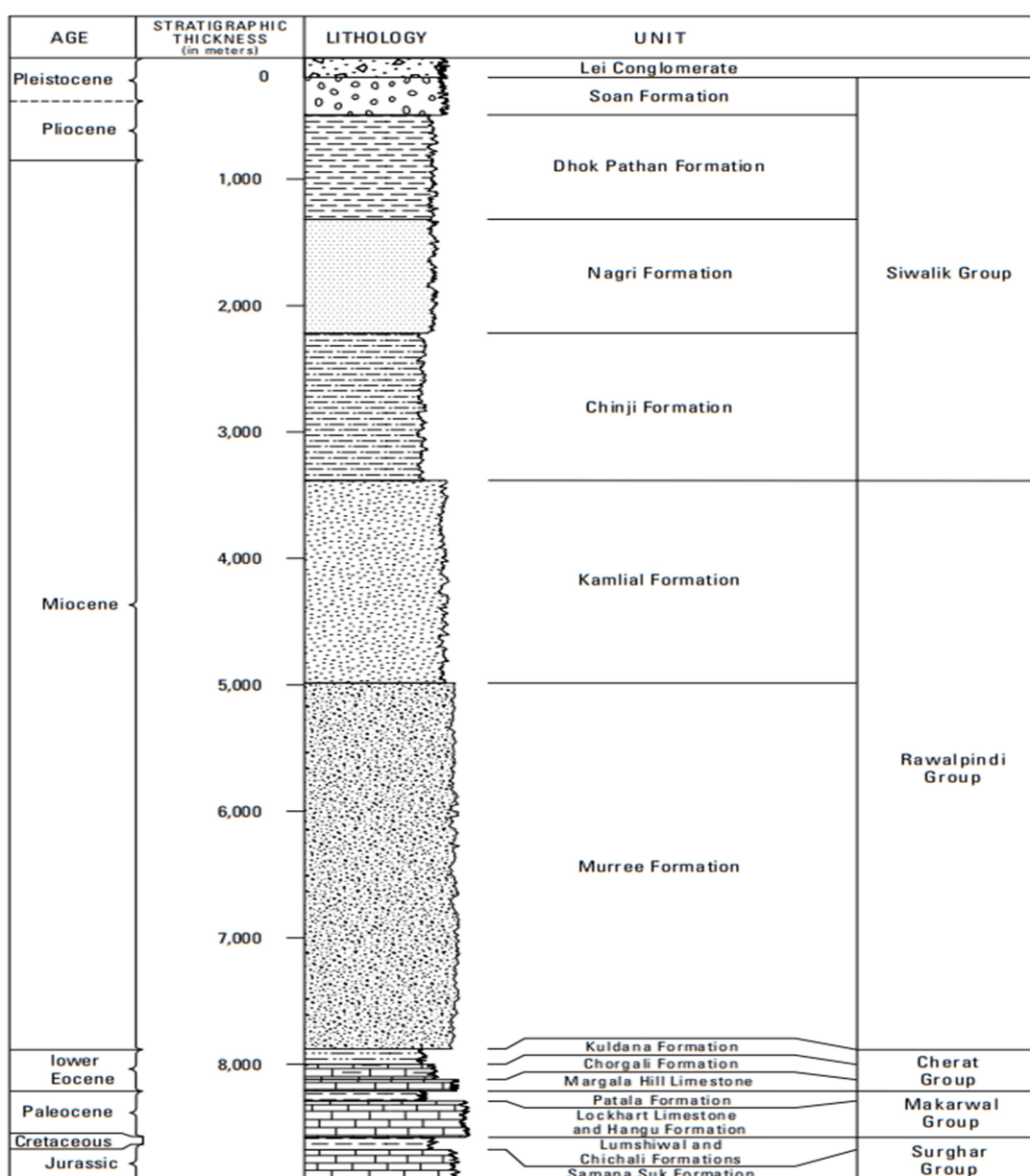


FIGURE – 4.4 : STRATIGRAPHIC SECTION OF CONSOLIDATED ROCKS IN THE ISLAMABAD

4.3.3 Hazara Fault Zone

Islamabad is on the south margin and leading edge of the Hazara fault zone. All the faults in the map area, except those south of Rawalpindi, are part of this fault zone. This zone consists of an arc of thrust and folded rocks about 25 km wide and 150 km long that is convex to the south and extends west–southwestward away from the Himalayan syntaxis. More than 20 individual thrust sheets have been identified across the 25–km–wide zone north of Islamabad, but only 5 major thrusts lie within the map area. In the Islamabad area, some of the thrust faults are slightly oblique to the front of the Margalla Hills; hence, they project west–southwestward beneath the cover of the piedmont fold belt. The extensions of these faults are prominent north of Feteht Jang, 25 km west of Rawalpindi, where they form the south margin of the Kala Chitta Range, which is an echelon extension of the structural pattern of the Margalla Hills.