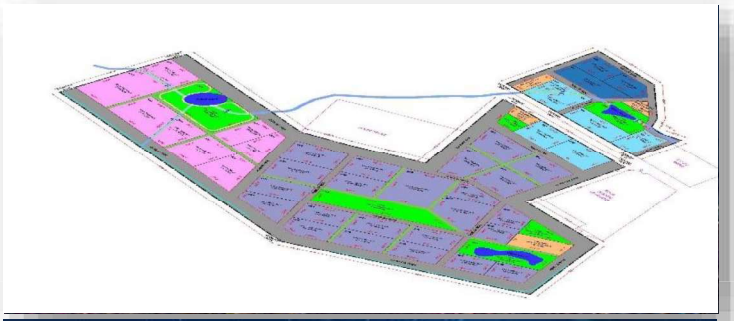
Special Technology Zones Authority

INFRASTRUCTURE DEVELOPMENT OF ISLAMABAD TECHNOPOLIS



ENVIRONMENTAL IMPACT ASSESSMENT (EIA)

June-2023

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LIST OF ABBREVIATIONS

ALGAS	Asia Least Cost Greenhouse Gases Abatement Strategy
AOI	Area of Influence
BMPs	Best Management Practices
BOD	Biochemical Oxygen Demand
CAR	Crude Activity Rate
CC	Construction Contractor
CDA	Capital Development Authority
CFCs	Chloro-Fluoro-Carbons
COD	Chemical Oxygen Demand
DC	Design Consultant
DCR	District Census Report
EIA	Environment Impact Assessment
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
FDI	Foreign Direct Investment
GOP	Government of Pakistan
AQ	Air Quality
ICT	Islamabad Capital Territory
IT	Information Technology
IWMB	Islamabad Wildlife and Management Board
JICA	Japan International Cooperation Agency
LDCs	Less Developed Countries
LoI	Letter of Intent
MDGs	Millennium Development Goals
MGD	Million Gallons per Day
NCS	National Conservation Strategy
NEP	National Environmental Policy
NEQS	National Environmental Quality Standards
NESPAK	National Engineering Services Pakistan

NFP	National Forest Policy
NIH	National Institute of Health
NOC	No Objection Certificate
OSHA	Occupational Safety and Health Administration
PEPA	Pakistan Environmental Protection Act
PEPC	Pakistan Environmental Protection Council
PM	Particulate Matter
PPC	Pakistan Penal Code
PPE	Personal Protective Equipment
RAR	Refined Activity Rate
SPM	Suspended Particulate Matter
STDs	Sexually Transmitted Disease
STZA	Specialized Technology Zones Authority
TA	Technical Assistance
UNDP	United Nation Development Program
VOCs	Volatile Organic Compounds

GLOSSARY

Air Quality Sensitive Receptors	People, property, species or designated sites for nature conservation that may be at risk from exposure to air pollutants potentially arising as a result of a proposed development.
Air Quality Standard	Air quality limiting values and objectives.
Annual Average Rainfall	Average amount of precipitation falling at a specified site recorded by the Meteorological Office. It gives a measure of the overall wetness of the local climate.
Baseline	Existing environmental conditions present on, or near a site, against which future changes can be measured or predicted.
Biodiversity	The variety of life in the world or in a particular habitat or ecosystem.
Climate	The climate can be described simply as the 'average weather', typically looked at over a period of 30 years. It can include temperature, rainfall, snow cover, or any other weather characteristic.
Climate Change	A change in the state of the climate, which can be identified by changes in average climate characteristics that persist for an extended period - typically decades or longer.
Decibel	A unit used to express relative differences in sound power or intensity. There is a million to one ratio in sound pressure (measured in Pascal (Pa)) between the quietest audible sound and the loudest tolerable sound. The decibel (dB) scale, based on a logarithmic ratio, is used in sound measurement because of this wide range. Audibility of sound covers a range of approximately 0-140dB.
Dust	All airborne particulate matter.
Earthworks	The removal or placement of soils and rocks such as in cuttings, embankments and environmental mitigation, including the in-situ improvement of soils/rocks to achieve desired properties.
Ecosystem	A biological community of interacting organisms (e.g. plants and animals) and their environment.
Effect	Used throughout this environmental impact assessment report to refer to the consequence of an impact to the receiving environment

Effluent	Liquid waste or sewage.
Environment Agency	Government agency established to protect and improve the environment and contribute to sustainable development. Responsibilities include: water quality and resources, flooding and coastal risk management and contaminated land.
Environmental Impact Assessment	A process of systematically assessing the likely environmental effects of proposed development projects. EIA is a legal requirement for certain public and private projects under PEPA Act 1997.
Environmental Impact Assessment Report	A suite of documents, previously referred to as an environmental statement, produced as part of an environmental impact assessment. It must include all information that is reasonably required to assess the likely significant environmental effects of a proposed development.
Excavated Material	Soil, rock and other material that has been removed from the ground during construction.
Greenhouse Gas	Any gas that has the property of absorbing infrared radiation (net heat energy) emitted from Earth's surface and reradiating it back to Earth's surface, thus contributing to the greenhouse effect. Carbon dioxide, methane, nitrous oxide (N_2O), and fluorinated gases are the most important greenhouse gases.
Groundwater	All water that is below the surface of the ground and within the permanently saturated zone.
Heavy Metals	The term heavy metal refers to any metallic chemical element that has a relatively high density and is toxic or poisonous at low concentrations
Impact	Used throughout this EIA Report to refer to changes to the environment that have the potential to occur as a result of the construction and/or operation of the proposed project.
Mitigation	The measures put forward to prevent, reduce and where possible, offset any adverse effects on the environment.
Risk Assessment	An assessment of the probability of a hazard occurring that could result in an impact.
Sand	Soil particles from 0.06mm-2.0mm in equivalent diameter. Fine sand particles are from 0.06mm-0.2mm; medium sand from 0.2mm-0.6mm; and coarse sand from 0.6mm-2.0mm.
Screening	The first stage in an environmental impact assessment. It is used to determine if further assessment is necessary and to categorize the project.

Soil Erosion	The detachment and movement of soil by the action of water and/or wind.
Soil Profile	A vertical cross-section through a soil.
Surface Water	Waters including rivers, lakes, reservoirs, canals, streams, ditches, coastal waters and estuaries.
Threshold	A level of effect above which an assessment will be taken of whether any changes to procedures need to be made.
Topography	The natural or artificial features, level and surface form of the ground surface.
Topsoil	Upper layer of a soil profile, usually darker in color (because of its higher content of organic matter) and more fertile than subsoil, and which is a product of natural biological and environmental processes.

EXECUTIVE SUMMARY

1. Introduction

Special Technology Zones Authority (STZA) has been established, under the Cabinet Division of Government of Pakistan to develop Special Technology Zones (STZs) across the country as well as provide special incentives to attract investors, builders, and technology companies to partner with the government, and also provide a one-window facilitation to local and international companies in the STZs.

To harness the opportunities of the digital age, Government of Pakistan has moved a step forward to provide institutional and legislative support for the technology sector with internationally competitive and export oriented structures and eco-systems, to attract foreign direct investment, develop collaboration eco-system connecting academia, research and technology industry, to initiate innovation in production system and products, to increase the standards and quality of technology goods and services, to increase productivity and decrease the costs of production through high-tech interventions, intensive innovation and futuristic entrepreneurship, to enable job creation, to commercialize technological knowledge and to provide for matters connected therewith or incidental thereto.

STZA intends to establish Islamabad Technopolis on 140 Acres of land, to achieve orderly and planned Technology zone in Islamabad in a dynamic and innovative manner with a view to provide turnkey solutions to the prospective entrepreneurs' and graduates thereby generating economic activity and creating mass employment opportunities.

STZA engaged National Engineering Services Pakistan Pvt. Ltd. (NESPAK) to provide services to carryout feasibility study and detailed design for infrastructure development (roads, electricity, water supply, sewerage, drainage etc.) of Islamabad Technopolis.

2. Policy, Legal and Administrative Framework

The Federal Government has promulgated laws/acts, regulations and standards for the protection, conservation, rehabilitation and improvement of the environment. The Ministry of Climate Change is the responsible authority for environmental protection policy making in Pakistan whereas Pakistan Environmental Protection Agency (PEPA) is the regulatory authority, which has provided guidelines for conducting EIA studies and has authority to issue regulatory clearance/ NOCs for various projects.

The main strategies/ Policies for this project are:

- National Conservation Strategy, 1992
- National Water Policy, 2018
- National Forest Policy, 2015
- National Environmental Policy, 2005
- Pakistan Labour Policy, 2010
- National Climate Change Policy, 2012
- National Disaster Risk Reduction Policy, 2013

- Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules, 2016
- Islamabad Capital Territory Building Control Regulations, 2020
- Pakistan Environmental Protection Agency Ban on (Manufacturing, Import, Sale, Purchase, Storage and Usage) Polythene Bags Regulations, 2019
- Islamabad Fire Prevention and Life Safety Regulations, 2010
- Standard Operating Procedure (SOP) for Management of Sanitation Services in Islamabad 2008
- National Drinking Water Policy, 2009
- National Sanitation Policy, 2006

Main Legislation/ Acts include:

- Pakistan Environmental Protection Act, 1997
- Pakistan Environmental Protection Agency, (Review of IEE and EIA) Regulations, 2000
- National Environmental Quality Standards (2010)
- National Clean Air Act, 2000
- Seismic Building Code of Pakistan 2007
- Pakistan Antiquities Act 1975
- Pakistan Penal Code, 1860
- The Protection against Harassment of Women at the Workplace Act, 2010
- Employment of Children Act, 1991
- Labour Laws as part of Constitution of Pakistan 1973,
- Guidelines for the Preparation and Review of Environmental Reports, 1997
- Land Acquisition Act 1894
- Cutting of Trees (Prohibition) Act, 1975
- National Disaster Management Act, 2010
- Pakistan Occupational Health and Safety Act 2018
- Canal and Drainage Act (1873)
- Protection of Trees and Bushwood Act, 1949
- Sectoral Guidelines for Environmental Reports (1997)
- The Forest Act (1927)
- Factories Act, 1934
- Special Technology Zone Authority Act, 2021
- Guideline for Solid Waste Management, 2005

3. Project Description

The main objectives of this project are to act as a catalyst for enhancing the Technology exports of Pakistan; to encourage Hi-Tech innovative solutions and futuristic entrepreneurship; to change the economic outlook of Pakistan by enhancing Technology exports and encouraging technology; to get knowledge transfer from global technology hubs; to develop employment within region as well as at National level; to create skilled and un skilled employment; and to contribute to raising national income levels.

The site of “Islamabad Technopolis” is located at Jinnah Avenue in the south of Rawal Lake adjacent to NIH Colony, Islamabad. Islamabad Technopolis is spread over an area of 140 acres. The project is expected to be completed in one year and six months (545 days) with an estimated cost of PKR 7.34 Billion.

The electrical load has been estimated to be 80 MW and estimated average water demand for the proposed project is 1.5 MGD.

4. Baseline Profile

A. Physical Environment

Islamabad is located at 33.43°N 73.04°E at the northern edge of the Pothohar Plateau, between Rawalpindi District and at the foot of the Margalla Hills in Islamabad Capital Territory with general height of 540 m (1,770 ft.) above the mean sea level (MSL). The project area lies between 1475 to 1721 ft above sea level. The modern capital and Rawalpindi city stand side by side and are commonly referred to as the Twin Cities. To the east of the city lies Murree and Kotli Sattian. To the north lies the Haripur District of Khyber Pakhtunkhwa. Kahuta lies on the northeast, Taxila, Wah Cantt, and Attock District to the northwest, Gujar Khan, Kallar Syedan, Rawat, and Mandrah on the northeast, and Rawalpindi to the southwest. Sensitive receptors in surrounding of the project area include Jamia Mosque Hanifia Ghosia, Jamia Mosque Touhidia, Jamia Mosque Gulzar e Mukhtar, Muhammadi Masjid, Mosque Mohran Jejan and Horse Stable, Mosque, Three (03) numbers of Graveyard & Schools.

The climate of Islamabad is a humid subtropical climate with four seasons: a pleasant Spring (March–April), a hot Summer (May–August), a warm dry Autumn (September—October), and a cold Winter (November–February). The hottest month is June, where average highs routinely exceed 38 °C (100.4 °F). The wettest month is July and August, with heavy rainfall and evening thunderstorms with the possibility of cloudburst. The coldest month is January, with temperatures variable by location. In Islamabad, temperatures vary from cold to mild, routinely dropping below zero. In the hills there is sparse snowfall. The weather ranges from a minimum of −6.0 °C (21.2 °F) in January to a maximum of 46.1 °C (115.0 °F) in June. Furthermore, the amount of precipitation in July and August is maximum and ranges between 2-5 mm.

The Project Area is located in Seismic Zone 2B, where 2B (upper moderate damage zone) represents peak horizontal ground acceleration from 0.16 to 0.24g.

B. Biological Environment

Islamabad is famous for its natural beauty and diverse species of plants. Cheel (Pinus logifolia), koa (wild olive), Phulai and Senetha are commonly found on top of Margalla Hills. Shisham (Dilbergia Sisso), Toot and paper mulberry are also grown. A famous species of grass is Dab (Amuricatus) whereas, wild products of the plains include flower buds of the wild pomegranate, blackberries, raspberries, cranberries, wild pears etc. Along the ravines small stunted bushes are commonly found. The trees commonly found in the Project Area

are Acacia Modesta, Dalbergia Sissoo, Ficus Carica, Broussonetia Papyrifera, Melia azedarach, Albizia Lebbeck, Poplar, Ficus bengalensis, Sapium sebi ferum and Morus alba.

A diverse variety of birds and animals can be seen in Islamabad especially in the Margalla Hills. The Birds species found here include Griffon vulture, Laggar Falcon, Peregrine Falcon, Kestrel, Indian Sparrow Hawk, Egyptian Vulture, White Cheeked Bulbul, Yellow Vented Bulbul, Paradise Flycatcher, Black partridge, Cheer Pheasant, Khalij Pheasant, Golden Oriole, Spotted Dove, Collared Dove, Larks, Shrikes, Wheatears and Buntings.

Wild bores, foxes, rabbits and jackals are also seen in the fields and forests. Chakor and gray partridges are mostly seen while black partridge is rare. Geese are found in the Soan Valley. Quail come annually in enormous number in the spring and autumn. Most of the fauna in the vicinity of the Project Site are pets, squirrels, lizards and birds.

C. Social Environment

Socioeconomic baseline was established using primary and secondary data. The baseline survey was carried out in NIH Colony, Mohra Jejan, Mohra Nur, Valley Homes Society and Horse Stable (NIH). Data related to social attributes and social parameters was collected and analyzed.

5. Public Consultation and Information Disclosure

Engagement of stakeholders (consultation) and disclosure is an integral part of project's environmental and social assessment. The methods used for public consultation with project stakeholders in order to ascertain their stakes regarding project implementation include social surveys, general/public meetings and on-site meetings.

Different categories of interested parties including project staff, government officials, and local communities were consulted to predict the nature and scale of risks, challenges and impacts of project perceived by them.

The general apprehensions of the public and government officials include that the project is beneficial for Islamabad city as well as neighboring districts; the project will be beneficial in terms of good infrastructure development and generation of various employment opportunities for the local residents; local people want to get engaged in more and more income generating activities and also want to be trained on specific vocational skills that would ease their ability to find employment which can support economic self-reliance.

6. Environmental Impacts & Mitigation Measures

The construction activities would cause changes in topography, soil contamination, surface & groundwater pollution, air pollution, noise & vibration, solid waste generation, disturbance to flora and fauna, overburdening of resources, construction camps issues, health & safety issues, emergency situations, traffic disruption and social issues.

Anticipated impacts during operational stage will include water pollution, air pollution, soil contamination, ecological disturbance, solid waste generation, occupational health & safety issues and emergency situations.

The positive impacts of the project include economic development, GDP growth, attraction of foreign direct investment, collaboration of academia and research industry, innovation in production system, raise the standard of technology goods, surge efficiency in production goods, futuristic entrepreneurship, employment generation, poverty abatement, increase in land values, centralized management and control for technology sharing, controllable waste & pollution discharge points, green economy and infrastructural development etc.

7. Environmental Management Plan

Recommended mitigation measures to control potential adverse impacts are described in the Environmental Management Plan (EMP). EMP shall become the part of construction contract agreement and shall be strictly enforced during the implementation of the proposed project.

A. Environmental Monitoring, Mitigation and Training Cost

The cost required to effectively implement the mitigation measures is important for the sustainability of the Project both in the construction and operation stages of the Project.

These costs are summarized below:

1.	Environmental Monitoring Cost		=	9,516,000 /-
2.	HSE Cost		=	13,307,500/-
3.	Environmental Training Cost		=	1,350,000/-
4.	Institutional Strengthening Cost		=	4,500,000/-
5.	Tree Plantation Cost		=	27,822,168/-
		Total	=	56,495,668/-
6.	20% Miscellaneous		=	11,299,134/-
		Total cost	**=**	**67,794,802/-**
		Say	**=**	**67.80 million**

1 INTRODUCTION

The current Environmental Impact Assessment (EIA) report has been prepared for the Special Technology Zones Authority (STZA), Government of Pakistan. This study covers the impacts from the construction of proposed infrastructural works (roads, parks, boundary wall, electrification, water supply, sewerage & drainage, etc.) under Islamabad Technopolis project spread over an area of 140 acres. This report has been prepared in compliance with environmental regulations and requirements under Pakistan Environmental Protection Act (PEPA), 1997. It is to be noted that this EIA remains a live document, subject to modifications as the project design and technical specifications are finalized or modify prior to the implementation stage.

1.1 Project Background

To harness the opportunities of the digital age, Government of Pakistan has moved a step forward to provide institutional and legislative support for the technology sector with internationally competitive and export oriented structures and eco-systems, to attract foreign direct investment, develop collaboration eco-system connecting academia, research and technology industry, to initiate innovation in production system and products, to increase the standards and quality of technology goods and services, to increase productivity and decrease the costs of production through high-tech interventions, intensive innovation and futuristic entrepreneurship, to enable job creation, to commercialize technological knowledge and to provide for matters connected therewith or incidental thereto.

For this purpose, STZA has been established, under the Cabinet Division of Government of Pakistan. STZA will develop Special Technology Zones (STZs) across Pakistan, provide special incentives to attract investors, builders, and technology companies to partner with the government, and also provide a one-window facilitation to local and international companies in the STZs. STZs will feature some of the leading global high-tech enterprises with major national tech companies, research institutes, new-technology-based firms, startups, business support services and convening community facilities, representing model collaborative spaces for innovation and entrepreneurship promotion.

1.2 Study Objectives

The major objective of this EIA study is the identification of the possible and induced impacts of the proposed Project on both short and long-term. The impact identification process focuses particularly on biophysical, socio-economic and cultural aspects of the environment. Based on the level and nature of these observations, the EIA then delineates proper mitigation measures. As a planning tool, the EIA aims to ensure that environmental, socio-economic and cultural issues throughout the entire project lifecycle are anticipated and considered by the project proponent. It also serves as a framework for establishing project controls to reduce or prevent adverse environmental or socio-economic impacts.

The specific objectives of this EIA are:

- To assess the existing environmental and socioeconomic conditions of the Project Area;

- To identify potential impacts of the proposed Project on the physical, ecological and social aspects of the Project Area, to predict and evaluate these impacts and determine their significance;
- To propose appropriate mitigation measures that should be incorporated in the design of the Project to eliminate or avoid/ minimize (if cannot be eliminated) the potentially adverse impacts;
- To assess the compliance status of the proposed activities with respect to the national environmental legislations;
- To provide institutional, monitoring, reporting and documentation measures for environmental safeguards compliance; and
- To aid decision makers to take informed decisions.

1.3 Purpose of EIA Report

The purpose of this EIA Report is to assess whether or not significant adverse environmental and social impacts are anticipated and to suggest mitigation and remedial measures to make the Project environmentally friendly and sustainable during the construction and operational stages of the Project and to initiate the process of NOC from the Federal EPA.

1.4 Need for EIA Study

EIA is mandatory according to the Pakistan Environmental Protection Agency review of Initial Environmental Examination (IEE) and Environmental Impact Assessment (EIA) Regulations, 2000, which are approved by Federal Government which states that:

"A proponent of a project falling in any category specified in schedule I or II shall file an IEE or EIA respectively with the federal agency and the provision of section 12 of the Act shall apply to such project."

According to the Pakistan Environmental Protection Agency (Review of IEE and EIA) Federal Regulations 2000, the proposed project falls under **Category B** of Schedule II, which requires EIA before commencement of construction.

1.5 The Proponent and Consultant

The proponent of the project is Special Technology Zone Authority (STZA), while the Consultant is NESPAK. The details are given as under:

1.6 Approach & Methodology to Work

1.6.1 Approach

The study has been conducted in accordance with Environmental Protection Agency (EPA), Government of Pakistan (GOP) Guidelines, 1997. The study is based on both primary and secondary data and information. The primary data includes data collected from field i.e.: information about land use; environmental sampling and analyses for air, water and noise; biodiversity & ecological survey; social survey including demographic characteristics, income dependency & quality of life, occupation, agriculture and cropping pattern and social amenities etc. The secondary data includes a review of relevant information from literature. Discussions were held with stakeholders including government officials, community representatives and a wide range of community and residents. The main purpose of this approach was to obtain an impartial impression of the people's perceptions about the project and its environmental and social impacts.

The assessment remains subject to change based on finalization of technical specifications and design of the proposed project.

1.6.2 Methodology

The following methodology was adopted for carrying out the EIA study of the proposed Project:

A. Orientation

Meetings and discussions were held among the members of the EIA Consulting Team. This activity is aimed at achieving a common ground of understanding of various issues of the Study.

B. Data Collection Planning

Subsequent to the concept clarification and understanding obtained in the preceding step, a detailed data acquisition plan was developed for the internal use of the EIA Consulting Team. The plan included; identification of specific data requirements and their sources, determination of time schedules and responsibilities for their collection and indication of the logistics and other supporting needs for the execution of the data acquisition plan. Field surveys were then conducted based on the data collection plan.

C. Detailed Field Survey

Detailed site visits for collection of data were conducted from 15th to 18th March, 2022, 11th to 12th May,2022, 4th to 6th August, 2022 and 3rd – 6th October, 2022. The data collected from field include:

- Identification of environmental sensitive receptors including air sensitive receivers, noise sensitive receivers and water bodies expected to receive pollutant load;
- Sampling and analysis for air, noise and water;
- Ecological survey;
- Socioeconomic survey including public consultation; and
- Stakeholders' consultation.

D. Sampling & Analysis of Physical Environmental Parameters

Environmental Services Pakistan Laboratory, which is EPA certified, was hired for physical environmental sampling and was mobilized on May 11, 2022 for sampling and analysis of air, water and noise quality. Twelve (12) Samples (Ambient Air, Noise, Ground Water & Wastewater) were collected for analysis in the laboratory.

E. Review of Secondary Data

Previous environmental and social soundness assessment for Islamabad and other published and unpublished information was collected in order to gain a complete understanding of existing environmental conditions of the area including:

- **Physical environment:** topography, geology, soils, surface and groundwater resources and climate;
- **Biological environment:** habitat types, flora and fauna (particularly rare or endangered species), critical habitats/zones and vegetation communities within the project area;
- **Socio-economic environment:** settlements, socio-economic conditions, infrastructure and land use.
- **Heritage aspects:** sites of cultural, archaeological or historical significance.

F. Area of Influence (AoI)

Area of Influence (AoI) includes the actual project area as well as the area in the surroundings in which positive and adverse impacts may be foreseen due to implementation of the proposed Project. The area of influence is the area likely to be affected by the project, including all its ancillary aspects, such as relocation and access roads, borrow and disposal areas and construction camps, as well as unplanned developments induced by the project (e.g., spontaneous settlement etc.).

Based on the given project boundary, the team of experts highlighted any potential sensitive physical, ecological and socio-economic constraints in the vicinity of project area. Based on the above, a maximum AoI of 200 m from the boundary of the project area was selected for the baseline survey.

G. Stakeholder Consultations

For this EIA study, stakeholder consultation was carried out through questionnaires and meetings with the community. The EIA team met with the government functionaries, affected persons and local communities in and surrounding (AOI) of the project area. The objective of the consultation was to disseminate information on the project and its expected impact, long-term as well as short-term, among primary and secondary stakeholders and to gather information on relevant issues so that the feedback received could be used to address these issues at an early stage.

H. Environmental Impact Assessment

The data collected from the field was analyzed and the impacts of the proposed project on the physical, biological and socio-economic environment prevalent in the project area were identified and characterized with respect to significance and probability of occurrence at the design, construction and operation phases. Possible mitigation measures and implementation mechanisms are proposed so that the impacts can be mitigated / controlled and the project implementation remains sustainable.

I. Development of Environmental Management Plan (EMP)

An EMP for the proposed project activities has been prepared. The EMP provides a plan for implementing and managing the mitigation and monitoring measures recommended in the EIA. The EMP includes the following:

- Mitigation and monitoring plan;
- Definition of roles and responsibilities of the proponent, contractors and monitoring teams;
- Requirements for communication, documentation and training during the project;
- Restrictions on design, timing and implementation of the project.

1.7 STRUCTURE OF THE REPORT

The structure of this report is listed below:

Section1: **Introduction** briefly presents the purpose and need, project background, objectives and methodology of the EIA study.

Section 2: **Policy, Legal and Administrative Framework** comprises policy guidelines, regulations, conventions and roles of institutions concerning EIA of the project.

Section 3: **Description of the Project** furnishes project information; location, major components cost, size and major components. It also contains a description of the various options that were considered for selecting the proposed system.

Section 4: **Description of the Environment** establishes baseline conditions for physical, biological and socio-economic conditions prevalent in the project area.

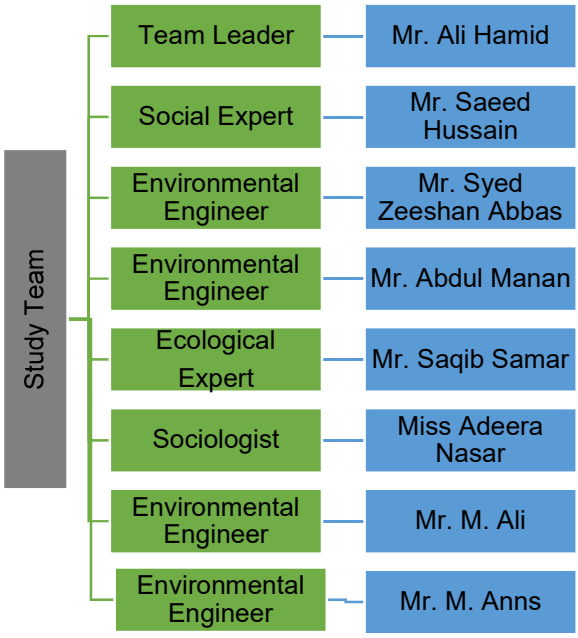
Section 5: **Stakeholder Engagement and Information Disclosure** identifies the main stakeholders and their concerns raised during scoping sessions, and deals with the measures to mitigate the social impacts.

Section 6: **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 project.

Section 7: **Environmental Management 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.

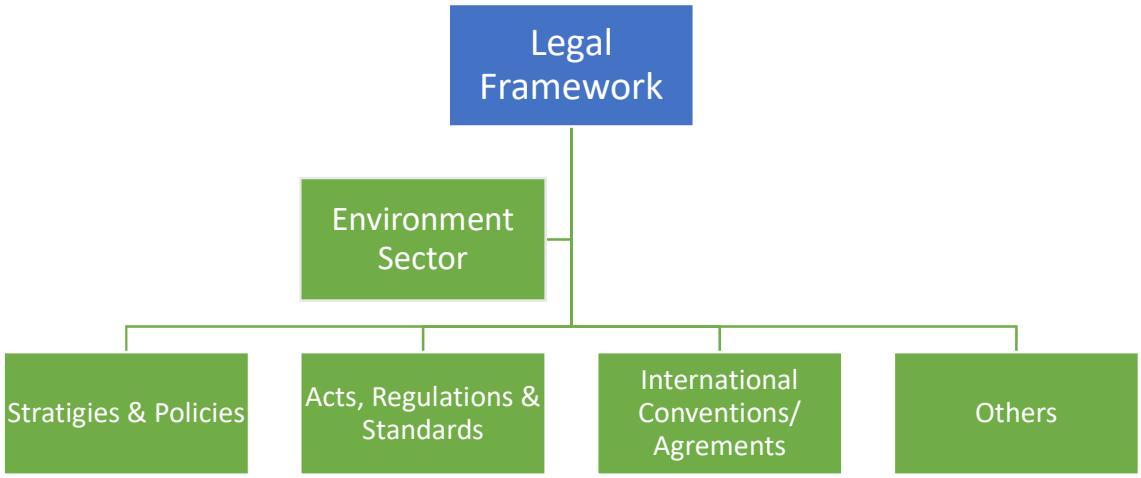
1.8 STUDY TEAM

A multidisciplinary team was formulated to conduct the study. The team comprises the following persons:



2 POLICY, LEGAL & ADMINISTRATION FRAME WORK

This section provides an overview of the policy framework and national legislations that apply to the proposed project. The project is expected to comply with all national legislations relating to environment in Pakistan and to obtain all the regulatory clearances required.



2.1 Administrative Framework

2.1.1 Special Technology Zone Authority (STZA)

The implementing agency of the proposed project is STZA, Government of Pakistan. The management of STZA will ensure that all the proposed measures are effectively implemented at the design, construction and operational stages.

2.1.2 Federal Environmental Protection Agency

The Pakistan Environmental Protection Agency, is an executive agency of the Government of Pakistan managed by the Ministry of Climate Change. The agency is charged with protecting human health and the environment by writing and enforcing regulation based on laws passed by Parliament.

2.2 Summary of Relevant Strategies, Policies, Acts and Legislation

The summary of major relevant strategies, policies, acts and legislation from environmental perspective are briefly described in **Tables 2.1 & 2.2** below:

Table 2.1: Main Strategies/Policies Related to Environment and Relevance to the Project

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
1.	National Conservation Strategy, 1992	Pakistan National Conservation Strategy (NCS), which was approved by the federal cabinet in March 1992, is the principal policy document on environmental issues in the Country. 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. The NCS has 68 specific programs in 14 core areas in which policy intervention is considered crucial for the preservation of Pakistan's natural and physical environment.	The core areas that are relevant in the context of the proposed project are pollution prevention during construction, conserving biodiversity and supporting forestry and plantation.
2.	National Water Policy, 2018	The National Water Policy aims at efficient management and conservation of existing water resources, optimal development of potential water resources, steps to minimize time and cost overruns in completion of water sector projects, improving urban water management by increasing system efficiency and reducing non-revenue water through adequate investments to address drinking water demand, sewage disposal, handling of wastewater and industrial effluents; equitable water distribution in various areas and canal commands, measures to reverse rapidly declining groundwater levels in low-recharge areas, increased groundwater exploitation in high-recharge areas, effective drainage interventions to maximize crop production, improved flood control and protective measures, steps to ensure acceptable and safe quality of water, minimization of salt build-up and other environmental hazards in irrigated areas, institutional reforms to make the managing organizations more dynamic and responsive.	The core areas that are relevant in the context of the proposed project are drinking water demand, sewage disposal, handling of wastewater.
3.	National Forest Policy, 2015	The goal of this policy is to expansion, protection and sustainable use of national forests, protected areas, natural habitats and watersheds for restoring ecological functions, improving livelihoods and human health in line with the national priorities and international agreements. In line with the Federal functions of national policy, planning and implementation of international	The proposed Project dose not involves any national forests, protected areas, natural habitats and watersheds, so this policy is not applicable.

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
		agreements, specific objectives of the National Forest Policy include: a) Promoting ecological, social and cultural functions of forests through sustainable management and use of forest produce including wood and non-wood forest products; b) Implementing a national level mass afforestation programme to expand and maintain optimum forest cover; c) Maximizing forest areas by investing in available communal lands/ shamlat, and Guzara forests and urban forestry; d) Facilitating and harmonizing inter-provincial movement, trade and commerce of wood and non-wood forest products through the Federal Forestry Board; e) Inter-linking natural forests, protected areas, wetlands and wildlife habitats to reduce fragmentation; f) Enhancing role and contribution of forests in reducing carbon emissions and enhancing forest carbon pools; g) Facilitating implementation of international conventions and agreements related to Forestry, Wetlands, Biodiversity and Climate Change; and h) Promoting standardized and harmonized scientific forest planning, research and education including for community-based management.	
4.	National Environmental Policy, 2005	In March 2005, Government of Pakistan (GoP) launched its National Environmental Policy, which provides a 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 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.	Clause (b) of sub-section 5.1 states that EIA related provisions in Environmental Protection Act, 1997, will be diligently enforced for all developmental projects.
5.	Pakistan Labour Policy, 2010	The main objective of the Labour Policy, 2010 is the social and economic well-being of the labour of	The labour will be employed for construction of the

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
		Pakistan. The Labour Policy, 2010 has following 4 parts: • Legal Framework; • Advocacy: rights of workers and employers; • Skill development and employment; and • Manpower export.	proposed project. The provision of policy will apply to all the labour employed.
6.	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. In view of Pakistan's high vulnerability to the adverse impacts of climate change, in particular extreme events, adaptation effort is the focus of this policy document. The vulnerabilities of various sectors to climate change have been highlighted and appropriate adaptation measures spelled out. The policy covers measure to address issues in various sectors such as water, agriculture, forestry, coastal areas, biodiversity and other vulnerable ecosystems. Notwithstanding the fact that Pakistan's contribution to global Greenhouse Gas (GHG) emissions is very small, its role as a responsible member of the global community in combating climate change has been highlighted by giving due importance to mitigation efforts in sectors such as energy, forestry, agriculture and livestock. Furthermore, appropriate measures relating to disaster preparedness, capacity building, institutional strengthening; technology transfer; introduction of the climate change issue in higher education curricula; ensuring environmental compliance through Initial Environmental Examinations (IEE) and Environmental Impact Assessments (EIA) in the development process; addressing the issue of deforestation and illegal trade in timber; promoting Clean Development Mechanisms (CDM); and raising Pakistan's stance regarding climate change at various international forums, have also been incorporated as important components of the policy. The policy thus provides a comprehensive framework for the development of Action Plans for national efforts on adaptation and mitigation.	This policy document is a 'living' document and will be reviewed and updated regularly to address emerging concepts and issues in the ever-evolving science of climate change.
7.	National Disaster Risk Reduction Policy, 2013	NDMA, being the lead focal agency for disaster preparedness and management, has therefore, embarked upon formulation of a comprehensive National Disaster Risk Reduction Policy through wider consultations with all stakeholders including all provinces, state of AJ&K and regions.	The proposed project is located in a 'disaster prone' area of Pakistan and will require special consideration related

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
		This policy covers disasters risk reduction in a more holistic way and introduces a proactive and anticipatory approach by laying special emphasis on risk assessment and prevention.	to disaster and risk management strategies.
8.	Handling, Manufacture, Storage, Import of hazardous waste and hazardous substances Rules, 2016	Subject to the provisions of this Act, no person shall generate, collect, consign, transport, treat, dispose of, store, handle or import any except under a license issued by the Federal Agency and in such manner as may be prescribed; or in accordance with the provisions of any other law for the time being in force, or of any international treaty, convention, protocol, code, standard, agreement or other instrument to which Pakistan is a party customary under sub-clause (a) and (b) of clause 13.	The project may involve the usage of any hazardous substance during construction or operation.
9.	Islamabad Capital Territory Building Control Regulations, 2020	Only such types of buildings/structures can be constructed in Islamabad Capital Territory plots, which are in accordance with the Master Plan / Functional Plan / these regulations and/or as described in the terms and conditions of allotment of respective plot(s).	The construction of the project must be done in accordance with the provision of these regulations.
10.	Pakistan Environmental Protection Agency Ban on (Manufacturing, Import, Sale, Purchase, Storage and Usage) Polythene Bags Regulations, 2019	According to the Ban on (Manufacturing, Import, Sale, Purchase, Storage and Usage) Polythene Bag Regulations 2019, there is a complete ban on making, buying or selling, and using single-use polythene bags in the ICT. However, permission has been granted for the use of large-sized polythene bags for dustbins and waste disposal. Under the law, the organizations wishing to use polythene flat bags will have to pay a Rs 10,000 fee. While any manufacturer, importer or wholesaler found supplying polythene bags will be fined a sum ranging from Rs 50,000 to Rs 500,000. A shopkeeper or hawker violating the regulation will be fined Rs 10,000 for the first time. The fine may go up to Rs 50,000 for repeated violations.	These regulations may trigger during the construction and operational phases of the project.
11.	Islamabad Fire Prevention and Life Safety Regulations, 2010	These regulations were prepared to make more effective provision for the Fire Prevention and Life Safety measures in certain buildings and premises in the Islamabad Capital Territory.	The provisions of these regulations are applicable in terms of taking precautionary measures to prevent and control the fire during the construction and operational phase of the project.
12.	Standard Operating Procedure	The Capital Development Authority (CDA) has the responsibility for the overall planning, provision and supervision of public health services, covering	These regulations are applicable to the project for the efficient

Sr. No.	Policy/Strategy	Brief Coverage	Relevance to project
	(SOP) for Management of Sanitation Services in Islamabad 2008	adequate sanitation and garbage disposal within the territorial limits of the Islamabad Capital Territory (ICT). It shall apply to waste generators (residential, commercial, hospital / clinical / hazardous / industrial, debris, green / garden waste etc) and waste / sanitation service providers (collection, storage, transportation & disposal) or Standard Operating Procedure (SOP) for Management of Sanitation Services in Islamabad or any person / agency who is directly / indirectly involved in solid waste management business.	management of solid waste and wastewater during construction or operation phase of the project.
13.	National Drinking Water Policy, 2009	The key policy principles that will be pursued for implementation of the Policy are as follows: (i) Access to safe drinking water is the basic human right of every citizen and that it is the responsibility of the Government to ensure its provision to all citizens; (ii) Water allocation for drinking purposes (as defined under Section 2) will be given priority over other uses; (iii) In order to ensure equitable access, special attention will be given to removing the existing disparities in coverage of safe drinking and for addressing the needs of the poor and the vulnerable; (iv) Recognizing the fact that women are the main providers of domestic waters supply and maintainers of hygienic household environment, their participation in planning, implementation, monitoring and operation and maintenance of water supply systems will be ensured; and Responsibilities and resources will be delegated to local authorities to enable them discharge their assigned functions with regard to provision of safe water supply in accordance with Local Bodies Legislation	The provision of this regulation is applicable in term of providing safe drinking water during construction or operation phase of the project.
14.	National Sanitation Policy, 2006	To ensure an open defection free environment; the safe disposal of liquid, solid, municipal, industrial and agricultural wastes; and the promotion of health and hygiene practices. To change the attitude and behavior on the use of sanitation. To increase mass awareness on sanitation and community mobilization.	This policy is applicable to the project for the efficient management of solid waste or wastewater during construction or operation phase of the project.

Table 2.2: Main Legislation/Acts Related to Environment and Their Relevance to the Project

Sr. No.	Act	Brief Coverage	Relevance to project
1.	Pakistan Environmental	The Pakistan Environmental Protection Act, 1997 is comprehensive legislation and provides the legislative framework for	The provision of the act is applicable for the proposed project for conducting an

Sr. No.	Act	Brief Coverage	Relevance to project
	Protection Act, 1997	protection, conservation, rehabilitation and improvement of the environment. The 'environment' has been defined in the Act as: (a) air, water and land; (b) all layers of the atmosphere; (c) all organic and inorganic matter and living organisms; (d) the ecosystem and ecological relationships; (e) buildings, structures, roads, facilities and works; (f) all social and economic conditions affecting community life; and (g) the interrelationships between any of the factors specified in sub-clauses 'a' to 'f'. The notable points of the law are: • No proponent of a project shall commence construction or operation unless he has filed with the Federal Agency an initial environmental examination or, where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Federal Agency approval in respect thereof. • Establishment of the Pakistan Environmental Protection Council; • Prohibition of certain discharges or emissions; and • National Environmental Quality Standards (NEQS) for ambient air, water, noise. For the proposed Project, Pakistan Environmental Protection Agency (Pak-EPA) is the concerned authority. The capability of regulatory institutions for environmental management is ultimately responsible for the success of environmental assessments and that development projects are environmentally sound and sustainable.	IEE/EIA according to section 12 and to obtain environmental approval from the Pak-EPA. The section 11 of the act is applicable in terms of compliance with National Environmental Quality Standards (NEQS) attached as **Annex-I**. Similarly, section 13 of the act prohibits the import of hazardous waste. The provisions of section 16 are also applicable to comply with the discharge or emission of any effluent, waste, air pollutant or noise or disposal of waste or handling of hazardous substance. Under section 17, penalties will apply if anyone fails to comply with the provisions of section 11, 12, 13 and 16.
2.	Pakistan Environmental Protection Agency, (Review of IEE and EIA) Regulations, 2000	These regulations set out: • Key policy and procedural requirements for filing an EIA; • The purpose of environmental assessment; • The goals of sustainable development;	The provisions of these regulations are applicable for environmental screening of the project, which implies that an EIA is required for the proposed project.

Sr. No.	Act	Brief Coverage	Relevance to project
		• The requirement that environmental assessment be integrated with feasibility studies; • The jurisdiction of the Federal and Provincial EPA's and Planning &Development (P&D) Departments; • The responsibilities of proponents; • Duties of responsible authorities; • Provides schedules of proposals that the project requires either IEE or an EIA; • The environmental screening process of the projects under schedule I, II and III; and • The procedure for the environmental approval for filing the case with the concerned EPA for the granting of the NOC.	
3.	National Environmental Quality Standards (2010)	The National Environmental Quality Standards (NEQS) will be applicable to the Project. Article 11(1) of the PEPA 1997 states that "Subject to the provisions of this Act and the rules and regulations made thereunder no person shall discharge or emit or allow the discharge or emission of any effluent or waste or air pollutant or noise in an amount, concentration or level which is in excess of the National Environmental Quality Standards". The National Environmental Quality Standards (NEQS) were first promulgated in 1993 and have been amended in 1995 and 2000 including standards for liquid effluent and gaseous emissions. The standards for ambient air, drinking water quality and noise levels were published on November, 2010 and standards for motor vehicle exhaust, diesel vehicle, and petrol vehicles published in August, 2009.	All projects to be implemented in Islamabad must comply with NEQS during all the phases i.e. construction and operation.
4.	National Clean Air Act, 2000	The act aims to control vehicular emissions, pollution from industry, and indoor air pollution in rural and urban areas.	This act will trigger if vehicles and machinery used for construction activities emanates air pollutants above the permissible limit.
5.	Seismic Building Code of Pakistan 2007	This code stipulates the minimum requirements for seismic safety of building and structures and the provisions of the Building Code of Pakistan (Seismic Provisions-2007) shall apply for engineering	This Code is applicable to the proposed project as it includes the formation of structures.

Sr. No.	Act	Brief Coverage	Relevance to project
		design of buildings, like structures and related components. Construction of buildings in defilement of the Building Code shall be considered as violation of professional engineering work specified under clause (XXV) of section 2 of the act.	
6.	Pakistan Antiquities Act 1975	The protection of cultural resources in Pakistan is ensured by the Antiquities Act of 1975. Antiquities have been defined in the Act as ancient products of human activity, historical sites, or sites of anthropological or cultural interest, national monuments etc. The act is designed to protect antiquities from destruction, theft, negligence, unlawful excavation, trade and export. The law prohibits new construction in the proximity of a protected antiquity and empowers the Government of Pakistan to prohibit excavation in any area, which may contain articles of archaeological significance. NOC would be requested from DG Archeological Department for construction within 200 feet of cultural heritage sites.	The law will be applicable to the project mainly due to its provision: ▪ The provisions of this act would also be applicable, if any accidental archaeological discoveries may occur during the excavation works for the construction of proposed Project.
7.	Pakistan Penal Code, 1860	The Code deals with the offences where public or private property or human lives are affected due to intentional or accidental misconduct of an individual or organization. The Code also addresses control of noise, noxious emissions and disposal of effluents.	The provisions of the Penal Code, 1860 are applicable to the project in terms of penalties for effecting human lives and public property. It also addresses the control of noise, air emissions and effluent disposal.
8.	The Protection against Harassment of Women at the Workplace Act, 2010	The Protection Against Harassment of Women at the Workplace Act (2010) refers to sexual harassment at the workplace.	This Act will be applicable to the project if women are employed for the construction of the proposed Project or women live near vicinity of the project area.
9.	Employment of Children Act, 1991	Article 11(3) of the Constitution of Pakistan prohibits employment of children below the age of 14 years in any construction, or any other hazardous employment. In accordance with this Article, the Employment of Child Act 1991 prohibits child labour (a child is under 14 years old). Presently GoPb has drafted a new Act "Punjab Restriction of Employment of Children Act 2015" dealing with child labour in the commercial and industrial sectors of Punjab. The Act is expected to be	The relevance of this act to the project will be to prohibit child employment for construction of the proposed project.

Sr. No.	Act	Brief Coverage	Relevance to project
		promulgated by the Punjab Assembly shortly.	
10.	Labour Laws as part of Constitution of Pakistan 1973,	The Constitution of Pakistan contains a range of provisions with regards to labour rights, in particular: • Article 11 of the Constitution prohibits all forms of slavery, forced labour and child labour; • Article 17 provides a fundamental right to exercise the freedom of association and the right to form unions; • Article 25 lays down the right to equality before the law and prohibition of discrimination on the grounds of sex alone; and • Article 37(e) makes provision for securing just and human conditions of work, ensuring that children and women are not employed in vocations unsuited to their age or sex, and for maternity benefits for women in employment. Labour law is controlled at both provincial and national levels with compulsory employment agreements containing the terms set out by the labour laws.The labour laws are a comprehensive set of laws in Pakistan dealing with the following aspects: • Contract of Employment; • Termination of Contract; • Working Time and Rest Time; • Working hours; • Paid Leave; • Maternity Leave and Maternity Protection; • Other Leave Entitlements; • Minimum Age and Protection of Young Workers; • Equality; • Pay Issues; • Workers' Representation in the Enterprise; • Trade Union and Employers Association Regulation; and • Other Laws.	The labour laws will be relevant as it would deal with employment of labour for the construction of proposed Project. Following are the major labour laws which are applicable to the project: • Bonded Labour System (Abolition) Act, 1992 • Employment of Child Act, 1991 • Minimum Wages Ordinance, 1961 • Industrial Relations Act, 2010 • West Pakistan Minimum Wages for Unskilled Workers' Ordinance, 1969
11.	Guidelines for the Preparation and Review of Environmental Reports, 1997	These guidelines describe the format and content of IEE/EIA reports to be submitted to Provincial EPA/EPD for obtaining NOC. The guidelines present:	The guidelines are applicable for the preparation of the EIA.

Sr. No.	Act	Brief Coverage	Relevance to project
		• The environmental assessment report format; • Assessing impacts; • Mitigation and impact management and preparing an environmental management plan; • Reporting; • Review and decision making; • Monitoring and auditing; and • Project Management.	
12.	Land Acquisition Act 1894	The primary law for acquisition of land for public purposes in Pakistan is the "Land Acquisition Act, 1894". The Land Acquisition Act, 1894, is a "law for the acquisition of land needed for public purposes and for companies and for determining the amount of compensation to be paid on account of such acquisition". The exercise of the power of acquisition has been limited to public purposes. The principles laid down for the determination of compensation, as clarified by judicial pronouncements made from time to time, reflect the anxiety of the law-giver to compensate those who have been deprived of property, adequately.	This act is not triggered as the project site already in ownership of STZA.
13.	Cutting of Trees (Prohibition) Act, 1975	The Act was enforced in 1975 to place restrictions on cutting of trees in order to restrain unchecked trend of tree felling without replacement plantations.	This act will be applicable to the subject project where the cutting of tree will be involved.
14.	National Disaster Management Act, 2010	National Disaster Management Act, 2010 was passed by Parliament of Pakistan in 2010. The Act applies to whole Pakistan including tribal areas of FATA. The Act was passed in backdrop of 2010 Floods in Pakistan and strengthens Disaster Management system.	This act is applicable to the proposed project due to its location in disastrous area of Pakistan. The proposed project will require special consideration of disaster and risk management strategies as per the Act.
15.	Pakistan Occupational Health and Safety Act 2018	An act to ensure safe and healthy working conditions for the people at work; by authorizing enforcement of the rules and regulations developed under the Act; by assisting and encouraging the organizations, institutions and geographic areas governed by the federal government in their efforts to ensure healthy and safe working conditions; by providing for research, information, education, and training in the field of occupational health and safety.	This act will be applicable to the proposed project in term of the health and safety during the construction and operational phases of the project.

Sr. No.	Act	Brief Coverage	Relevance to project
16.	Canal and Drainage Act (1873)	This Act prohibits corruption or fouling of water in canals (defined to include channels, tube wells, reservoirs and watercourses), or obstruction of drainage.	This act will be applicable to the proposed project in term of sewage disposal & handling of wastewater.
17.	Protection of Trees and Bushwood Act, 1949	This Act prohibits cutting or lopping of trees and brushwood without permission of the Forest Department. In our project the Wildlife Department is responsible which will be approached for permission to cut trees in the proposed project site.	This act will be applicable to the proposed project in term of Tree Cutting.
18.	Sectoral Guidelines for Environmental Reports (1997)	Pakistan Environmental Assessment Procedure deals with general guidelines as well as the sectoral guidelines for the environmental assessment studies. "Sectoral Guidelines for Environmental Reports – Industrial Estates" are used as a reference in this document.	This act will be applicable to the proposed project in terms of compliance of the sectoral guidelines.
19.	The Forest Act (1927)	The Forest Act 1927 is designed to protect forest areas. The law prohibits grazing hunting, quarrying, clearing for the purpose of cultivation, removing forest produce, and cutting or looping trees in forest or protected areas	This act is not triggered as the project site is not come under forest or protected area.
20.	Factories Act, 1934	This law governs the employment of labor, working hours, working conditions and facilities to be provided in the workplace. The Act deals primarily with matters related to labor relations, their working conditions and their health and safety in the working place. Section 14 to 33 of the act specifically covers all the issues related to working environment of laborers including ventilation (sec14), drinking water conditions for workers (ectll the issues related to working environment of labourers including ventilation (14), drinking water conditions for worsec19), precautions against fire hazards (sec22) or any other hazardous operation within the working area (sec33) under this act.	This act will be applicable during the construction and operational stages of the project. Contravention to any of the provision of this act will lead to penalty against the concerned person.
21.	Special Technology Zone Authority Act, 2021	The Special Technology Zones Authority Act, 2021 received assent from President on 6th October 2021 and was promulgated as an Act of the Parliament. STZA has been set up to ensure the development of scientific and technological ecosystem through development of zones to accelerate technology development in the country. The purpose of the STZA Act is to provide	This act STZA has been set up to ensure the development of scientific and technological ecosystem through development of zones.

Sr. No.	Act	Brief Coverage	Relevance to project
		institutional and legislative support for the technology sector with internationally competitive and export-oriented structures and eco-systems, to attract foreign direct investment, develop collaborative eco-system connecting academia, research and technology industry.	
22.	Guideline for Solid Waste Management, 2005	Guidelines for Solid Waste Management (2005) are in draft form (Pak-EPA in cooperation with Japan International Corporate Agency and United Nations Development Programme).	The provision of these guidelines is applicable for waste generation during construction & operation phase of the proposed project.

2.3 CDA Ordinance 1960

Capital Development Authority (CDA) was established on June 14, 1960, first by an executive order issued on June 24, 1960 entitled the Pakistan Capital Regulation, to be superseded by the CDA Ordinance issued on June 27, 1960.

The CDA Ordinance constituted the authority, laid down its charter and defined its power, duties, functions and responsibilities.

Objective of the Ordinance firstly, planning and development of the Capital (Islamabad), secondly completing or authorizing Capital Development Authority to perform functions of a Municipal Committee and to provide for cleanliness, health, education of inhabitants, supply of goods, articles of food and mild, to promote interest of different sections of public. All provisions are for advancing interest and public good.

2.4 CDA Bylaws

The CDA has a certain group of laws for development in ICT. To carry out the construction works in ICT one has to follow these laws. These are given below;

1. Islamabad Capital Territory Building Control Regulations-2020
2. Revised Modalities & Procedures (2020) for development of Private Housing /Farm Housing Schemes in Zones 2,4 & 5 of ICT Zoning Plan
3. The Islamabad Laws
4. Islamabad Residential Sector Zoning (Building Control) Regulations-2005)
5. Amendments in ICT (ZONING) Regulations, 1992 of ZONE-4
6. Planning parameters for construction of Medium Rise Residential Apartments in Zone - II, Zone-IV and Zone-V
7. BYE-LAWS / Parameters for establishment of Marriage/ Event Halls and Marquees
8. ICT Zoning Regulations 2005
9. Islamabad Residential Sector (Building Control Regulations 1993)
10. ICT Municipal Bye Laws 1968

11. SOP for Management of Sanitation Services in Islamabad 2008
12. ICT Zoning Regulations 1992
13. Islamabad Fire Prevention and Life Safety Regulations 2010
14. Cabinet Division notification regarding Property Tax and Water Charges
15. Employees (Service) Regulations 1992 (Amended till 2011)

2.5 ISO 18001 Occupation Health and Safety Assessment Series (OHSAS)

OHSAS 18001 is an Occupation Health and Safety Assessment Series for health and safety management systems to help organizations to control occupational health and safety risks. The OHSAS specifications are applicable to any institute that desires to establish an OH&S management system to eradicate or reduce risk to employees and other interested parties who may be exposed to the risks allied with the project activities. As the subject project is a construction of proposed project and involves various health and safety issues to construction labor, therefore these ISO 18001 guidelines will be applicable and pertinent.

2.6 Guidelines for Critical and Sensitive Areas, 1997

Protected areas are of crucial and growing importance. Properly managed protected areas are based on the establishment of a system, which aims to:

- Safeguard the earth's precious biodiversity;
- Protect outstanding areas of natural beauty; and
- Conserve areas of cultural significance.

In Pakistan, there exists a system of protected areas for the protection of endangered species, habitats, ecosystems, archaeological sites, monuments, buildings and other cultural heritage. The threats to protected areas in Pakistan are commercial-industrial pressures including mining, logging, overgrazing, cutting wood for fuel, development Projects and mismanaged tourism. Protected areas in Pakistan can be broadly categorized into two groups; i.e.

- Ecosystems; and
- Archaeological and cultural sites.

There is no central level legislation for wildlife conservation in Pakistan. However, each province has its own laws covering protected areas. There are separate wildlife departments in the provinces that administer protected areas.

It should be noted that the above legislation consists of complicated, lengthy and legal documentation. Logically, only the relevant conservation authorities are in a position to provide the proponent or consultant with the most appropriate technical, scientific, administrative and regulatory assistance relating to the different legislations.

The GoP in the past years has taken some concrete steps to preserve, conserve and manage our national heritage, fauna and vegetation through the establishment of protected areas. This is being done through legislation, scientific research and education. In all the four (04)

provinces, there are statutes that provide for creation and management of national parks, wildlife sanctuaries and game reserves.

The official classification of notified protected ecosystems in Pakistan consists of wildlife sanctuaries, national parks and game reserves.

In addition, there are protected forests, reserved forests, village forests/guzara forests, state forests and range lands. The relevant conservation authorities supply information on these areas to the Proponent or Consultant. In planning and siting a project, the proponent needs to focus on being sensitive to the particular values of the relevant ecosystem or archaeological and cultural sites.

Any activity involved in reserve and guzara forests either for the purpose of small scale or large-scale NOC from/through the Secretary Forestry, Environment and Wildlife Department, the Chief Conservator of Forests (CCF)/Conservator of Forests (CF) will be mandatory/obligatory through proper channel. After the issuance of NOC from the competent authority the project interventions will be made.

2.7 Checklist of Procedure for Environmental Assessment

Prior to any Environmental approval being granted by the responsible authority, the following steps should be undertaken:

- First of all, the proponent should identify whether the site for the proposed development is within the precincts of a protected ecosystem, cultural and archaeological sites. For this, STZA should refer to the list of notified ecosystem, archaeological and historical sites. This list was last updated in April 1997. If the proposed site is not located in a notified area and there are no apparent ecological or cultural values associated with the site, take no further action;
- If project identifies an ecological site that appears to be of importance, but the site is not listed, they should discuss the site with the relevant conservation authority;
- If the site falls within the boundaries of a protected ecosystem, the relevant conservation authority should be contacted for advice about the extent to which the development may be allowed and with what conditions. Certain protected areas may have total prohibition of development while others may allow controlled development;
- The relevant conservation authority should inform the responsible authority of their assessment of the significance of the likely impacts of the proposed development early in the process in order for the responsible authority to determine the level of documentation required. Pak-EPA will then be in a position to review the level of reporting required in the light of the advice from the conservation authorities; and
- During the review of the environmental report, the responsible authority will liaise with the Conservation Authority to ensure that the impacts and mitigation measures detailed in the environmental report are well based to frame environmental approval conditions, which protect the values of the listed area.

2.8 Protected Areas Clearance Procedure

The protected areas help maintain the integrity and diversity of eco-systems, protect flora and fauna and facilitate ecological processes such as water flows, soil regeneration, nutrient cycling and so on, which is vital for all life.

The 'Guidelines for Sensitive and Critical Areas' have described the procedure for the clearance of the Forestry and Wildlife departments in case the project lies in protected areas.

The Federal Secretary, Forestry and Wildlife department will be involved in providing comments and recommendations for EA related to ecosystems.

At the federal level, the office of the Inspector General Forestry (IGF) will be the central and national coordinator and will be involved to assist in any dispute between the Wildlife department and STZA, which they cannot resolve themselves.

In case, project site lies in protected area, the EA report should not be finalized and submitted to the responsible authority (i.e. Pak-EPA) until there is consultation with the wildlife department and their comments and recommendations are taken into consideration as part of the mitigation and control measures.

The involvement of the wildlife department and federal IGF in the EIA report review will become a critical part of the process for project review and approval, for development in or vicinity of protected ecosystems.

While the Wildlife Conservation department and the federal IGF will provide this technical and specialized expertise in the review process, the review of the environmental reports and the provision of any environmental approval will be undertaken by the responsible authority, as provided for in the Act and elsewhere in the package.

2.9 Compliance Procedure for Obtaining NOC from Pak-EPA

Review of IEE and EIA Regulations, 2000 provide the necessary details on the preparation, submission, and review of the IEE and the EIA reports. Categorization of projects for IEE and EIA is one of the main components of these regulations. Projects have been classified on the basis of expected degree of adverse environmental impact.

According to the Pakistan Environmental Protection Agency (Pak-EPA) (Review of IEE and EIA) Regulations 2000, the proposed project falls under category B of Schedule II, which requires EIA before commencement of construction to initiate the process of environmental approval for obtaining NOC from Pak-EPA.

The regulations stipulate that within ten (10) working days of the IEE or EIA study having been submitted, the concerned environmental Protection agency will confirm that the document submitted is complete for the purpose of review. During this time, should the agency require the proponent to submit additional information, it will return the IEE or EIA to the proponent for revision, clearly listing those aspects that need further discussion. Subsequently, the Pak-EPA

would make every effort to complete an IEE review within forty-five (45) days and an EIA review within ninety (90) days of filing.

The prescribed procedure for review of EIA by the EPAs is described in Review of IEE and EIA Regulations, 2000 and is depicted in **Figure 2.1**.

Article 12(4) of PEPA 1997 binds the Federal Agency to communicate its approval or otherwise within a period of four months from the date the IEE or EIA is filed, complete in all respects in accordance with the prescribed procedure, failing which the IEE or, as the case may be, the EIA study shall be deemed to have been approved, to the extent to which it does not contravene the provisions of this Act and the rules and regulations made thereunder.

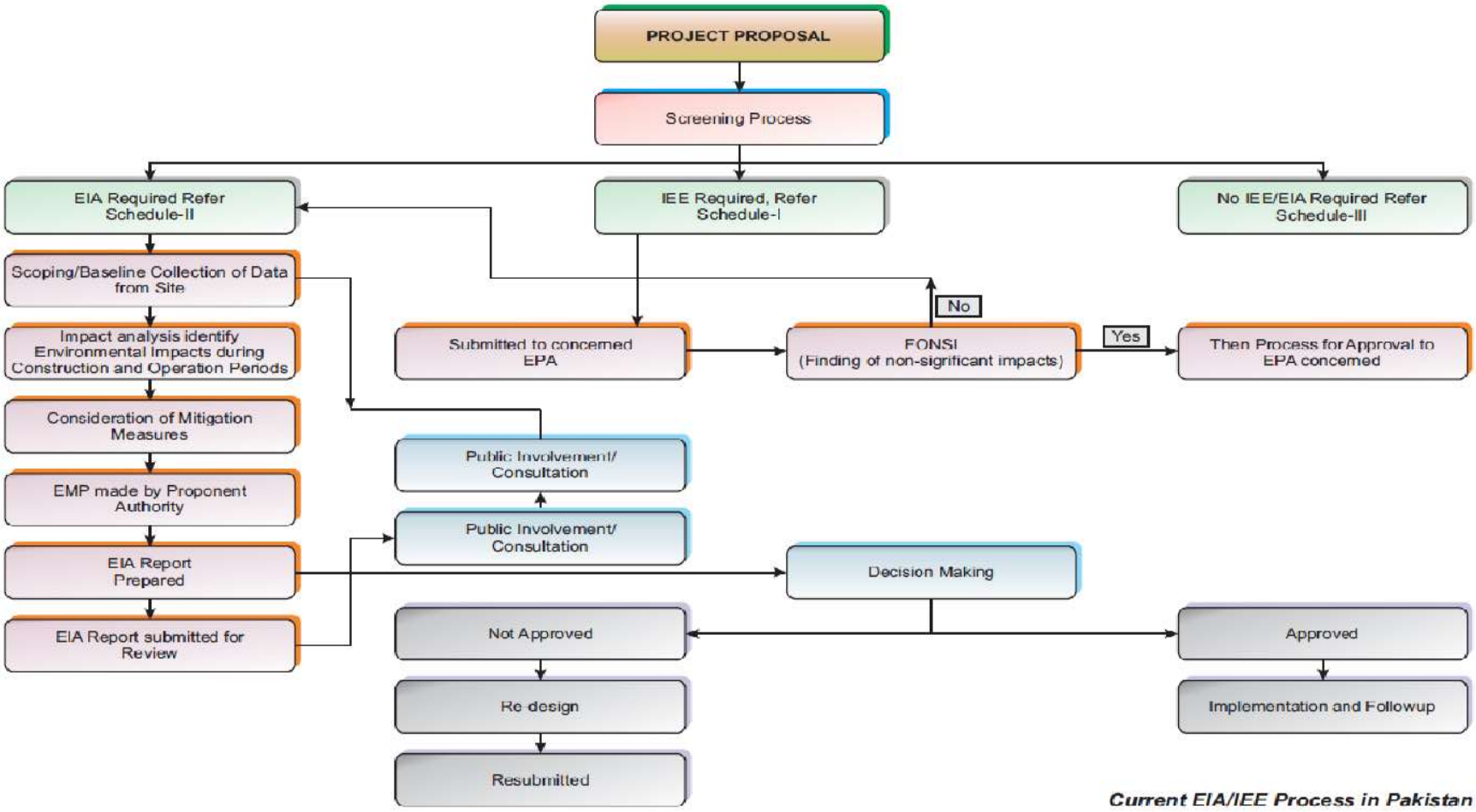


Figure 2.1: Procedure for Submitting the EIA Report

2.10 International Protocol/Conventions

As Pakistan is a member of a number of international organizations such as United Nations Organization (UNO), Organization of the Islamic Conference (OIC), South Asian Association for Regional Cooperation (SAARC), Economic Cooperation Organization (ECO) etc., so it has to follow the international protocols and obligations related to the environment. The major protocols, ratification dates by Pakistan and obligations related to the proposed project are provided in the **Table 2.3** below.

Table 2.3: International Agreements/Conventions/Standards Relevant to the Project

Sr. No	Agreement/Convention	Ratification	Description/Relevance
1.	United Nation Framework Convention on Climate Change (UNFCCC) Amended, 2015. Web Link: http://unfccc.int/resource/docs/convkp/conveng.pdf	Pakistan ratified this convention on June 1, 1994.	The objective of the Convention is to stabilize greenhouse gas concentrations "at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system." Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.
2.	International Union for Conservation of Nature and Natural Resources Red List, 2000 Web Link: https://www.iucnredlist.org/		This enlists wildlife species experiencing various levels of threats internationally. Some of the species indicated in the IUCN red list are also present in the wetlands of Pakistan. However, no wildlife species experiencing various levels of threats are present in and around the surroundings of project area.
3.	UNESCO Convention on the Protection of the World's Cultural and Natural Heritage, 1972 Web Link: http://whc.unesco.org/en/%20convention%20text/	Pakistan ratified this convention on 23 July 1976.	Convention concerning the Protection of the World Cultural and Natural Heritage requires parties to adopt a general policy on the protection of the natural and cultural heritage, to set up services for such protection, to develop scientific and technical studies, to take appropriate legal, technical, scientific and administrative measures and to foster training and education for such protection.
4.	Convention on the International Trade of Endangered Species (CITES), 1975	Pakistan signed the Convention in 1973 and ratified it in April 1976.	The convention entered in to force on 1 July 1975. The principal obligations of contracting parties to the CITES are to safeguard the trade in rare or endangered species and it established a permit system to control imports and exports of wild fauna and

Sr. No	Agreement/Convention	Ratification	Description/Relevance
	Web Link: https://www.cites.org/		flora. According to this convention, species threatened with extinction whose movement between countries is prohibited except for conservation purposes such as captive breeding, species whose commercial trade is permitted but export permits are needed.
5.	Convention on Conservation of Migratory Species of Wild Animals, 1979 https://www.cms.int/	Pakistan signed this convention in 1981 and ratified it in December 1987.	Convention on the Conservation of Migratory Species deals with the conservation and protection of the migratory species. Species covered in the Convention should be given special attention during EA and monitoring and any impacts identified should be mitigated to acceptable levels.
6.	The Rio Declaration, 1992 Web Link: http://www.unesco.org/education/pdf/RIO_E.PDF	Pakistan signed the treaty on 13Jun 1992 and ratified on 1 June 1994	The Rio Declaration comprises 27 principles which address important issues such as; sustainable development to integrate environmental protection into the development process; common but differentiated responsibilities to conserve, protect and restore the earth's ecosystems; public participation and information access at the national level, reduce and eliminate unsustainable patterns of production and consumption.
7.	Paris Agreement, 2015 Web Link: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-7-d&chapter=27&clang=_en	Pakistan has ratified Paris Agreement, 2016.	The Paris Agreement's central goal is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below two degrees celsius above pre-industrial levels and to pursue efforts to limit the temperature increase even further to one and half degrees celsius. Additionally, the agreement aims to increase the ability of countries to deal with the impacts of climate change, and at making finance flows consistent with a low GHG emissions and climate-resilient pathway.
8.	Basel Convention, 1994 Web Link: https://en.wikisource.org/wiki/Basel_Convention	Pakistan has ratified Basel Convention in 1994.	In 1994, Pakistan signed Basel Convention that restricts trans-boundary movements of "Hazardous Waste and their Disposal" with aim to protect human health and surrounding environment by minimizing the use of hazardous waste production. The proposed project will not necessitate the endowment of this convention.

Sr. No	Agreement/Convention	Ratification	Description/Relevance
9.	Kyoto Protocol, 1992 and its Amendments, 2012 Web Link: https://unfccc.int/kyoto_protocol	Pakistan has ratified Kyoto Protocol in 2005	The Kyoto Protocol is a protocol to reduce Greenhouse gasses that cause climate change. It was agreed on 11th December, 1997 at the 3rd Conference of the countries to the treaty when they met in Kyoto, and entered into force on 16th February, 2005. As of November 2007, 175 countries have ratified the protocol. One hundred and thirty-seven (137) developing countries have ratified the protocol, including Brazil, China, India and Pakistan but have no obligation beyond monitoring and reporting emissions. This Project has been proposed with an objective to fulfil the protocol by putting no change to climate.
10.	Convention on Biological Diversity, 1994 Web Link: https://www.cbd.int/	Pakistan signed this treaty in 1992 and it was ratified by cabinet in 1994.	The Convention on the Biological Diversity (CBD) has three main goals: Conservation of biological diversity (or biodiversity); sustainable use of its components; and fair and equitable sharing of benefits arising from genetic resources.
11.	UN Convention to Combat Desertification (UNCCD), 1994 Web Link: https://www.unccd.int/	Pakistan signed the Convention on 15th October 1994 and ratified it on 24 February, 1997	The UNCCD is a Convention to combat desertification and mitigate the effects of drought through national action programs that incorporate long-term strategies supported by international cooperation and partnership arrangements.
12.	Stockholm Convention on Persistent Organic Pollutants (POPs), 2004 Web Link: https://www.un.org/press/en/2004/unep204.doc.htm	The Stockholm Convention on Persistent Organic Pollutants was signed on 22 May 2001 and entered in to force on 17 May, 2004. Pakistan signed the convention on December 6, 2001	Convention seeks to protect human health and the environment from POPs as set out in Article 1, which are chemicals that remain intact in the environment for long periods, become widely distributed geographically and accumulate in the fatty tissue of humans and wildlife.

3 PROJECT DESCRIPTION

This section presents technical and design summary of the proposed Islamabad Technopolis Project.

3.1 Rationale of The Project

Technology Parks/ Zones are also known as Science or Research parks or Innovation and Science Centers. The term technology park usually denotes a focus on technology innovation and tenant company involvement in applied science. Technology parks are designed to facilitate the production and commercialization of advanced technologies by forging synergies among research centers, education institutions and technology-based companies. Tenants of technology parks are usually companies pursuing an ambitious growth strategy based on the incubation of new ideas to facilitate the successful adaptation and take-up of these ideas in the market place, the technology park provides:

- Cooperation in Research & Development with scientific research institutes
- Financial consulting and assistance in obtaining venture capital
- Professional, technical, and administrative assistance
- Information & telecommunications services; and supportive business infrastructure

By aiding the growth of tenant companies, technology parks play a significant role in the development of local economies. These helps create new jobs, attract foreign capital and increase local and national competitiveness. This developmental role is particularly important in transition economies, which must absorb a great deal of structural unemployment and "catch-up" with rapid technological developments in the global economy.

Technology Zones are also becoming aware of the costs associated with environmental measures such as pollution control, waste disposal, accident response and remedial clean-up activities. The cost of mitigation measures is increasingly being integrated into the decision-making process of companies looking for sites of new plants. On the other hand, pre-planned technology park with waste treatment and disposal systems and other necessary infrastructure offers distinct advantages.

From an environmental viewpoint the sources of pollution are concentrated in one area, avoiding the mixture of potential sources of pollution with other land uses, particularly residential. It does however, mean that a technology park itself has a concentration of users in one location and that the question of site selection for the technology park becomes even more sensitive and critical.

3.2 Project Objectives

The main objectives of this project are:

- To provide state-of-the-art infrastructure facilities like roads, electrical networks, water supply system, wastewater collection and drainage system including water and wastewater treatment plant.
- To act as a catalyst for enhancing the Technology exports of Pakistan;
- To encourage Hi-Tech innovative solutions and futuristic entrepreneurship;
- To change the economic outlook of Pakistan by enhancing Technology exports and encouraging technology;
- To get knowledge transfer from global technology hubs;
- To develop employment within region as well as at National level;
- To create skilled and un-skilled employment;
- To enhance research and development within region and as well as national level;
- To encourage human capital development;
- To enhance direct foreign investment; and
- To contribute to raising national income level.

3.3 Project Location

The “Islamabad Technopolis” is located at Jinnah Avenue in the south of Rawal Lake adjacent to National Institute of Health (NIH) Colony, Islamabad. The Park Road is the main artery which serves the traffic coming from/ to Rawal Dam Chowk, Lehtrar Road and etc. This road meets the project site through Jinnah Avenue. Location Map of Project site is shown in **Figure 3.1** and nearby important land marks of project area is shown in **Figure 3.2**. Islamabad Technopolis is spread over an area of 140 acres.

3.4 Project Administrative Jurisdiction

Special Technology Zone Authority (STZA) has been established, under the Cabinet Division of Government of Pakistan. Islamabad city is under the general charge of Deputy Commissioner.

3.5 Project Implementation Schedule

The project namely “Infrastructure Development of Islamabad Technopolis” is expected to be completed in one year and six months (545 days) after award of execution contract.

3.6 Land Acquisition

The currently lying unutilized land along with the NIH is leased by Capital Development Authority (CDA) to STZA. Leasing letter from CDA to STZA is attached as **Annex-II.**

3.7 Cost of The Project

The total project investment cost is estimated to be **Rs. 7.340 Billion.**

3.8 Alternative Studies

Three (03) alternative options were studied based on land use distribution, sub-zones, amenities and hierarchy of roads. Three Layouts of proposed Master Plan Options -1, 2 & 3 are given in **Figure 3.3, Figure 3.4 & Figure 3.5.** Brief of alternative options is given in **Table 3.1.** Final Master Plan of special technology zone is shown in **Figure 3.6.** CDA approval of Layout Plan and Building Bye Laws dated 14-11-2022 is received from STZA on 02-02-2023 which is attached as **Annex-II.**

Table 3.1: Alternative Master Plan Options

Sr. No.	Land uses	Option-1	Option-2	Option-3
		Area (Acres)		
A. Land use Distribution				
1.	Production / Manufacturing Zone	26.12	25.04	27.28
2.	Technology Zone	45.54	48.93	51.85
3.	Commercial / Residential Zone	8.42	8.42	11.93
4.	Amenities	7.21	8.78	8.69
5.	Parks	10.07	10.07	2.50
6.	Roads	42.65	38.46	37.75
	Total	**140**	**140**	**140**
B. Sub-Zones/ Plots		**No. of Plots**		
1.	2.0 Acre			
2.	1.0 Acre			
C. Amenities		**Area (Acres)**		
1.	Other Amenities including offices	2.10	3.04	3.06
2.	Masjid	0.57	0.57	1.14
3.	CETP	2.30	2.30	1.36
4.	Grid Station	2.50	2.51	2.40
5.	Rescue / Fire Fighting Buildings	--	0.66	--
6.	Parks	10.07 (6 Nos.)	10.07 (4 Nos.)	2.50 (2 Nos.)
D. Hierarchy of Roads		**Right of Way (feet)**		
1.	Main Boulevard	150’	150’	200’
2.	Secondary Road	120’	120’	150’
3.	Connecting Road	80’	80’	80’
4.	Vehicle Emergency Road	25’	------	----

The proposed Islamabad Technopolis project is designed in a ring road pattern with major traffic on the periphery and the Technopolis is supposed to be a limited traffic flows within the developed zones (secondary and tertiary roads) with green environment concepts. Throughout the Technopolis following amendments were made in the master plan on requirement of client and final option was selected and presented in **Figure 3.6,** whereas landuse distribution is given in **Table 3.2.**

Parks & Green Spaces

As per guidelines provided by CDA, minimum area allocation for Parks / Open Spaces etc. is required to be adjusted around 15%. Therefore Final Master Plan has been prepared with 15.08% Green Spaces (parks, green spaces etc.) which has inevitably reduced saleable area to around 53.91%.

Existing Road in Commercial / Residential Zone

Existing road in Commercial/Residential Area which is connecting population on both sides of Islamabad Technopolis was made intact in concept plan. However, on the basis of decision taken by STZA that population on both sides will be given access through road along boundary wall, the existing road has not been incorporated in Final Master Plan.

Existing Road Passing Throug Technology & Production Zones

Existing roads passing through Technology and Production Zones were kept intact in concept plan which have been omitted in Final Master Plan on the basis of STZA's decision.

Grid Station

The Area allocated for Grid Station plot was originally 2.5 acres as per NESPAK's Conept Plan Proposals. However, on STZA's direction same has been reduced to 1.5 acres.

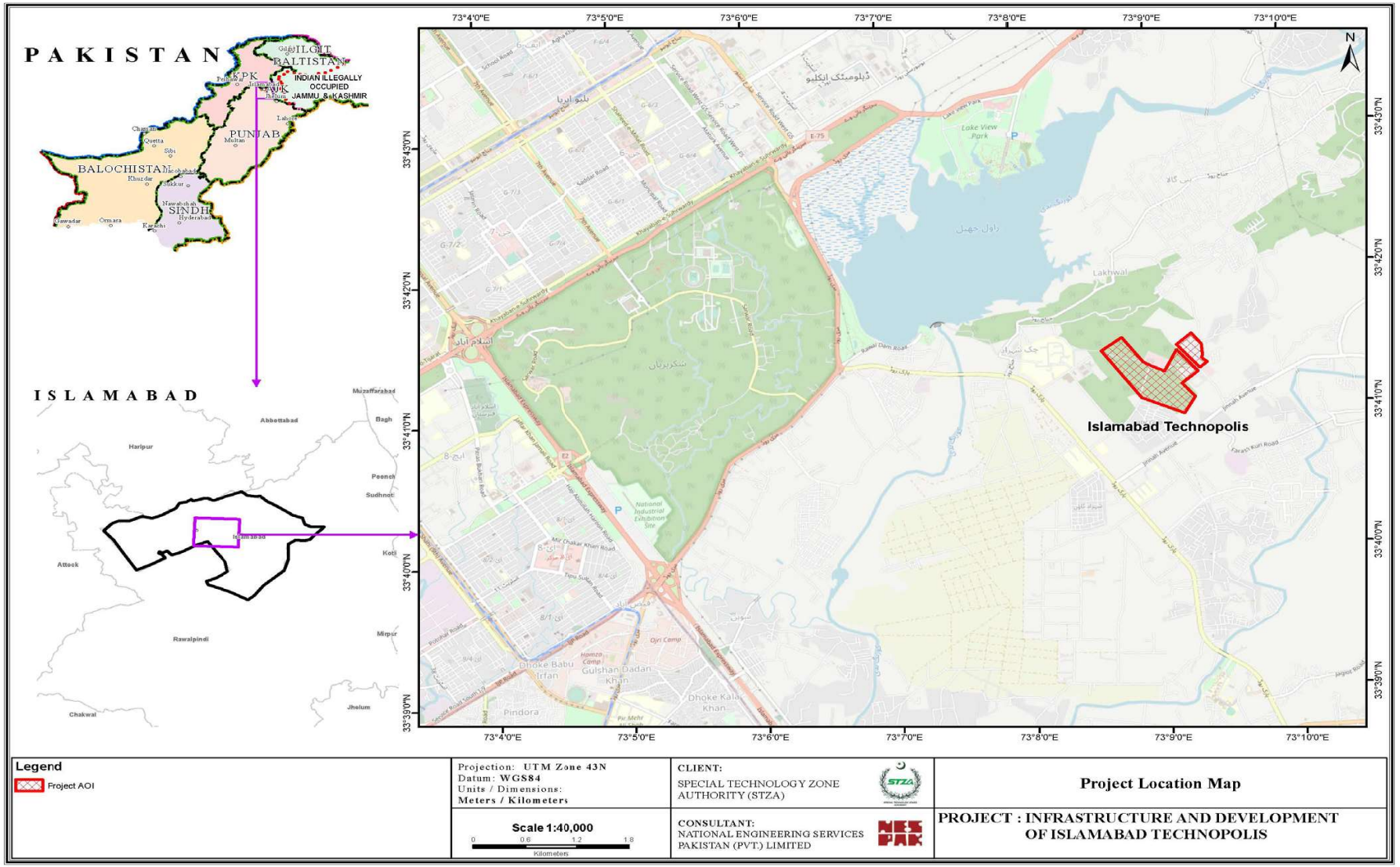


Figure 3.1: Project Area Location Plan

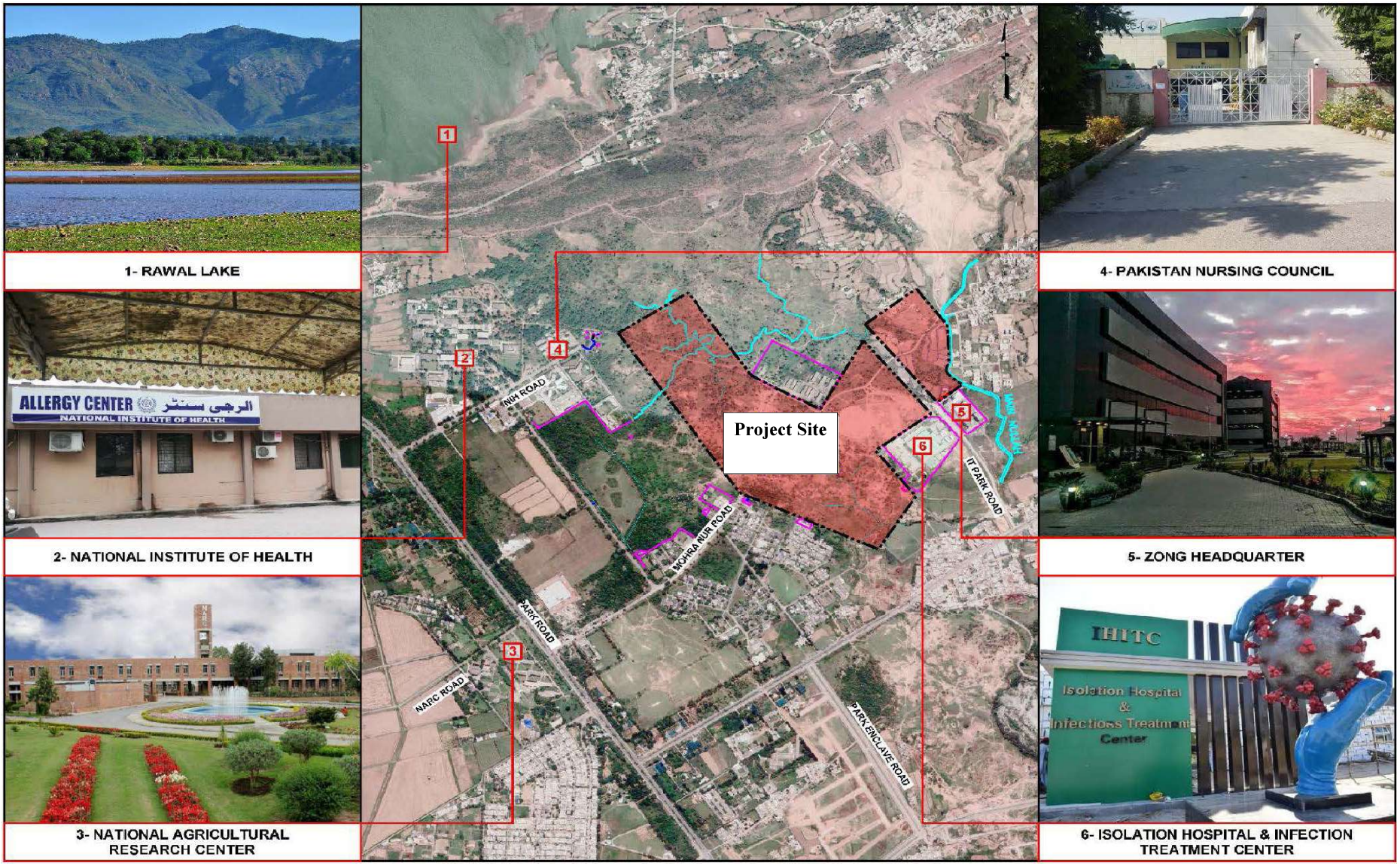


FIGURE 3.2: Nearby Important Landmarks of Project Area

LEGEND

Landuses	Area (Acres)	%Age
Manufacturing Zone	26.12	32.62
Technology Zone	45.54	56.87
Commercial/Intuitional Zone	8.42	10.51
	80.08	100
Total	80.08	57.20
Amenities/ Commercial/ Park	7.21 10.07	5.15 7.19
25' Wide Roads Main Roads	3.41 39.24	2.44 28.02
Total	140	100

Figure 3.3: Conceptual Master Plan Option - 1

Figure 3.4: Conceptual Master Plan Option - 2

Figure 3.5: Conceptual Master Plan Option - 3

LEGEND

Landuses	Area (Acres)	%Age
Production Zone	18.65	24.71
Technology Zone	47.32	62.69
Residential Zone	3.89	5.29
Commercial Zone	5.62	7.31
	75.48	100
Total	75.48	53.91
Park	16.65	78.87
25' Wide Green Corridor	4.46	21.13
	21.11	100
Total Park	21.11	15.07
Nullah	0.54	0.39
Amenities	3.17	2.27
Main Roads	39.70	28.36
Grand Total	140	100

0 2000 4000

CLIENT: SPECIAL TECHNOLOGY ZONES AUTHORITY	CONSULTANT: NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE - NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.	04 / 03 / 02 / 01 / REV. / DATE / DESCRIPTION / APPROVED	DRAWN: ADNAN; SUBMITTED; RECOMMENDED; CHD./VER.; APPROVED	PROJECT: CONSULTANCY SERVICES FOR MASTER PLANNING, INFRASTRUCTURE DESIGN, EIA AND CONSTRUCTION SUPERVISION OF ISLAMABAD TECHNOPOLIS	LAYOUT PLAN OF ISLAMABAD TECHNOPOLIS; DATE: APRIL 2022; DRAWING No.: 4384/LP/01; SCALE: 1:2000; REV.: 0

Figure 3.6: Final Master Plan

3.9 Selected Option

As per the final master plan of the Islamabad Technopolis following are the different components of the project.

3.9.1 Land use Distribution

Total land of the project area has been divided into different zones/land uses. Approval of Landuse Plan of Islamabad Technopolis has been accorded by CDA. The existing land use of the project area is described later in **Section 4.2.7**.

District 1: Production Zone

Providing world class infrastructure, the district is planned to boost Technology exports by providing opportunities for global manufacturers to manufacture products or components through research and development. High Tech Production district shall also be supported by Technology Clusters (District 2) by provisioning university boot camps and incubation centers for academia needs and research work.

District 2: Technology Zone

Apart from second to none infrastructure, the high-tech office space has been planned to host best in class tech firms, keeping in view their needs addressed by global scale Technopolis projects. The district shall comprise multipurpose buildings, so designed to ensure academia, office space, research centers, incubation centers, co-working spaces, on campus dine in and fitness center possibilities under one roof.

District 3: Commercial / Residential Zone

Thriving on the concept of a sustainable smart city, residential district compliments the needs of its neighboring districts by providing ample student and resident housing (apartments), lifestyle amenities (shopping malls), commercial developments (i.e., shops and apartments and hotel etc.).

Table 3.2: Landuse Distribution

Sr. #	Landuse	Area (acres)	% Age
1	Production Zone	18.65	13.32
2	Technology Zone	47.32	33.80
3	Commercial	5.52	3.94
4	Residential Zone	3.99	2.85
5	Parks / Green Areas	21.11	15.08

Sr. #	Landuse	Area (acres)	% Age
6	Amenities	3.17	0.39
7	Main Nullah	0.54	2.26
8	Roads	39.70	28.36
Total		**140**	**100**

3.9.2 Type of Industries

Several types of industries have been proposed to be established in the production zone of Islamabad Technopolis. The types of industries shared by STZA on the basis of applicants, letter of intent (LOI) and general interest shown by various companies vide email dated 20-09-2022 is given in **Table 3.3.**

Table 3.3: Types of Industries

Sr. No.	Types of Industries	Status
1	Mobile Assembly & Manufacturing	Applicants
2	Electronics (PCB/SMT) Production and Packaging including Software Development	Applicants
3	Solar Cell Manufacturing	Applicant
4	Drone Manufacturing	Applicant
5	Vaccine Production	LoI Only
6	Semiconductor Outsourced Assembly & Test (OSAT) Facility	Interest Only
7	EV Charging Station Manufacturing	Interest Only
8	High Vaccuum Production & Testing Products / Advanced Physics Equipment	Interest Only

3.9.3 Details of Amenities

Provision has been made for the commercial and social amenities in the proposed Technology zone. **Table 3.4** shows the details of social amenities.

Table 3.4:Details of Amenities Plots

Sr. #	Amenity	Area (acres)
1	Jamia Masjid 1	0.32
2	Jamia Masjid 2	0.33
3	Grid Station	1.50
4	Disposal Station & Treatment Plant	0.46

Sr. #	Amenity	Area (acres)
5	Rescue Area	0.56
Total		**3.17**

Final Master plan of project is shown above in **Figure 3.6.**

3.9.4 Sustainability

Sustainable design planning, infrastructure and carbon footprint reduction are the nucleus of master plan program concept for Islamabad Technopolis. The entire development's founding principal rests on a core spine of green systems - parks, energy conserving mechanical equipment, shared infrastructure, retreatment of water and utilization of clean and renewable energy. A green spine runs though out the Layout plan, linking 4 larger green recreational spaces / parks for users to utilize in all three districts. In addition, based on natural water channels, three water bodies are planned on the far ends of the site which are lower points in the topography and can therefore become eco parks with rainwater recycling for the Technopolis. Sustainability Core- Green System shown in **Figure 3.7.**

As per the ICT Building Control Regulations/2021 for Islamabad Technopolis, to promote sustainability, green/low carbon emissions buildings and vertical development to reduce contribution to global climate change, the Technopolis envisioned as a sustainable research park with green, energy-efficient buildings that provide state-of the-art research facilities, office buildings, manufacturing units and residential with ample natural indirect light, thoughtful interior design, inviting work spaces, and support spaces to encourage interaction and promote blue-sky research, or "curiosity-driven science." All buildings are encouraged to utilize high-performance sustainability practices to reduce the environmental impact of each project and to create healthy working environments for employees and visitors.

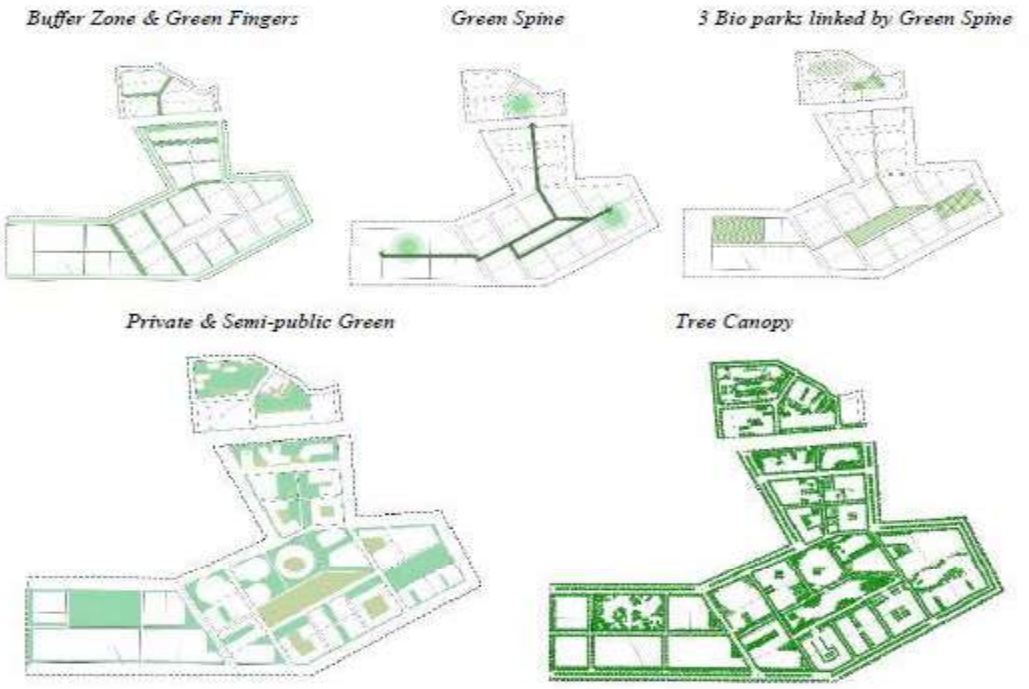


Figure 3.7Sustainability Core- Green System

3.10 Carbon Footprint

Carbon footprint is the total amount of greenhouse gases that are generated by human activities. The expected carbon footprint of the construction activities for proposed Islamabad Technopolis project is about 3.2 metric tons for the entire construction period of 18 months. A tree sapling normally absorbs 5.7 kg of CO_2 per annum, therefore, the number of saplings required to sequester carbon footprint for the construction phase are 550.

The carbon footprint during the operational phase of the project cannot be precisely calculated at the stage as it depends upon the type of industries and the development process of Islamabad Technopolis. However, for the operational phase of the project, it is envisaged that no major GHGs emissions shall take place as the project is designed on the concept of sustainability and green buildings. Major source of GHGs emissions would be vehicles. As per the ICT Building Control Regulations/2021 for Islamabad Technopolis, considering sustainability and green/low carbon emissions to reduce contribution to global climate change, there will be less movement of private vehicles within Islamabad Technopolis as electric buses shall be used for the movement around.

Taking into account full development of Islamabad Technopolis, total carbon emissions from estimated vehicles would be around 38.5 metric ton per year. It is pertinent to mention that the absorption capacity of a tree increases with the age and a mature tree can absorb around 21 kg of GHGs per annum. to sequester the GHGs emissions from vehicles, around 300 trees would be required. However, around 6,500 trees shall be planted in the project area which will not only sequester the GHGs emissions but also enhance the environmental conditions of the area.

3.11 Project components

Islamabad Technopolis will comprise of following components:

- Diversified Land-use consisting of Technology Zone, Production Zone and Commercial/Residential Zone
- Planned Road Network with Green Corridors,
- Underground Electricity Distribution & Street Lighting,
- Parks and open spaces
- Water Supply Transmission, Treatment and Network
- Sewage/Wastewater Collection, Disposal and Treatment System,
- Storm Water Drainage System and Channelization of Existing Nullahs,
- Amenities including Maintenance office, Firefighting/Rescue Building, Medical Center, Parking Spaces, Mosque etc.,
- Boundary Wall and Monuments, and
- Entrance Gates.

This EIA study covers the impacts and its mitigation measures of above-mentioned components only. However, separate EIA/ IEE studies shall be carried out for each sub-zones/ sub-projects prior to construction by the concerned developers and shall be submitted to Pak-EPA for getting NOC. Major components are briefly described as under:

3.11.1 Landuse Master Plan

Considering following features and limitations, Landuse Master Plan for Islamabad Technopolis has been prepared:

- Connection with Proposed Primary Roads on both sides
- Relatively Tough Terrain
- Low lying area near north western corner of the site
- Complicated Drainage pattern
- Division of Project Area into two parcels
- Topography does not support allocation of larger plots
- Existing road running across the project area has been incorporated in planning concept

3.11.2 Road Network

Following **Table 3.5** presents different right of way (row) roads are proposed in Islamabad Technopolis:

Table 3.5:Details of Amenities Plots

Sr. No.	Type of Roads	ROW (ft)	Length (Km)
1	Main Boulevard	120' wide	1.84
2	Secondary Road	80' wide	0.64
3	Connecting Road	50' wide	0.82
4	Vehicle Emergency Road	25' wide	2.07
Total			**5.37**

3.11.3 Water Supply System

Water demand of Islamabad Technopolis would be around 1.5 MGD. Break-up of the Average Water Demand is given below in **Table 3.6.**

Table 3.6: Average Water Demand

Sr. No.	Description	Area (acre)	Water demand	Unit
1	Production Zone	18.67	403,158	Gallons/day
2	Technology Zone	47.32	573,851	Gallons/day
3	Residential Zone	3.99	499,873	Gallons/day
4	Amenities and Commercial Area	10.42	23,268	Gallons/day
5	Horticulture Area	15.77	89,143	Gallons/day
Total Water Demand			**1.5**	**Million Gallons/day**

As per initial ground water study, underground water is not available therefore surface water will be used to fulfil the water requirements of Islamabad Technopolis. For surface water, there are three possible water sources for Islamabad Technopolis as follows:

- Rawal Dam
- Simly Dam
- Khanpur Dam

Availability of water from either of these sources will be ascertained after detailed water source studies. Further, Water Storage Tank(s) will be constructed along with water treatment (if required), pumping station and water distribution network to supply water.

A. Evaluation of Groundwater Sources

- The depth to water table in and around the project varies from 40 to 50 feet below ground levels. The depth of open/dug wells installed in and around the vicinity of proposed Islamabad Technopolis site is between 50 to 100 feet below ground. Injector pumps are installed inside

open/dug well having maximum discharge capacity of around 90 lit/minute.

- The shallow groundwater water is physically and chemically fit on the basis of the parameters tested for drinking purpose for human consumption as per PEQSWD Guidelines/standards. However, deep groundwater quality is not good and is beyond WHO and PSQCA Drinking standards.

- The secondary data of ERS No.1 (left bank corner of the Zong HQ building, Village Kuri) and ERS No. 2 (left corner of Zong HQ building, village Kuri, Islamabad) had recommended trial bore 800 to 1000 ft. below ground. The recommended yield of these wells was around 130 lit/minute (around 0.07 Cusec). Trial bore holes were logged up to 380 ft. (116 m) and 500 feet (152 m) respectively. The yield test of bore was conducted which resulted about 1200 to 1400 GPH and 2000 to 2500 GPH respectively. Water quality test analysis of bore holes is unsatisfactory with higher values of TDS (1083 mg/lit) and Conductivity (1445 µS/cm).

- CDA, Islamabad has shared recent groundwater wells installed in the year 2021 for water supply of Park Enclave Phase-II, Margalla Town, Poona Faqira. The discharge of these wells is ranging from 0.35 to 0.51 Cusec (10,200 GPH to 13,800 GPH) with high drawdowns ranging from ± 90 to ±100 feet. The recovery period of these wells is around 60 minutes after stoppage of 6 hours pumping. Keeping the alarming drawdown conditions in these areas, underlying aquifers of these areas appears to be unsustainable and cannot be recommended as sustainable source of water supply for Islamabad Technopolis.

- The results of fresh ERS performed for identification of groundwater source for Islamabad Technopolis during survey reveals presence of very low permeability clays/ shale/ sandstone and limited lateral distribution of aquifer. In the opinion of ERS expert, potential for required quantities of groundwater is not expected to exist in the subsurface in the study area.

- Keeping the results of 2 nos. trial boreholes located in Zong Head Quarter, village kuri, Islamabad just adjacent to the proposed Islamabad Technopolis boundary, and recent ERS results, it is concluded that due to the presence of very low permeability clays/ shale/ sandstone and limited lateral distribution of aquifer with very low groundwater potential, further investigation through test borehole drilling for development of groundwater as source of water supply for Islamabad Technopolis is not feasible and is not recommended.

- The alternate sustainable source of water supply other than groundwater to meet water demand of proposed Islamabad Technopolis is suggested to be arranged. Existing water supply in Islamabad by Capital Development Authority (CDA) can be another option to meet the water requirement of Islamabad Technopolis. However, for this option approvals from concerned authorities will be required.

B. Surface Water Sources

Rawal Dam, providing domestic supplies to twin cities i.e., Islamabad and Rawalpindi, is the reliable available water resource in the close vicinity of the project area. Total water demand of Islamabad technopolis would be around 1.5 MGD. The other alternatives are Simly Dam and Khanpur Dam which are located at an aerial distance of 17 km and 25 km, respectively. The locations of these potential water sources are shown in **Figure 3.8**.

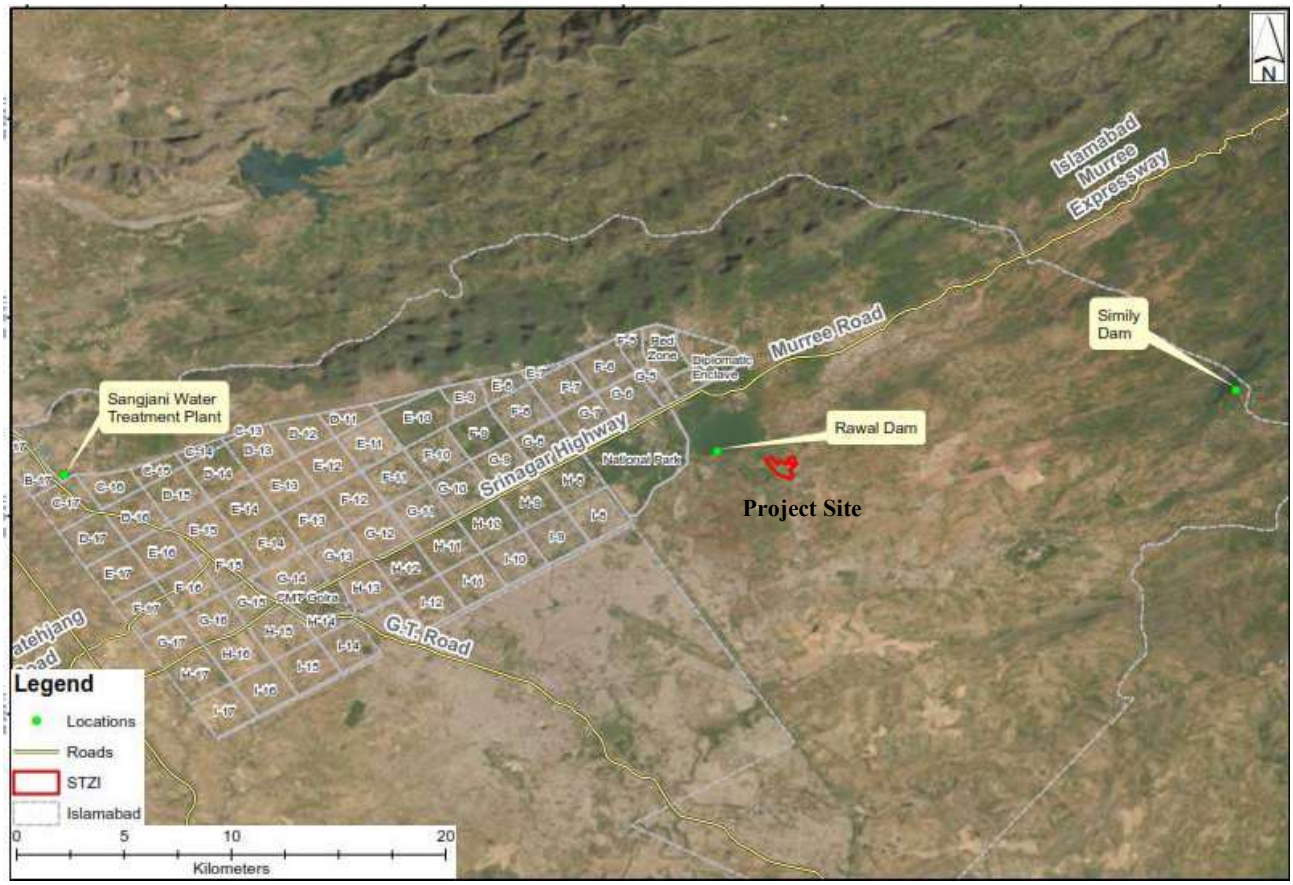


Figure 3.8: Overview Map of Nearby Water Sources

- Shahana Distributary of Rawal Dam has sufficient redundant capacity for carrying the additional discharge, if the source is selected for meeting the Islamabad Technopolis water requirement. It has been estimated that water can be carried to the site under gravity.

- A pipeline of 21" dia carries flows of Simily Dam traverses close to the Islamabad Technopolis and reaches at a nearby Poona Faqirian pumping station. Presently, 4 MGD is being pumped from this location and expected that the pipeline of 21" dia can carry higher discharges and may be the potential source for meeting the water demands of Islamabad Technopolis. A potential route of pipeline from Poona Faqiran pumping station to Islamabad Technopolis site may further be studied in detail upon finalization. Generally, it is believed that CDA is

providing 60-70 MGD to the capital city against the demand of 210 MGD; therefore, the system operates in shortage and new water sources from Indus and Jhelum rivers are being studied.

- The conveyance system from Sanjgani treatment plant has no direct access to the project site and therefore, cannot be used as the potential water resource for the Islamabad Technopolis.

Project Director, Small Dam Organization, Irrigation Department, Government of Punjab was approached for the desired water supplies from the Rawal Dam. Project Director, Small Dams, vide letter No. PDC-1/2022/2865-66 1 RWD dated 2.09.2022, has recommended availability of 1.5 MGD water for Islamabad Technopolis. Copy of letter is attached as **Annex-III** of the report. Recommended amount of 1.5 MGD of water will fulfill the need of phase-1 (for next 10 to 15 years) of Islamabad Technopolis.

After completion of Phase-1 (i.e. expected development in next 10 to 15 years), actual water demand of Islamabad Technopolis will be established by monitoring consumption at each sub-zone/building. Accordingly, the water conservation strategies shall be enhanced (i.e., additional tariffs and water metering etc.) which will narrow down the further demands. Furthermore, alternate water sources may also be explored to meet the future increase in demands (if any). Water supply components are given in **Table 3.7.**

Table 3.7: Water supply components

Description	Quantity
Water Treatment Plant (2.12 MGD) (No.)	01
Underground Storage Tank (1.25 MG) (No.)	01
Pumps of 04 cusecs capacity (No.)	04
Water Transmission Main (20 inch) PN-8	3.4 km
Water Distribution Network (4”-12” Ø)	6.1 km

3.11.4 Wastewater Collection & Disposal System

Wastewater, to be generated from project site, will be collected in a planned way and will be disposed into Main Nullah adjacent to Zong Head Quarter on the Western side of Islamabad Technopolis Project Site. Wastewater treatment plant will be provided to treat the wastewater before disposing of into main Nullah as per prevailing environmental standards. The main Nullah traverses through various settlements at downstream connects with Gumrah Khas which ultimately discharges in Korang River. Wastewater disposal points are shown in **Figure 3.9** as well as wastewater components are given in **Table 3.8.**

Table 3.8: wastewater components

Sr.	Parameter	Unit	Value
1	Total Design Flow including 33% standby requirement	cusecs	12.9

2	Total No. of Pumps (5 cusecs)	No.	3
3	Force Main (500 mm)	ft	100

3.11.5 Stormwater Drainage System

Existing natural nullahs will be channelized and separate stormwater collection system will be provided along the roads that will ultimately dispose into natural nullahs. The estimated quantity of stormwater within the Technopolis is around 348.2 cusecs. Stormwater Components are given in **Table 3.9.** Whereas quantity of stormwater pertains to cross drainage will be in the range of 300 cusec to 1150 cusec.

Table 3.9: Storm water Components

Sr.	Description	Design Flow	Length	Hydraulic Sizes	
				Bed Width	Depth
		Cusecs	km	(ft)	(ft)
1	Internal Drainage System	348.72	12.2	2-4	2-4
2	Cross Drainage Works	300 – 1150	-	3 - 13	2 – 7.5

3.11.6 Electrification System

Underground electrification will be provided with dedicated Grid Station. Existing electrical transmission line is available along Kurri Road.

- 11kV Trunk/Primary feeder network from 132/11.5kV Grid station (to be constructed by IESCO).
- 11kV Underground Network including 11kV Ring Main Units (3 & 4 way), 11/0.415 kV, 8.7/15kV Medium Voltage Cables as per Electrical loading requirements and IESCO standard specifications.
- Road/Street Lighting Network

Based upon the electrical power demand parameters, the total estimated power requirement is 77.11 MW / 90.69 MVA. The total estimated power shall be fulfilled from independent 17 Nos. 11kV feeders with average capacity of 4.0 – 4.60 MW. In addition, 6 No's of 11kV Express Feeders are proposed as back-up supply in case of fault or maintenance of primary/trunk feeders.

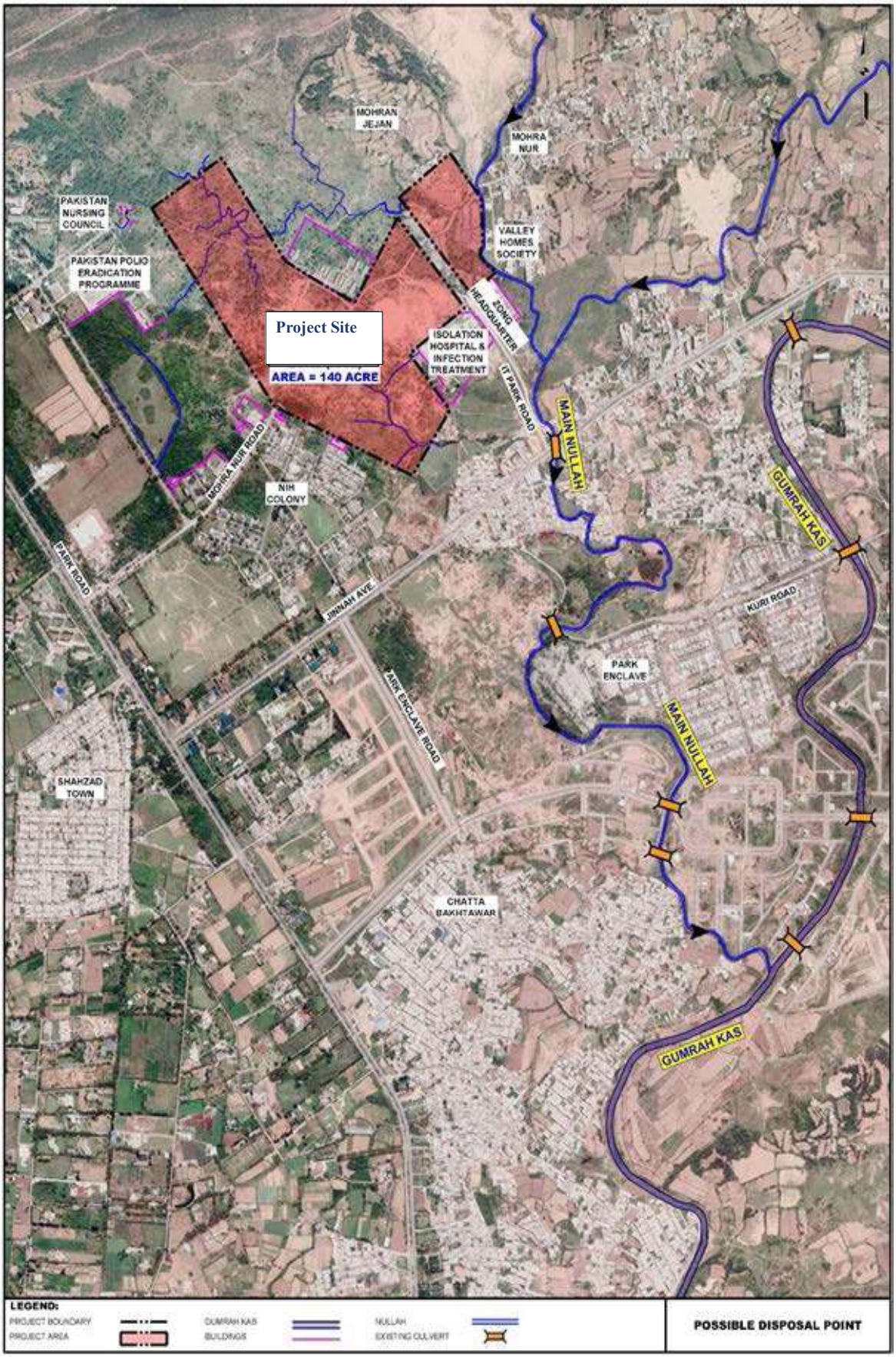


Figure 3.9: Potential Wastewater Disposal Point

3.12 Green Building Concepts in Proposed Islamabad Technopolis

The proposed project is supposed to be an ecofriendly place. Provision of green terraces, open spaces, parks and recreational spots have been proposed in the design. **Plate 3.1** presents a glimpse of proposed planning views:

Green Building Concepts in Proposed Islamabad Technopolis

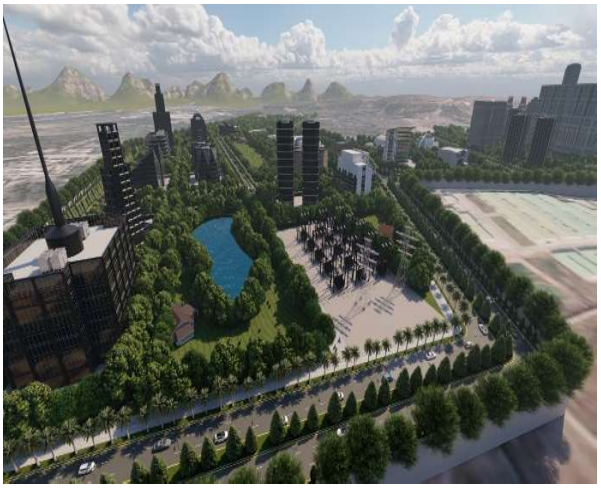



Plate 3.1: Presents a Glimpse of Proposed Planning

3.13 Mobility / Parking

The main principle is to limit the transit of private vehicles within the districts as much as possible to allow walking, cycling and smart travel to be safer and more livable; have quieter greens and public spaces and at the same time encourage people to cross and live the district in a healthier and more environmentally friendly way. The strategy is therefore to think a ring system from which punctually access parking's of the individual plots. Allowing extended transit within the area for emergency and service vehicles. Moreover, entrances to parking shall be provided inside the plot, not around the primary ring road.

A brief illustration regarding Parking Entrances and Parking Strategy have been shown in **Figure 3.10** and **3.11** below:

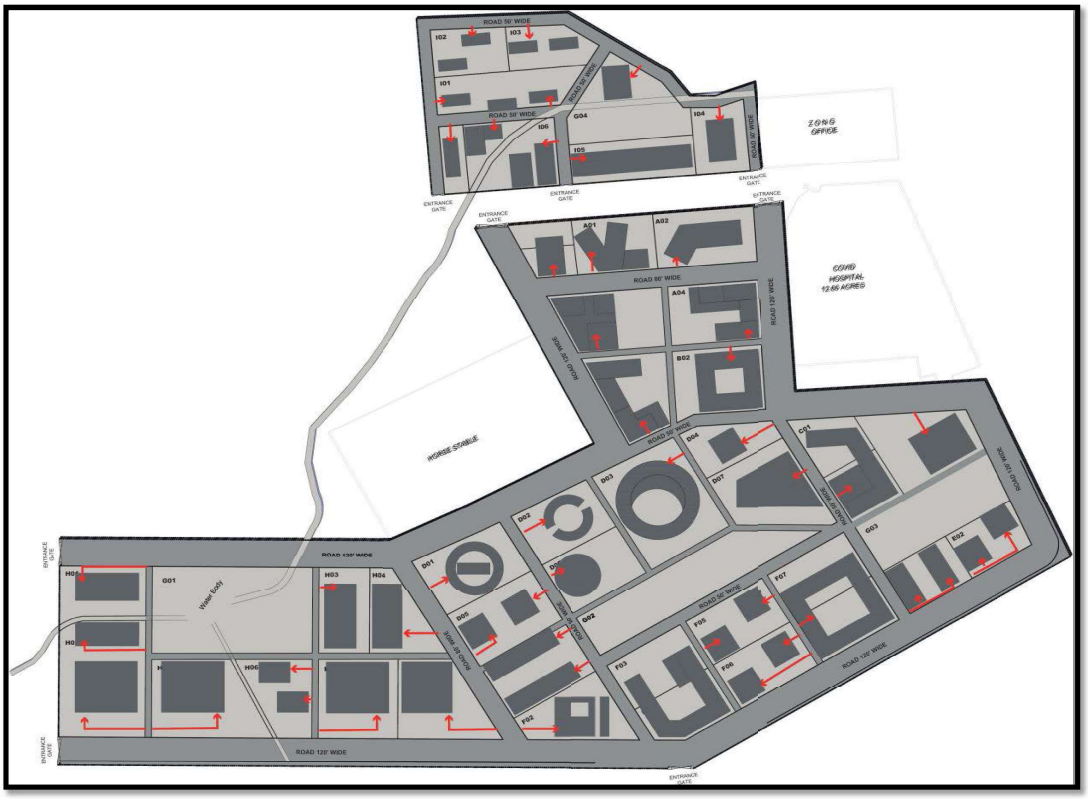


FIGURE 3.10: PARKING ENTRANCES

FIGURE 3.11: PARKING STRATEGY

3.14 Traffic Management

3.14.1 Existing Road Network

As stated in section above, the proposed Islamabad Technopolis is located in the heart of city. This new development is located on Jinnah Avenue Road and it connect to Rawal Chowk via with Park road and also linked with Lehtrar Road. Details of existing road network is given below;

1) Park Road

The Park Road is the main artery which serves the traffic coming from/ to Rawal Dam Chowk, Lehtrar Road and etc. This road meets the project site through Jinnah Avenue. Volume of traffic is seen on this road especially on peak hours with queues on main directions.

2) Jinnah Avenue

This road is an approach road to our proposed development and directly connects it with Park Road. Traffic volume on this road is very high. Volume of traffic is seen on this road especially on peak hours with queues on main directions.

3) Lehtrar Road

The Lehtrar Road is also main artery which serves the traffic coming from/ to Islamabad Expressway, Thanda Pani etc. Volume of traffic is seen on this road especially on peak hours with queues on main directions.

3.14.2 Level of services (LOS) on the Road Network

The trips generated by proposed facility when added with traffic circulating on adjacent roads, it will cause an immense effect on traffic flow and decrease level of service (LOS) immediately, **Table 3.7** shown below the LOS without project and with project scenario.

Table 3.10: Level of Service Year-wise

Facility	Condition	Year	Level of Service
Park Road – Jinnah Avenue Intersection	Without Project	2022	D
Park Road – Lehtrar Road Intersection			F
Park Road – Bani Gala Road Intersection			E
Park Road – Jinnah Avenue Intersection	With Project	2022	F
Park Road – Lehtrar Road Intersection			F
Park Road – Bani Gala Road Intersection			F

This traffic will generate congestion on the surrounding roads and ultimately choke the traffic when add-up with exiting traffic. Therefore, it is suggested that NIH and Mohra Nur roads shall be extended

from 1+1 to 2+2 lanes to avoid traffic jams and unnecessary delays. Current road network and proposed road network is shown in **Figure 3.12** and **3.13.**

The traffic impact analysis (TIA) of the proposed Islamabad Technopolis reveals that;

Park road which is a main road to collect traffic from the Islamabad Technopolis will face LOS F (which represents severe congestion) during peak hours after the addition of Islamabad Technopolis traffic. Refer to **Table 3.2** of **Annex IV**, peak hour trips are 7,224 and after distribution of these trips on internal road network of 120 feet (2+2 lane) the overall LOS-C is estimated on internal road network, which is reasonable for future too.

Addition of 7,224 peak-hour trips to the existing congested network without any possible alternate routes will worsen existing traffic flows and traffic congestion. This addition of traffic will choke traffic circulation on major conflict points of the surrounding road network

Remedial/ mitigation measures are needed like signalization of intersection, addition of lane to cater traffic and improvement of junction geometry.

The traffic impact analysis (TIA) of the proposed Islamabad Technopolis was conducted and attached as **Annex IV.**

Figure 3.12: Current Road Network with Lanes Around Development

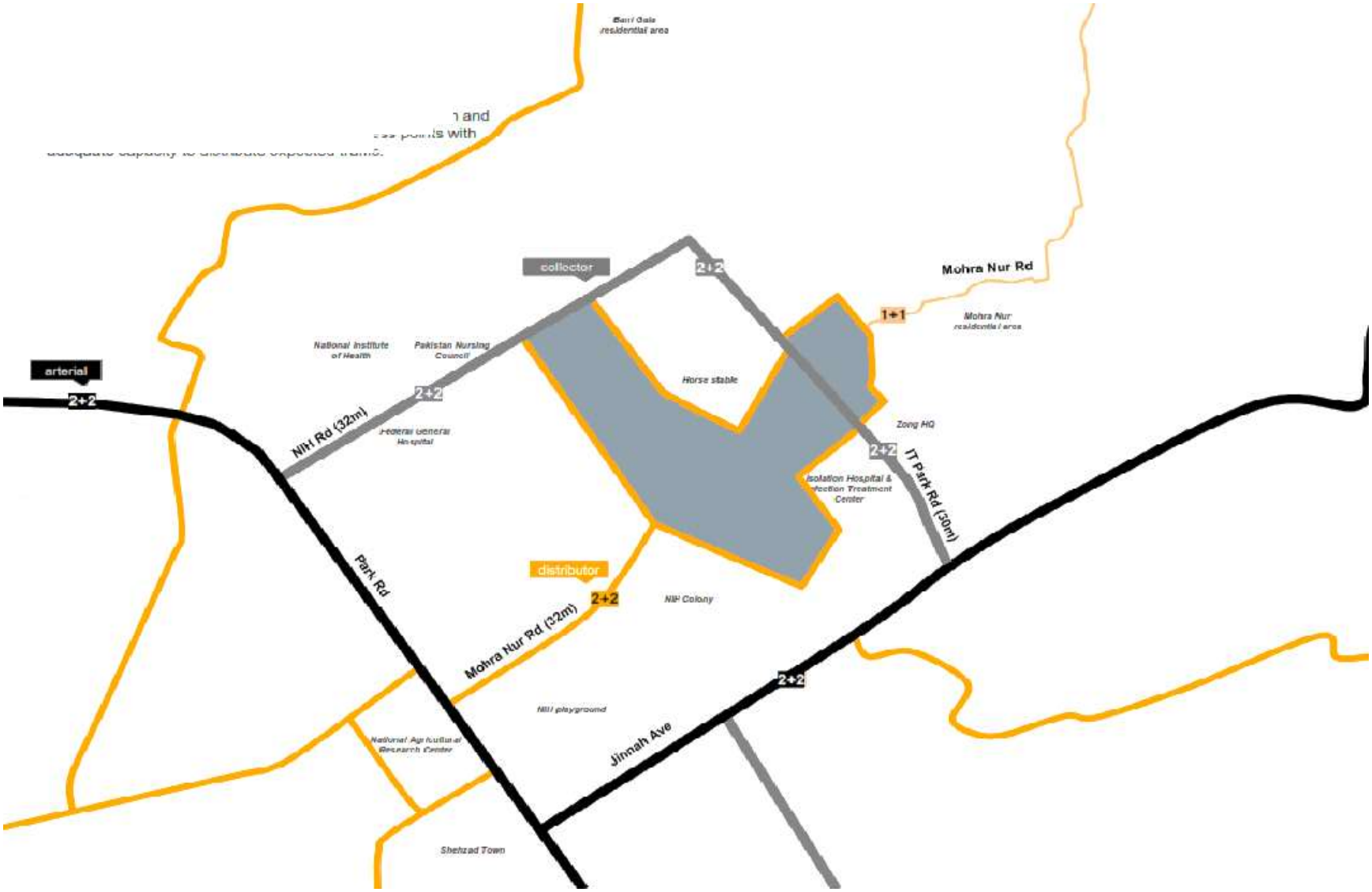


Figure 3.13: Proposed Road Network for Traffic Routing from Proposed Development

3.15 Fire Demands

The optimum water demand for firefighting is **112,000 gallons** calculated by National Guidance Document on the Provision of Water for Fire Fighting (U.K) is adopted.

3.16 Solid Waste Management

Primarily, integration of the solid waste management operations within the administrative jurisdiction of Islamabad Technopolis, with the already established system of CDA will be proposed. The meeting with Deputy Director Sanitation, Capital Development Authority (CDA) held on 8th September, 2022, regarding the finalization of operational modalities of the collection and disposal of the solid waste generated within the boundaries of Islamabad Technopolis. The representatives of the consultant (NESPAK) also attended the meeting along with the representative of the Special Technology Zones Authority (STZA). Total 19 ton/d waste will be generated at Islamabad Technopolis, Quantification of waste generation is given in **Table 3.8**. As far as the collection and disposal of the solid waste generated in Islamabad Technopolis four options were discussed;

Option-01

The CDA will be performing all activities related to solid waste management starting from primary collection, road sweepings (manual and mechanical), secondary collection, transfer, transportation and ultimate disposal of the waste.

Option-02

The administration of Islamabad Technopolis will be responsible for the primary collection and transfer of the waste to the designated location within the jurisdiction of the Islamabad Technopolis. The CDA will perform the transportation of the waste from that designated location to its ultimate disposal.

Option-03

The administration of the Islamabad Technopolis will perform the primary collection and transfer of the waste to the designated transfer stations of the CDA. The location map of the proposed transfer stations of CDA is attached herewith for ready reference and perusal as shown in **Figure 3.14**. The CDA will be responsible for the transportation of the waste from transfer station to ultimate disposal site.

Option-04

The administration of Islamabad Technopolis (STZA) will be performing all activities related to solid waste management starting from primary collection, road sweepings (manual and mechanical), secondary collection, transfer, transportation of the waste till the ultimate disposal location. The CDA will perform the waste handling at the disposal site.

At the end of the meeting it was decided mutually that, the first option is more viable and practical due to the following reasons;

- The single entity must be performing all activities related to waste management. Different entities performing different components of solid waste management may cause operational conflicts and at the end the quality of the services may affect.
- The CDA already have the mechanical and human resources with requisite expertise and experience. No capital investments will be required as the CDA will utilize the already available resources.

Safe disposal of hazardous waste (if any to be generated from Islamabad Technopolis), as per international and national laws, will be responsibility of owner of the facility.

The Deputy Director Sanitation CDA committed to engage the consultant for the evaluation of the per ton cost for the above-mentioned options and will inform at earliest.

Table 3.11: Quantification of the Waste

Activity	Area (Acre)	Occupants Load[1]	Waste Generation Criteria	Waste Generation (t/d)
Health Care[2]	1.73	1765	2 kg/bed[3] for Number of Patients	1
			0.32 kg/capita[4] for other occupants	
Offices	43.44	65583	0.14-0.2 kg/capita/d[5]	13
Production Units	18.65	8125	28 kg/1000sq.ft./d[6]	2.1
Residential	3.99	4036	0.6 kg/capita/d[7]	2
Commercial	5.52	16041	10-20% of the Residential Waste[8] and 1.13 kg/100 sq. ft/d[9]	0.43
Total	**73.33**	**95550**		**19**

[1] Special Technology Zones Authority (STZA)
[2] Non-Infectious/Non-Hazardous
[3] UNEP, Compendium of Technologies for Treatment/Destruction of Healthcare Waste, 2012
[4] Characteristics and Management of Institutional Solid Waste of Jamal khan Ward, Chittagong, Bangladesh
[5] Characteristics and Management of Institutional Solid Waste of Jamal khan Ward, Chittagong, Bangladesh
[6] Draft Environmental Impact Report (EIR) for South Gate Commercial Corridors Redevelopment Project
[7] Environmental Protection Department Punjab
[8] Consultant's experience
[9] Guide to Solid Waste and Recycling Plans for center 1997 Development Projects (Santa Barbara County Public Works Department)

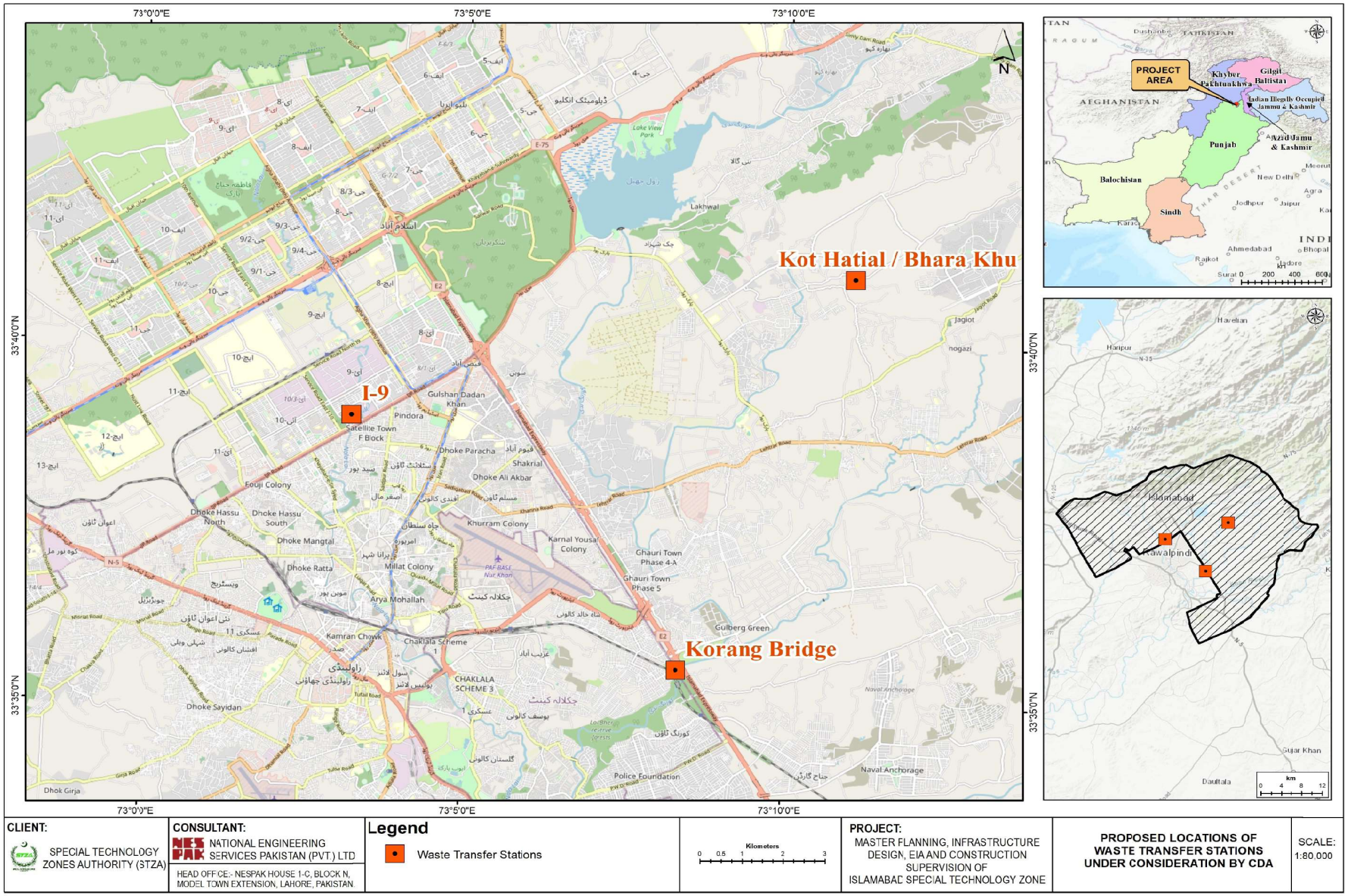


Figure 3.14: Location Map of the Proposed Transfer Stations of CDA

3.17 Power Requirements

Construction Phase

The main source of electricity/electric power during construction phase will be feeder line from IESCO for construction camps and construction machinery. Letter is attached as **Annex-V.**

Operational Phase

Special Technology Zone Authority grid station will have 40 MW load in 2025-26, however the ultimate load demand of Islamabad Technopolis is 80 MW in 2030-31, therefore this load flow study has been carried out for each load demands of Islamabad Technopolis. Approval of interconnection arrangements of 80 MW load for Islamabad Technopolis is attached as **Annex-V.** It will be interconnected with the 132 kv network of IESCO by making in/out of 132 kv Taramri- Bahria Enclave transmission line with a length of 500 meter on rail conductor. Approval of 80MW electricity is attached as **Annex-V.**

3.18 Construction Materials

The materials used in construction of the proposed project would include Bricks, coarse aggregates (crush), fine aggregates (sand), water, asphalt, reinforcement, cement, razor wire, barbed wire etc.

3.19 Construction Camps

Camp sites will be selected based on following considerations:

- Number of workforces deployed
- Type and quantity of machinery mobilized
- Availability of adequate area for establishing camp sites including parking areas for machinery, stores and workshops,
- Access to communication and local markets and away from the local population settlements
- Appropriate distance from sensitive areas including settlements and religious and/or cultural facilities

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 communication and local markets, and an appropriate distance from sensitive areas in the vicinity. Final locations will be selected by the contractor in consent with Supervision Consultant after approval from STZA.

3.20 Expected Equipment for Construction

The list of the machinery and the equipment required for the proposed project is provided in **Table**

3.9.

Table 3.12: Machinery and Equipment Requirement for the Proposed Project

Sr. No.	Machinery / Equipment
1	Mobile Crane
2	Wood Shuttering
3	Steel Cage Shuttering Unit
4	Dumpers
5	Mini/ Hand Roller
6	Road/ Power Roller
7	Ramming Machine
8	Water Tanker
9	Excavator
10	Loader
11	Road Cutter
12	Concrete batching Plant

3.21 Workforce Requirements

Manpower demand estimation is an essential component to facilitate deployment of manpower.

Workforce during Construction Phase

Total man power required on site for proposed Project will be approximately 500 workers per day, depending on the activity schedule and type of construction. They will be inside of the area of possession, under the supervision of a Contractor who will be awarded the contract.

Workforce during Operation Phase

Total man power required during operation phase for proposed Project will be approximately 50 workers comprising skilled and unskilled staff.

3.22 Water Requirement

Construction Phase

The water consumption is estimated to be 40,000[10] gallons/day for 500 construction workers during construction phase of the proposed Project.

Operation Phase

Estimated water consumption for Islamabad Technopolis would be about 1.5 MGD

[10] WASA Average Daily Per Capita Water Consumption (80 gallons/day)

3.23 Wastewater Generation and Treatment Mechanism

Construction Phase

The wastewater generation is estimated to be 32,000[11] gallons/day for 500 construction workers during construction phase of the proposed Project.

Temporary toilets with cesspit will be adequately installed and treated periodically, and after the completion of work, the ground will be restored.

Operation Phase

Total wastewater generation is estimated to be 1.2 MGD for Islamabad Technopolis.

3.24 Solid Waste Generation

Construction Phase

The domestic solid waste generation is estimated to be 308[12] kg/day for 500 construction workers during construction phase of the proposed Project.

[11] Design Criteria of Public Health Engineering for Water Supply, Sewerage and Storm Water Drain (Domestic sewage generation = 80% of water consumed/day)

12 Pakistan – Waste Management Report, 2018 (Islamabad: 0.616 kg/capita/day)

4 DESCRIPTION OF THE ENVIRONMENT

4.1 General

For any development project, the prevailing environmental conditions need to be assessed prior to the stages of planning, designing and execution of the project. Identification of physical, ecological and social aspects of environment and collection of relevant data is essentially important for the evaluation of impacts as well as for the suggestion of adequate mitigation measures, which forms the basis for the implementation of the proposed project in terms of prevailing environmental and social conditions in the study area.

The existing environmental conditions of the proposed project have been considered 200 m in outskirts of boundary line (Area of Influence) of the proposed Project as shown in **Figure 4.1** with respect to physical, biological and socio-economic aspects. Information collected from variety of sources including published literature, DCRs, field observations and surveys conducted specifically for this Project have been analyzed for this study. Consultations were also held with the general public and stakeholders of the project area in order to seek the public opinion on the implementation of the proposed Project.

4.2 PHYSICAL RESOURCES

The following section provides an overview of the information on physical environment of the proposed Project study area collected from primary as well as secondary sources. The major parameters covered include Physiography and Topography, Geology, Soil, Seismicity, Climate and Meteorology, Water Resources, Solid Waste, and Land Use etc.

4.2.1 Physiography and Topography

Islamabad is located at 33.43°N 73.04°E at the northern edge of the Pothohar Plateau, between Rawalpindi District and at the foot of the Margalla Hills in Islamabad Capital Territory with general height of 540 m (1,770 ft.) above the mean sea level (MSL). The project area lies between 1475 to 1721 ft above sea level. The terrain in Islamabad consists of plains and mountains whose total relief exceeds 1,600 m. The modern capital and the ancient Gakhar City of Rawalpindi form a conurbation, and are commonly referred to as the Twin Cities.

The city is divided into four physiographic[1] zones i.e.:

- Margalla Hills;
- Higher Plain;
- Lower Plain; and
- Valley Area.

[1] JICA (2003) The Study on Comprehensive Flood Mitigation and Environmental Improvement Plan of Lai Nullah Basin in The Islamic Republic of Pakistan, Final Report, CTI Engineering International Co., Ltd., Pacific Consultants International

Margalla hills are located in the north of the area. The dominant formations are composed of sandstone, shale, and lenses of conglomerates and are covered with permanent mixed scrub and coniferous forest. The ground elevation is up to 1,240 m at the upstream end. There are three major tributaries of Lai Nullah namely Saidpur Kas, Tenawali Kas and Bedarawali Kas, which originate from the Margalla Hills forming a very steep channel bed slope of about 1/10.

The **higher plain** expands over the built-up area of Islamabad City with a gradual slope from North to South. Saidpur Kas, Tenawali Kas and Bedarawali Kas run southward in the plain and finally flow into Lai Nullah just upstream of Kattarian Bridge.

The **lower plain** extends over the upper part of the Rawalpindi area above Chaklala Bridge. This area is flatter than the upper Higher Plain and the lower Valley Area forming a bowl-shaped topography. Rawalpindi city area is covered with alluvium and eolian deposits and is part of dissected basin plain formed by Lai Nullah and its tributaries.

The **valley area** is located below Chaklala Bridge. The valley area, falling down to the Soan River, a tributary of the River Indus is composed of gravel/boulder and sand/silt.

Figure 4.2 represents the contour map of the proposed Project.

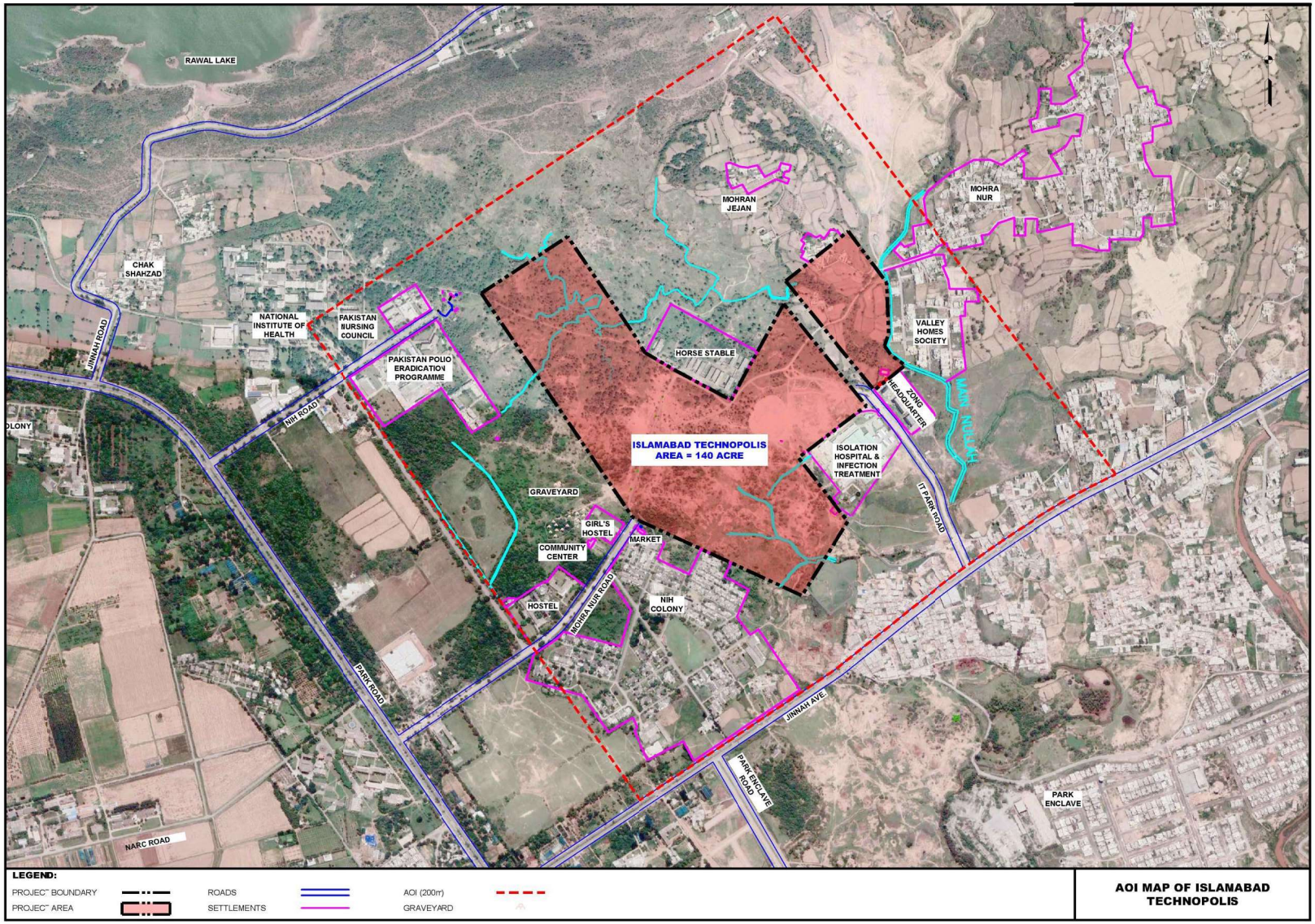


Figure 4.1: Study Area (Area of Influence) Map of the proposed Project

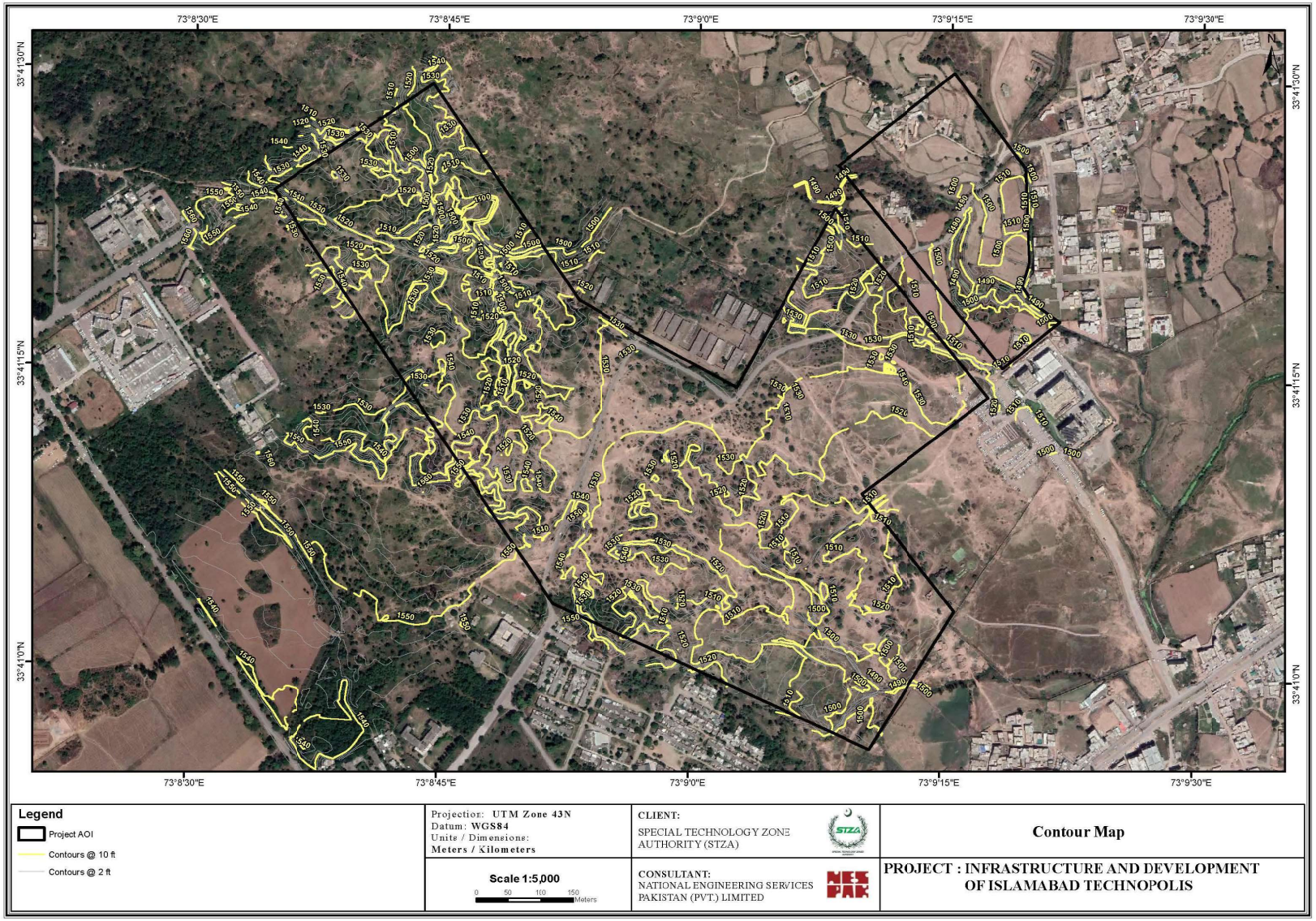


Figure 4.2: Contour Map of the Study Area

4.2.2 Geology

The geological structure and stratigraphy of the Islamabad-Rawalpindi area is very complex due to the convergence of the Pakistan-India and Eurasian tectonic plates and their collision that began about 20 million years ago. The geological history records a long period of gentle geological fluctuations and slow deposition in the study area while the Pakistan-India plate drifted northward. This period is followed by more vigorous tectonic processes and rapid deposition since the convergence of the Pakistan-India and Eurasian plates. Therefore, the period from the Middle Jurassic to the Lower Miocene (150 million years) is represented by only 675 m of primarily marine sedimentary rocks, whereas the last 20 million years are represented by more than 7,570 m of continental sedimentary rock[2].

The sedimentary rocks exposed in the Islamabad area date from the Middle Jurassic to the Quaternary. Three structural zones can be pointed out in the study area:

- **Mountainous Margalla Hills in the north**: Jurassic through Eocene limestone and shale complexly folded and thrust along the Hazara fault zone;

- **South of the Margalla Hills**: the southward-sloping piedmont bench (piedmont fold belt) is underlain mainly by truncated folds in the sandstone and shale of the Rawalpindi Group;

- **Southernmost area**: fluvial sandstone, clay stone and conglomerate deposits along the axis of the Soan syncline west-southwestward.

The **Hazara fault zone** is located in the north of the Islamabad-Rawalpindi area and affects a scope of about 25 km of width and 150 km of length. The area is convex to the south and extends west-southwestward away from the Himalayan syntaxis. Hence, the thrust and fold structure of the Margalla Hills immediately north of Islamabad is complex: there are at least five principal thrust sheets repeating the pre-Miocene marine section.

In the **piedmont fold belt area**, Pleistocene conglomerate, overlying sandstone of the lower Miocene, is folded in the broad anticline at Shakar Parian Park in Islamabad.

The **Soan syncline** is an asymmetric, faulted fold of regional extent, plunging west-southwestward where fluvial sandstone, clay stone and conglomerate were deposited. The maximum width of the synclinal in the study area is about 11 km, but the fold extends 100 km to the southwest.

The **quaternary deposits** are generally heterogeneous. The subsurface mainly presents silt and clay deposits. The gravel beds are present in discontinuous layers with silty clay. Their

[2] Iqbal M. Sheikh, Mustafa K. Pasha, Van S. Williams, S. Qamer Raza, and Kanwar S.A. Khan (2007), Environmental Geology of the Islamabad-Rawalpindi Area, Northern Pakistan, Study by Geological Survey of Pakistan, under the auspices of the U.S. Agency for International Development, U.S. Department of State, and the Government of Pakistan

thickness decreases in the south and west. The average thickness of the alluvium is more than 200 m, and can even be 300 m in some areas.

Four different main lithological units are present in the Islamabad-Rawalpindi area: (i) Sandstone and limestone of Cretaceous age, (ii) Margalla Hill limestone of Eocene age, (iii) Nimadrics of Miocene to Lower Pleistocene, and (iv) Deposits of Pleistocene and Quaternary age. The stratigraphic section of consolidated rocks in the Islamabad-Rawalpindi area is shown in **Figure 4.3** and **Figure 4.4** which contains regional geology of the study area**. Table 4.1** showing the different formations of the Pleistocene and Holocene in the study area and their main lithology characteristics.

Table 4.1: Lithology Characteristics of Geological Units of the Pleistocene and Holocene Formation

Sr. No.	Unit Name	Lithology	Thickness (m)
1.	Stream-Channel Alluvium	Unconsolidated, channel-cross bedded, moderately sorted channel and bar deposits of sand and gravel	3
2.	Flood Plain and Fan Alluvium	Flood plain: Unconsolidated, channel cross bedded, moderately sorted channel and bar deposits of sand and gravel, overlain by relatively thin veneer of silt, clay and organic material Fan alluvium: Primarily unconsolidated sand and gravel of a mixture of the lithologies found in the tributary watersheds. The surface may be covered with thin soil of silt and clay. Poorly sorted and beddes. Debris-flow deposits are common	Flood-plain alluvium: 6 Fan alluvium: 20
3.	Alluvium and Windblown Silt	Eolian silt and stream-channel, flood plain, terrace and slope-wash alluvium	10
4.	Terrace Alluvium	Unconsolidated, channel-cross bedded, moderately sorted channel and bar deposits of sand and gravel, overlain by relatively thin veneer of silt, clay and organic material	6
5.	Potwar Clay	Windblown clay and silt and subordinate amounts of alluvial gravel. Fine grained, hard, compact and calcareous	1-35
6.	Lei Conglomerate	Subangular cobbles of Eocene limestone as large as 30 cm. Matrix of reworked eolian silt. Conglomerate is thickly interbedded with sandy silt beds and gravel beds.	106

Source: *Geological Survey of Pakistan, under the auspices of the U.S. Agency for International Development, U.S. Department of State, and the Government of Pakistan (2007)*

Geotechnical investigations executed at project site indicated that the subsurface stratum mainly consists of Lean Clay / Lean Clay with Sand / Silty Clay / Silty Clay with Sand from top of the ground to maximum investigated depth of 20 m below NSL. Groundwater was not encountered in any of the borehole during execution of field investigations. However, seepage / perched water was encountered in few boreholes at a depth of 1.45 m to 7.8 m below NSL. Geologically, the project area is located in a terrain which is covered by unconsolidated surficial deposits of clay, silt and gravel / cobbles in varying proportions surrounded by Miocene rocks.

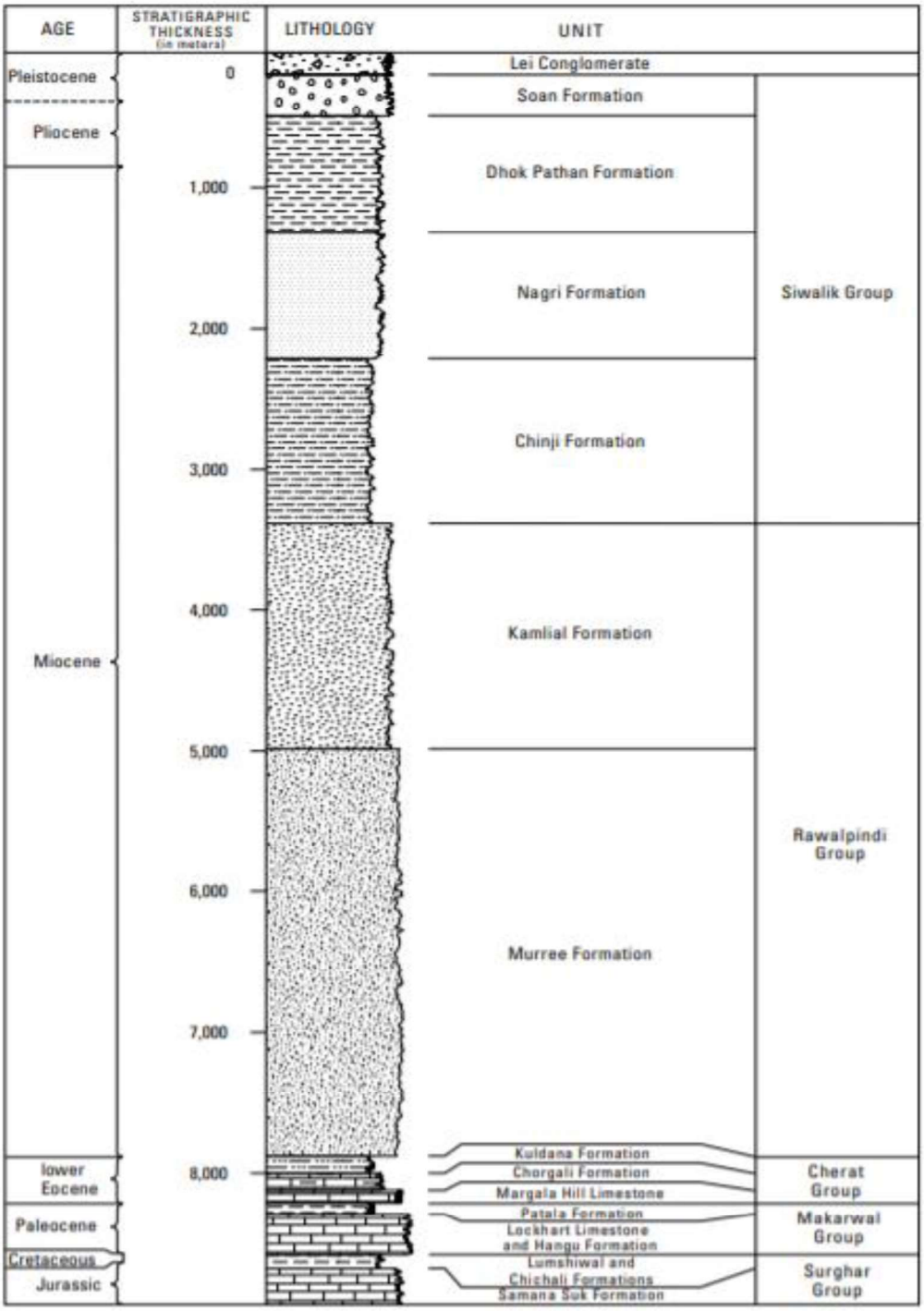


Figure 4.3: Generalized Composite Stratigraphic Section of Consolidated Rocks in the Islamabad-Rawalpindi

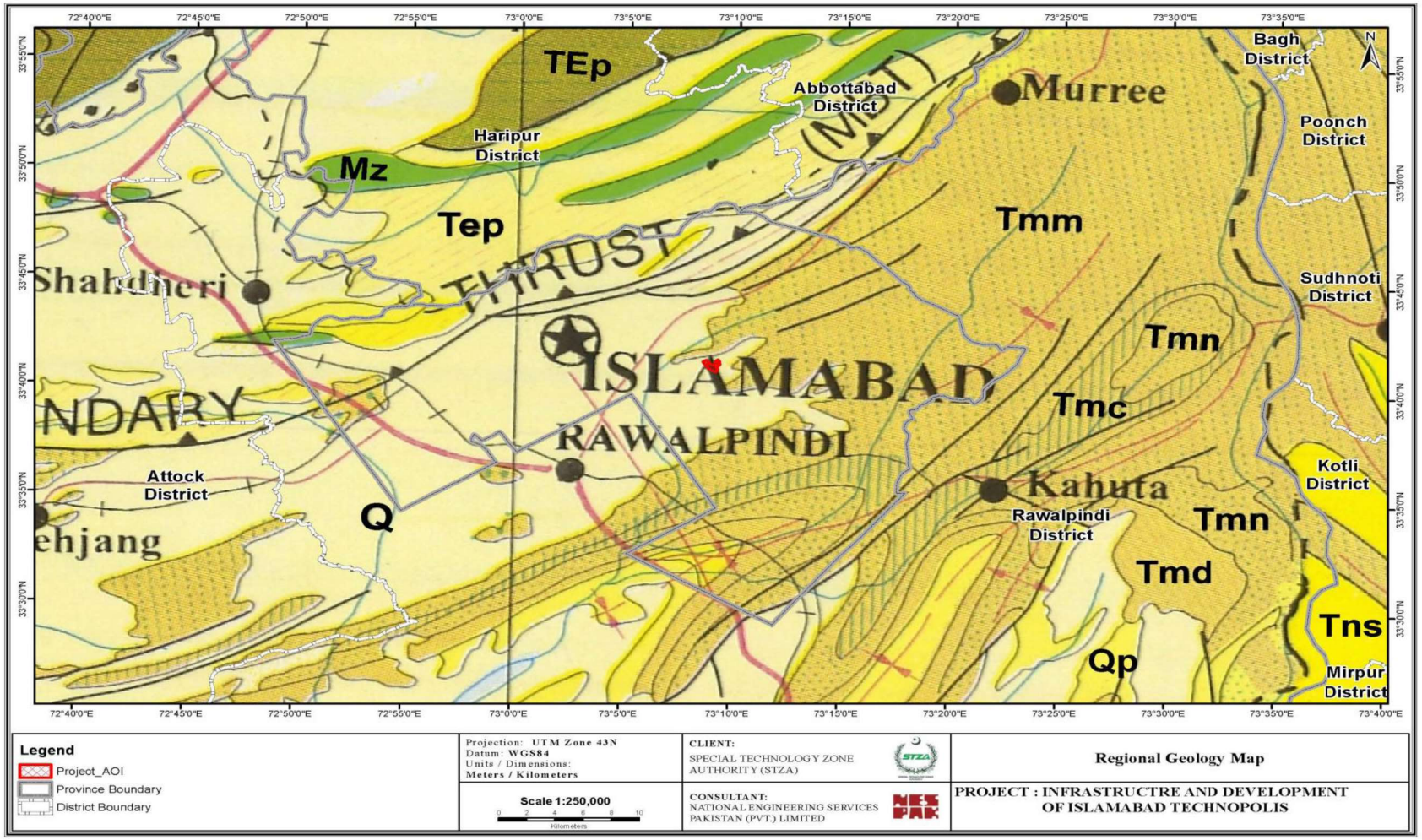


Figure 4.4: Regional Geology Map of the Project Area

4.2.3 Soil

Soil in the area derived from rocks in the Punjab province, as well as originates from fluvial deposits. In zones where depositional landforms are present, the surface can be: (i) without any soil development (stream beds, low islands and bars), (ii) covered with fine sand, silt and clay with a relatively high organic content and fertile soil (stream flood plains), (iii) covered with a thin layer of fine-textured soil overlying channel deposits of sand and gravel (stream and fan terraces), and (iv) covered with fertile and easy tilled soil overlying fine silt and clay deposits (loess plains).

In areas where erosional landforms are present, the surface can be covered with thin sandy soil derived from weathering of the underlying rock (conglomerates of the Soan formation or Lei conglomerate, Kamlial formation).

4.2.4 Climate and Meteorology

The climate of Islamabad is a humid subtropical climate with four seasons: a pleasant Spring (March–April), a hot Summer (May–August), a warm dry Autumn (September—October), and a cold Winter (November–February). The hottest month is June, where average highs routinely exceed 38 °C (100.4 °F). The wettest month is July and August, with heavy rainfall and evening thunderstorms with the possibility of cloudburst. The coldest month is January, with temperatures variable by location. In Islamabad, temperatures vary from cold to mild, routinely dropping below zero. In the hills there is sparse snowfall. The weather ranges from a minimum of −6.0 °C (21.2 °F) in January to a maximum of 46.1 °C (115.0 °F) in June. The average low is 2.0 °C (35.6 °F) in January, while the average high is 38.1 °C (100.6 °F) in June. The highest temperature recorded was 46.5 °C (115.7 °F) in June, while the lowest temperature was −6 °C (21.2 °F) in January. On 23 July 2001, Islamabad received a record breaking 620 millimeters (24 in) of rainfall in just 10 hours. It was the heaviest rainfall in 24 hours in Islamabad and at any locality in Pakistan during the past 100 years. Average yearly rainfall is about 1143 mm and average yearly humidity is 55%.

Mean monthly (modelled) data for past 30-years has been obtained from Meteoblue[3] and is presented below:

i. Average Temperatures and Precipitation

Figure 4.5 presents mean daily maximum and minimum temperatures for different months and mean precipitation for 2015-2022. The "mean daily maximum" (solid red line) shows the maximum temperature of an average day for every month for Islamabad. Likewise, "mean daily minimum" (solid blue line) shows the average minimum temperature of an average night for every month for Islamabad.

Hot days and cold nights (dashed red and blue lines) show the average of the hottest day and coldest night of each month of the last 30 years.

[3] https://www.meteoblue.com/en/weather/historyclimate/climatemodelled/islamabad_pakistan_1176615

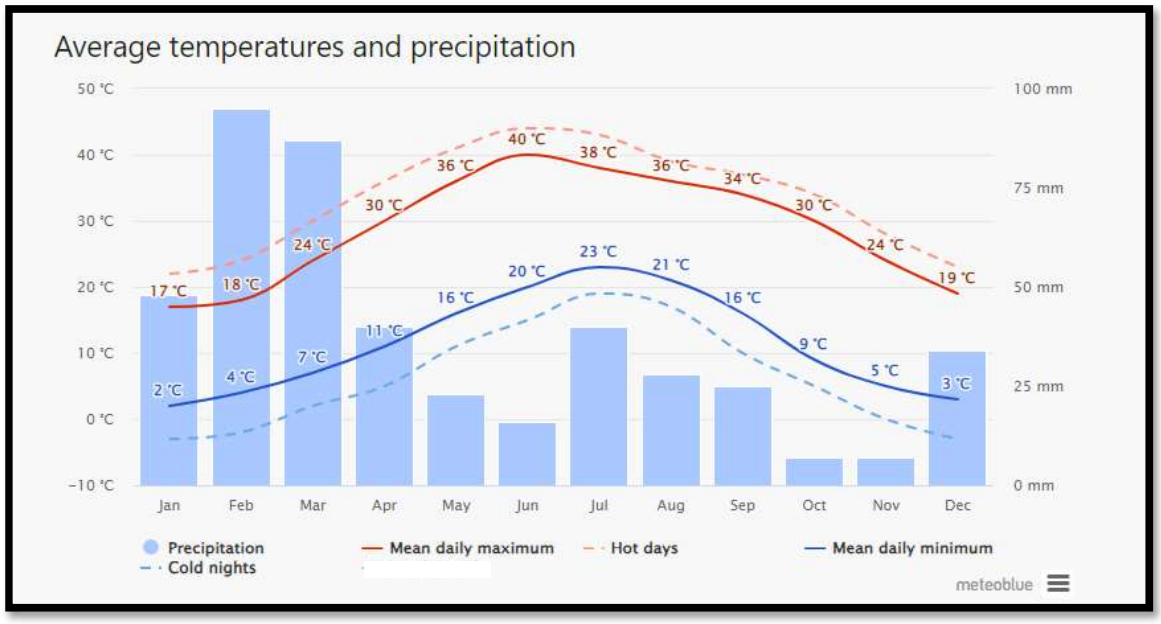


Figure 4.5: Average Temperatures and Precipitation

As it can be seen from **Figure 4.5**, the project area has extreme climate. It has hot summer and cold winters. The summer starts from May and lasts till September. June is the hottest month. The mean maximum and minimum temperature ranges from 40 ºC and 20 ºC respectively for month of June. The winter seasons lasts from November to February. January is the coldest month. The mean maximum and mean minimum temperature ranges from 17 ºC to 2 ºC in January. The maximum temperatures are presented in **Figure 4.6**.

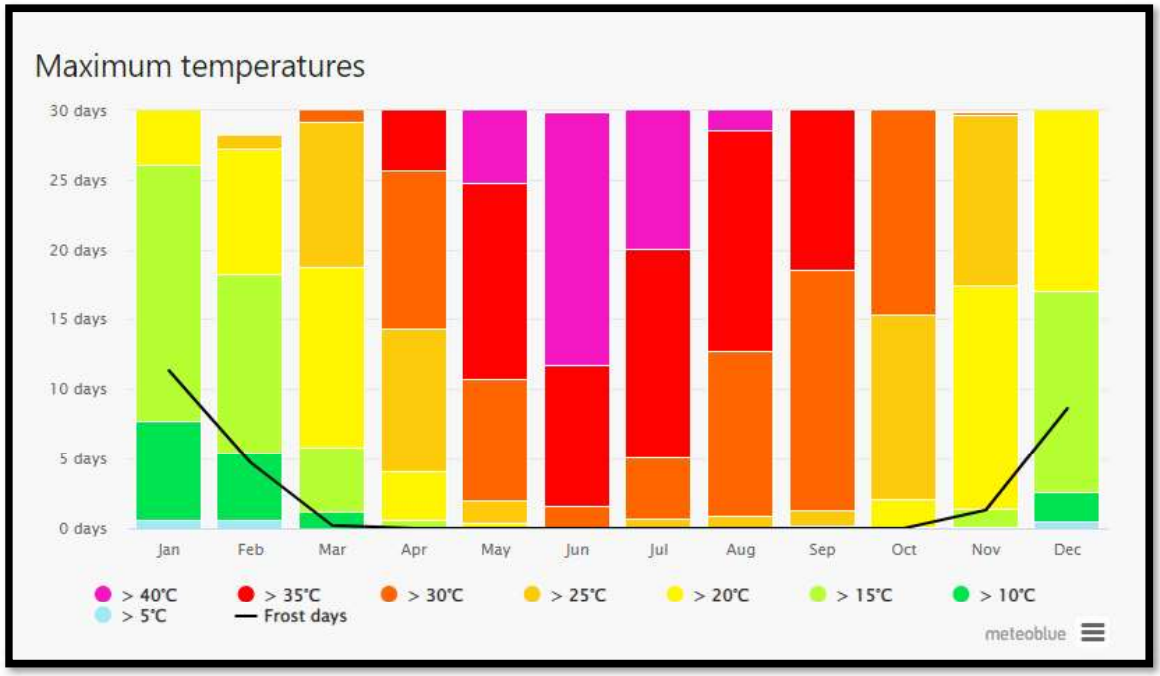


Figure 4.6: Maximum Temperatures

Figure 4.7 shows the monthly number of sunny, partly cloudy, overcast and precipitation days. Days with less than 20% cloud cover are considered as sunny, with 20-80% cloud cover as partly cloudy and with more than 80% as overcast.

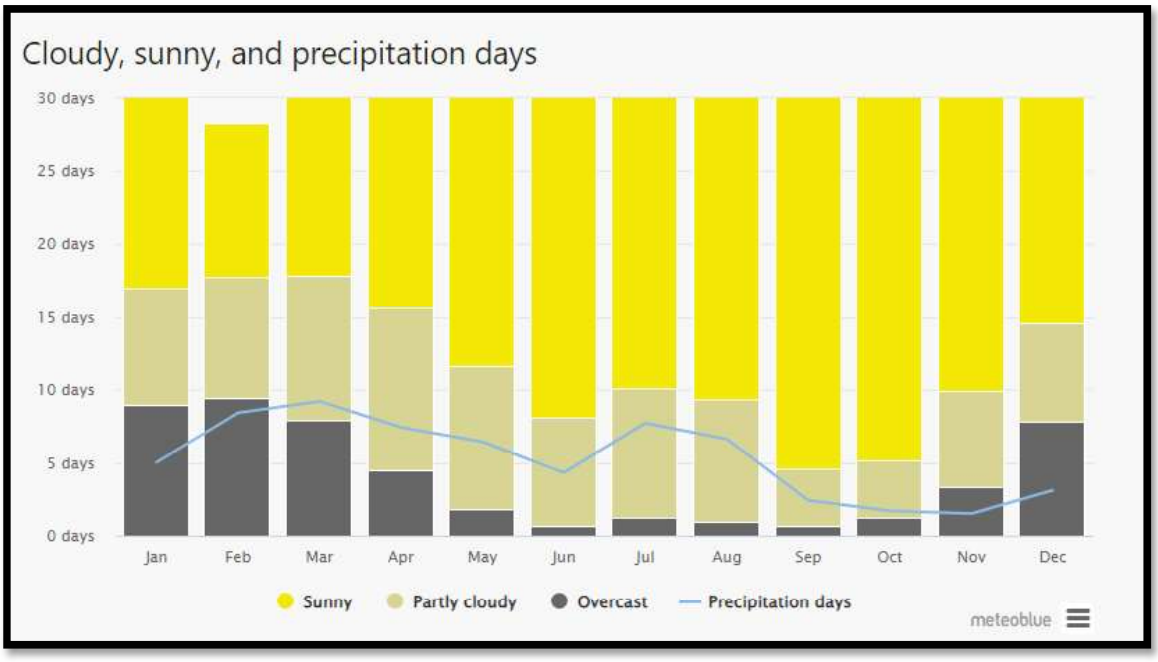


Figure 4.7: Cloudy, Sunny and Precipitation Days

It is clear from the chart that most of the times of year sunny days dominate. A few days per month are partly cloudy and with seldom overcast days. The maximum participation days are observed during February, March, April, and July.

Figure 4.8 shows on how many days per month, certain precipitation amounts are reached.

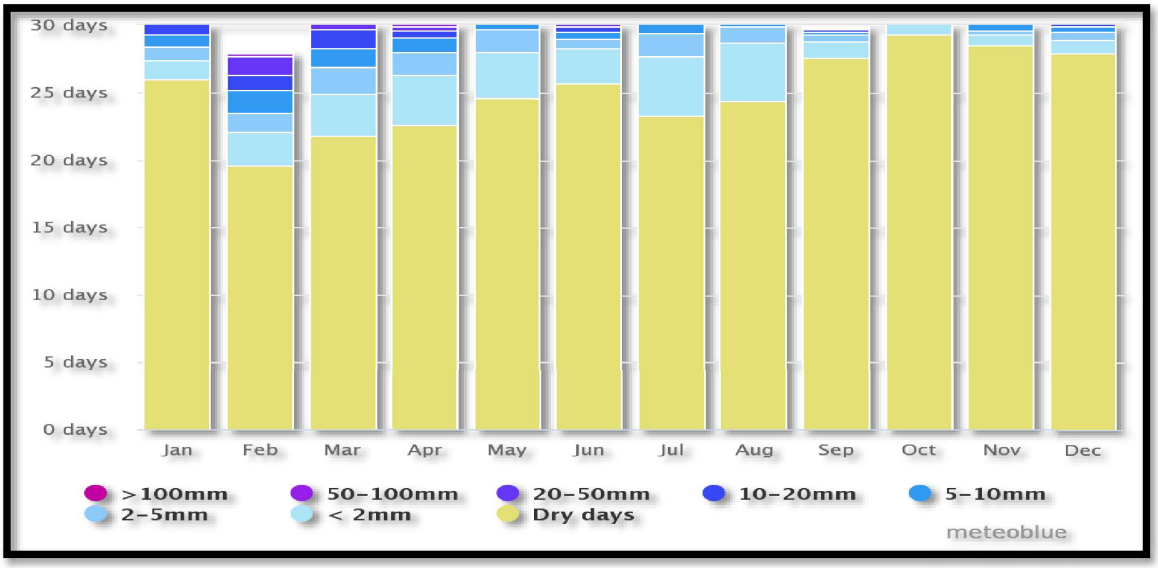


Figure 4.8: Precipitation Amounts

It can be seen from the chart that the precipitation in July and August is maximum and ranges between 2-5 mm. Highest intensity of precipitation is observed in the month of February and March.

ii. Wind

Figure 4.9 shows the days per month, during which the wind reaches a certain speed.

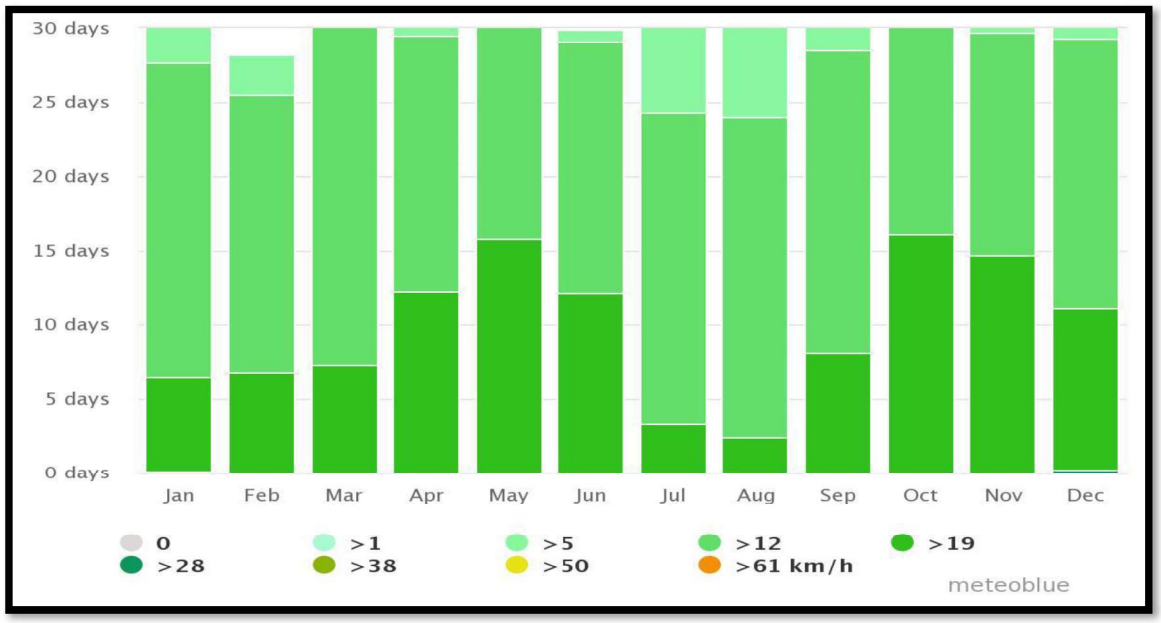


Figure 4.9: Wind Speed

Maximum wind speeds can be observed in the months of May and October. Wind speed >19 km/h dominates for four to five days in these months. However, the dominant wind speed throughout the year is >12 km/hr.

The wind rose for Islamabad shows how many hours per year the wind blows from the indicated direction. Wind rose is shown in **Figure 4.10**.

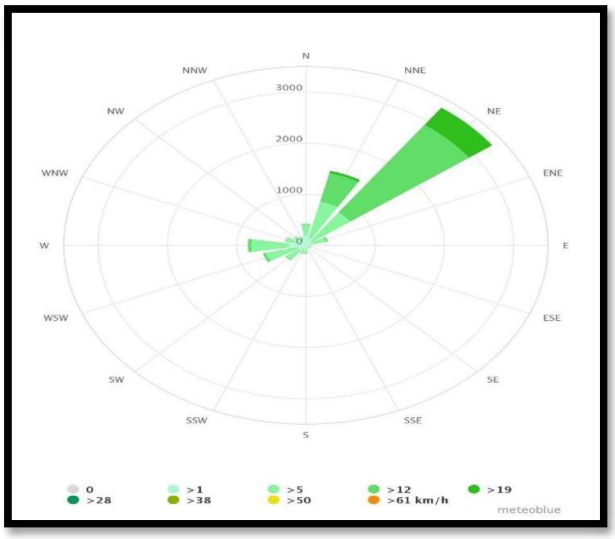


Figure 4.10: Wind Rose for Islamabad

It can be seen from the wind rose that dominant wind direction is towards NE and NNE.

4.2.5 Ground Water

Groundwater resources in the Islamabad-Rawalpindi area are mainly contained in and discharged from the recent Quaternary alluvium deposits. Recharge is principally due to precipitation and supplied by nearby streams.

The amount of the available groundwater is not exactly known. Former reports supposed an availability of 86 MGD (HESC, 2014). Capital Development Authority (CDA) is supplying the ground water of 180 tube wells to Islamabad while Rawalpindi Development Authority (RDA) is supplying by 260 tube wells to Rawalpindi[4]. Private and municipal wells are also used to fulfill the water requirements. However, the number of private wells is difficult to estimate, but NESPAK study (2007) identified 129 tube wells in Islamabad and their total daily discharge of about 63 MGD. The extraction of groundwater is also comprehended by a public bore well network which consists of about 200 bore wells.

Groundwater in Islamabad and Rawalpindi is being depleted on a gradual pace due to the unsustainable use of water, increased ground water extraction and reduced water percolation in soil due to urban expansion and increasing population. On average, groundwater is depleting at the rate of 1.7 meters per year. A maximum 20 meters drop in groundwater level was noticed in Gulshanabad Mohallah[5]. **Figure 4.11** shows decline of groundwater levels in Islamabad from 1986 to 2015.

[4] Water resource vulnerability assessment in Rawalpindi and Islamabad, Pakistan using Analytic Hierarchy Process (AHP), October 2016. Journal of King Saud University – Science, Volume 28, Issue 4, , Pages 293-299
[5] Nestle Water Factory Islamabad Study (2016), Constructive Critical Review of Hydrogeological Reports.

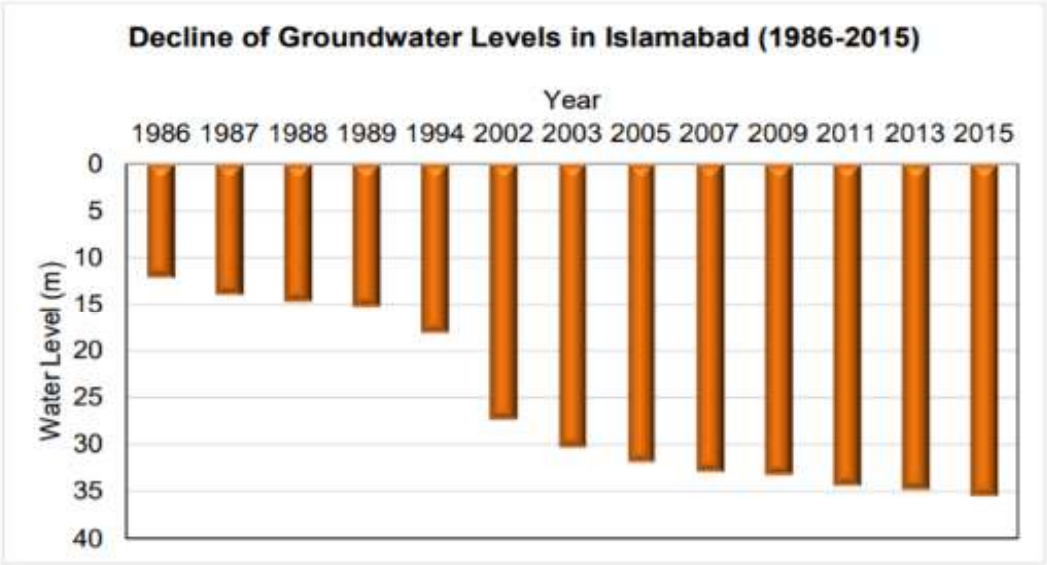


Figure 4.11: Decline of Groundwater Levels in Islamabad from 1986 to 2015

4.2.6 Surface water Hydrology and Drainage

Islamabad is the capital city, located at the foot of the Margallah Hills, whereas Rawalpindi lies in the Potohar Plateau. City is located in the semi-arid region of Pakistan, where the residents meet their basic need of water through groundwater resources. For the last many years, the quantity and quality of groundwater in these cities has been deteriorating very rapidly.

The Soan and Kurang Rivers are the main streams draining the area. Their primary tributaries are the Ling River, draining northwestward into the Soan; Gumreh Kas, draining westward into the Kurang from the area between the Kurang and Soan; and Lei Nala, draining southward into the Soan from the mountain front and urban areas. The Kurang and Soan Rivers are dammed at Rawal and Sambli Lakes, respectively, to supply water for the urban area. Extensive forest reserves in the headwaters of the Kurang and Soan Rivers benefit the quality and quantity of supply. A supplemental network of municipal and private wells as deep as 200 meters (m) produces ground water primarily from Quaternary alluvial gravels. The altitude of the water table decreases from about 600 m at the foot of the Margala Hills to less than 450m near the Soan River, so that the saturated zone generally lies 2–20 m below the natural ground surface. Lei Nala carries most of the liquid waste from Rawalpindi and contributes greatly to the pollution of the Soan River below their confluence. Solid-waste disposal practices threaten the quality of surface-water reserves.

The water is being discharged to metropolitan areas of major cities of Islamabad and Rawalpindi, the combined population of which is about 2.8 million, with a density of 880 persons/km^2. Surface water supplies are maintained from Rawal and Simly dams, which provide 21 million gallons per day (MGD) to Rawalpindi city and 17 MGD to Islamabad city. Groundwater supplies are 24 MGD from about 200 public tube wells in Islamabad, and 27 MGD from about 300 public tube wells in Rawalpindi. The average needs of Islamabad and Rawalpindi are 65 and 175 MGD, respectively, which exceed the capacity of available water resources. In Rawalpindi about 300 water wells are being pumped for about 18– 22 hour per

day year-round to meet the growing demand of the inhabitants of the city. Hydrology and drainage Map of project area is shown in **Figure 4.14.**

The different surface water resources[6] present in and around the Islamabad jurisdictions are discussed below and shown in **Figure 4.12**.

A) Soan River

Soan River rises near the small village Bun in the foothills of Patriata and Murree and drains much of the water of the Potohar region. Its water is stored in the Simly Dam. After treading a long path of 250 km, this relatively small stream falls into the Indus River near by the Kalabagh close to Pirpiyahi.

B) Kurang River

Kurang River is the main stream draining the area of Islamabad. Its main tributary is Gumrah Kas which drains westward into the Kurang River from the area between Kurang and Soan River.

C) Rawal Lake or Rawal Dam

Rawal Lake is an artificial reservoir located in an isolated section of the Margalla Hills National Park. It is fed by water from Kurang River and other small streams coming from the Margalla Hills like the Jinnah Stream. Its storage capacity is about 58,600,000 m^3; the discharge capacity of its spillway is about 2,300m^3/s. It provides drinking water for the population of Islamabad and Rawalpindi. Mean annual water available is 72 MGD (million gallons per day).

D) Simly Dam

Simly dam is located on the Soan River at some 30 km east of Islamabad and fed by melting snow and natural springs of Murree Hills. It is the largest reservoir of drinking water for the population of Islamabad. The storage capacity of the dam is about 35,463,000 m^3 with a spillway of discharge capacity of 1,275 m^3 /s. Mean annual water available is 68 MGD.

E) Khanpur Dam

Khanpur Dam is located on the Haro River in the north of the Margalla Hills at about 40 km of Islamabad. Its stored water provides domestic water to Rawalpindi and Islamabad as well as irrigation water for agriculture and industries in the surroundings of these cities. The storage capacity of the dam is about 140,000,000 m^3. Mean annual water available is 198 MGD.

[6] Nestle Water Factory Islamabad Study (2016), Constructive Critical Review of Hydrogeological Reports.

F) Headwork's

Headwork water is diverted from springs located at Saidpur, Nurpur and Shahdara**.** The capacity of the four headwork's sources is as follows: (i) Kurang River: 4 MGD, (ii) Saidpur: 0.8 MGD, (iii) Nurpur: 0.7 MGD, and (iv) Shahdara: 1.6 MGD.

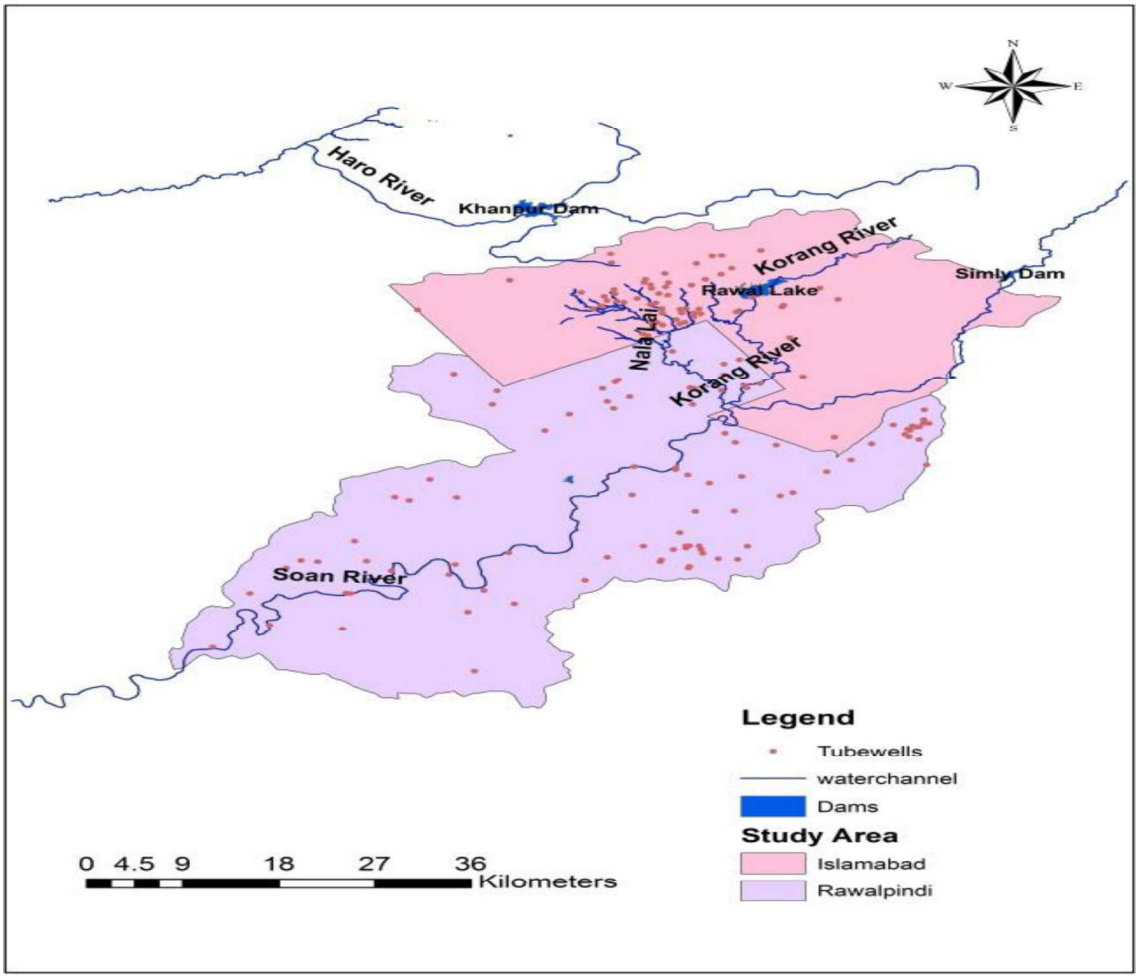


Figure 4.12: Map of the Study Area with Water Resources

G) Nullah Lai

The Lai Nullah Basin is located between 33º 33´ and 33º 46´ North and 72º 55´ and 73º 07´ East. It has a catchment area of 239.8 Km² (161.2 Km² in Islamabad and 73.6 Km² in Rawalpindi) and a length of about 30 Km, stretching from the Margalla hills in Federal Capital City Islamabad at the Northwestern edge until Soan River at the South-eastern edge in District Rawalpindi of Province of the Punjab. The principal surface water sources in Lai Nullah basin come from Simly Dam on Soan River, Khanpur Dam on Haro River and Rawal Dam on Kurang River and the current land use in the Lai Nullah basin is 38.6 % of residential and 14.2 % of agricultural areas, 14.8 % of forest and the rest are grass and bare land surfaces. The watershed of Nullah Lai Basin is shown in **Figure 4.13**.

The present water supply capacity in the Lai Nullah Basin area is about 785 million liters per day in total. Out of the total water supply, the service area of Capital Development Authority in federal Capital, Islamabad shares 507.33 million liters per day, while the service area of Water & Sanitation Agency (WASA) of Rawalpindi city and its Cantonment share 122.74[7] Million.

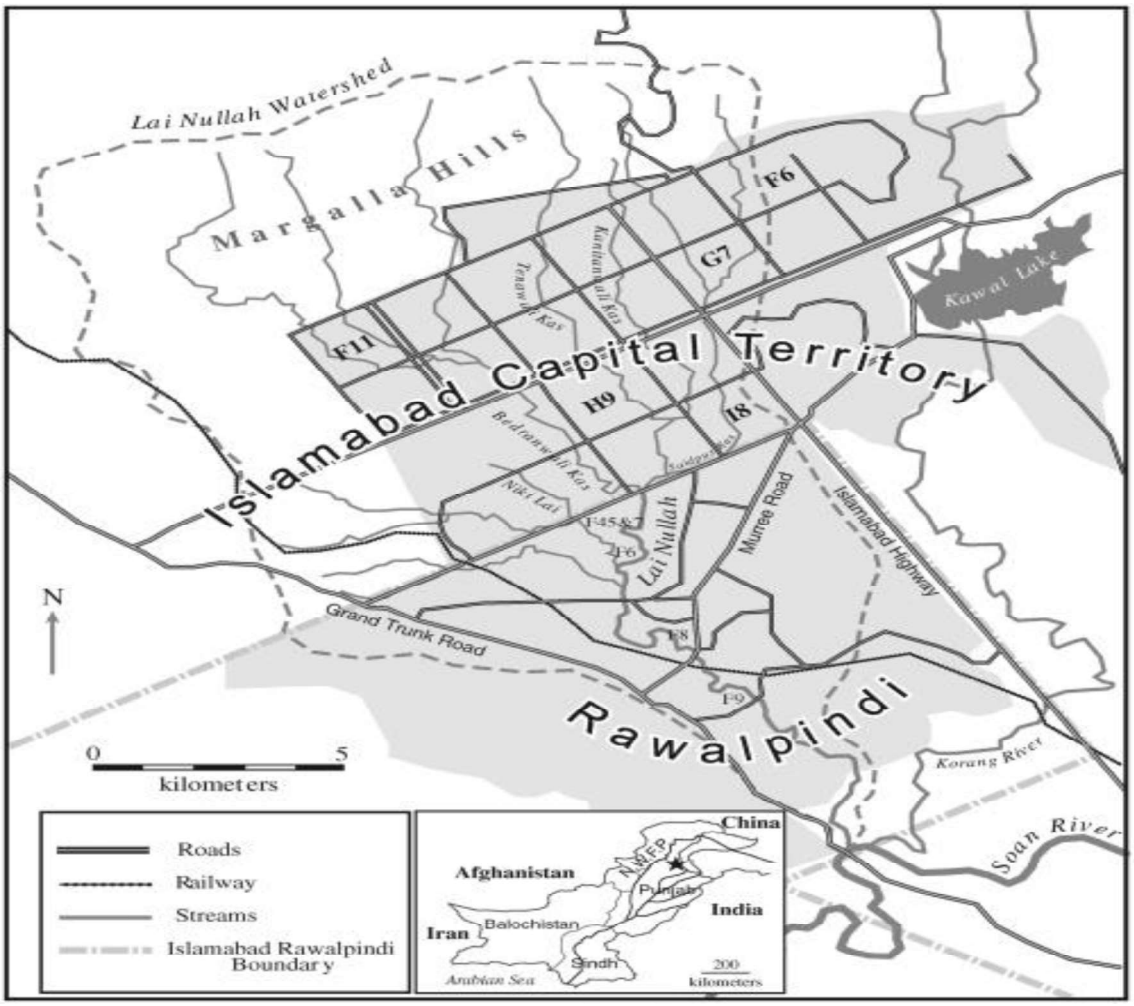


Figure 4.13: Lai Nullah Watershed in Rawalpindi-Islamabad Conurbation

4.2.7 Existing Land Use

Proposed site for the Islamabad Technopolis is dominantly consist of open land including agriculture land, open plots, trees, bushes, roads, existing drain, some uneven patches and few number of houses. Client informed NESPAK that CDA has already paid compensation to resident of these houses however they will vacate the site shortly. Islamabad Technopolis is located at Jinnah Avenue south of Rawal Lake adjacent to NIH Colony. Rawal Lake, Rawal Marquee located in the northern side of the Site at a distance of 0.97 kilometer. In the south side lies the Newmal Colony at a distance of 0.39 kilometer. NIH colony is located on the west side of the proposed site, whereas, Mohra Nur is located on the east side of the

[7] Pakistan: Lai Nullah Basin Flood Problem Islamabad – Rawalpindi Cities, The Associated Programme On Flood Management by World Meteorological Organization (2004)

proposed site. Land use map of the Project Area is shown in **Figure 4.15** and **Plate 4.1** shows the land use pattern in the project area.

Plate 4.1: Landuse view of Project Area

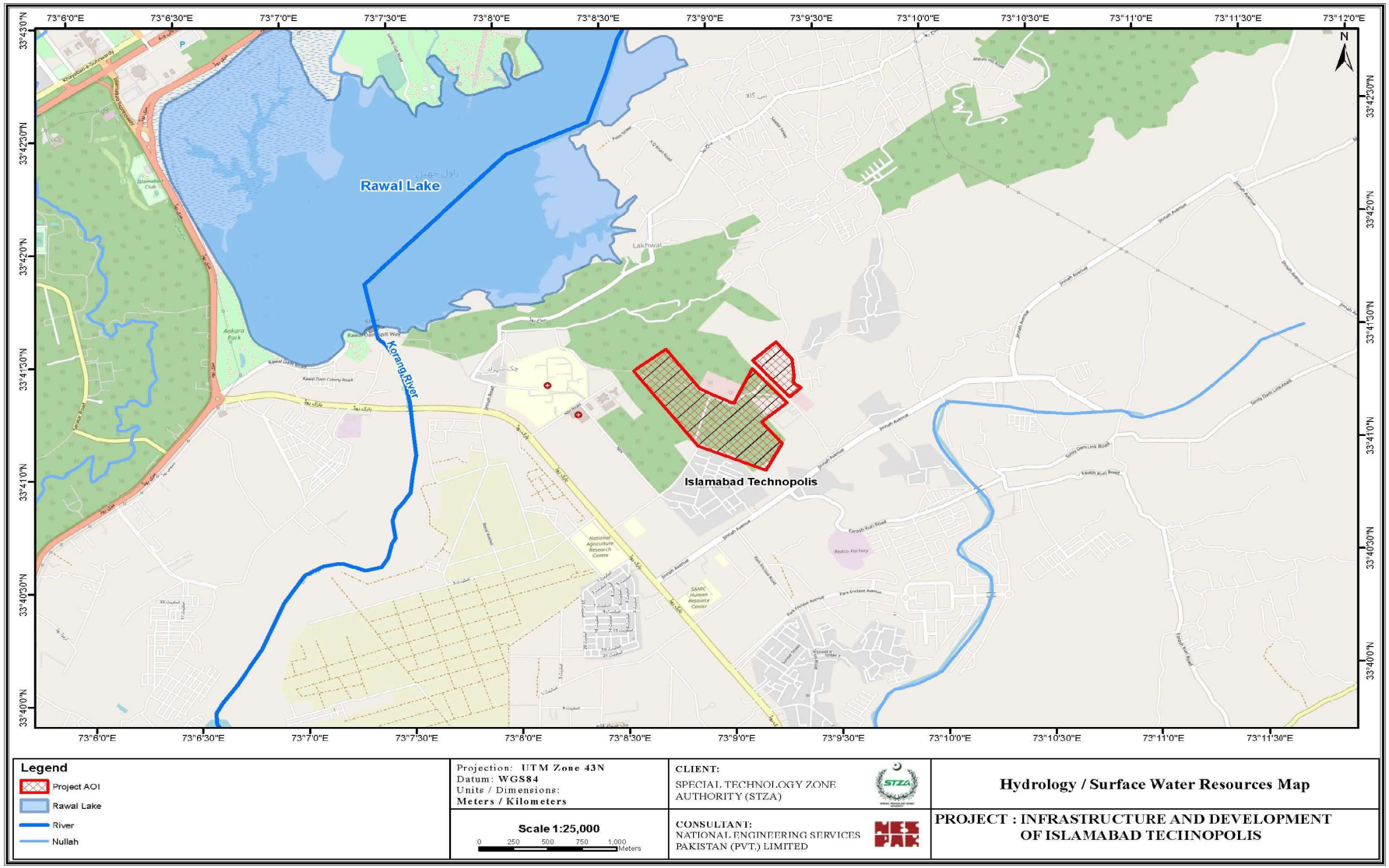


Figure 4.14: Hydrology and Drainage Map of Project Area

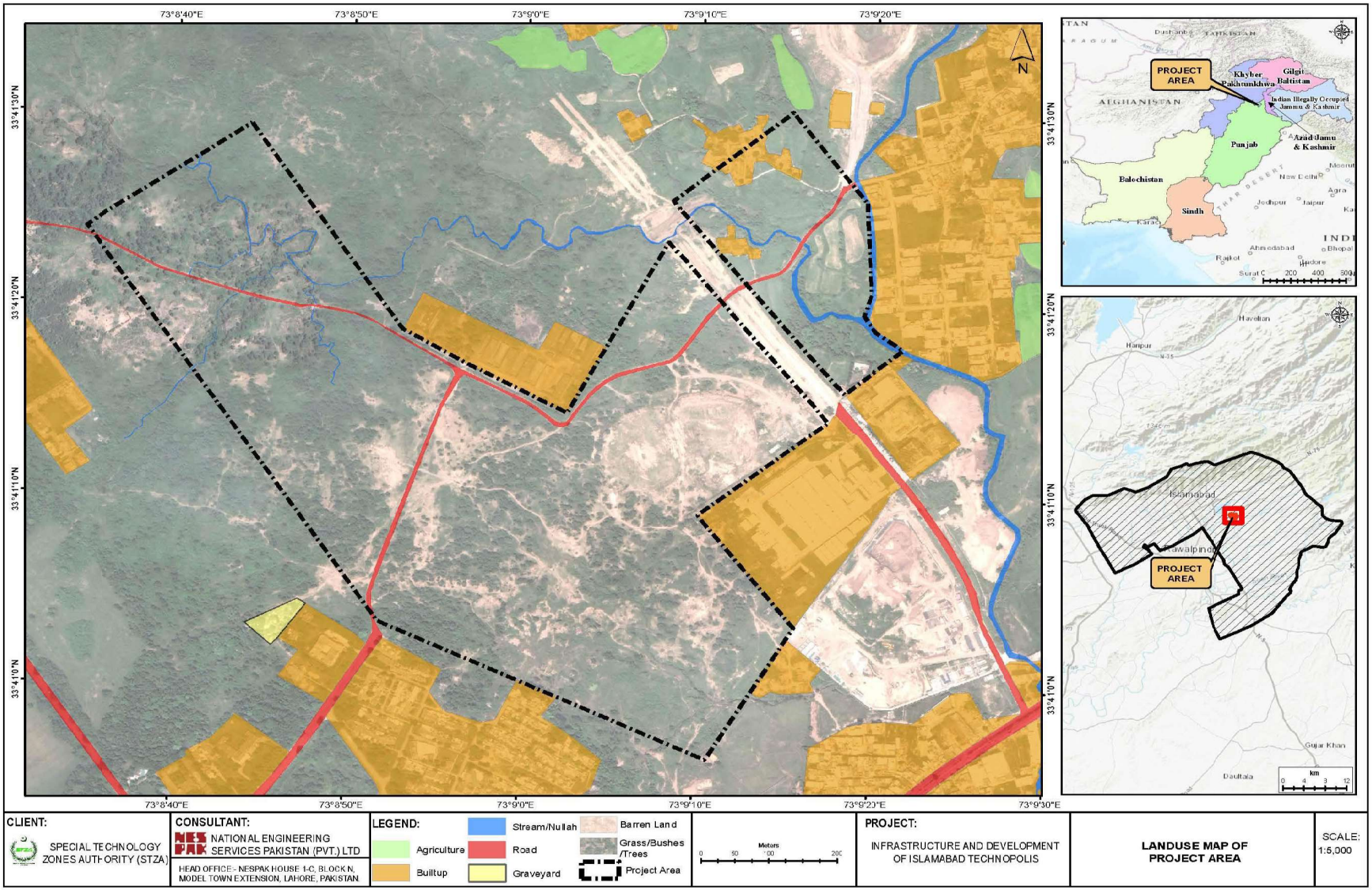


Figure 4.15: Land Use of Project Area

4.2.8 Environmental Monitoring

Environmental monitoring was conducted in and around the project area to assess the baseline environmental conditions including water, surface/wastewater, noise and ambient air. Three locations were selected to get the samples. The findings of environmental monitoring are summarized below. Environmental monitoring report is attached as **Annex-VI** and location map of monitoring points is attached as **Figure 4.16.**

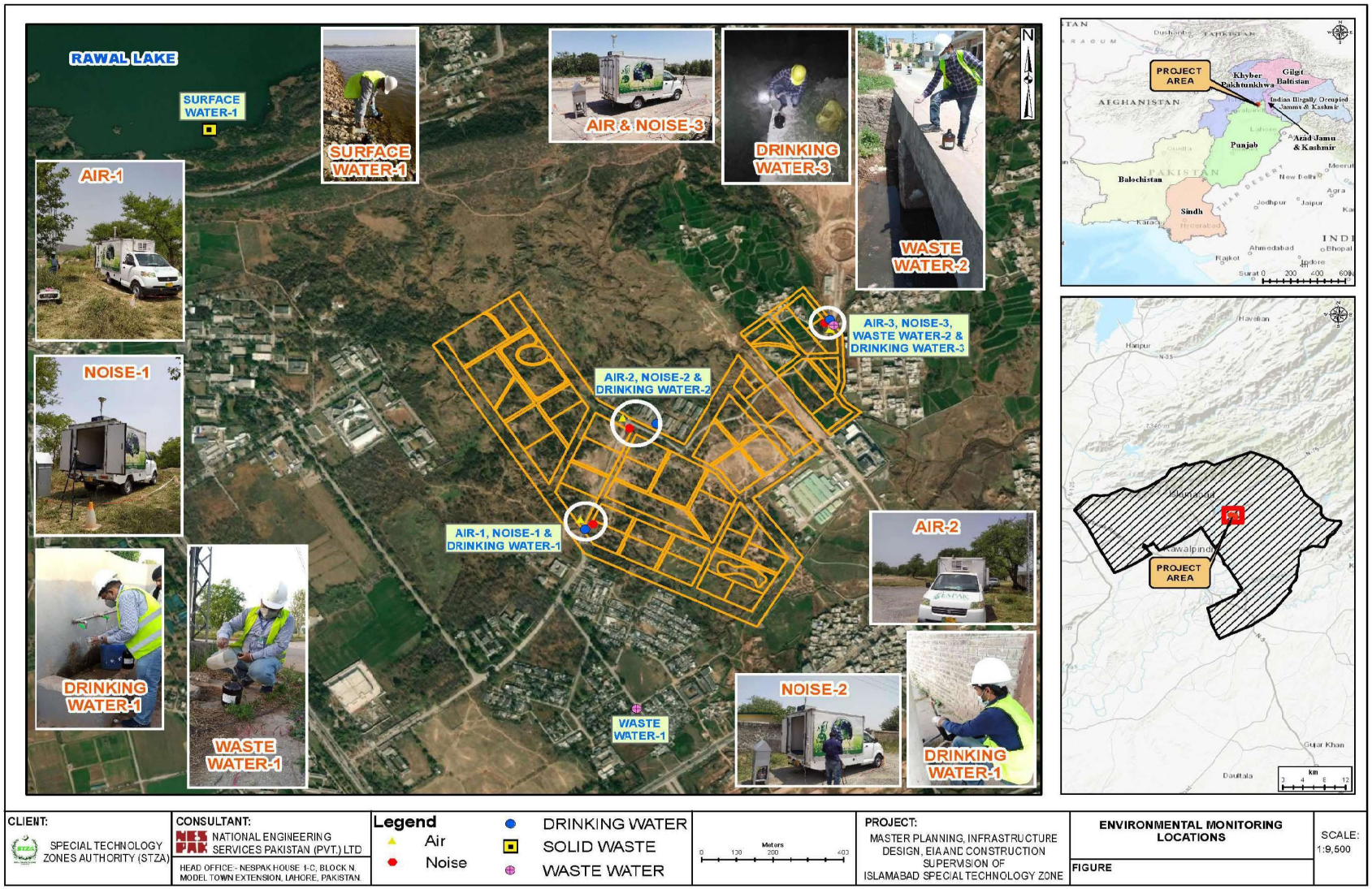


Figure 4.16: Environmental Monitoring sampling locations

A. Ambient Air Quality

The ambient air quality was monitored using a mobile station at three specified locations. 24-hour continuous monitoring was conducted. The results of ambient air quality monitoring are given in **Table 4.2**. The filed working is shown in **Plate 4.2**.

Table 4.2: Ambient Air Quality Results

Sr. No.	Parameters	Avg. sampling time	Unit	Location			NEQS
				Sample 1	Sample 2	Sample 3	
1	Carbon monoxide	24 hrs.	mg/m^3 (1 Hour)	0.1-0.9	0.1-0.5	0.01-1.6	5
2	Carbon monoxide		mg/m^3 (8 Hour)	0.5-0.6	0.5-0.7	0.8-0.9	10
3	Sulphur dioxide		µg/m^3	14.9	16.1	18.4	120
4	Ozone		µg/m^3 (1 Hour)	2.9-6.9	3.4-13.7	4-15	130
5	Nitric oxide		µg/m^3	13.3	13.8	14.9	40
6	Nitrogen Dioxide		µg/m^3	22	21.9	26.1	80
7	PM (2.5)		µg/m^3	38	37.1	33.8	35
8	PM (10)		µg/m^3	152	151	138	150
9	Suspended particulate Matter(SPM)		µg/m^3	253	305	230	500
10	Lead		µg/m^3	0.05	0.04	0.04	1.5

Plate 4. 1: Ambient Air Quality & Noise Monitoring at Site

B. Noise

The noise levels were monitored using potable noise meter at three specified locations. 24-hour average was taken to get the better results. Noise level at location 2 at night time is slightly higher side due to the presence of horse stable near sampling point. The results of noise monitoring are given in **Table 4.3**.

Table 4.3: Noise Monitoring Results

Sr. No.	Location	Equivalent Noise Level (L_{eq}) dB(A)		NEQS Limit dB(A)	
		Day Time	Night Time	Day Time	Night Time
1	Location 1	60	55	**65**	**55**
2	Location 2	60	58		
3	Location 3	56	53		

C. Surface Water Quality

The surface water sampling was carried out at Rawal Lake. Composite sample was collected to get the better results. For wastewater quality monitoring, sampling was carried out at two locations. The result of surface water quality monitoring is given in **Table 4.4** and Wastewater quality results are shown in **Table 4.5**. The field working is shown in **Plate 4.3**.

Table 4.4: Results of Surface Water Monitoring

Sr. No.	Parameters	Unit	Concentration	(NEQS)
1	Total Coliforms	MPN/100ml	1819	Must not be detectable in any 100mL Sample
2	E. Coli	MPN/100ml	1044	Must not be detectable in any 100mL Sample
3	Fecal Coliform Bacteria	MPN/100ml	507	Must not be detectable in any 100mL sample
4	Biochemical Oxygen Demand	mg/L	18	80
5	Chemical Oxygen Demand	mg/L	30	150
6	Color	TCU	Nil	≤15 TCU
7	Taste	-	Taste scale 9	Non-Objectionable / Acceptable
8	Odor	-	Non-objectionable	Non-Objectionable / Acceptable
9	Turbidity	NTU	60	<5 NTU

Sr. No.	Parameters	Unit	Concentration	(NEQS)
10	Total Hardness as $CaCO_3$	mg/L	130	<500 mg/L
11	Total Dissolved Solids (TDS)*	mg/L	270	<1000 mg/L
12	Total suspended solids	mg/L	130	-----
13	pH*	------	8.011	6.5-8.5
14	Aluminum (Al)	mg/L	BDL	≤0.2 mg/L
15	Antimony (Sb)	mg/L	BDL	≤0.005 mg/L
16	Arsenic (As)	mg/L	0.0014	≤0.05 mg/L
17	Barium (Ba)	mg/L	BDL	0.7 mg/L
18	Boron (B)	mg/L	BDL	0.3 mg/L
19	Cadmium (Cd)*	mg/L	BDL	0.01 mg/L
20	Chloride (as Cl^-)*	mg/L	15	<250 mg/L
21	Chromium (Cr)*	mg/L	0.021S	≤0.05 mg/L
22	Copper (Cu)*	mg/L	0.00853	2.0 mg/L
23	Cyanide (CN^-)	mg/L	BDL	≤0.05 mg/L
24	Fluoride (F^-)	mg/L	0.2 mg/L	≤1.5 mg/L
25	Lead (Pb)*	mg/L	BDL	≤0.05 mg/L
26	Manganese (Mn)*	mg/L	0.0727	≤0.5 mg/L
27	Mercury (Hg)	mg/L	BDL	≤0.001 mg/L
28	Nickel (Ni)*	mg/L	0.0004	≤0.02 mg/L
29	Nitrate (NO_3^-)	mg/L	BDL	≤50 mg/L
30	Nitrite (NO_2^-)	mg/L	BDL	≤3 mg/L
31	Selenium (Se)	mg/L	BDL	0.01 mg/L
32	Residual Chlorine	mg/L	BDL	0.2-0.5 mg/L
33	Zinc (Zn)*	mg/L	0.0770	5.0 mg/L
34	Phenolic Compounds (as Phenols)	-	ND	NGVS

Sr. No.	Parameters	Unit	Concentration	(NEQS)
35	Pesticides, Herbicides& Fungi sides	mg/L	ND	BDL
36	Temperature	o_C	27.9	40

Legends:

BDL: Below detection limit
ND: Not Detected
TCU: True Color Units
NTU: Nephelometric Turbidity unit

Plate 4. 2: Surface Water Quality Monitoring at Rawal Lake

D. Wastewater Quality

Table 4.5: Results of Wastewater Monitoring

Sr. No.	Parameters	Unit	Sample 1- Wastewater from NIH Colony	Sample 2 sewerage drain in Islamabad Technopolis	(NEQS)
1	Total Coliforms	MPN/100ml	>16000 MPN/100mL	400 MPN/100mL	NGVS
2	E. Coli	MPN/100ml	>16000 MPN/100mL	180 MPN/100mL	NGVS
3	Fecal Coliform Bacteria	MPN/100ml	>16000 MPN/100mL	180 MPN/100mL	NGVS
4	Biochemical Oxygen Demand	mg/L	56	46	80
5	Chemical Oxygen Demand	mg/L	75	92	150
6	Color	TCU	22 TCU	40TCU	NGVS

Sr. No.	Parameters	Unit	Sample 1- Wastewater from NIH Colony	Sample 2 sewerage drain in Islamabad Technopolis	(NEQS)
11	Total Dissolved Solids (TDS)*	mg/L	336	746	3500 mg/L
12	Total Suspended solids	mg/L	33	165	200
13	pH*	------	6.9	7.3	6-9
16	Arsenic (As)	mg/L	ND	ND	1.0 mg/L
17	Barium (Ba)	mg/L	0.2	0.9	1.5 mg/L
18	Boron (B)	mg/L	0.1	ND	6.0 mg/L
19	Cadmium (Cd)*	mg/L	ND	ND	0.1 mg/L
	Chlorine	mg/L	ND	ND	1.0 mg/L
20	Chloride (as Cl^-)*	mg/L	17	83	1000 mg/L
21	Chromium (Cr)*	mg/L	ND	ND	1.0 mg/L
22	Copper (Cu)*	mg/L	ND	ND	1.0 mg/L
23	Cyanide (CN^-)	mg/L	ND	0.11	1.0 mg/L
24	Fluoride (F^-)	mg/L	0.2	0.4	10 mg/L
	Iron	mg/L	0.5	0.3	8.0
25	Lead (Pb)*	mg/L	ND	ND	0.5 mg/L
26	Manganese (Mn)*	mg/L	0.1	0.3	1.5 mg/L
27	Mercury (Hg)	mg/L	ND	ND	0.01 mg/L
28	Nickel (Ni)*	mg/L	ND	ND	1.0 mg/L
31	Selenium (Se)	mg/L	ND	ND	0.5 mg/L
	Silver	mg/L	ND	ND	1.0 mg/l
33	Zinc (Zn)*	mg/L	0.2	0.1	5.0 mg/L
34	Phenolic Compounds (as Phenols)	mg/L	ND	0.02	0.1 mg/L
	OIL & Grease	mg/L	ND	ND	10

Sr. No.	Parameters	Unit	Sample 1- Wastewater from NIH Colony	Sample 2 sewerage drain in Islamabad Technopolis	(NEQS)
	AN-Ionic Detergents	mg/L	0.6	3.8	20
	Sulfates	mg/L	30	41	600
	Sulfides	mg/L	ND	ND	1.0
	Ammonia	mg/L	7.0	9.0	40
	Total Toxic Metals	mg/L	0.3	0.9	2.0

Legends:
BDL: Below detection limit
NGVS: No Guideline Values
ND: Not Detected
TCU: True Color Units

E. Groundwater Quality

Groundwater sampling was done at three specified locations. Composite samples were collected to get the better results. The results of groundwater quality monitoring are given in **Table 4.6**. The filed working is shown in **Plate 4.4**.

Table 4.6: Results of Groundwater Monitoring

Sr. No.	Parameters		Groundwater			NEQS Limits
		Unit	NIH colony	Horse Stable	Bahria Enclave	
1.	Total Coliform	MPN/ 100mL	>8.0	ND	ND	Must not be detectable in any 100 ml sample
2.	E Coil	MPN/ 100mL	ND	ND	ND	Must not be detectable in any 100 ml sample
3.	Fecal Coliform	MPN/ 100mL	>8.0	ND	ND	Must not be detectable in any 100 ml sample
4.	Color	TCU	NIL	NIL	Nil	≤ 15 TCU
5.	Taste		Acceptable	Acceptable	Acceptable	Non-Objectionable/ Acceptable
6.	Odor		Acceptable	Acceptable	Acceptable	Non-Objectionable/ Acceptable
7.	Turbidity	NTU	0.9	0.4	0.2	<5
8.	Total Hardness as CaCO3	mg/l	468	200	497	<500

Sr. No.	Parameters	Unit	Groundwater			NEQS Limits
			NIH colony	Horse Stable	Bahria Enclave	
9.	Total Dissolved Solid (TDS)	mg/l	576	288	992	<1000
10.	pH		7.2	7.5	6.9	6.5-8.5
11.	Aluminum	mg/l	ND	0.1	0.5	≤ 0.2
12.	Antimony	mg/l	ND	ND	ND	0.005
13.	Arsenic	mg/l	ND	ND	ND	≤ 0.05
14.	Barium	mg/l	0.3	0.1	0.5	0.7
15.	Boron	mg/l	0.1	0.1	ND	0.3
16.	Cadmium	mg/l	ND	ND	ND	0.01
17.	Chloride	mg/l	30	20	120	<250
18.	Chromium	mg/l	ND	ND	ND	≤0.05
19.	Copper	mg/l	ND	ND	ND	2
20.	Cyanide	mg/l	ND	ND	ND	≤ 0.05
21.	Fluoride	mg/l	0.3	0.2	0.3	≤1.5
22.	Lead	mg/l	ND	ND	ND	≤ 0.05
23.	Manganese	mg/l	0.1	0.1	0.1	≤ 0.5
24.	Mercury	mg/l	ND	ND	ND	≤ 0.001
25.	Nickel	mg/l	ND	ND	ND	≤ 0.02
26.	Nitrate	mg/l	23.5	5.5	135	≤ 50
27.	Nitrite	mg/l	0.2	0.1	ND	≤ 3
28.	Selenium	mg/l	ND	ND	ND	0.01
29.	Zinc	mg/l	0.1	0.3	0.1	5
30.	Phenol	mg/l	ND	ND	ND	---

Legends:

BDL: Below detection limit
ND: Not Detected
TCU: True Color Units

Plate 4. 3: Ground water quality Monitoring at site

4.2.9 Seismology

The project site falls in the Punjab plain, which has low to moderate level of seismicity. The project region has been subjected to severe shaking in the past due to earthquakes in the Himalayas. The known main active fault of the Himalayas is the Main Boundary Thrust (MBT). The epicenters of low to moderate magnitude earthquakes, recorded in the Punjab plain are associated with the subsurface fractures in the basement rocks, which are concealed by thick alluvial deposits.

According to Building code of Pakistan, 2007 prepared by NESPAK, the project area falls in Seismic Zone 2B of Pakistan (low to moderate damage), and peak ground acceleration (PGA) from 0.16 to 0.24 gram. **Figure 4.17** shows the seismic zoning map of Project area which is falling under Seismic Zone-2B. The seismic zoning on the basis of Peak Ground Acceleration (PGA) is summarized in **Table 4.7**.

Table 4.7: Seismic Zones

Seismic Zone	Peak Horizontal Ground Acceleration "g" is the acceleration due to gravity
1	0.05 to 0.08g
2A	0.08 to 0.16g
2B	0.16 to 0.24g
3	0.24 to 0.32g
4	> 0.32g

Source: *Building Code of Pakistan, Seismic Provisions - 2007*

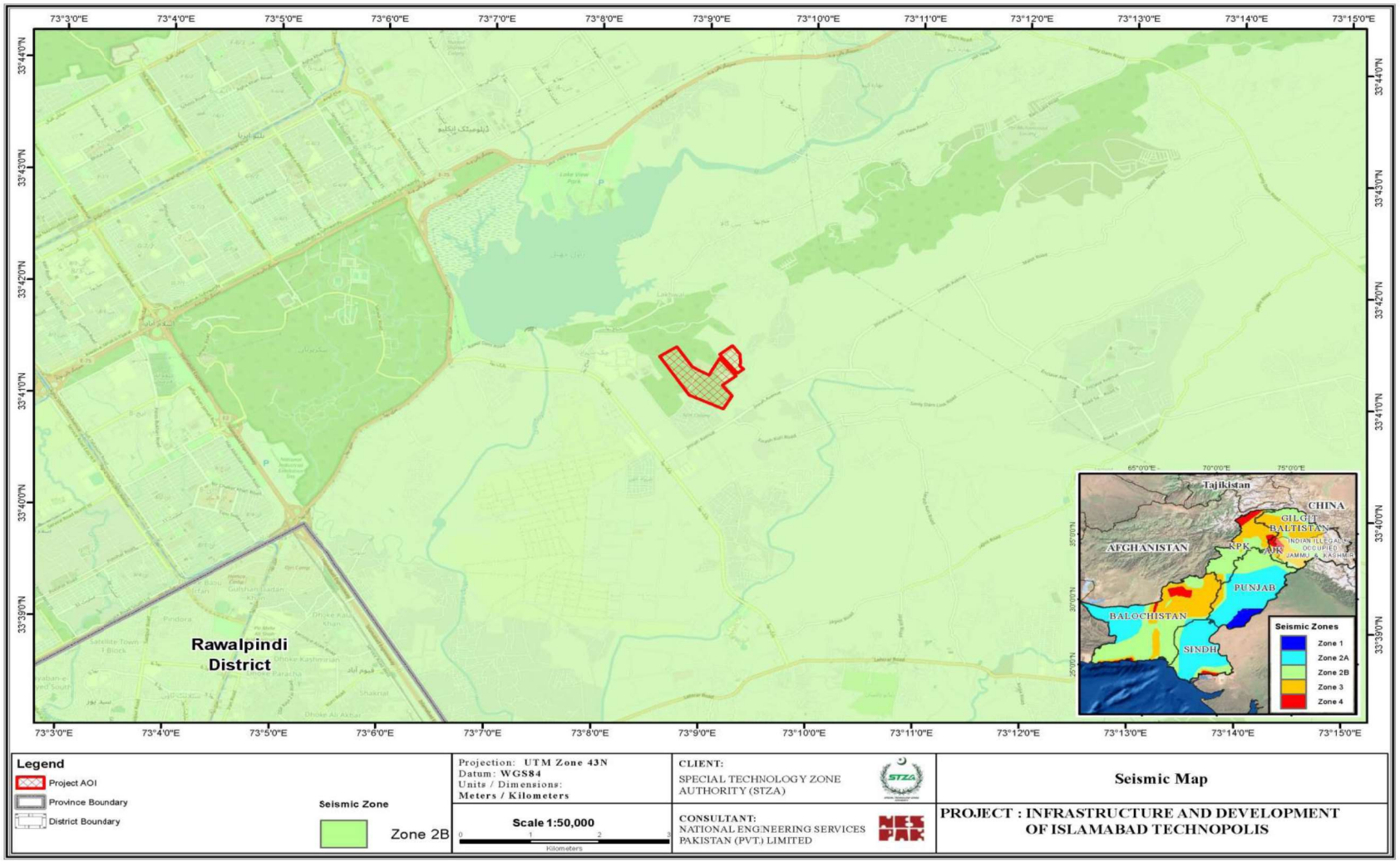


Figure 4.17: Seismic Zoning Map of Project Area

4.2.10 Environmental Sensitive Receptors

Sensitive receptors are mainly people or other organisms that may have a significantly increased sensitivity and exposure to the pollutants and social disturbance, due to the developmental projects. Thus, sensitive receptors are necessary to be identified, to evaluate the potential impacts of the proposed project on public health and the surrounding environment.

The environmental sensitive receptors in and around the project area were identified during field surveys. The educational institutes, health facilities, religious places as well as residential areas have been identified as they shall be exposed to noise and air pollution and will also face mobility issues. The sensitive receptors and their respective sensitivity are listed in **Table 4.8.** A comprehensive map showing sensitive receptors of the project area such as schools, Mosques, Graveyard, Hospital, etc. is given in **Figure 4.18.**

Table 4.8: Environmental Sensitive Receptors and Their Sensitivity

Sr. No.	Name/Type of Physical Sensitive Receptor	Remarks
A	**Educational institutions**	
1	Islamabad model school for girls	Sensitivity due to access, dust, noise and vibrations especially in teaching hours during construction phase
2	Islamabad model college for girls	
B	**Health Institutions**	
1	Sana Clinic	Sensitivity due to access, dust, noise and vibrations especially during construction phase
2	Infectious diseases Hospital	
3	NIH Hospital	
C	**Mosques/Shrines/Graveyard**	
1	Jamia Mosque Hanfia Ghosia	Mosque is sensitive due to access to fulfill the religious rituals. Graveyard sensitivity is due to the disturbance of the area at the time of death rituals.
2	Jamia Hanfia madrassa	
3	Jamia Mosque Tohidia	
4	Jamia Mosque Mukhtaar	
5	Mosque Mohran Jijan	
6	Graveyard (Muslims)	
7	Graveyard (Christians)	
8	Graveyard (Mohranur)	
9	Graveyard (Mohrajijan)	
10	Horse stable Mosque	
D	**Residential Areas**	
1.	NIH Colony, community centers, mohran noor, mohran jejan, hostels. e.t.c	Sensitivity due to air pollution, noise and vibrations. Exposure to dust and access problems may occur at certain locations during construction phase.

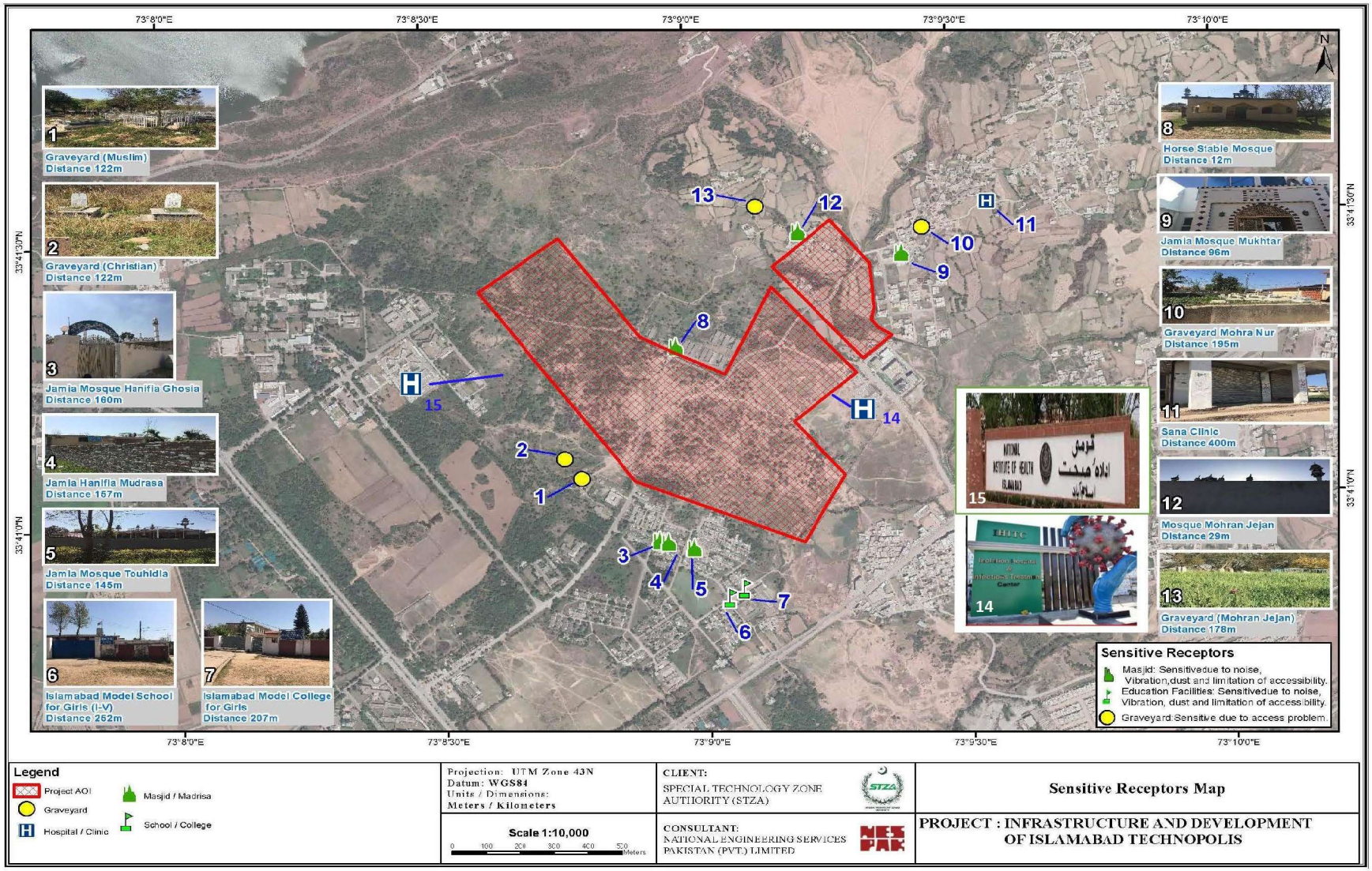


Figure 4.18: Sensitive Receptors Near Project Area

4.3 Ecological Environment

4.3.1 Flora/Natural Vegetation

Islamabad is famous for its natural beauty and diverse species of plants. Cheel (Pinus logifolia), koa (wild olive), Phulai and Senetha are commonly found on top of Margalla Hills. Shisham (Dilbergia Sisso), Toot and paper mulberry are also grown. A famous species of grass is Dab (Amuricatus) whereas, wild products of the plains include flower buds of the wild pomegranate, blackberries, raspberries, cranberries, wild pears etc. Along the ravines small stunted bushes are commonly found.

The trees commonly found in the Project Area are Acacia Modesta, Dalbergia Sissoo, Ficus Carica, Broussonetia Papyrifera, Melia azedarach, Albizia Lebbeck, Poplar, Ficus bengalensis, Sapium sebi ferum, Morus alba etc. See **Plate 4.4.** However, due to infrastructure development, around 604 trees will be cut which exist in the Right of way (ROW) of the proposed roads. Approximate number of trees to be cut are given below:

Species	Common Names	No. of Trees
Acacia Modesta	Phulai	315
Dalbergia Sissoo	Tahli	182
Ficus Carica	Injir	37
Broussonetia Papyrifera	Paper Mulberry	14
Melia azedarach	Daraik	5
Albizia Lebbeck	Kala Sirin	2
Populus	Poplar	39
Ficus bengalensis	Bargad	1
Sapium sebi ferum	Chinese Tahli	6
Morus alba	Desi Toot	3
	Total	**604**

Plate 4.4: A view of Floral Pattern in the Project Area

4.3.2 Fauna

A vast variety of birds and animals can be seen in Islamabad especially in the Margalla Hills. The Birds species found here include Griffon vulture, Laggar Falcon, Peregrine Falcon, Kestrel, Indian Sparrow Hawk, Egyptian Vulture, White Cheeked Bulbul, Yellow Vented Bulbul, Paradise Flycatcher, Black partridge, Cheer Pheasant, Khalij Pheasant, Golden Oriole, Spotted Dove, Collared Dove, Larks, Shrikes, Wheatears and Buntings.

Wild bores, foxes, pigs, cats rabbits and jackals are also seen in the fields and forests. Chakor and gray partridges are mostly seen while black partridge is rare. Geese are found in the Soan Valley. Quail come annually in enormous number in the spring and autumn. Most of the fauna in the vicinity of the Project Site are pets, squirrels, lizards and birds.

4.3.2.1 Wildlife Mammals

Islamabad is the only city in the country which has struck a perfect balance between civilized progress and maintaining its wild side too. Perhaps because the expansion and progress are relatively better organized and disciplined than elsewhere.

Margalla Hills is a habitat to all kinds of animals, exotic birds, monkeys, grey gorals, barking deer, jungle cats, porcupines, cape hares, Himalayan palm civets, red foxes, Asiatic jackals, white crested kalij pheasants, golden orioles, paradise flycatchers, grey shrikes, spotted doves and others.

Moreover, there is no wild mammalian specie observed in the project area except some domesticated animals including cats, dogs, etc. However, the following **Table 4.9** shows the list of mammalian species present in Islamabad region.

Table 4.9: List of indigenous Mammals in Islamabad region

Sr. No.	Mammals	Scientific Name
1	Rhesus macaque	*Macaca mulatta*
2	Wolf	*Canis lupus*
4	Jackal	*Canis aureus*
5	Fox	Vulpes vulpes
6	Jungle Cat	*Felis chaus*
7	Palm Squirrel	*Funambulus palmarum*
8	Mongoose	*Herpestes auropunctatus*
9	Indian mole rat	*Rattus rattus*
10	Field mouse	*Funambulus pennant*
11	Porcupine	*Hystrix indica*
12	Rabbit	*Oryctolagus cuniculus*
13	Cape hare	*Lepus capensis*
14	Masked palm civet	*Paguma larvata*
15	Wild boar	*Sus scrofa*

4.3.2.2 Amphibians

In the project area, the most common cause of population decline of amphibians is habitat destruction due to rapid growth of urbanization. It means that due to urbanization, suitable habitat has been lost due to which the current situation of homeland amphibians has been declined. The most common causes of their population decline include climate change, increased exposure to ultraviolet radiation, pathogens, introduced species, habitat destruction and modification, acid rain, and chemical stressors such as pesticides and fertilizers.

Following amphibians are found near or around the project area are given in the **Table 4.10** below.

Table 4.10: Amphibians of the Study Area

Sr. No.	Local/ English Name	Scientific Name
1	Common frog	*Rana tigrine*
2	Common toad	*Bufo bufo*
3	Marble frog	*Uperodon systoma*

4.3.2.3 Reptiles

Islamabad region supports a good variety of reptiles. In Islamabad, the most common reptile that is worth mentioning and is occasionally witnessed by the hikers is Monitor Lizard. These are

generally large reptiles, although some can be as small as 12 centimeters in length. They have long necks, powerful tails and claws, and well-developed limbs.

Following Reptiles are found near or around the project area are given in the **Table 4.11** below.

Table 4.11: Reptiles of the Study Area

Sr. No.	Local/ English Name	Scientific Name
1	Fringed toed Lizard	*Acanthodactylus cantoris*
2	Spiny tailed Lizard	*Uromastyx hardwickii*
3	Common Krait	*Bungarus caeruleus*
4	King Cobra	*Ophiophagus Hannah*
5	Viper	*Vipera xanthina*

4.3.2.4 Birds – Avifauna

Many bird species have been reported in and around the Study Area. These include passage migrants, vagrant, resident, breeding and irregular visitors. The migratory birds descend from higher altitudes during the winter months. The common birds observed and reported in the Study Area are given in **Table 4.12** below:

Table 4.12: Birds Found in Study Area

Sr. No.	Common Name	*Scientific Name*
1	Rock Pigeon	*Columba livia*
2	Myna	*Acrido therestritis*
3	Grey Partridge	*Perdix perdix*
4	House Sparrow	*Passer domesticus*
5	Red-billed chough	*Pyrrhocorax pyrrhocorax*
6	Magpie	*Pica pica*
7	Alpine Chough	*Pyrrhocorax graculus*
8	Grey shrikes	*Lanius excubitor*
9	Spotted doves	*Spilopelia chinensis*

4.3.3 Endangered Species

There are no endangered species of flora and fauna in the project area or the study area.

4.3.4 Reserved Forests and Protected Areas

Margalla hills near the project site have been ranked as Protected Areas. The tail of these expands till Rawal Lake adjacent to project site, however, there are no reserved forests and protected areas within project area.

4.4 Socio-Economic Environment

4.4.1 Socio-Economic Baseline Structure

This section deals with the existing socioeconomic baseline conditions of the proposed project area. The socioeconomic baseline has been studied with respect to human and economic development and quality of life values of the population residing in or in the vicinity of the project site. During the desk/ office study, available reports/ documents were comprehensively reviewed. Detailed site visits were conducted by expert Sociologists to appraise the prevailing socioeconomic conditions and to assess the impacts of construction of Islamabad Technopolis. It is imperative to study the prevailing socio-economic conditions of the local community. During the field survey, interviews and consultations meetings were held with the local residents around the project area, road users, shopkeepers, customers and Hostel Students etc. Observations were made after giving consideration to the desk/ office study results. The survey tool used for the socio-economic survey is attached as an **Annex-VII.**

4.4.2 Political and Administrative Setup

For an administrative system with judicial and administrative control over the Islamabad Capital Territory (ICT), the District Administration was established in 1980. Accordingly, on January 01, 1981 administrative functions were assumed by the Federal Government with direct administration by the President and Islamabad administration was assigned all the powers and functions of a Provincial Government. The Local Government institutions in ICT area therefore are slightly different from those of other districts in Pakistan.

The Capital Territory is spread over an area of 906 sq. km., and is divided into three segments; namely, (i) Islamabad Urban area including institutional and industrial area, covering 220 sq.km (ii) Islamabad Park occupying 220 sq.km, and (iii) Islamabad Rural area measuring 466sq.km. The rural area of Islamabad encompasses 132 villages and administratively consists of 12 Union Councils.

4.4.3 Study Area

The study area falls in Islamabad Tehsil of Islamabad District. Islamabad Tehsil spread over the area of 906 square kilometers. According to latest census (2017) of Islamabad, it has a population of 2,006,572 persons, of which 1,055,712 persons are male and 950,727 were females. Of the total population, 1,014,825 lives in urban areas while 991, 747 lives in rural area. Sex ratio is measured as 111. Average household size of the Islamabad Tehsil was 6.2 persons. Average Annual Growth Rate (1998 to 2017) is measured as 4.91%.

4.4.4 Methodology

Data collection for socioeconomic study of the proposed project involved socio-economic baseline survey of the proposed project area.

A. Primary Data

Primary data was collected through socio-economic baseline survey. For the selection of respondents simple random sampling technique was adopted and 100 respondents residing in the vicinity of proposed project were selected. After determining sample size, an interview schedule was developed for the collection of baseline data. This interview schedule included the baseline data/information (i.e., demographic characteristics, livelihoods, economic conditions, quality of life, housing and settlement patterns and land acquisition) that is required for establishing the baseline study and was collected during the socioeconomic baseline survey.

Baseline data for socio-economic analysis was created in Microsoft Excel spread sheet in the form of quantitative data. After entering, checking, sorting, and transforming the data, the basic operation, data analysis (descriptive analysis) was taken place by finding out the percentages and the frequencies of the respondent's views in the form of tables and charts/graphs.

B. Secondary Data

Secondary data was collected from Pakistan Bureau of Statistics (Census 2017) and District Census Report (DCR) Islamabad, 1998 for socio economic baseline survey. The latest census of 2017 released the statistics of few demographic parameters like households, populations for all sexes, male female ratio, sex ratio, average annual growth rate of 1998 to 2017 at at the national, provincial and district level so the rest of the information has been dragged from the DCR 1998.

4.4.5 Population Composition and Demographic Characteristics

According to the results of 2017 census report, the total population of Pakistan is estimated as 207,774,520 persons with annual growth rate of 2.40% and the total population of Islamabad District is 2,006,572, with urban population of 1,014,825 which is around 50.58% of the total population. The average annual growth rate of population in the district during this period was 4.91 percent. The total area of district is 906 kilometres which gives population density of 1,165 persons per square kilometres. **Table 4.13** gives population, its intercensal increase and average annual growth rate from 1998 to 2017.

Table 4.13: Households, Population Increase, Sex Ratio and Growth Rates

Sr. No	Area	Households	Population-2017				Population 1998	Sex Ratio 2017	1998-2017 Average Annual Growth Rate
			Male	Female	Trans-gender	All Sexes			
1	Islamabad Tehsil	-	-	-	-	2,006,572	805,235	-	-
2	Islamabad District	336,182	1,055,712	950,727	133	2,006,572	805,235	111.04	4.91
	Rural	165,246	515,855	475,840	52	991,747	276,055	108.41	6.95
	Urban	170,936	539,857	474,887	81	1,014,825	529,180	113.68	3.48
3	Punjab	17,103,835	55,958,974	54,046,759	6,709	110,012,442	73,621,290	103.54	2.13
4	Pakistan	32,205,111	106,449,322	101,314,780	10,418	207,774,520	132,352,279	105.07	2.40

Source: Pakistan Bureau of Statistics (Census 2017)

A. Rural and Urban Distributions

According to the census 2017, the urban population is 1,014,825 which is around 50.58% of the total population with an annual growth rate 3.48. The rural population is 991,747 which is around 49.42% of the total population of Islamabad with an annual growth rate 6.95. There is no Municipal Corporation/Committee, Cantonment, Town Committee etc. except Capital Development Authority (CDA) created for development of the capital city

B. Religion

The population of district is predominantly Muslims i.e. 95.5 per cent. The next higher percentage is of Christian with 4.1 points, followed by Ahmadi 3 per cent. While other minorities like Hindu (jati), Scheduled castes etc. are very small in number. The proportion of Muslims is higher in rural areas (98.8 per cent), as compared to their counterparts in urban (93.8 per cent). Christians are mostly living in urban areas representing 5.7 per cent as compared to just 0.9 per cent in rural areas. Similarly, Ahmadis are more in urban area as compared to their proportion in rural areas.

C. Ethnic Structure

For the study of ethnography Islamabad can be divided into two parts i.e. urban and rural. In Islamabad city people belonging to almost all possible races and tribes of Pakistan are living. Regarding people living in rural area, they are mostly Rajput. The important sub-division are Bhatti, Rawal, Janjua and Chohan. Besides, Gujjar, Awan, Mughal, Qureshi, Syed and Satti are also living there. Some of the other minor tribes are the Jat, Malyar and Pathan and some Khattar.

D. Mother Tongue

The mother tongue refers to the language used for communication between parents and their children in any household. Punjabi is the predominantly language being spoken in Islamabad Capital Territory, representing 71.6 per cent of population followed by Urdu spoken by 10.1 per cent, Pushto 9.5 per cent and Siraiki 1.1 per cent while others speak Sindhi Balochi, Bravi, Dari etc. The proportions of people speaking Urdu, Sindhi, Pushto, Siraiki and other languages except Punjabi are more in urban area than in rural areas.

E. Sex Ratio

Sex ratio, i.e. proportion of males for every 100 females, according to the census of 2017 the sex ratio is 111.04, that is 108.41 in rural and 113.68 in urban area which was 117 per cent recorded in 1998 Census which had decreased from 119 in 1981. The ratio was 118 per cent in rural area and 122 in urban area.

F. Marital Status

The population above 15 years was classified into never married, married, widowed and divorced. 34.5 percent of the total population was never married, 60.2 percent married, 4 percent widowed and 0.3 percent divorced. The percentage share of never married male was higher than that of females, being 39.8 percent and 30.2 percent respectively. The percentage of never married females was higher in urban than in rural areas implying thereby that fertility must be at lower level in the former then the latter area.

G. Disabled Persons

Disability refers to malfunctioning of any organ of the body, visible or invisible. Here we refer to the former disability. The disability is classified as blind, deaf and mute, crippled, insane, mentally retarded, multiple disability and any other visible disability. Disabled persons constituted 1.0 percent of the total population. Among them almost two-thirds were males and one-third females. Of disabled persons, 29.9 percent were crippled followed by insane, deaf/mute, blind, mentally retarded and multiple disability persons, representing 12.5, 12.1, 9.2, 8.1, and 4.6 respectively.

H. Age Structure

In 1998 the proportion of the infants under one year was 2 percent, children under 5, 11.9 percent, children under 10-year 25 percent, under 15-year 37.9 Percent of the total population. Those eligible for obtaining National Identity Card (i.e., 18 years and above) represented 55.4 percent while those eligible for casting vote (i.e., 21 years and above) were 48.7 percent of the total population. the proportion of population of working age groups i.e., 15 to 64 years, were recorded as 59.4 percent and over 65-year 2.7 percent resulting age dependency ratio of 68.4 percent. Women of reproduction ages. i.e., 15-49 years, were 50.7 percent of their total population.

The proportion of infants and children under 15 years and population 65 and over were higher in rural areas when compared to population living in towns, resulting high dependency ration in the former than in the latter areas representing 79.2 and 63.4 percent respectively.

I. Migration

The total number of life time in-migrants in Islamabad Capital Territory was 3, 97,731 or 49.4 per cent of population of the district. Of total life time in-migrants 312,640 persons were settled in Capital city. Of total district migrants 88.1 per cent came from Punjab, Sindh, Baluchistan and KPK, 6.6 per cent from Azad Kashmir and Northern areas while remaining 5.4 per cent Pakistani repatriated from other countries. There is no single case of migrant whose birth place is not reported.

J. Culture

Dress

Males generally wear Shalwar, Kameez and Chaddar. The Chaddar is a multipurpose dress of rural people. The colour of the man's dress is generally white, khaki or grey. In winter sometimes they wear long coats or blanket just to protect themselves from the cold effect of winter females wear coloured Shalwar, long shirt and a Dophtta/Chaddar over their heads. They generally like ornaments, bangles, necklaces on occasion of festivals and marriages.

Food & Habits

Wheat and maize are the staple food grains while bajra is also used to a lesser extent The villagers mostly use vegetables with tandoori bread and sometimes also take meat. While the people of the urban areas mostly take balanced diet.

Cultural Resources

The plains and lower foot hills near the western and northern Margallah range have witnessed a very long and rich human settlement and history. This is partially manifest in the magnificent archaeological sites in the Taxila valley Archaeological Protection area, adjacent to the park's north-western boundary. The alternating extensions of cultures and influence from the west and east mimic the overlapping of natural ecosystem, and reflect and unusually diverse cultural heritage.

Although the most significant known sites are not in the park, there are associated sites in the Park which are worthy of protection and interpretation. There are locally important religious features, such as the Bouhar (banyan tree) near Faisal Mosque. The shrine of Bari Shah Imam is built on top of Medieval sites, which may be on top of older features. Nurpur and Saidpur villages originated in Medieval age therefore are at least 450 years old. The shrine of Pir Mahar Ali Shah in Golra Sharif is not far from the park southern boundary near Shah Allah Ditta. There are numerous others which need to be recovered and evaluated.

K. Economic Conditions

Economically Active Population

The economically active population as enumerated in the last census was 23.0 per cent of the total population or 30.7 per cent of the population 10 years and over i.e., the population exposed to the risk of entering the economically active life at any time. The formal percentage is known as Crude Activity Rate (CAR) while the latter is known as Refined Activity Rate (RAR). Of the total male population 39.5 per cent were economically active, while 77 per cent not economically active, 25 per cent children under 10 years, 13 per cent students, 33 per cent domestic workers while 6 per cent were land lords, property owners, retired persons, disabled etc. the participation rate is higher in the urban area as compared to people living in rural area.

Unemployment

Unemployment rate is measured as ratio of looking for work and laid off in total employed population comprising those looking for work, laid off and un-paid family helpers, generally representing in percentage. The unemployment rate in Islamabad Capital Territory was 15.7 per cent which was mainly due to unemployment among male representing 16.8 per cent. Female employment rate was just 1.7 per cent. This is because of their small proportion in their total proportion. The unemployment rate was almost three times higher in rural as compared to urban areas representing 28.7 and 10.1 per cent respectively.

L. Industries

In order to meet local requirement, C.D.A., has allotted 450 Industrial plots in I-9, I-10 Sectors of Islamabad and Kahuta Triangle. So far 135 firms have been registered under Factory Act 1934. Approximately, 5,800 persons are engaged for smooth functioning of these factories, 100 trade unions are registered whereas only 32 are acting as C.B.A. The city has 11 main markets in addition to Industrial and Trade Centre as well as Blue area. Fecto Cement Factory is also situated near the Margallah hills and 9 stone crusher units in the name of “Sangjani Stone Factory” are also functioning within the limits of Islamabad. These are supplying crushed stone to the Railway Department and general public.

M. Agriculture

Due to sufficient rainfall throughout the year, the climate of Islamabad is suitable for growing vegetables. Turnip (Loki), lady finger, brinjal, bitter gourd, cauliflower and carrot are grown in abundance. Lentils (Masoor), mung, mash, peas (matter) are grown as Rabi crops. Very few fruit orchards are found in the district. Area under orchard ranges between 30 to 36 hectares. The climate and soil however, is suitable for growing lemon, orange, guava and apricot.

N. Infrastructure

Communications

The road network in the urban area of Islamabad is designed to provide an effective transportation system to servers of all sector of city. It consists of various specifications, such as highways, main roads and service roads. Islamabad is linked to the Nation Wide Dialing System (NWD) / Subscriber Trunk Dialing (STD) systems and gate-way exchange system for rapid and quick internal as well as external communication. Project area is connected through a number of paved roads i.e. NIH Road, Park Road, Mohra Nur Road, Jinnah Avenue, IT Park Road.

A View of Road Network in and around the Project Site

Railways

Islamabad has also been linked by railway line at Margallah, situated between Sector I-9 and H-9.

Airport

Islamabad has an international airport with good domestic and international connections. It is directly linked with Middle East, Europe and China.

O. Education

Education has significant impact on the life of an individual, which enhances the quality of life and productivity. It also serves as a key indicator of any socio-economic development. Islamabad city is famous for its reputable educational institutions in the public sector. Islamabad has four universities namely Quaid-e-Azam University, Allama Iqbal Open University, International Islamic University and National University of Modern Languages. There are two campuses of Hamdard University Karachi, and Al-Khair University Muzaffarabad, AJK. Besides the above, there are fourteen (14) Islamabad Model Colleges, seven (7) Degree Colleges, thirteen (13) Higher Secondary Schools, seventy-nine (79) High Schools and forty-six (46) Middle Schools and 216 Primary Schools. Some Private schools are also present near project area named as Islamabad Model School for Girls (I-V), Islamabad Model College for Girls which has shown below:

A View of Islamabad Model School for Girls (I-V) in the project site

A View of Islamabad Model College for Girls

P. Health

Health conditions are one of the major determinants of a society's social development and quality of life. Healthy manpower is imperative for derive to advancement and economic growth.

Sufficient medical and health care facilities are available in the Islamabad Capital Territory (ICT). There are six hospitals with 1660 beds available to meet the growing health needs of the population. Federal Government Services Hospital, Capital Hospital, Pakistan Institute of Medical Sciences (PIMS), Children Hospital, National Institute of Health (NIH) and Shifa International Hospital are some of the renowned Hospitals of the City. Besides 35 (ICT) Dispensaries, Maternal Child Hospital (MCH), 03 Rural Health Centers and 13 Basic Health Units in rural area are functioning day and night. The health network of ICT seems to be satisfactory as compared with other areas of the country.

NIH is situated near the project area. It is located on Park Road, Chak Shehzad adjacent to Pakistan Nursing Council and near to Rawal Lake. It is one of most prestigious institutions of the country involved in multi-disciplinary public health related activities like diagnostic services, research and production of biologicals for the last more than 40 years. Other than this Poly Clinic, PIMS, Al Shifa Hospital are also present near the project area.

A View of National Institute of Health (NIH) in the Project Site

Q. Archeological and Cultural Property/ Places of Interest

The most common physical and cultural heritage of Islamabad Capital Territory are Lok Virsa, Islamabad Museum, Pakistan Museum of National History and Rawal lake. Lok Virsa located near Shakarparian hills, has been established to preserve the living folk and traditional culture of Pakistan. It has a large display of embroidered costumes, jewellery, woodwork, metal work, block printing, ivory and bone work. Islamabad Museum presents a long and historic sequence of the land where Pakistan is situated today. Pakistan Museum of National History depicts early human history, geology and wild life of Pakistan is also located in Islamabad. While Rawal lake is a reservoir which provides domestic water supply for the city of Rawalpindi.

There are no Archaeological / Cultural Places have been found around the project area. But Rawal Lake has been considered an important recreational site for the residents of project area. The terraced garden and the lake are used for picnics, fishing and boating.

A View of Rawal Lake near Project Site

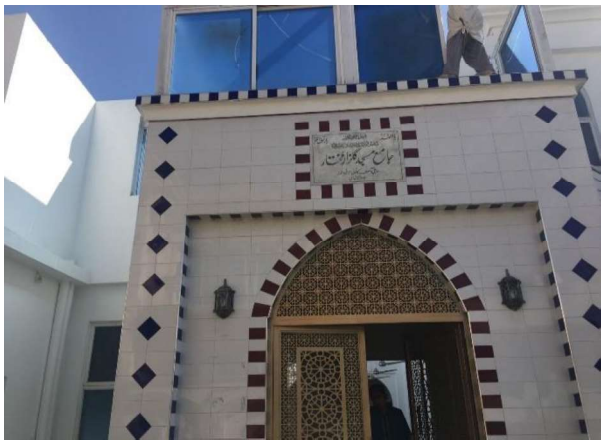
R. MOSQUES AND SHRINES

There is beautiful Shah Faisal Mosque and it was designed by a renowned Turkish Architect, Vedat Dalokay and named after late King Faisal of Saudi Arabia.

Shrine of Syed Mehar Ali Shah of Golra Sharif located in Sector E-11 of Islamabad. He preached and spread the message of Islam during the turbulent times. Devotees assemble here on the occasion of annual Urs. Another Shrine is Shah Abdul Latif Kazmiis popularly known as Bari Imam. The death anniversary (Urs) of Bari Imam is observed in the first week of May beginning Monday through Thursday with lot of festivities representing the Potohar culture and attracts people from all over the country.

There are also small local level mosques including Jamia Mosque Hanifia Ghosia, Jamia Mosque Touhidia, Jamia Mosque Gulzar e Mukhtar, Muhammadi Masjid, Mosque Mohran Jejan and Horse Stabl Mosque along the entire stretch of the Project area. The small shrines which have been observed around the project site were Rayari Shrine, Peer Proti, Kuri Sher, Baloti Shareef.

A View of Jamia Mosque Hanifia Ghosia



A View of Jamia Mosque Gulzar e Mukhtar

A View of Jamia Mosque Touhidia

A View of Horse Stable Mosque

4.5 Socioeconomic Baseline Survey

The information regarding socioeconomic baseline survey is based on the primary data collected from the settlements existing in surroundings of the proposed project area. Baseline survey was carried out to identify the socioeconomic conditions and their impacts & magnitudes on the affected population. The baseline survey was carried out at NIH Colony, Mohra Jejan, Mohra Nur, Valley Homes Society and Horse Stable (NIH). During the survey, both males and females were included in the sample.

During the survey major focus was to collect information about their settlement patterns and availability of facilities (educational, medical, religious, recreational and historical/archeological) of all the settlements existing in the surroundings of proposed project.

Efforts were made to include different types of stakeholders according to their stakes in the sample and contact the maximum population during the survey. The survey tool used for the socio-economic survey is attached as an **Annex –VII.**

4.5.1 Settlements / Communities along the Proposed Project Site

Around the project area, NIH Colony, Mohra Jejan, Mohra Nur, Valley Homes Society and Horse Stable (NIH) are located. Following **Figure 4.19** shows the baseline map of the settlements/ communities located along the proposed project site.

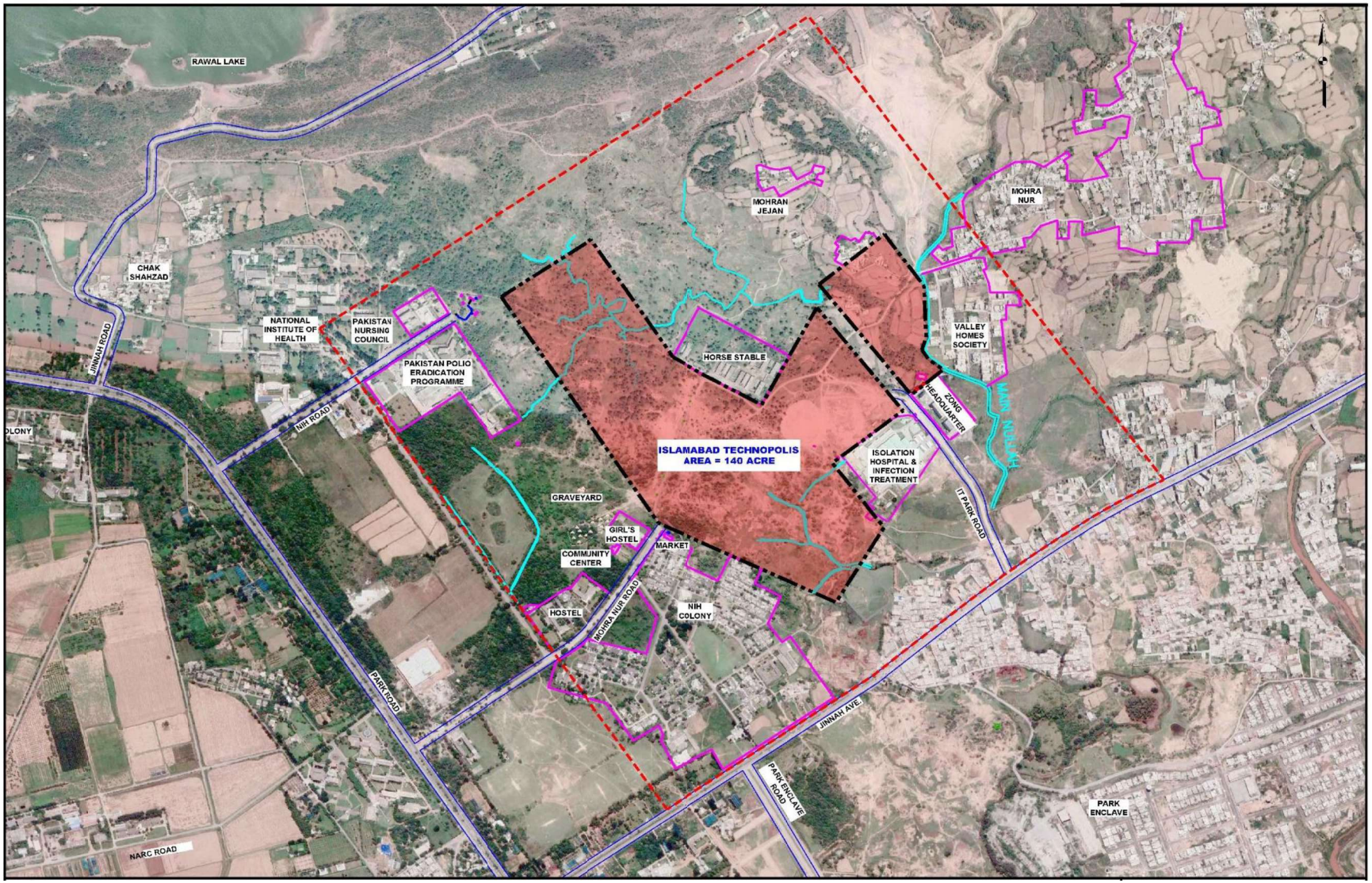


Figure 4.19: Settlements / Communities along the Proposed Project Site

4.5.2 Field Survey

A site visit of the proposed project was carried out from 15 to 18 March 2022. This included the collection of demographic and socio-economic baseline information. During the survey major focus was to collect information about their settlement patterns and availability of facilities (educational, medical, religious, recreational and historical/archeological) of all the settlements existing in the surroundings of proposed project. Around the project area, NIH Colony, Mohra Jejan, Mohra Nur, Valley Homes Society and Horse Stable (NIH) were included in the sample survey.

4.5.3 Survey Results

A. Demographic Characteristics of the Respondents

Demography is defined as statistical analysis of data about the characteristics of a population, such as the age, sex / gender, religion, ethnic structures, mother tongue, marital status of the people within the population. According to survey, demographic characteristics of sampled population are described hereunder;

B. Sex Ratio of the Respondents

The sex ratio is proportional distribution of the sexes in a population aggregate, expressed as the number of males per 100 females. During the baseline survey, 100 respondents were interviewed, comprising 93% males and 7% females. **Table 4.14** shows sex ratio of the respondents.

Table 4.14: Sex Ratio of the Respondents

Sr. No.	Sex Ratio	Number	Percentage
1	Male	93	93
2	Female	7	7
Total		**100**	**100**

The percentages of sex ratio of the respondents have been shown in the following bar chart **(Figure 4.20).**

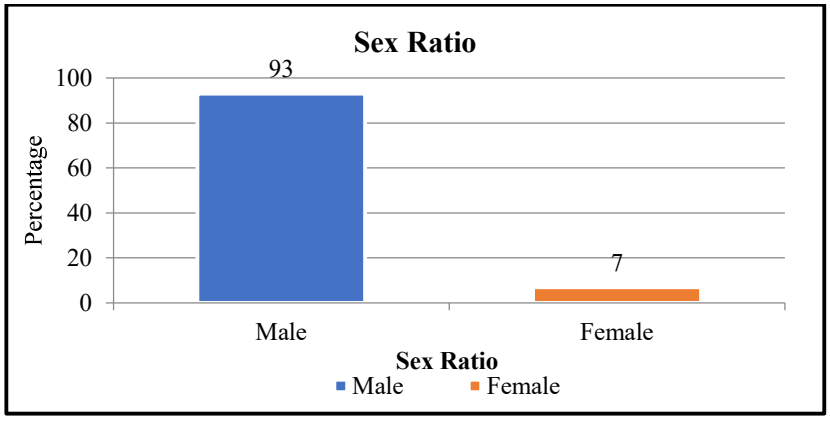


Figure 4.20: Sex Ratio of the Respondents

C. Age Composition of the Respondents

The demographic characteristics of the sample survey (**Table 4.15**) shows that 29% of the respondents were up to 25 years of age, 24% of the respondents were aged between 25 – 35 years while 21% were 35 – 45 years old and 26% respondents were more than 45 years of age. These figures show that sampled respondents were mature enough to give their opinion about the proposed project and have envisioned of its impacts.

Table 4.15: Age Composition of the Respondents

Sr.No.	Age Limit	Number	Percentage
1	15-25	29	29
2	25-35	24	24
3	35-45	21	21
4	Above 45	26	26
Total		**100**	**100**

The bar chart **(Figure 4.21)** given below, shows the age composition percentages of the respondents.

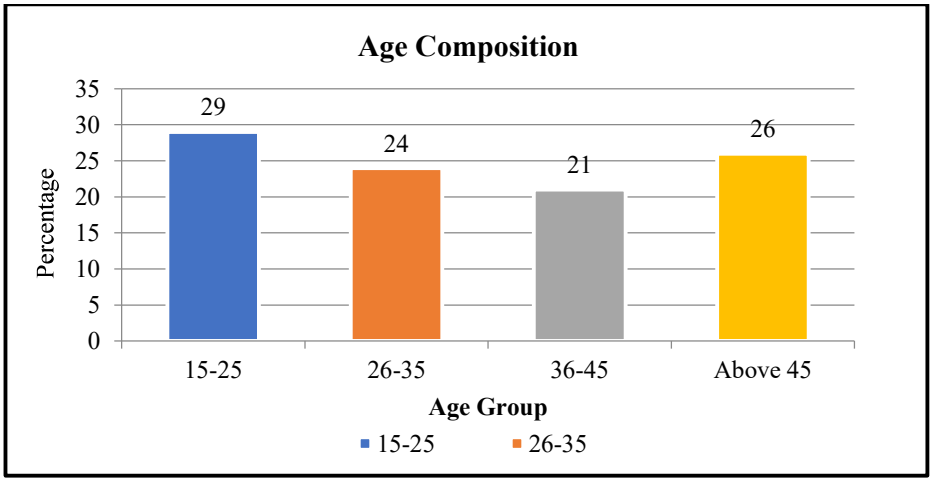


Figure 4.21: Age Composition of the Respondents

D. Marital Status

In sampled respondents, the percentage share of the married respondents was higher than that of the unmarried. Majority of the respondents i.e., 72% were found married, 27% were unmarried while 1% widows are observed during socioeconomic baseline survey as shown in **Table 4.16.**

Table 4.16: Marital Status of the Respondents

Sr.No.	Marital Status	Number	Percentage
1	Married	72	72
2	Unmarried	27	27
3	Widow	1	1
Total		**100**	**100**

The bar chart **(Figure 4.22)** given below shows the percentage of marital status of the respondents.

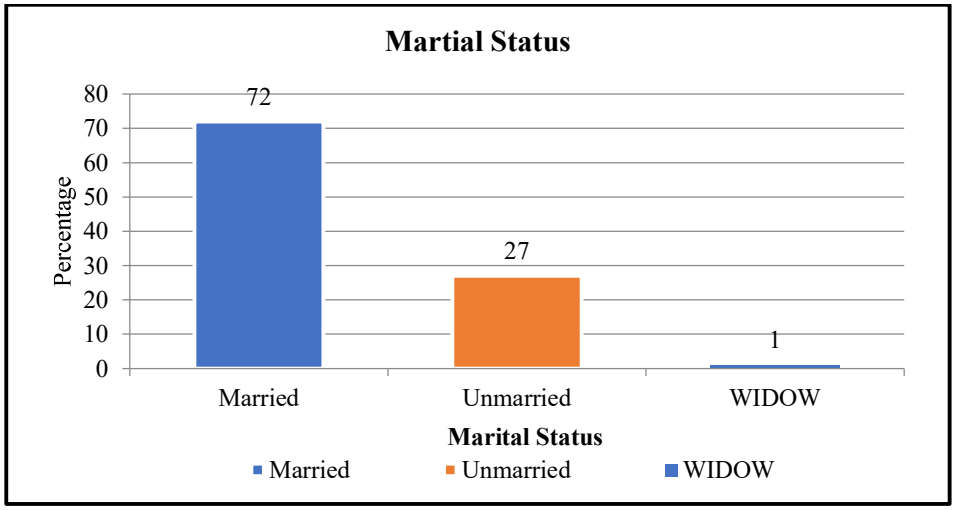


Figure 4.22: Marital Status of the Respondents

E. Mother Tongue

Punjabi language was the predominate language being spoken by majority of the respondents i.e., 67%. Besides Punjabi, 17% respondents speak Pashto language While 9% speaks Urdu for communication. **Table 4.17** shows the language being spoken by the respondents.

Table 4.17: Mother Tongue of the Respondents

Sr.No.	Mother Tongue	Number	Percentage
1	Urdu	9	9
2	Punjabi	67	67
3	Pashto	17	17
4	Potohari	1	1
5	Gujar	4	4
6	Hindko	1	1
7	Siraiki	1	1
Total		**100**	**100**

The percentage distribution of mother tongue being spoken by the respondents has been shown in the following bar chart **(Figure 4.23)**.

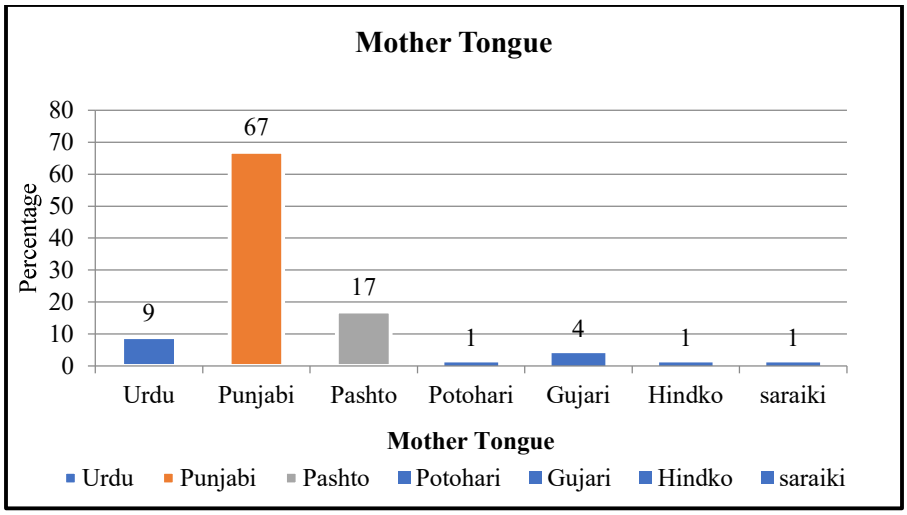


Figure 4.23: Mother Tongue of the Respondents

F. Religion of the Respondents

It was found during baseline survey that the largest number of the respondents i.e. 98% were found Muslims while only 2% are Christians in the project area. The castes of the sampled respondents are given in **Table 4.18.**

Table 4.18: Religion of the Respondents

Sr. No.	Religion	Number	Percentage
1	Muslim	98	98
2	Christian	2	2
	Total	**100**	**100**

The bar chart below (**Figure 4.24**) shows the Religion of the respondents

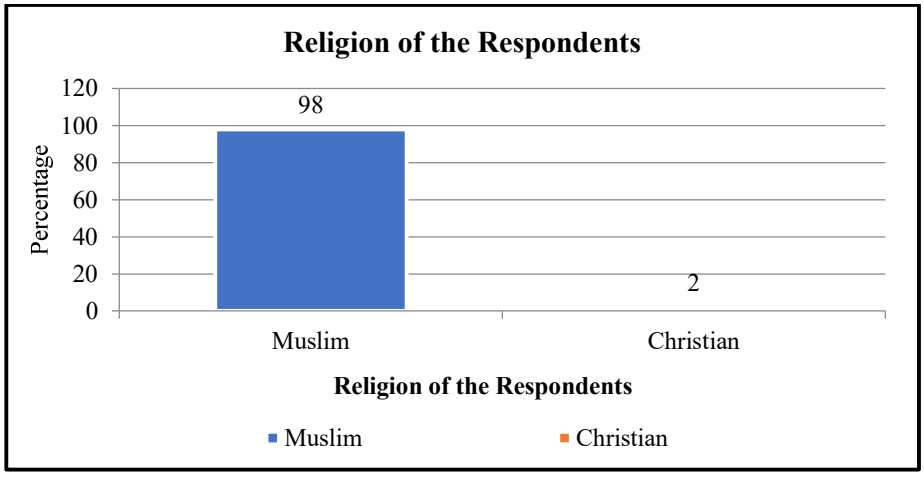


Figure 4.24: Religion of the Respondents

G. Caste / Ethnic Group

According to baseline survey, it was found that the largest number of the respondents i.e. 32% were Rajput by caste, 22% were gujjar, 17% were Pathan, 4% were Awan and Mughal, 3% were Chaudhary and 18% included in other castes which have less percentages. The castes of the sampled respondents are given in **Table 4.19.**

Table 4.19: Caste / Ethnic Group of the Respondents

Sr.No.	Caste	Number	Percentage
1	Mughal	4	4
2	Pathan	17	17
3	Rajput	32	32
4	Awan	4	4
5	Chaudhary	3	3
6	Gujjar	22	22
7	Other	18	18
Total		**100**	**100**

The bar chart below (**Figure 4.25)** shows the caste distribution of the respondents.

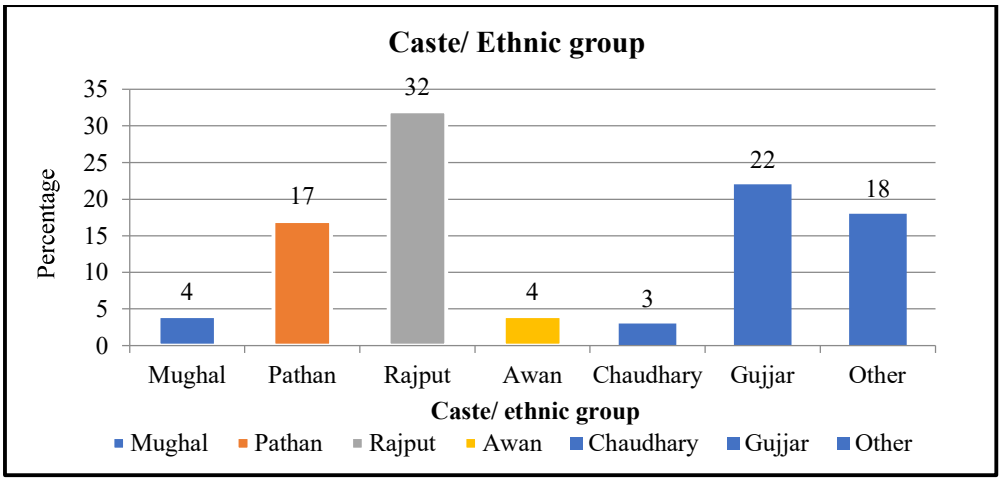


Figure 4.25: Caste/Ethnic Group of the Respondents

H. Quality of Life

Educational Status of the Respondents

From survey results (**Table 4.20**) it was found that out of 100 respondents, majority i.e. 31% were illiterate 16% were upto Primary level. Middle school respondents were 15%, 8% were up to matric level and 13% were of intermediate & 17% of above inter level education.

Table 4.20: Educational Status of the Respondents

Sr.No.	Education level	Number	Percentage
1	Illiterate	31	31

Sr.No.	Education level	Number	Percentage
2	Primary	16	16
3	Middle	15	15
4	Matric	8	8
5	Intermediate	13	13
6	Above Inter	17	17
Total		**100**	**100**

The bar chart given below in **(Figure 4.26)** shows the educational status of the respondents.

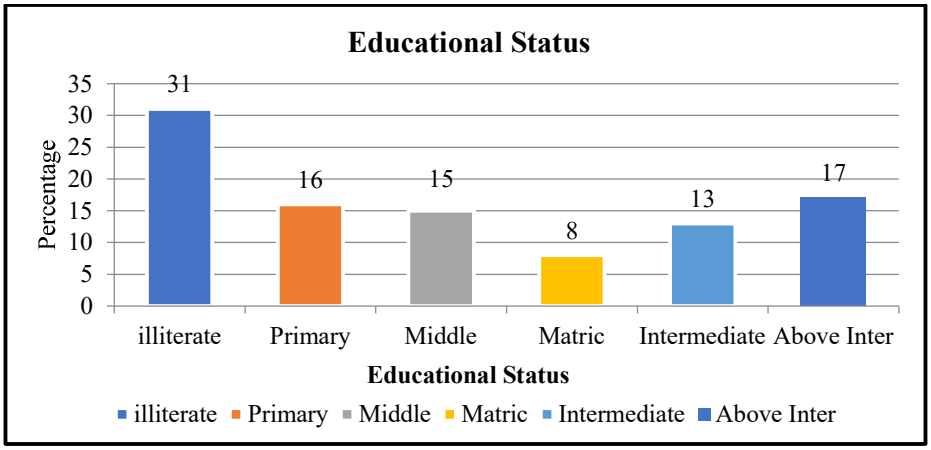


Figure 4.26: Educational Status of the Respondents

Professional Status of the Respondents

According to socioeconomic survey findings, majority i.e. 33% were self-employed, 21% were private employees, 15% are unemployed, 9% are working as daily wage labor, 7% are housewives, 6% are Govt. Employee and 3% respondents belong to some other professions. and During survey, efforts were made to integrate with people from all walks of life. The detailed statistics based on sample survey, regarding professional status of the respondents are shown in **Table 4.21.**

Table 4.21: Professional Status of the Respondents

Sr.No.	Profession Type	Number	Percentage
1	Govt. Employee	6	6
2	House Wife	7	7
3	Labor	9	9
4	Self Employed	33	33
5	Private Employee	21	21
6	Unemployed	15	15
7	Livestock	6	6
8	Other	3	3
Total		**100**	**100**

Bar chart **(Figure 4.27)** showing the professional status of the respondents is given below.

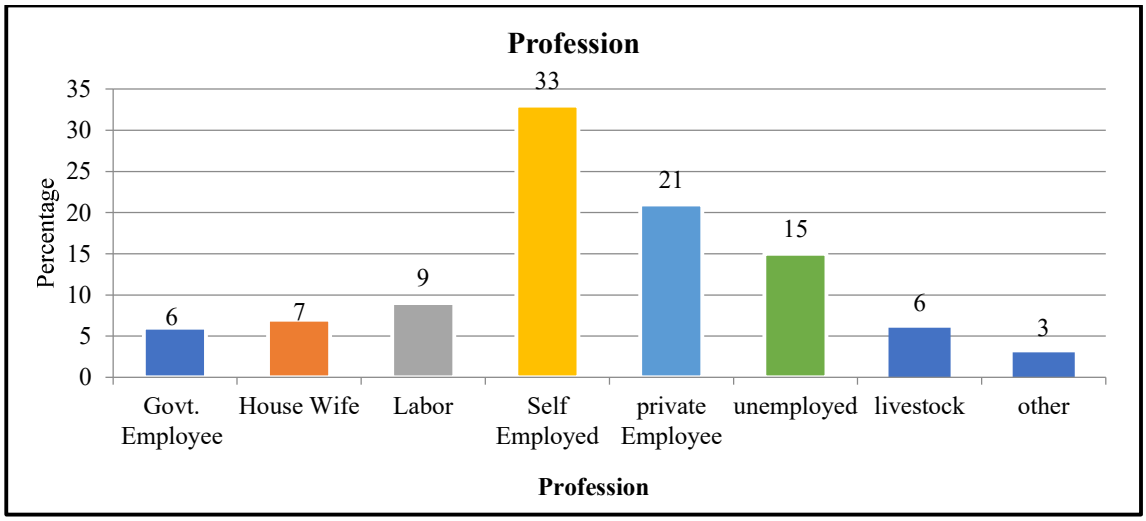


Figure 4.27: Professional Status of the Respondents

Employment Status of Family Members

Socioeconomic survey findings depicted that out of 100 respondents, majority i.e. 53% respondent's family members are self-employed who are running their own businesses and shops, 31% are working in private companies, 8% are unemployed, 07% are Govt employees and 1% involve in other professions. Employment status of family members is shown in **Table 4.22.**

Table 4.22: Employment Status of Family Members

Sr.No.	Employment status	Number	Percentage
1	Govt. Employee	7	7
2	Private Employee	31	31
3	Self Employed	53	53
4	Unemployed	8	8
5	Other	1	1
Total		**100**	**100**

Bar chart **(Figure 4.28)** shows the employment status of the respondents.

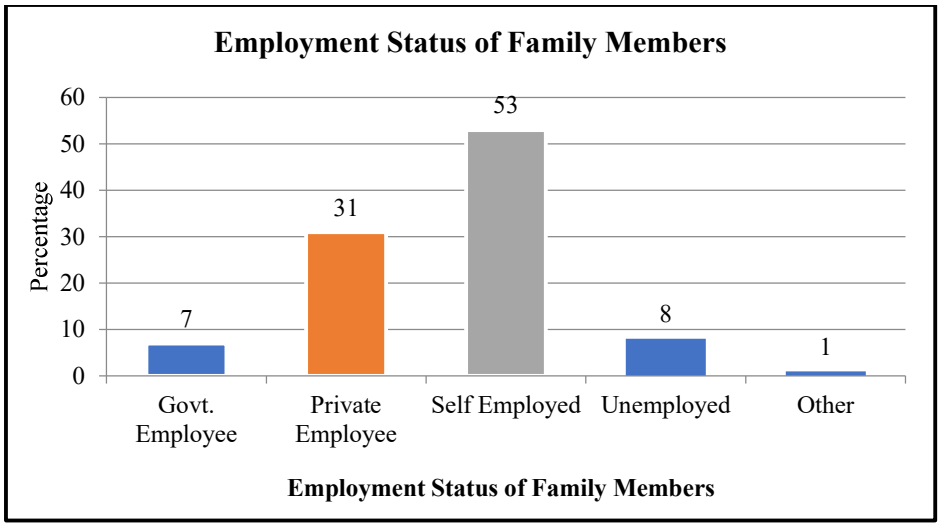


Figure 4.28: Employment Status of Family Members

I. Economic Dependency

Source of Income

Socioeconomic survey findings depicted that 15% source of income depends upon livestock and on providing different items like milk and ghee selling, 10% respondents are running their own business, 8% respondents are working as laborers, 2% involve in Agriculture and again 2% are housewives and students. Another 63% have other source of income which the respondents have not mentioned with their interviewers. Source of income of the respondents has been shown in **Table 4.23.**

Table 4.23: Source of Income of Respondents

Sr.No.	Source	Number	Percentage
1	Agriculture	2	2
2	Livestock	15	15
3	Trade/Business	10	10
4	Any Other	63	63
5	General Labour	8	8
6	Others (Housewives & students)	2	2
Total		**100**	**100**

Bar chart **(Figure 4.29)** which shows the source of income of the respondents is given below.

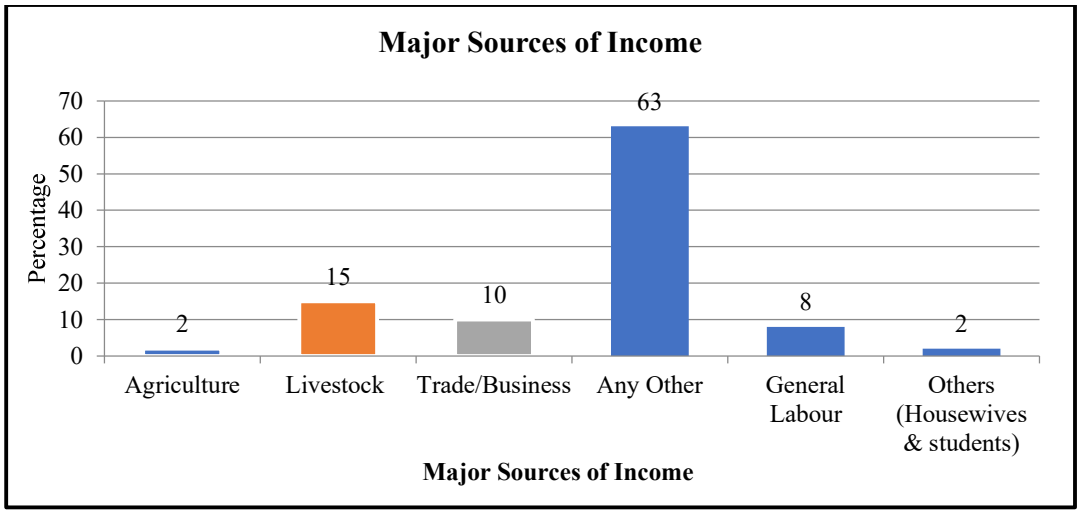


Figure 4.29: Source of Income of the Respondents

Average Monthly Income

The income status of the respondents was evaluated by dividing the respondents into different income groups. During field survey it was observed that 25% respondents fall within the income range of less than 10000, 10% respondents fall within income range of 10,001 to 15,000, 16% respondents fall within the income range of 15,001 to 20,000, 07% respondents fall within the income range of 20,001 to 25,000, 11% earn between 25,001 to 30,000 and majority i.e. 31% respondents fall within the income range of above 30,000. **Table 4.24** shows income status of the respondents.

Table 4.24; Average Monthly Income of the Respondents

Sr. No.	Distribution	Number	Percentage
1	Less than 10,000	25	25
2	10,001 to 15,000	10	10
3	15,0001 to 20,000	16	16
4	20,001 to 25,000	7	7
5	25,001 to 30,000	11	11
6	Above 30,000	31	31
Total		**100**	**100**

In the bar chart **(Figure 4.30),** the percentage distribution of average monthly income of various respondents is shown below.

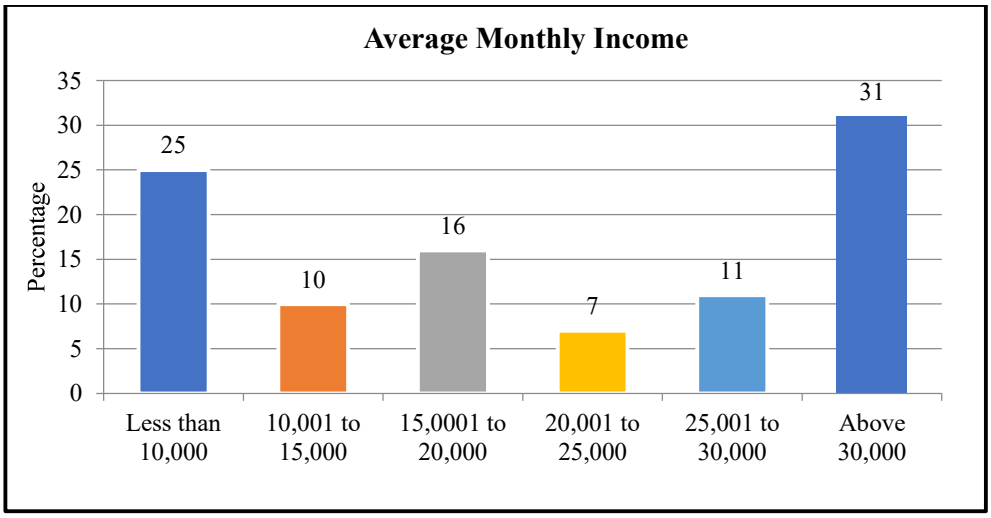


Figure 4.30 : Average Monthly Income of Respondents

Average Monthly Expenditures

Table 4.25 shows average monthly expenditure of the respondents. Out of 100 respondents, 07% respondents earn less than 10000, 08% respondents fall within the expenditure range of 10,001 to 15,000, 17% respondents fall within the expenditure range of 15,001 to 20,000, 14% respondents reported their expenditures within the range of 20,001 to 25,000, 09% respondents reported their expenditures within the range of 25,001 to 30,000 while majority i.e. 45% spend above 30,000.

Table 4.25: Average Monthly Expenditures of the Respondents

Sr. No.	Distribution	Number	Percentage
1	Less than 10,000	7	7
2	10,001 to 15,000	8	8
3	15,0001 to 20,000	17	17
4	20,001 to 25,000	14	14
5	25,001 to 30,000	9	9
6	Above 30,000	45	45
Total		**100**	**100**

In bar chart **(Figure 4.31),** the percentage distribution of average monthly expenditures of various respondents is shown below.

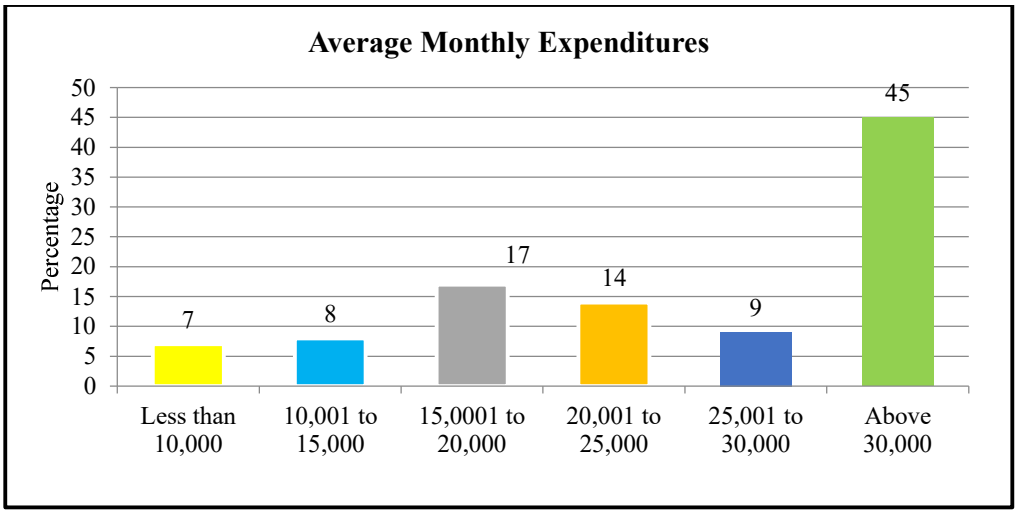


Figure 4.31: Average Monthly Expenditures of Respondents

J. Family Pattern and Family Size

Family System

Survey results shown that majority of the respondents i.e. 68% are living in the joint family system in which parents and children live with other combinations of family members. Remaining 32% are living in the nuclear family system which has been shown in the **Table 4.26.**

Table 4.26: Family System of the Respondents

Sr.No.	Type	Number	Percentage
1	Joint	68	68
2	Nuclear	32	32
Total		**100**	**100**

Bar chart **(Figure 4.32)** shows the family system percentage distribution of the respondents.

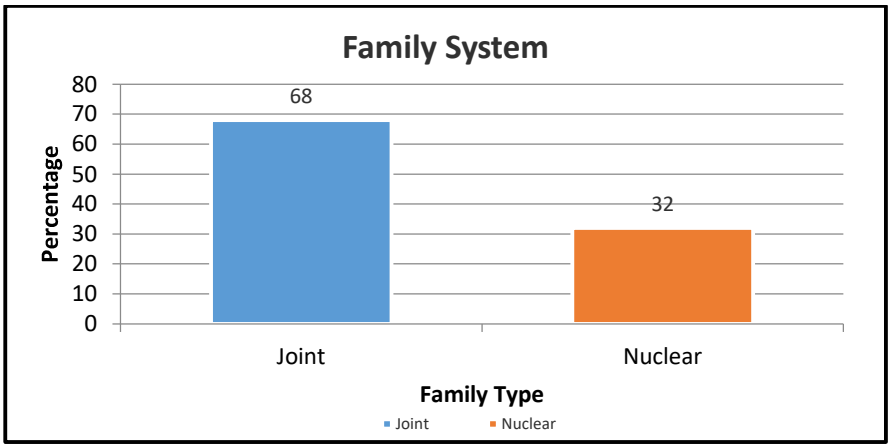


Figure 4.32: Family System of the Respondents

Family Size

Survey results shows that 36% families have 1 to 5 family members, 56% families have 6 to 10 family members and remaining 08% respondents have above 10 family members which has been shown in the **Table 4.27.**

Table 4.27: Family Size of the Respondents

Sr.No.	Members	Number	Percentage
1	1 to 5	36	36
2	6 to 10	56	56
3	Above 10	8	8
Total		**100**	**100**

Bar chart **(Figure 4.33)** shows the percentage distribution of family size of the respondents.

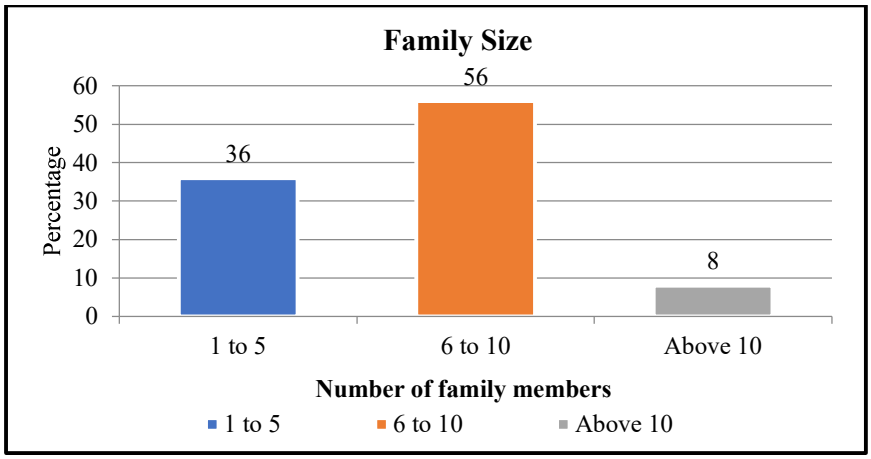


Figure 4.33: Family Size of Respondents

K. Housing & Settlement Pattern

Ownership Status of the House

Ownership status of the houses depict that how much respondents belong to self owned, rented structures (houses). During field survey it was observed that majority i.e. 39% of the respondents have self owned structures, 27% of the respondents were found to live in rented structures, 19% are living as free on landlord property, 15% have govt. apartments. Following **Table 4.28** shows the ownership status of the houses of the respondents.

Table 4.28: Ownership Status of the House

Sr.No.	Response	Number	Percentage
1	Owned	39	39
2	Government	15	15

Sr.No.	Response	Number	Percentage
3	Rented	27	27
4	Free on landlord Property	19	19
5	Relative House	0	0
Total		**100**	**100**

The bar chart **(Figure 4.34)** shows the ownership status of the houses of the respondents.

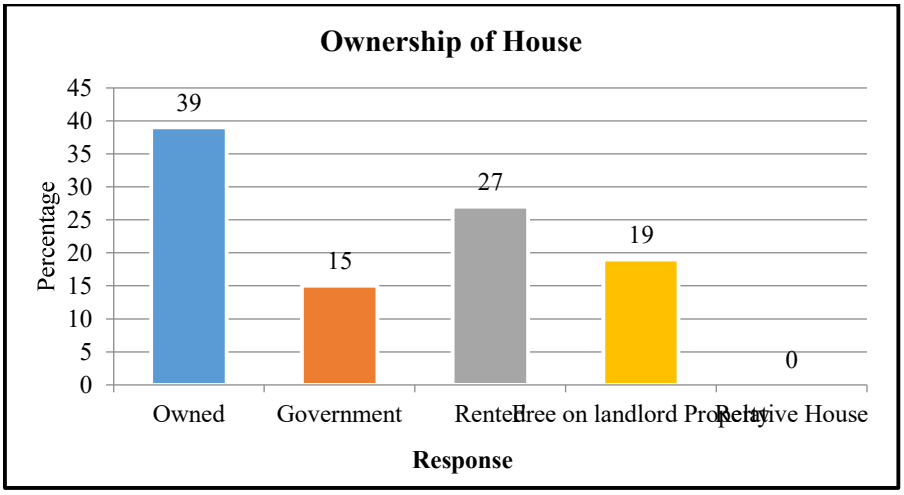


Figure 4.34: Ownership Status of the House

Nature of Construction of Houses

Out of 100 respondents, majority i.e. 84% live in the pacca houses made up of bricks and concrete, 16% live in the kaccha structures. **Table 4.29** shows the nature of the construction of the houses.

Table 4.29: Nature of Construction of Houses

Sr. No.	Type	Number	Percentage
1	Kaccha	16	16
2	Pacca	84	84
3	Semi Pacca	0	0
Total		**100**	**100**

The bar chart below **(Figure 4.35)** shows the nature of construction of houses.

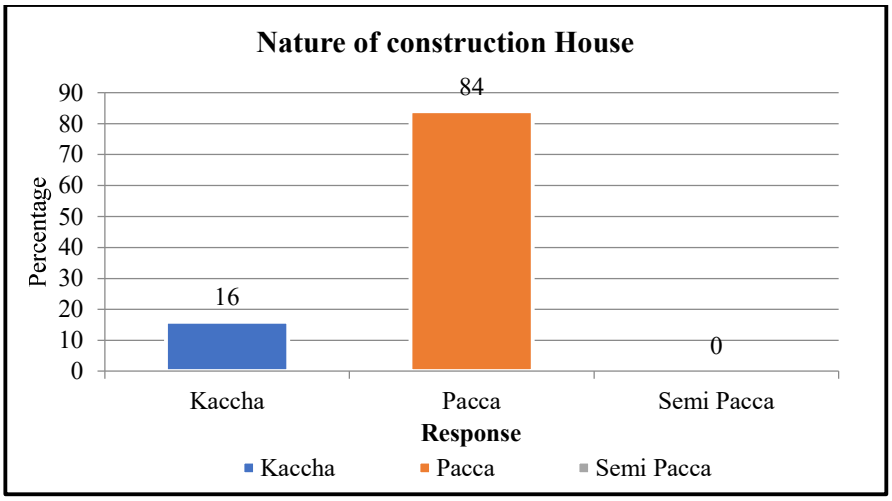


Figure 4.35: Nature of Construction of Houses

L. Basic Amenities

Availability of Basic Facilities

The availability of facilities and development of this community is noticed by visiting the project area and its vicinity places. **Table 4.30** shows that majority of the respondents i.e. 99% have electricity, 65% have water supply, 53% have gas, 72% have telephone facility, 55% have sewerage/drainage system, 35% have solid waste management, 30% have public transport.

Table 4.30: Availability of Facilities

Sr. No	Facilities	Number	Percentage
1	Electricity	99	99.0
2	Water Supply	65	65.0
3	Gas	53	53.0
4	Telephone	72	72.0
5	Sewerage	55	55.0
6	Solid waste management	35	35.0
7	public transport	30	30.0

In the bar chart **(Figure 4.36),** the percentage distribution of available facilities for various respondents has been shown below.

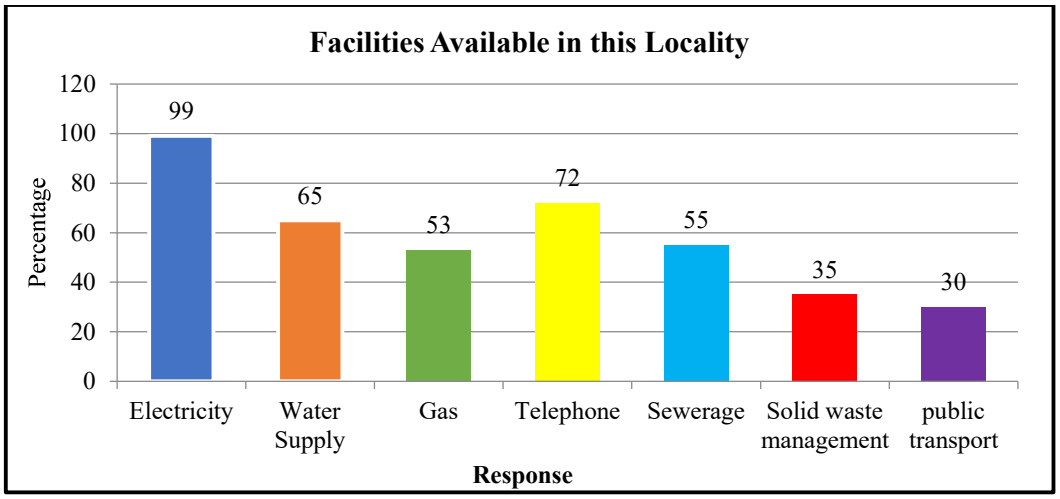


Figure 4.36 : Availability of Facilities for Respondents

M. Source of Water and its Satisfaction Level

Source of Water for Domestic Use

Sampled respondents are depending upon a number of sources of water for domestic use which has been shown in **Table 4.31.** Water Bore is the main source of water for domestic use in the proposed project area so majority of the respondents i.e. 46% depend on this source of water, 38% respondents use public water supply and 15% are using other sources of water like well which located at faraway places.

Table 4.31: Source of Water for Domestic Use

Sr. No.	Source of water	Number	Percentage
1	Public water supply	38	38
2	Hand pumps	1	1
3	Water Bore	46	46
4	Any Other (well)	15	15
Total		**100**	**100**

In the bar chart **(Figure 4.37),** source of household water for domestic use has been shown.

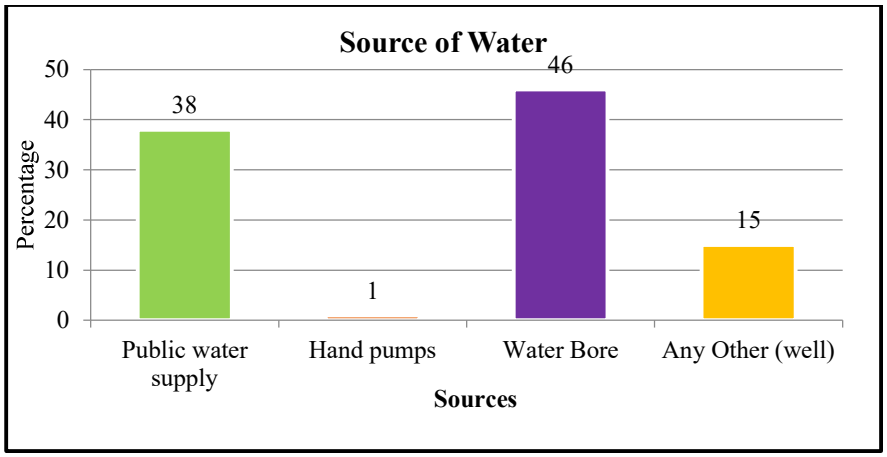


Figure 4.37: Source of Water for Domestic Use

Satisfaction Level with Water Quality

The quality of water is directly linked to the quality of health. **Table 4.32** depicts the perception of people about water quality in the proposed project area. It was noticed during the baseline survey that the quality of water is satisfactory. Majority of respondents i.e. 92% are satisfied with it while 8% respondents are not satisfied with its quality.

TABLE 4.32: Satisfaction Level with Water Quality

Sr.No.	Response	Number	Percentage
1	Yes	92	92
2	No	8	8
Total		**100**	**100**

In the bar chart **(Figure 4.38),** satisfaction level with water quality has been shown.

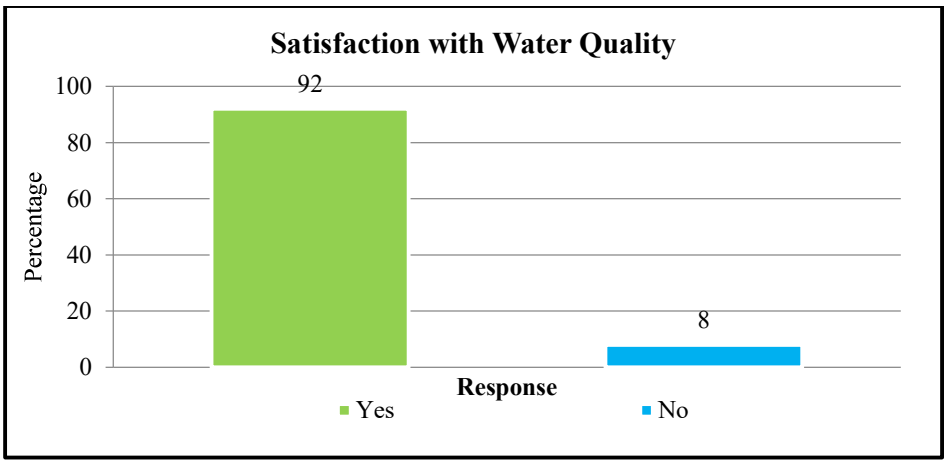


Figure 4.38: Satisfaction Level with Water Quality

Reasons of Dissatisfaction

The reasons of dissatisfaction are shown in the **Table 4.33** depicts that majority of respondents i.e. 5% are not satisfied with it due to having bad taste while according to 03% respondents' water is brackish and is unable to drink while remaining 92% are satisfied with its quality.

Table 4.33: Reasons of Dissatisfaction with Water Quality

Sr. No.	Response	Number	Percentage
1	Dirty Water	3	3
2	Low Pressure	0	0
3	Bad Taste	5	5
4	Satisfied	92	92
Total		**100**	**100**

In the bar chart **(Figure 4.39),** reasons of dissatisfaction with water quality has been shown.

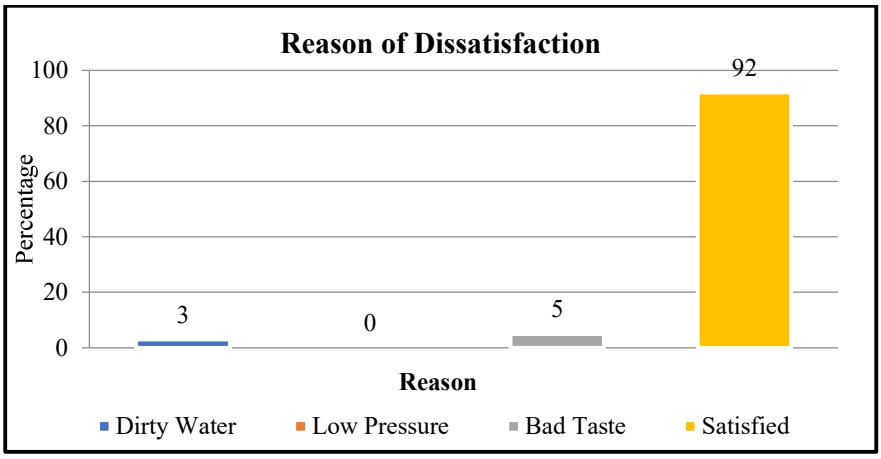


Figure 4.39: Reasons of Dissatisfaction with Water Quality

N. Solid Waste and its Collection Visits

Solid Waste Collection System

The solid waste collection system has been shown in the **Table 4.34** which depicts that majority respondents i.e. 63% have no collection service system, 19% respondents reported that the solid waste is collected on daily basis through a vehicle arranged by Govt while remaining 18% mentioned that their society/settlement has their own collection system which collect waste daily by charging fee every month.

Table 4.34: Solid Waste Collection System

Sr. No.	Collection System	Number	Percentage
1	Collected by Govt.	19	19
2	No Collection Service	63	63

3	Settlement/Society own collection system	18	18
Total		**100**	**100**

Following bar chart **(Figure 4.40)** shows the solid waste collection system.

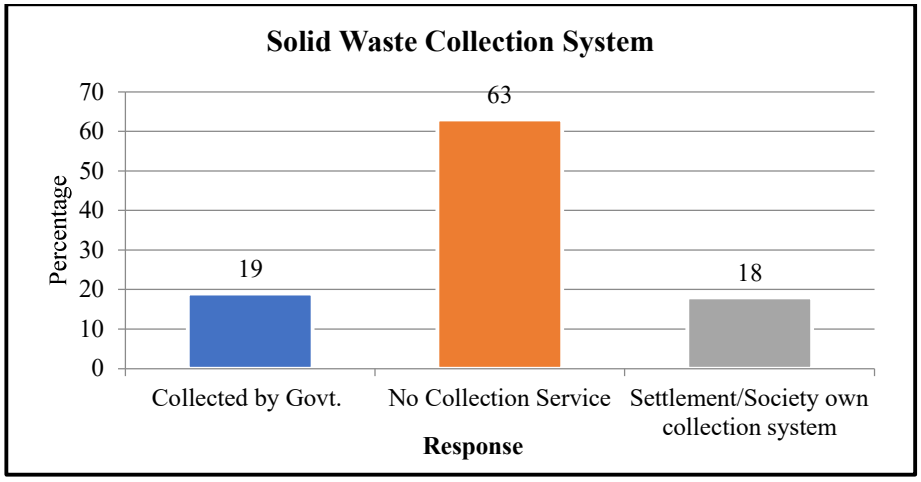


FIGURE 4.40 : SOLID WASTE COLLECTION SYSTEM

Garbage pickers visit

Garbage pickers visits has been shown in the following **Table 4.35** which shows that majority i.e. 62% have no collection service system, 18% respondents reported that the garbage picking vehicles visit on daily basis, 17% reported that the garbage pickers comes in every week. Remaining 03% mentioned that the garbage pickers come once in a month.

Table 4.35: Garbage pickers visits

Sr. No.	Response	Number	Percentage
1	Daily	18	18
2	Weekly	17	17
3	Once in a month	3	3
4	No collection service	62	62
Total		**100**	**100**

Following bar chart **(Figure 4.41)** shows the Garbage pickers visits

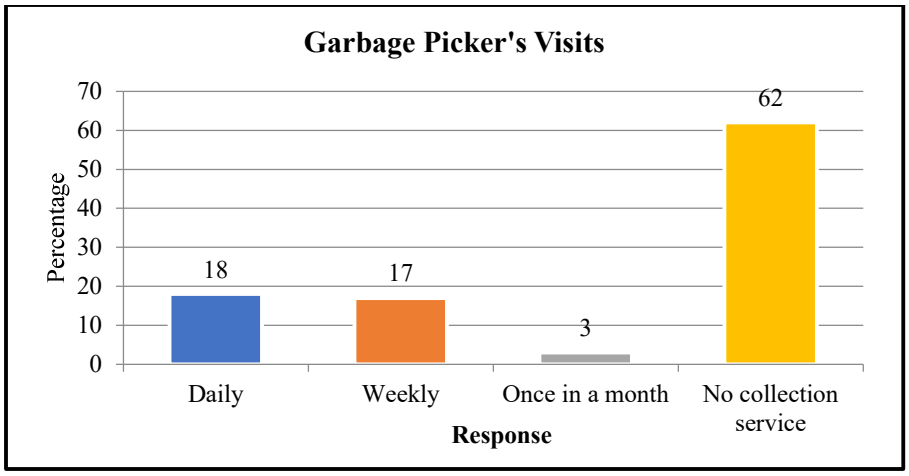


Figure 4.41: Garbage picker's visits

O. Availability of Health Facility and its Satisfaction Level

Health Facility in Locality

Socioeconomic baseline survey results showed that 89% respondents avail the facilities provided by Nationl Institute of Health. While 07% respondents rely not only NIH but also on other hospitals.

Table 4.36: Health Facility in Locality

Sr. No.	Response	Number	Percentage
1	BHU	0	0
2	RHC	0	0
3	THQ	4	4
4	NIH	89	89
5	NIH / Others	7	7
Total		**100**	**100**

Following bar chart **(Figure 4.42)** shows the Health Facility available in project area

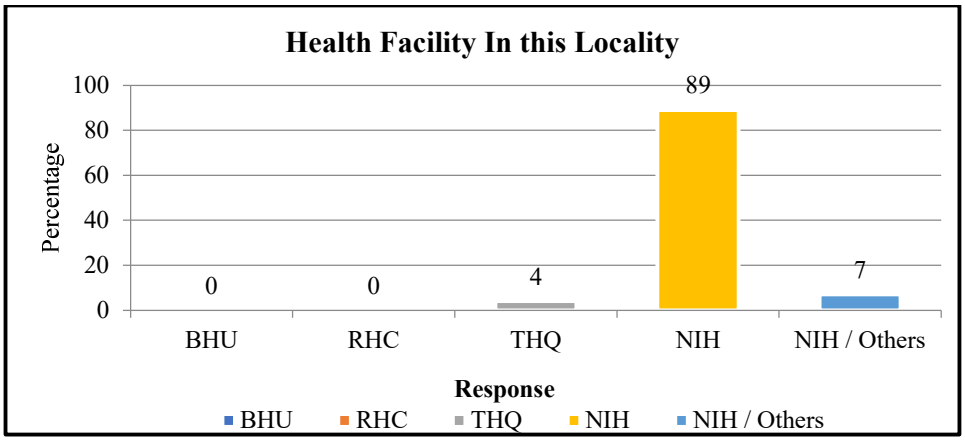


Figure 4.42: Health Facility in Locality

Satisfaction with Health Facility

Data given in the following **Table 4.37** that 94% respondents are satisfied with Health facility. While 06% respondents are not satisfied with the available facilities.

Table 4.37: Satisfaction with Health Facility

Sr. No.	Response	Number	Percentage
1	Yes	94	94
2	No	6	6
Total		**100**	**100**

Following bar chart **(Figure 4.43)** shows the satisfaction level with Health Facility of project area.

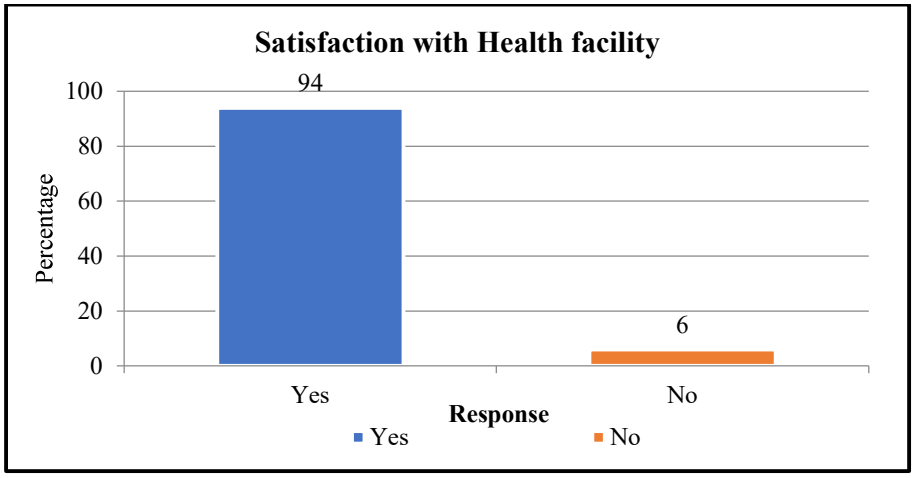


Figure 4.43 : Satisfaction with Health Facility

P. NGO Working in Area

Survey results showed that 90% respondents expressed to have no NGO in the project area, while 10% reported to have WHO in the project area.

Table 4.38: NGO Working in Area

Sr. No.	Response	Number	Percentage
1	WHO	10	10
2	No NGO	90	90
Total		**100**	**100**

Following bar chart **(Figure 4.44)** shows the NGO working in the project area

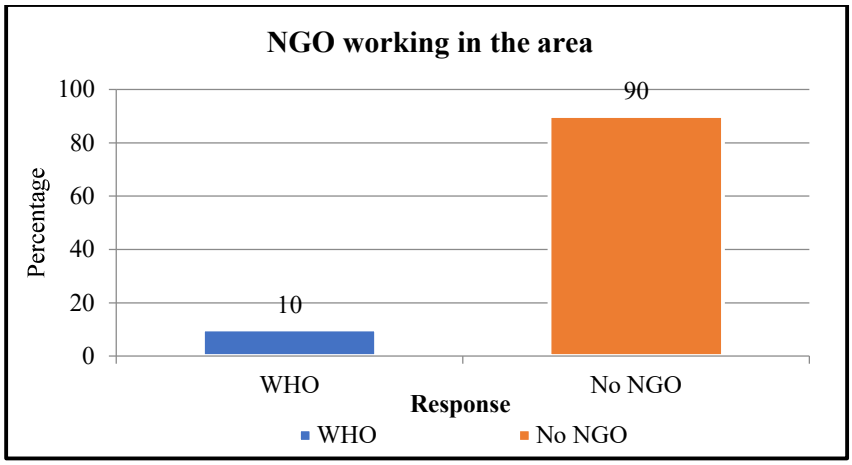


Figure 4.44: NGO Working in Area

Q. Provision of Education System and its Satisfaction level

Educational Facilities of Project Area

Majority respondents i.e 71% showed that the educational institutes in the project area are above matric. Whereas 22% respondents reported to have the institutes up to matric, 5% have the primary level institutes while 2% have the middle schools.

Table 4.39: Educational Facility

Sr. No.	Response	Number	Percentage
1	Primary	5	5
2	Middle	2	2
3	Matric	22	22
4	Above	71	71
Total		**100**	**100**

Following bar chart **(Figure 4.45)** shows the Educational Institutes of the project area

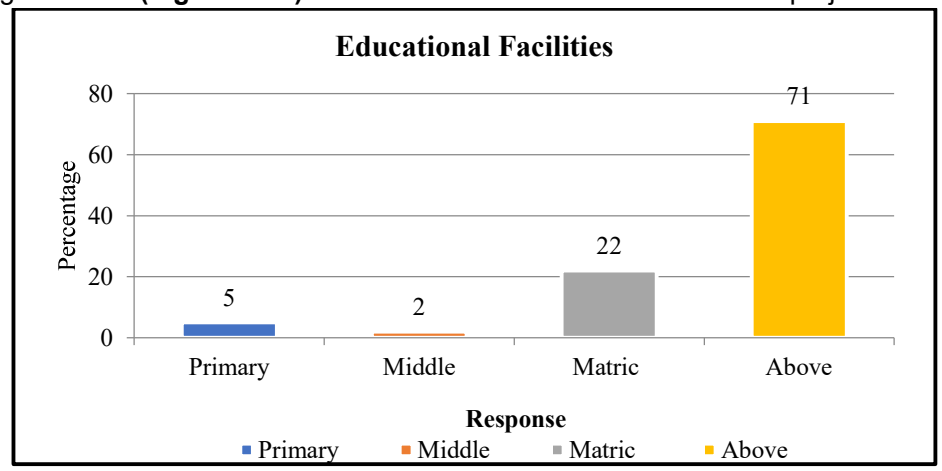


Figure 4.45 : Educational Facilities of Project Area

Satisfaction with Educational Facility

Baseline survey results showed that 99% respondents are satisfied with Educational facility. While only 01% respondents are not satisfied with the available facilities.

Table 4.40: Satisfaction with Educational Facility

Sr. No.	Response	Number	Percentage
1	Yes	99	99
2	No	1	1
Total		**100**	**100**

Following bar chart **(Figure 4.46)** shows the satisfaction level with Educational Institutes

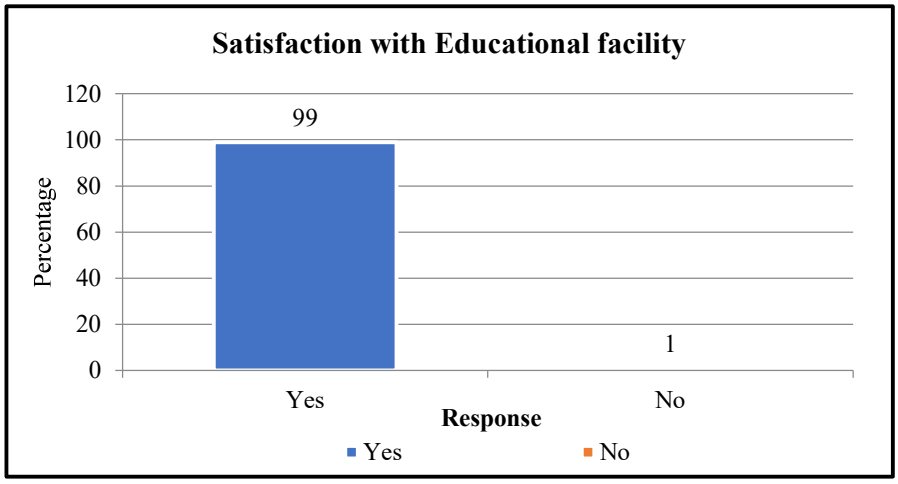


Figure 4.46 : Satisfaction with Educational Facility

R. Historical/Archeological Monuments

Baseline survey results showed that 80% respondents said to have Historical and Archeological Monuments. While 20% respondents do not have Historical and Archeological Monument.

Table 4.41: Historical/Archeological Monuments

Sr. No.	Response	Number	Percentage
1	Yes	20	20
2	No	80	80
Total		**100**	**100**

Following bar chart **(Figure 4.47)** shows the access to Historical and Archeological Monuments

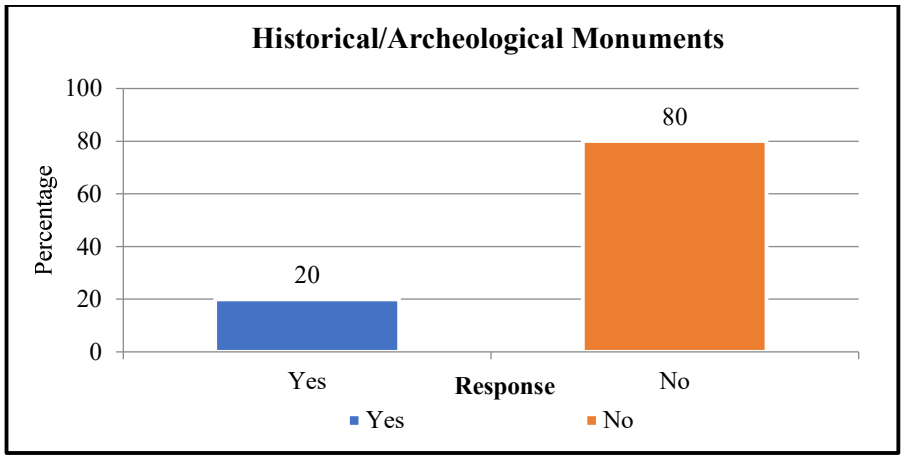


Figure 4.47 : Historical/Archeological Monuments

S. Mode of Transport

Table 4.42 shows that 75% respondents use private transport to move from one place to another while 24% use both private and public and only 1% use public transport.

Table 4.42: Mode of Transport

Sr. No.	Transport Type	Number	Percentage
1	Public	01	01
2	Private	75	75
3	Both	24	24
Total		**100**	**100**

In the bar chart **(Figure 4.48),** mode of transport of locals has been shown.

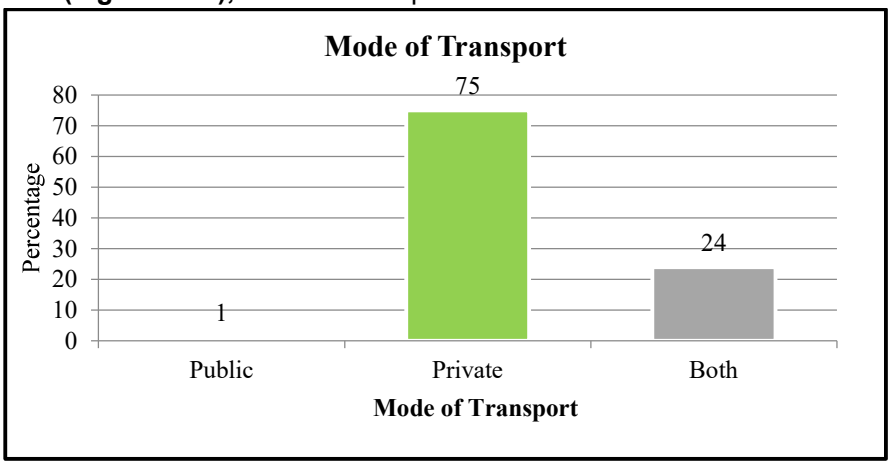


Figure 4.48: Mode of Transport

T. Awareness & Implementation of Proposed Project

Knowledge about the Project

The analysis of socio-economic baseline survey shows the awareness level about the proposed project in **Table 4.43**. Majority of respondents i.e. 29% were aware about the proposed project while remaining 71% of the respondents had no awareness about the proposed project.

Table 4.43: Awareness about the Proposed Project

Sr.No.	Response	Number	Percentage
1	Yes	29	29
2	No	71	71
Total		**100**	**100**

In the bar chart **(Figure 4.49),** awareness about proposed project has been shown.

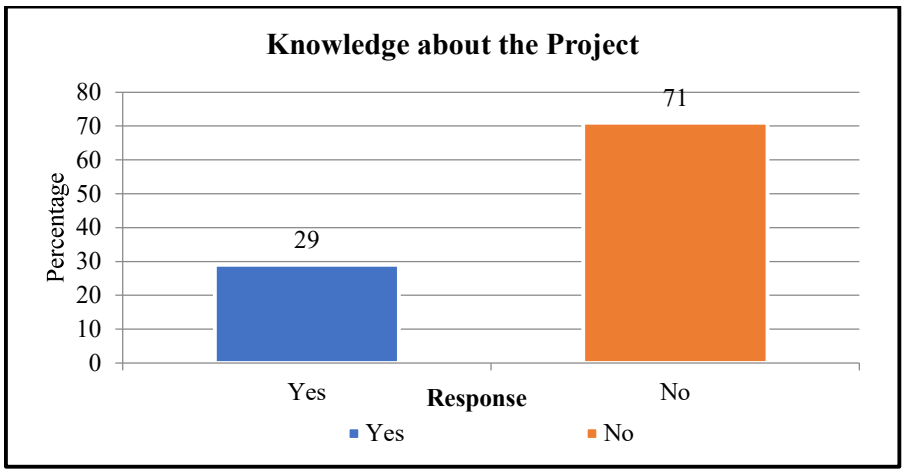


Figure 4.49: Awareness about the Proposed Project

Implementation of the Proposed Project

All the respondents i.e. 100% are in favor of the construction of this special technology zone by considering it beneficial for many reasons i.e raising standards of living, generating employment opportunities for locals. **Table 4.44** shows the implementation of proposed project.

Table 4.44: Implementation of the Proposed Project

Sr.No.	Response	Number	Percentage
1	Yes	100	100
2	No	0	0
Total		**100**	**100**

In the bar chart **(Figure 4.50),** the perception of various respondents about the proposed project has been shown.

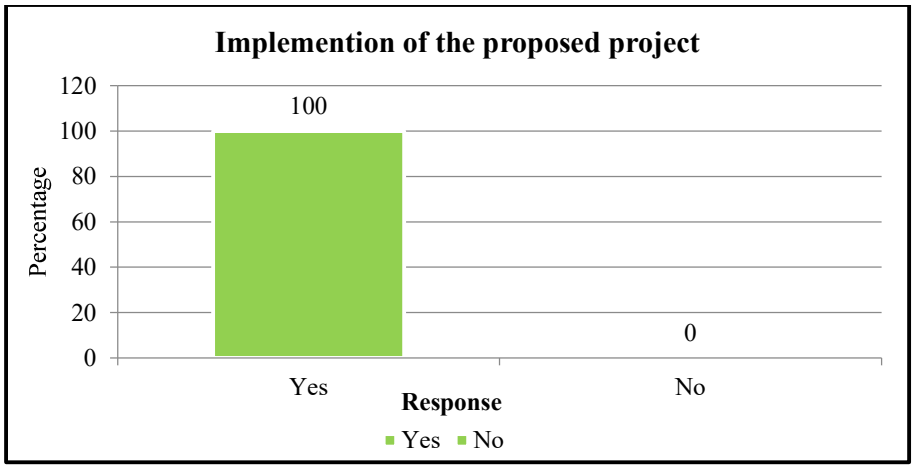


Figure 4.50: Implementation of Proposed Project

c) Reasons of Implementation of the Proposed Project

Most of the respondents described various positive impacts of the Project. High-tech industrial growth will be expected throughout this project. Highly skilled job opportunities will also be provided to local residents. Modern infrastructure facilities and amenities are expected to deliver to locals of project area and vicinity areas. Project will enhance the IT exports of Pakistan and also upskill the youth for future. Attraction of FDI through development of knowledge ecosystem will only be possible through this project. **Table 4.45** shows the reasons of implementation of the proposed project.

Table 4.45: Reasons of Implementation of the Project

Sr. No.	Reasons	Yes	No	Don't Know
1	Achievement of high-tech industrial growth	100	0	0
2	Provision of modern infrastructure facilities and amenities	99	1	0
3	Creation of highly skilled job opportunities	99	1	0
4	Project upskill youth for future	100	0	0
5	Enhancement of IT exports of Pakistan	99	1	0
6	Attraction of FDI through development of knowledge ecosystem	95	1	4

In the bar chart **(Figure 4.51),** the reasons of implementation are shown below;

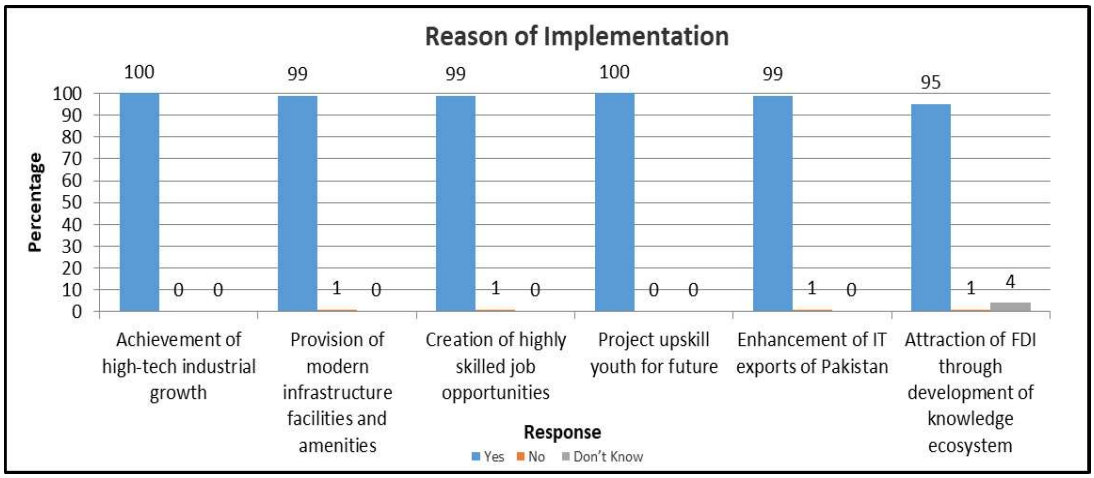


Figure 4.51: Reasons of Acceptance of Project

U. Perceived Impacts of the Project during and after Construction

Table 4.46 & **Table 4.47** provide us the various impacts perceived by the respondents during construction and during operational phase of the special technology zone.

Perceived Impacts of the Project During Construction Phase

When respondents were asked about impacts which they perceive during construction phase, 30% believed that dust and noise emissions may cause asthamatic and other health issues for the locals, 22% suggested that dust emissions should be controlled and tree cutting should be avoided. 08% respondents will face privacy issues and mobility issues and also suggested to have alternate routes during construction phase, while 07% suggested to avoid air pollution by environmental monitoring of air at the time of construction, again 07% and 05% respondents consider it beneficial in case of generating employment opportunities and also showed concern about dust, noise and raod blockage issues. 06% respondents said that daily activities of locals will be disturbed due to road closure. The perceived impacts have been shown in the following **Table 4.46.**

Table 4.46: Possible Impacts (During Construction)

Sr. No.	Impacts	Number	Percentage
1	Dust Emission, Noise Emission	30	30
2	Dust Emission, Tree Cutting	22	22
3	Dust, Noise and roads blockage issues	7	7
4	Job opportunities for labour work	7	7
5	Job opportunities and dust Issues	5	5
6	Mobility & Privacy issues	8	8
7	Environmental monitoring of air at the time of construction to avoid air pollution	7	7

Sr. No.	Impacts	Number	Percentage
8	Disturbance of locals due to road closure, dust issues	6	6
9	Access Issues and alternate route	8	8
Total		**100**	**100**

The possible impacts of the respondents during construction are shown below in bar chart **(Figure 4.52)**.

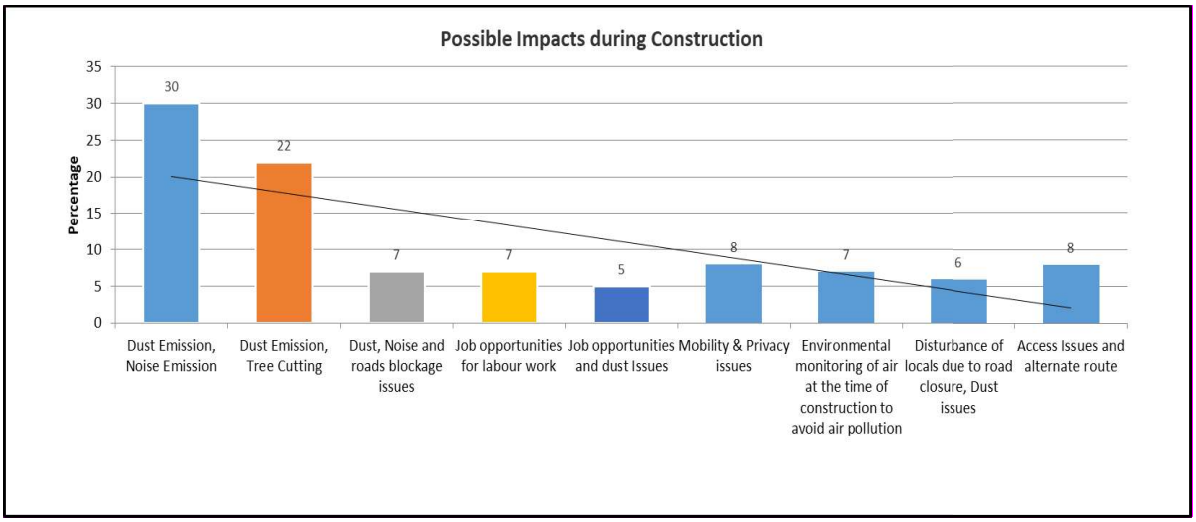


Figure 4.52: Impacts perceived by Respondents

Possible Impacts of the Project During Operation Phase

When respondents were asked about impacts which they perceive during operation phase, majority of respondents i.e. 70% believed that more jobs will be provided to locals. 12% of the view that besides providing job opportunities, land value and business value will be increase throughout this project, 06% will face traffic congestion and mobility issues on the access road, 05% believe that area will be developed more and income generating activities will be provided to locals, 04% supposed this technology zone is environment friendly and expected to increase standard of living and improve quality of life, while 03% said that noise should be controlled after during and after construction phase of this project. The perceived impacts have been shown in the following **Table 4.47.**

Table 4.47: Possible Impacts (During Operation)

Sr. No	Impacts	Number	Percentage
1	Job opportunities and land/business value increases	12	12
2	Development of area and job opportunities	5	5
3	Job opportunities	70	70

Sr. No	Impacts	Number	Percentage
4	Noise issues created by generator should be less	3	3
5	Quality of life and living standards will improve	4	4
6	Traffic congestion and mobility issues	6	6
Total		**100**	**100**

The perceived impacts of the respondents during operation are shown below in bar chart **(Figure 4.53)**.

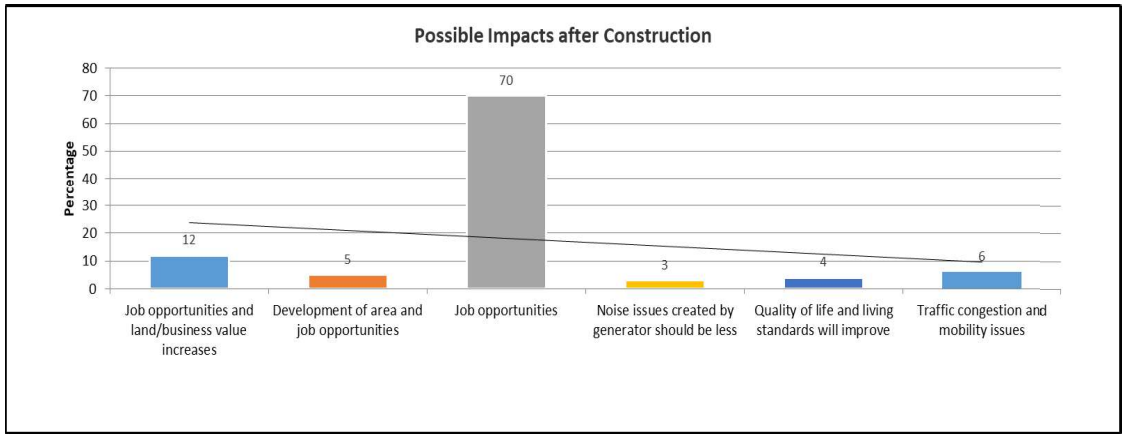


Figure 4.53: Impacts Perceived by Respondents

V. Protective Measures

From the data given in **Table 4.48**, 21% respondents claimed that noise control and sprinkling of water are necessary arrangements for residents of for project area and all adjacent colonies, 06% respondents said that privacy should maintained throughout the construction time and operation phase of the project, 10% respondents said that apart from tree plantation, noise and air monitoring should also take place for the safe and healthy environment, 22% respondents highlighted sprinkling of water should necessarily takes place during all construction activities and tree plantation is also their major concern, 08% said that local residents should be given priority for employment, 12% respondents said that sprinkling of water should make sure and cover dust carrying trucks to control pollution, 18% said that an alternate route/diversion plan should be given to local residents while 03% respondents said that playgrounds should established for project area and all adjacent colonies.

Table 4.48: Protective Measures

Sr. No.	Protective Measures	Number	Percentage
1	Alternate route should be provided	18	18
2	Locals should be preferred for jobs during construction	8	8

Sr. No.	Protective Measures	Number	Percentage
3	Noise control and sprinkling of water	21	21
4	Playgrounds should be established	3	3
5	Privacy should be maintained	6	6
6	Sprinkling of water, cover dust carrying trucks	12	12
7	Tree Plantation and sprinkling of water	22	22
8	Tree plantation/ Noise and air monitoring	10	10
Total		**100**	**100**

In the bar chart below **(Figure 4.54)** the protective measures suggested by the respondents are shown.

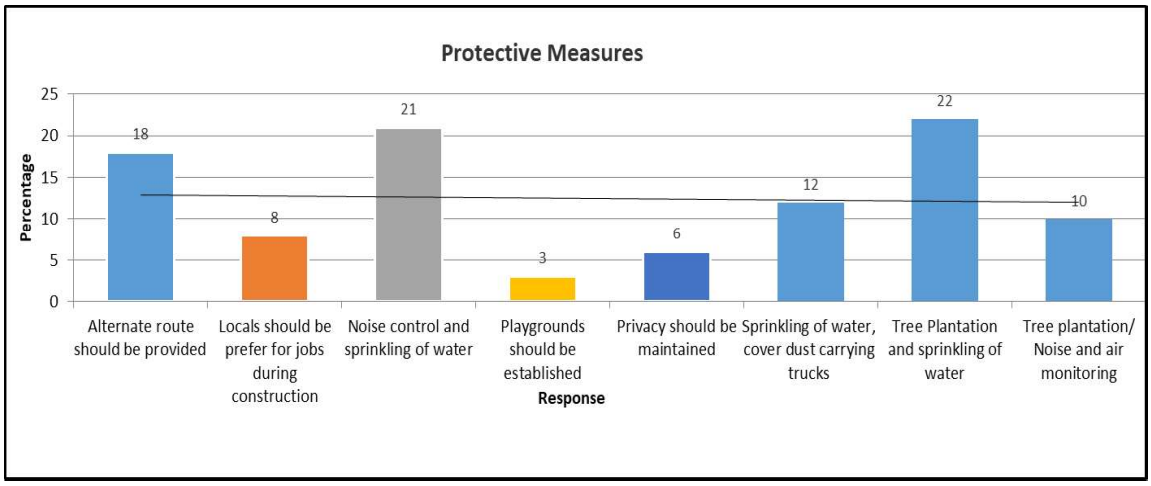


Figure 4.54: Protective Measures Suggested by Respondents

5 PUBLIC CONSULTATION

5.1 General

This section describes the outcome of the public consultation sessions held with different stakeholders that may be directly or indirectly affected by the proposed project. Public Consultation is a mandatory part of the EIA process for development projects. The adequacy of the public consultation and information disclosure is one of the basic criteria used to determine the project compliance with the national / international safeguard policies.

The consultation process was carried out in accordance with the requirements of Pakistan Environmental Procedures. The objectives of this process are to:

- Inform the public about the proposed project.
- Identify and involve all stakeholders, especially local residents, in the consultative and participation process;
- Share information with stakeholders on the design and construction of the proposed project and anticipated impacts on the physical, biological and socio-economic environment of the project area;
- Understand stakeholders' concerns regarding various aspects of the project, including the existing available facilities and problems, construction of the project and the likely impacts (positive & negative) of construction and operation related activities;
- Understand the perceptions, assessment of social impacts and concerns of the communities in the vicinity of the proposed project;
- Provide an opportunity to the public in the public consultation session to provide valuable suggestions for the project design in a positive manner; and
- Reduce the chances of conflict through the early identification of controversial issues, and consult them to find acceptable solutions.

5.2 Consultation and Participation Process

To ascertain the perceptions of different stakeholders about the project (during construction/ operation) consultation meetings were conducted. These meetings were carried out at Mohra Nur, Mohran Jejan, Valley Homes Society, Zong Headquarters, Isolation Hospital & Infection Treatment, Horse Stable, NIH Colony, Girls Hostel, and National Institute of Health. The meetings with stakeholders were carried out during the month of March, 2022. The Flow chart diagram of the Consultation process is presented in **Figure 5.1.**

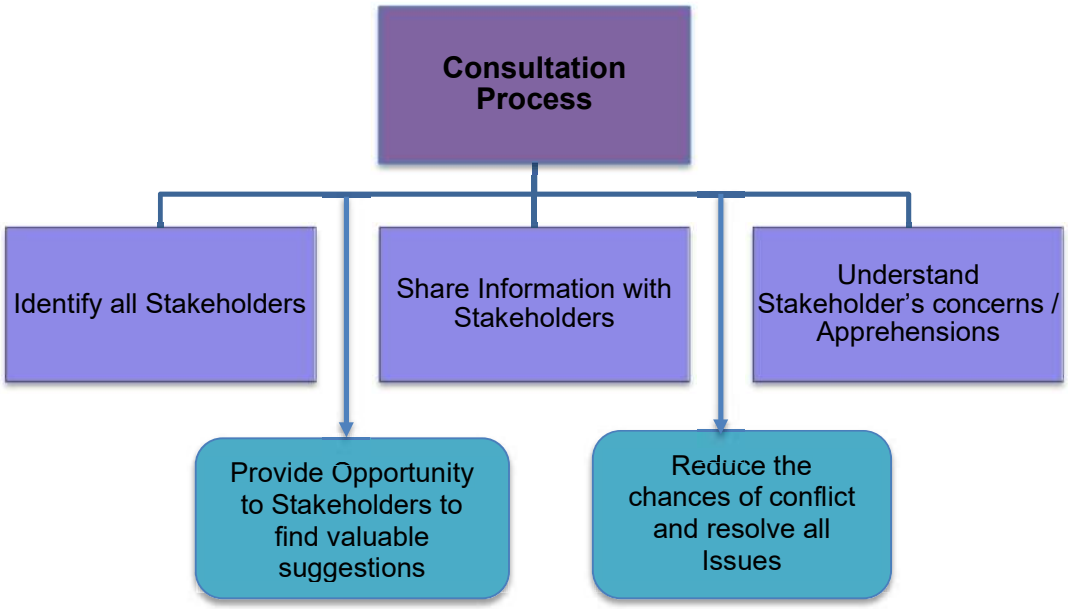
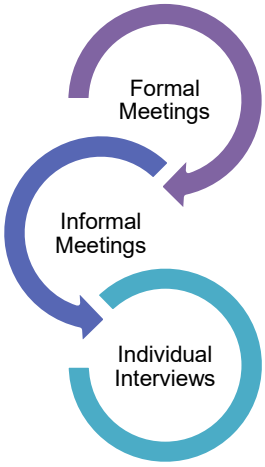


Figure 5. 1: Consultation process is presented in

5.3 Methods of Public Consultation

Public Consultation were carried out in order to establish stakeholder's opinion regarding project implementation. The following methods were used for public consultation with project stakeholders:



5.4 Identification of Stakeholders

Stakeholders are those who have a direct or indirect interest in the project development and will be involved in the consultation process. During the field survey, significant efforts were made to identify the possible categories of stakeholders and their stakes. Following stakeholders were identified during field survey:

- Special Technology Zones Authority (STZA)- Proponent
- Environmental Protection Agency (EPA)
- Capital Development Authority (CDA)
- National Institute of Health (NIH)
- Islamabad Wildlife and Management Board (IWMB)
- Billion Tree Tsunami Programme
- Local Residents of Surrounding Communities
- Isolation & Infection Treatment Hospital
- Shopkeepers
- Customers and Road Users

All the stakeholders had different type of stakes according to their professions which are listed down along with their apprehensions. Informal group discussions were also held as an additional tool for the assessment of the perceptions of the stakeholders.

5.5 Categories of Stakeholders Contacted

Following categories of stakeholders were contacted during field visits:

Plate 5.1 shows the pictorial view of individual interviews and consultation meetings held with the stakeholders.

Consultation Meeting with **Mr. Rana Kashif** (Director Environment - CDA Department)

Consultation Meeting with **Mr. Amjad** (Manager QS)

Consultation with Shopkeeper

Glimpses of Consultation Meetings in Nearby Settlements

Consultation Meeting near NIH Colony

Public Consultation near Zong Office

Public Consultation near Mohra Noor

Plate 5. 1: Interviews and Consultation Meetings with Different Stakeholders

5.6 Consultation Meetings (Formal & Informal)

A. Formal Meetings

Formal meetings regarding project impacts, their magnitude and mitigation measures were held with STZA, EPA, CDA, NIH, IWMB, Billion Tree Tsunami Programme, Local Residents of Surrounding Communities, Isolation & Infection Treatment Staff to know their concerns regarding proposed project.

B. Informal Meetings and Individual Interviews

Informal meetings and Individual interviews were conducted with the local residents of surrounding communities (Mohra Nur, Mohran Jejan, Valley Homes Society, Zong Headquarters, Isolation Hospital & Infection Treatment, Horse Stable and NIH Colony), Isolation & Infection Treatment Staff, Shopkeepers, Customers, Road Users and Hostel Students. These meetings were carried in and around the Islamabad Special Technology Zone (ISTZ).

Generally, it was found that almost all respondents including local residents and other stakeholders showed their willingness for the proposed project. This project will be good for the development of the area as this technology zone will provide job opportunities to local residents.

5.7 Concerns / Suggestions of the Stakeholders

The commonly raised concerns during the meetings are listed below:

- The construction of proposed project should be completed in time;
- Usually, local community is not aware about the project impacts. There is a need to launch awareness programs regarding project impacts, prior to the project so that they should be aware of the effects caused by the construction activities of project.
- Exposure of noise, vibration and dust pollution will cause disturbance and health issues to the local residents of NIH Colony, NIH Market, Girls Hostel, Isolation Hospital and Infection Treatment, Horse Stable and Zong Headquarters throughout the construction phase due to movement of construction machinery and transportation of construction materials. The effects of noise vibration and dust pollution on the local residents should be minimized by making necessary arrangements. Dust pollution should be controlled by water sprinkling on regular basis;
- Due to the movement of machinery during the construction period of proposed technology zone, congestion on Mohra Nur Road will take place. Proper diversion route should be defined to avoid traffic blockage during the entire construction period; During construction period local residents of NIH and Horse Stable, Isolation Hospital & Infection Treatment staff, road users and pedestrians will face difficulties while moving to other places in the vicinity of proposed project area.
- Local residents of nearby colonies should be given priority for jobs both in construction and operation phase;

- Due to construction of the proposed project, public utilities will be disturbed. Arrangements should be made to minimize the disruption of public utilities or they may be rehabilitated on priority basis to reduce the impacts;
- Increase in traffic and safety hazards will create problems to local population of surrounding communities. Accordingly, a detailed health and safety plan must be developed to mitigate the construction and operation risks of the proposed project on the local residents and surrounding communities;
- Tree cutting should be avoided as much as possible;
- Solid waste produced during construction period should be disposed of adequately; and
- Construction material and asphalt plant should be located away from the residential area.

5.8 Mitigation Measures Proposed by EIA Consultants for Addressing the Stakeholder's Concerns

The contractors and design consultants may include the following environmental and safety provisions in the project design in order to protect the surrounding communities from the anticipated impacts of pre/post construction activities;

- The contractor should be made bound to follow the mitigation measures proposed in the EMMP of the EIA Report;
- Construction machinery should be placed at adequate locations away from the sensitive areas to minimize the impacts related to the noise;
- Project facilities should be located outside the existing residential areas. All the construction activities should remain confined with the project boundary;
- The utilities to be shifted due to the implementation of the proposed project should be rehabilitated on priority basis to minimize the impacts on the local community;
- Solid waste generated during construction at site should be disposed of safely at the waste disposal sites; and
- All necessary measures should be taken for the safety of the workers during construction including medical screenings, insurance of workers and provision of PPEs etc.

5.9 Details of Meetings with the Stakeholders

The detailed schedule of meetings with the stakeholders at site and the issues raised by them are given below in **Table 5.1**.

Table 5. 1: Schedule of Meetings with Stakeholders and their Concerns / Apprehensions

Sr. No.	Agency / Department / Stakeholder	Date	Representative	Apprehensions Raised	Suggestions
01.	**Proponent STZA** (Special Technology Zone Authority)	16-03-21	Mr. Amjad (STZA)	Local residents of NIH may face mobility problems during the construction phase of the project.	In order to avoid restricting the daily movement of the local residents, project facilities and construction vehicles should remain confined within their designated areas of movement;
				Traffic congestion on Mohra Nur Road will take place.	To avoid traffic blockage, proper diversion will be defined for the smooth flow of traffic.
				Health and safety issues may occur to the local community and the workers during the construction phase.	A proper HSE Plan will be established to avoid the health and safety issues during the construction phase of the project.
				Local residents will face direct impacts during construction phase.	Local residents should be given priority for jobs during construction phase.
				Noise and vibration issues will take place during construction phase nearby residential colonies.	Construction machinery will be placed at adequate locations away from the residential areas to minimize the vibration impacts.
02.	**Responsible Authority- EPA** (Environmental Protection	16-03-21	Mr. Ahsan (Director EIA)	Air and noise pollution will be created throughout the construction phase due to the movement of construction machinery.	The effects of noise and dust pollution on the local residents of NIH Colony, Horse Stable and Infection Hospital should be minimized by making necessary arrangements. Dust pollution should be

Sr. No.	Agency / Department / Stakeholder	Date	Representative	Apprehensions Raised	Suggestions
	Authority, Punjab)				controlled by water sprinkling on daily basis.
				Traffic disturbance may create problems to access the vicinity areas during construction phase of this technology zone.	A proper traffic management plan should be adopted for road users and traffic wardens should be deputed to avoid traffic congestion.
				Solid waste management issues for residential and commercial places during construction phase	Solid waste produced should be properly managed and disposed of regularly at the designated areas / approved dumping sites.
				Parking issues after construction of technology zone.	Proper parking facility and parking space should be given with in the premises.
				Tree cutting and vegetation issues may occur due to the construction of technology zone.	A comprehensive tree plantation plan should be proposed and adopted by avoiding maximum tree cutting.
03.	**<u>Other Departments</u>** CDA (Capital Development Authority)	16-03-21	Mr. Abdul Haq Deputy Director (CDA Planning) Mr. Rana Kashif Director Environment	Road users and hostel students will face difficulty in their mobility.	Some alternate routes should be defined and allocated for the free movement of road users and hostel students.
				Noise and dust particles will create health issues to the local residents, shopkeepers, customers and hostel students	Efforts should be made to control the noise and dust pollution created during the construction phase.
				Time delays will occur due to traffic disturbance during construction time of the proposed project.	A proper traffic management plan should be adopted for road users.

Sr. No.	Agency / Department / Stakeholder	Date	Representative	Apprehensions Raised	Suggestions
			(CDA Department)		
04.	**Other Departments** IWMB (Institute of Wildlife Management Board)	16-03-21	Mr. Sakhawat Ali (Manger Operations IWMB)	Endangered species of Islamabad are Common Leopard while the critical Endangered Species are Pangolins.	For the accomplishment of this project, try to save the Endangered Species of project area and their vicinity areas.
				Due to the construction of the proposed project, traffic flow will be disturbed and vehicle stay time will increase which will create more emissions.	For smooth flow of traffic, traffic blockage should be avoided to reduce emissions.
				Noise and dust particles will create health issues to the students/teachers of this institution.	Efforts should be made to control the noise and dust pollution created during the construction phase.
05.	**Other Departments** NIH (National Institute of Health)	16-03-21	Mr. Mehmood Ahmad (Estate Officer)	Due to traffic congestion, fuel emission will take place which will further create air and noise pollution and from this pollution, local residents may suffer from many diseases.	To avoid traffic congestion, traffic wardens should be deputed on site during construction phase. This enforcement will also save the local community from its health impacts.
				Health and safety issues may occur to the local community and the workers during the construction period.	A proper HSE Plan should be established to avoid the health and safety issues during the construction time period of the project. Local residents and workers should follow the local health and safety standards to ensure the safety.

Sr. No.	Agency / Department / Stakeholder	Date	Representative	Apprehensions Raised	Suggestions
06	**Other Departments** Billion Tree Tsunami Programme	16-03-21	Mr. Hassan Ali (National Project Director)	Tree cutting and vegetation issues may occur due to the construction of technology zone.	Significant efforts including change in design should be adopted to avoid or minimize the physical impacts on the existing plantation. If tree cutting is unavoidable a detailed tree plantation plan should also be implemented.
				Solid waste produced during construction period is a major concern.	Solid waste produced should be properly managed and disposed of regularly at the designated areas / approved dumping sites.
				Air and noise pollution will be created throughout the construction stage due to the movement of heavy machinery.	The effects of noise and dust pollution on the local residents should be minimized by making necessary arrangements. Dust pollution should be controlled by water sprinkling on daily basis.
07.	**Wider Community** (NIH Colony)	16-03-21	Local Residents	Noise and dust pollution will create problems for residents of NIH Colony throughout the construction phase.	The noise and dust pollution should be minimized by water sprinkling on regular basis.
				Privacy issues were raised by local residents of NIH Colony due to the	Labour should bound to work and stay in the designated area or camp sites.

Sr. No.	Agency / Department / Stakeholder	Date	Representative	Apprehensions Raised	Suggestions
				construction work of labourers in the project area.	
				Traffic will be congested on Mohra Nur road during the construction phase of this project. It will be difficult for local residents of NIH to reach their destination and more time will be consumed.	Diversion routes should be provided to minimize the traffic problems during construction phase.
				Solid waste produced during construction phase is a major concern of residents of NIH Colony.	Solid waste produced should be properly disposed of in an identified designated area.
				Public utilities will be disturbed.	Public utilities should be rehabilitated on priority basis to reduce the impact
				During construction phase pedestrians will face difficulties while walking to nearby places in the vicinity of project area.	Appropriate detour plans should be proposed to avoid the disruption of pedestrians due to working of heavy machinery in day timings.
				The project is a good step for the development of the proposed project area.	Efforts will be appreciated to complete the construction as soon as possible.
08.	**Wider Community**	16-03-21	Local residents of Surrounding Communities,	Being front business point, shopkeepers and customers of NIH markets will face direct impacts during construction time.	Significant efforts including change in design should be adopted to minimize the physical disturbance of shopkeepers.

Sr. No.	Agency / Department / Stakeholder	Date	Representative	Apprehensions Raised	Suggestions
	(NIH Market, Mohra Nur, Mohran Jejan, Valley Homes Society, Zong Headquarters, Isolation Hospital & Infection Treatment, Horse Stable)		Isolation & Infection Treatment Staff, Shopkeepers, Customers, Road Users and Hostel Students.	Customers will face access problem during construction phase	To avoid the mobility problems, an appropriate diversion plan should be anticipated.
				Traffic will be congested on Mohra Nur road during the construction phase. It will be difficult for road users to reach their destination and more time will be consumed.	Proper diversion route should be provided to minimize the traffic problems during construction phase.
				During construction phase road users will face difficulties while moving to nearby places in the vicinity of proposed project area.	Appropriate detour plan should be developed to avoid the disruption of road users due to use of heavy machinery in day timings.
				Delay in construction will create problems for Hostel students.	The efforts should be made to complete the construction work within the time period.
				Exposure dust particles would cause severe health issues for local residents, students, hospital staff.	The effects of dust pollution should be minimized to reduce the severe impacts on health
				Noise and vibration impact during construction phase may take place to local residents.	Construction machinery should be placed at adequate locations away from the communities to minimize the vibration impacts.

Sr. No.	Agency / Department / Stakeholder	Date	Representative	Apprehensions Raised	Suggestions
				Traffic congestion will take place on Mohra Nur during the construction phase of the proposed project.	The movement of the heavy machinery near Girls Hostel and NIH Market should be restricted.
				Solid waste produced during construction period is a major concern.	Solid waste produced should be properly managed and dispose of in an identified designated area.
				Increase in traffic and safety hazards will create problems not only to local community but also to the hostel students, shopkeepers and customers falling along the project area.	A detailed health and safety plan must be developed and implement to mitigate the construction and operation risks of the proposed project on the local community.

6 ANTICIPATED ENVIRONMENTAL IMPACTS & MITIGATION MEASURES

6.1 General

This section identifies the overall impacts of pre-construction (design), construction and operational phases of Islamabad Technopolis project on the physical, biological and socio-economic environment. In addition, it also recommends the measures to mitigate or minimize the project's adverse environmental impacts.

6.2 Identification of Environmental Impact Matrices

Each identified impact was evaluated according to a number of criteria including its nature, extent, intensity, duration and probability. Taking into account these criteria, the overall significance of the impacts was classified as either:

- Low: The impact which has a slight influence on the physical, ecological and socio-economic aspects and requires no mitigation; or
- Medium: The impact which can be eliminated/ reduced after adopting the appropriate mitigation measures; or
- High: an impact, which, if not mitigated, could prohibit the Project activities.

A comprehensive map showing the environmental sensitive receptors e.g., educational institutes, medical facilities, religious places and graveyards etc. is given in **Figure 6.1**.

6.3 Characterization of Impacts

Characterization is done on the basis of Consequences, Probability & significance of the potential impacts in the surrounding environment. To evaluate the impacts, Environmental Impact Matrices are used for construction and operation stages. These matrices are given in **Tables 6.1** and **6.2** respectively.

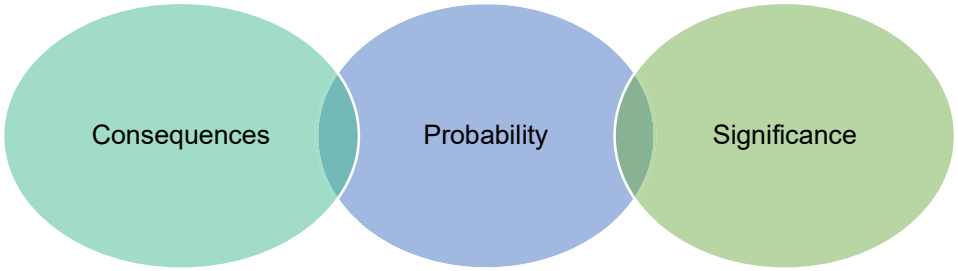


Table 6.1: Significance Rating of Potential Impacts During Construction Phase

Sr. No.	Impact	Nature	Consequence			Probability	Significance Rating	
			Extent	Intensity	Duration		Without Mitigation / Enhancement	With Mitigation / Enhancement
Physical Aspects								
1.	Soil Contamination	(-)	Local	Medium	Short Term	Definite	Medium	Low to Negligible
2.	Topography & Landscape Changes	(-)	Local	High	Short Term	Definite	Medium	Low
3.	Deterioration of Ambient Air Quality	(-)	Local	Medium	Short Term	Definite	Medium	Low
4.	Noise and Vibration	(-)	Local	Medium	Short Term	Definite	Medium	Low
5.	Water Quality	(-)	Local	Medium	Short Term	Probable	Medium	Low
6.	Solid Waste (Construction, Municipal and Hazardous Waste)	(-)	Local	Medium	Short Term	Definite	Medium	Low
7.	Greenhouse Gases and Climate Change	(-)	Local	Medium	Short Term	Definite	Medium	Low
8.	Resource Conservation	(-)	Local	Medium	Long Term	Definite	Medium	Low
9.	Construction Camps Sites	(-)	Local	Medium	Short Term	Definite	Medium	Low
10.	Heavy Vehicles on the Existing Road Network	(-)	Local	Medium	Short Term	Definite	Medium	Low
Ecological Aspects								
1.	Flora	(-)	Local	High	Long Term	Definite	High	Low
2.	Fauna	(-)	Local	Medium	Short Term	Definite	Medium	Low
Socio-Economic Aspects								
1.	Employment Opportunity	(+)	Local	Medium	Short Term	Definite	---	---
2.	Visual Impact and Aesthetics	(-)	Local	Medium	Short Term	Definite	Medium	Low
3.	Interference with Other Utilities	(-)	Local	Medium	Short Term	Probable	Medium	Low

Sr. No.	Impact	Nature	Consequence			Probability	Significance Rating	
			Extent	Intensity	Duration		Without Mitigation / Enhancement	With Mitigation / Enhancement
4.	Social / Cultural Conflicts	(-)	Local	Low	Short Term	Probable	Low	Negligible
5.	Health Impacts (Diseases)	(-)	Local	Medium	Short Term	Probable	Medium to High	Low
6.	Health and Safety including occupational and community health, accidental risks and natural disasters	(-)	Local	Medium	Short Term	Probable	Medium to High	Medium to Low

From the above matrix, it is depicted that the impacts the of the proposed project activities during pre-construction / design phase has low to moderate adverse effect on the environmental and social indicators. However, it can be avoided through environmentally sustainable engineering designs and techniques.

Table 6.2 Significance Rating of Potential Impacts During Operation Phase

Sr. No.	Impact	Nature	Consequence			Probability	Significance Rating	
			Extent	Intensity	Duration		Without Mitigation / Enhancement	With Mitigation / Enhancement
Physical Aspects								
1.	Topography	(+)	Local	Medium	Long Term	Definite	---	---
2.	Ambient Air Quality	(-)	Local	Medium	Long Term	Definite	Medium	Low
3.	Noise and Vibration	(-)	Local	Medium	Long Term	Definite	Medium	Low
4.	Drinking Water Contamination	(-)	Local	Medium	Short Term	Probable	Medium	Low
5.	Surface Water Contamination	(-)	Local	Medium	Short Term	Probable	Medium	Low
6.	Soil Contamination	(-)	Local	Medium	Short Term	Probable	Medium	Low
7.	Solid Waste (Municipal and Medical Waste)	(-)	Local	Medium	Long Term	Definite	Medium	Low
8.	Fire and Explosions Hazard	(-)	Local	Medium	Long Term	Probable	High	Medium

Sr. No.	Impact	Nature	Consequence			Probability	Significance Rating	
			Extent	Intensity	Duration		Without Mitigation / Enhancement	With Mitigation / Enhancement
9.	Traffic Management	(-)	Local	Medium	Short Term	Probable	Medium	Low
Ecological Aspects								
1.	Flora	(-)	Local	Medium	Short Term	Probable	Medium	Low
Socio-Economic Aspects								
1.	Employment Opportunity	(+)	Local	Medium	Long Term	Definite	---	---
2.	Occupational Health and Safety Considerations	(-)	Local	Medium	Long Term	Probable	Medium	Low

From the above matrix, it is depicted that the impacts the of the proposed project activities during operational phase has low to moderate adverse effect on the environmental and social indicators. However, the implementation of the proposed project activities will provide employment opportunities to skilled and unskilled labors.

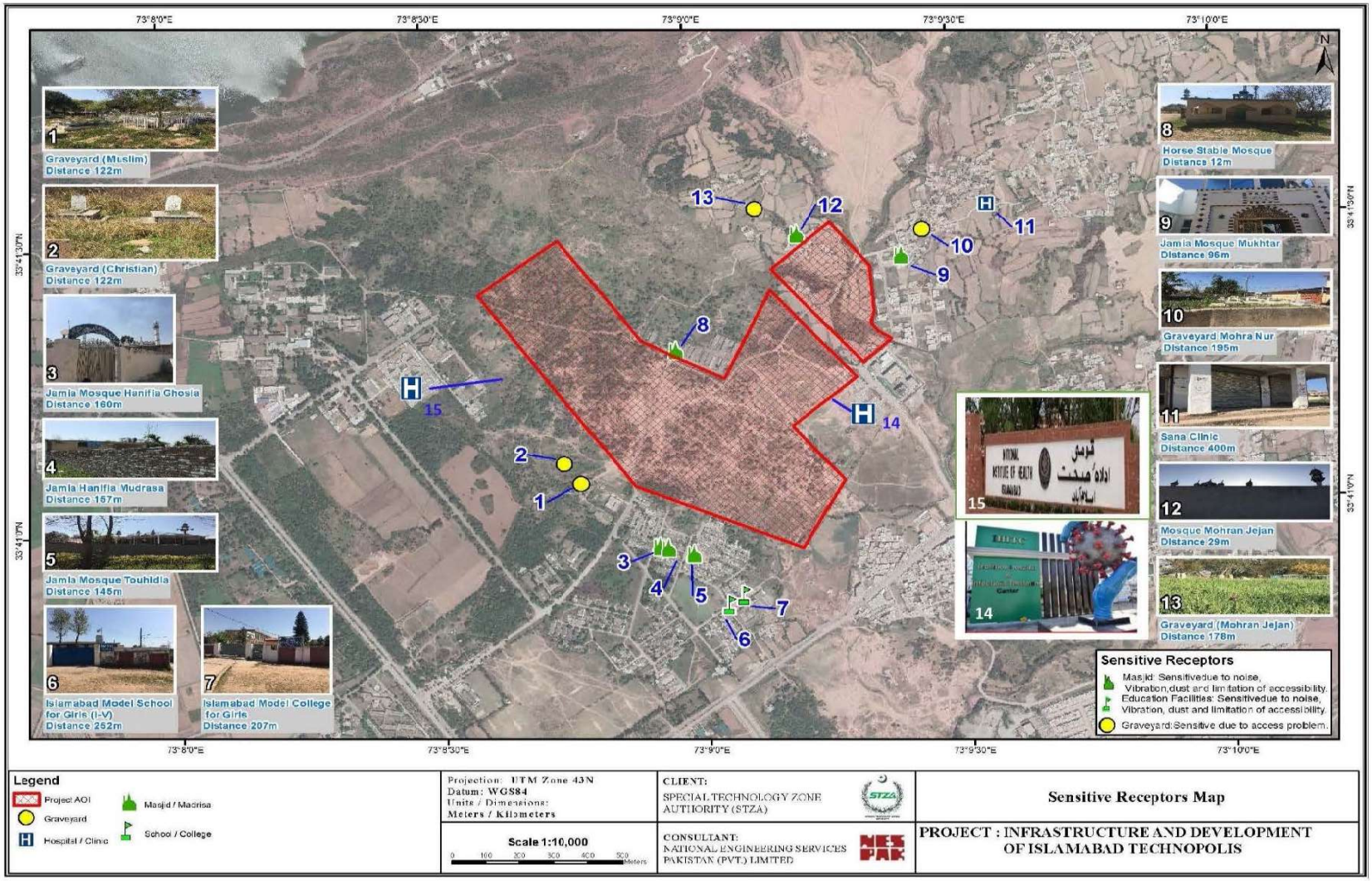


Figure 6.1: Sensitive Receptors Near Project Area

6.4 Significance Rating

The overall significance of the impacts was defined based on the result of a combination of the consequence rating and the probability rating. Each identified impact was analyzed in terms of magnitude, extent, duration, and probability of occurrence, the value of the affected environment and likely degree of recovery of the affected area. The results of the assessment of the significance of the residual impacts were then linked to decision making in the following manner.

Significance Rating	Implication
Low	Should not have an influence on the decision to proceed with the proposed project, provided that recommended mitigation measures to mitigate impacts are implemented.
Medium	Should influence the decision to proceed with the proposed project, provided that recommended measures to mitigate impacts are implemented.
High	Should strongly influence the decision to proceed with the proposed project regardless of mitigation measures.

6.5 Anticipated Impacts during Pre-Construction/Design Phase

Following is the description of impacts envisaged and the recommended mitigation measures during Pre-construction/Design Phase:

6.5.1 Design & Layout Planning

The project design and layout planning is a critical task and needs to be robust, environmentally sustainable and socially acceptable. Incompatible layout plan and engineering design of the project's structures can undermine the overall aesthetic beauty and ambience of the project area. Also, low utilization of the available spaces and not designing the structures taking into account, the prospective and futuristic needs can result in structures with low social acceptability and functionality. This impact will be permanent and moderate negative in nature.

Mitigations:

- All structural, layout and engineering designing of Islamabad Technopolis should be in strict accordance with the applicable by-laws and engineering/town planning parameters.

6.5.2 Land Use/Land Value

Proposed site for Islamabad Technopolis is located at Jinnah Avenue south of Rawal Lake adjacent NIH Colony. Rawal Lake is located in the northern side of the Site at a distance of 0.97 kilometer. In the south side lies the Newmal Colony at a distance of 0.39 kilometer. NIH colony is located on the west side of the proposed site, whereas, Mohra Nur is located on the east side of

the proposed site. Construction of the proposed Project will enhance the land value of the Project Area. This impact will enhance the economy and will be positive in nature.

6.5.3 Land Acquisition and Resettlement

The proposed land for construction of Islamabad Technopolis has already been transferred to STZA from CDA. The land was already earmarked for commercial development / activity by the CDA. No private land acquisition is involved in the project. Therefore, there is no negative impact related to land acquisition.

6.5.4 Social Issues

As the project area consists of residential and commercial areas including educational institutes, health facilities mosques and graveyards etc. Significant number of natives have to use the roads for the purpose of access to their jobs / business points. During the construction and operation phase of the project, it might be difficult for the students and natives to get access to their educational institutes and jobs locations. There are almost 5-8 illegally built houses by encroachers in the project boundary which are being vacated by the client. Similarly, the patients may also face difficulty to access the hospitals and other medical facilities. It has been observed during site visit that alternate routes are available that are not too far away to reach the destinations in the project area. However, people may also face difficulty in parking of private vehicles during the construction phase. This impact is temporary and minor negative in nature.

Mitigation:

- Development of traffic diversion plans, provision of appropriate safety sign/boards; and
- Communication of traffic plans to the public before the commencement of construction activities through local media.

6.5.5 Selection Water Source

Islamabad is a water scarce city. The groundwater table is very low potential and the only reliable source for the city is Rawal Lake. However, to meet the water demands of 1.5 MGD for the Islamabad Technopolis Rawal Lake is the reliable source.

Mitigation:

- A detailed groundwater/ hydrological study should be conducted to foresee the impact of water extraction and recharge, so that there is no negative impact on the surrounding area and the delivery of services.
- Ensuring efficient use of resources and incorporation of design and infrastructure measures for water conservation that include use of low-flush water closet (1.6 US gallons per flush) instead of the traditional 4-gallons water closet and designing of wastewater treatment plant

keeping in view the reuse of treated water.

6.5.6 Traffic Congestion/ Parking Issue

During the operational stage, traffic in and around the project area will increase and will cause congestion and parking problems. This will be a moderate negative impact.

Mitigation:

- The individual buildings should also keep provision of parking facilities based on their daily influx of people;
- Re-strengthen/widening of NIH road, Mohra Nur road and IT park road upto 2+2 lane, for better traffic management.

6.5.7 Additional Load on Existing Utilities

Water pipelines, electricity cables, telephone lines and sewerage system will come under additional pressure because of the demand of the proposed project will be of a high magnitude. This will be a moderate negative impact.

Mitigation:

- The buildings in Islamabad Technopolis should be structured to maximize use of natural light, reducing the need for artificial lighting and providing impressive long-distance views even from deep inside the building;
- The design of the buildings will include two service cores which by virtue of their placement provide buffer zones, helping in insulating internal spaces thereby reducing air-conditioning loads;
- The design of the buildings will be energy efficient (30-40% less energy consumption as compared to conventional methods) and centrally air conditioned.
- Buildings will have their own power supply, main as well as standby;
- For digital telephone exchange, there will be provision of installation of approximately 200 lines Wireless local loop telephone exchange with expansion capability; and
- Location of Air Handling Units on each floor will be on the shaded side of the building and fresh air drawn from shaded side will save on energy consumption. The green terraces proposed in the architectural design will further enhance the saving in energy.
-

6.5.8 Seismic Hazard

The project area is located in Seismic Zone 2B, where 2B represents peak horizontal ground acceleration from 0.16 to 0.24 g. In this Zone, designing of various types of structures should be done on the basis of Peak Ground Acceleration (PGA). Moderate intensity earthquake impacting the project site can adversely impact the development. This factor requires special consideration

of the designers keeping in view the earthquake of October 08, 2005. The infrastructure may be affected negatively in case of earthquake tremors and the significance of damage depends upon the severity of earthquake.

Mitigation:

- The proposed project shall be designed and constructed to withstand low to moderate earthquakes. For seismic hazard analysis, updated structural and seismic evaluations will be consulted.

6.5.9 Resource Conservation

The materials used in construction of proposed project would include coarse aggregates (crush), fine aggregates (sand), steel, water, asphalt, reinforcement and cement etc. Almost all the materials to be used in the construction of proposed project are non-renewable and therefore their sustainable use is necessary for the future use.

Fuel will be used to operate construction machinery, asphalt plant and batching plants. Sustainable use of energy resources is very important not only to continue future use but it will also help to reduce air emissions. For conservation of energy, efficiency of the engines and burning processes shall be considered in planning.

Mitigation:

- Ensure adequate insulation to reduce heat loss through batching plants;
- Plan for reuse of construction waste materials may be formulated;
- Plan for use of Solar panels at operation phase should be considered;
- A good camp design and an efficient worksite management plan should be prepared during design stage that may help the contractor to reduce the water demand, wastewater and solid waste volumes to the lowest levels; and
- Rain water harvesting system may be considered through collection of water from roofs and its proper usage to irrigate green areas and also for domestic use with proper treatment.

The Resources Conservation Plan is attached as **Annex-VIII.**

6.5.10 Emergency Response

Disasters such as earthquakes, flooding and other manmade disasters such as fires may occur, which have to be considered for minimizing their impacts. This will be a moderate negative impact.

Mitigation:

- The Building Regulations of STZA will be strictly adhered to;
- Complete equipment control system, fire escape stairs and secured access system

supplemented with close circuit surveillance equipment/alarms will be included in the design of the Building;

- Adequate internal and external water distribution system will be designed, with standby system for sufficient water from tube well, which could also supply adequate quantity for firefighting during emergency; and
- Provision for pumping out water from basement will be kept, to meet any emergency in case of water flooding the basement.

6.5.11 Landscaping

Green areas, open spaces, parks and other green features should be included in the design. Landscaped surfaces dominated by local plants at different levels of buildings, rooftop plantations and green terraces should also be proposed.

Improvement/ Beneficiation:

- This will give a pleasant aesthetic look to the project area; and
- The plantation will absorb carbon dioxide and generate oxygen, benefiting the occupants of the building and the surroundings.

6.5.12 Fire Fighting System & Storage

Inefficient firefighting system and insufficient storage of fire water may cause severe damage to the buildings and other components of the project. This will be a high adverse impact.

Mitigation:

- Storage for firefighting should be provided in water storage reservoir;
- Water sprinkler system and Siamese coupling should also be part of firefighting system;
- Special provisions for fire safety in the building will also be considered during the design phase.

  These will be:
  - The number of emergencies exits from the site.
  - Location of the fire exits.
  - Signs required at exits.
  - System required to detect fire.
  - Alarms required to warn people of fire.
  - Sprinkler systems to extinguish fires.
  - Materials to be used in the construction of the building to slow fire growth.
  - Construction to limit fire spread from one area to another.

6.5.13 Visual impact

The proposed intervention in the green area will adversely affect the natural outlook of the site. Despite of architectural beauty of the buildings, the aesthetics of the area will be compromised. This impact is moderate negative and permanent in nature.

Mitigation:

- Proposed buildings should be built on the barren land;
- The natural aesthetics of the plain should be maintained or restored in the natural condition by planting trees.

6.6 Anticipated Impacts during Construction Phase

Following is the brief description of impacts and their mitigation envisaged during the construction phase:

6.6.1 Soil & Deep Excavation

Due to the proposed construction activities, soil erosion and contamination may occur. Soil erosion may occur on Project site and at contractors' camps as a result of excavation of earth/cutting operations whereas contamination of soil may be caused by oil and chemical spills at asphalt plant sites, camp sites and temporary construction site office. This impact is negative, local, medium, short term and definite.

Mitigation:

- The base of foundation excavation should be properly proof rolled before pouring lean concrete;
- Stored excavated material should be covered and preferably reused;
- Prepare a plan for use and movement of construction vehicles within the area based on the nature of soil;
- Vehicles and equipment movement should be confined to dry areas with hardened soil; no vehicle and equipment should enter the damp areas and areas with soft soil;
- Do not drive or park machinery or vehicles within 10 feet of the edge of the excavation unless the banks are frequently inspected and confirmed to be stable;
- Sprinkling of water may help in reducing the erosion of soil;
- Non-bituminous wastes from construction activities should be dumped in approved sites, in line with the guidelines for dump sites, and must be covered;
- If excavations have to be made very close to the existing foundation or roads, suitable excavation support system should be provided to stop any untoward incident. The Contractor should submit method statement for dewatering, excavations, their supporting etc. to Engineer for approval before taking up these works;

- During construction of foundation, the excavation should be inspected by an experienced Geotechnical Engineer before of pouring lean concrete;
- Confining excavations to the specified spots as per the approved engineering drawings and unnecessary excavations should be avoided;
- Excess spoil should be reused where possible and residual spoil can be disposed of at designated site to prevent erosion;
- Loss of topsoil can be avoided by stripping and storing topsoil prior to construction, then re-using it for green areas of the building;
- Mat / pile foundation should be used for transferring the loads of the proposed multi story buildings. However, spread foundation should be used for lightly loaded structures;
- Assure that proper sloping, benching, or shoring techniques are utilized in excavations of five feet or greater in depth;
- Use trench shields during trenching operations, when required;
- Review the impact loading near the trench to ensure that adequate bracing is in place;
- Oil separators should be installed at equipment or machinery washing yards to prevent soil contamination from oily water;
- Septic tanks of adequate capacities should be constructed for receiving and treating wastewater from all temporary worksite toilets and construction camps to avoid soil contamination;
- Regular inspection of the wastewater disposal from construction camps;
- Construction work should be scheduled to be completed before monsoon season to avoid the soil erosion through surface run-off; and
- Jute erosion protection mats can be applied in areas where erosion is noticed during inspections.

6.6.2 Construction Camps/Camp Sites

Improper location of construction camp(s) and mis-management of construction camp activities can lead to various social and environmental impacts which include loss of vegetation due to setting up construction camps, indiscriminate generation of solid waste, and discharge of sanitary effluent, water pollution and health & safety issues. Furthermore, cultural differences, behavior of construction workers, potential disregard for local cultural norms can lead to increase tension between local communities, NIH Colony, NIH hostels and workers residing in the construction camps. If the sites are left unclear after completion of construction phase; it may cause disturbance for the proponent and local community. This impact is negative, local, low, short term and definite.

Mitigation:

- Camps should be designed to be self-contained to reduce demand on infrastructure and services of nearby communities and to minimize the removal of existing macro-plants; and
- Formulation of a comprehensive safety and security plan for the camps which should be comprised of a training manual, use of safety equipment, emergency preparedness and code

of ethics.

6.6.3 Health and Safety

A. Occupational Health and Safety

Health risks and work safety problems may result at the workplace if the working conditions provide unsafe and/or unfavorable working environment and due to storage, handling and transport of hazardous construction material. Workers should be provided with safe and healthy working environment taking into account risks inherent to the particular sector and specific classes of hazards in project area. Construction health and safety check list attached as **Annex-IX.**

Mitigation:

- The flammable and combustible substances will be properly stored in designated areas and material safety data sheets will prepared.
- Non-toxic and environmentally friendly concrete releasing agents and surface leaning agents will be used.
- Obligatory insurance against accidents for labourers/workers;
- Providing basic medical training to specified work staff and basic medical service and supplies to workers;
- Layout plan for camp site, indicating safety measures taken by the contractor, e.g., firefighting equipment, safe storage of hazardous material, first aid, security, fencing, and contingency measures in case of accidents;
- Work safety measures and good workmanship practices are to be followed by the contractor to ensure no health risks for labourers;
- Protection devices (ear muffs) should be provided to the workers doing job in the vicinity of high noise generating machines;
- Provision of adequate sanitation, washing, cooking and dormitory facilities including light up to satisfaction;
- Proper maintenance of facilities for workers will be monitored;
- Provision of protective clothing for labourers handling hazardous materials, e.g. helmet, adequate footwear for bituminous pavement works, protective goggles, gloves etc;
- Ensure strict use of wearing protective clothing during work activities;
- Elaboration of a contingency planning in case of major accidents;
- Instruct foremen to strictly enforce the keeping out of non-working persons, particularly children, off work sites; and
- Adequate signage, lightning devices, barriers, yellow tape and persons with flags during construction to manage traffic at construction sites, haulage and access roads.

B. Community Health and Safety

The construction activities and vehicular movement at construction sites and access service roads may also result in road side accidents particularly inflicting local communities who are not familiar with presence of heavy equipment and machinery. This is a temporary and major negative impact. Quality of groundwater and surface water resources available in the nearby local communities may get contaminated due to the construction activities, oil spillage and leakage, roadside accidents etc. The laborers with different transmittable diseases may cause spread out of those diseases in the local residents.

Mitigation:

- There should be proper control on construction activities and oil spillage of vehicles;
- The labours having different transmittable diseases should be avoided;
- Efforts should be made to create awareness about road safety among the drivers operating construction vehicles;
- Timely public notification of planned construction works;
- Close consultation with local communities to identify optimal solutions for diversions to maintain community integrity & social links;
- Seeking cooperation with local educational facilities (school teachers) for road safety campaigns;
- Provision of proper safety and diversion signage, particularly at sensitive/accident-prone spots;
- Setting up speed limits in close consultation with the local stakeholders;
- If identified, consider additional guard rails at accident-prone stretches and sensitive locations (schools & hospitals);
- The communicable disease of most concern during construction phase, like sexually-transmitted disease (STDs) such as HIV/AIDS, should be prevented by successful initiative typically involving health awareness; educational initiatives; training heath workers in disease treatment; immunization program and providing health service;
- Reducing the impacts of vector borne diseases on long-term health effect of workers should be accomplished through implementation of diverse interventions aimed at eliminating the factors that lead to disease, which includes: Prevention of larval and adult propagation of vectors through sanitary improvements and elimination of breeding habitat close to human settlements and by eliminating any unusable impounding of water;
- During construction work pedestrian and vehicular passages should be provided for crossing near settlement;
- Fencing around the camps should be strong enough so that it cannot be broken easily by local people for making passages; and
- Use of water should not disturb public water availability and source of water should be selected carefully.

C. Emergency Response

Disasters such as earthquakes, flooding and other events such as fires may occur, and that must be considered for minimizing their impacts.

Mitigation:

- An Emergency Response Plan for earthquakes and manmade disasters shall be implemented in close consultation with the Rescue 1122 Service, Fire Fighting Department, bomb disposal squad and paramedics;
- In addition, training of the staff/employees regarding the emergency procedures/plans will be regularly conducted.

6.6.4 Ambient Air Quality

Air quality will be affected by fugitive dust emissions from construction machinery; dust from the unpaved surface and construction vehicles. Emissions may be carried over longer distances depending upon the wind speed, direction, temperature of surrounding air and atmospheric stability. Besides, multifarious construction activities the increased vehicular traffic (construction vehicles) would also contribute to the localized airborne dust. Once in the air, the larger sized particles, under influence of gravity, tend to settle down in the immediate vicinity of the source. The Suspended Particulate Matter (SPM) of the size smaller than 10 micrometer (PM_{10}) tends to remain suspended in the environment for much longer and persistent time and is an environmental hazard. The objectionable impacts of settling of the suspended dust would be its dry deposition on vegetation, glass windows, motor vehicles, buildings, and other exposed surfaces. Exhausts from fossil fuel burning in the construction machinery will also deteriorate local air quality. Similarly, exhausts from generators can also have impacts on air quality in the vicinity.

The critical sources of dust pollution during the construction phase will be:

- Unpaved road surface;
- Transportation of materials and other construction activities that create dust emissions.

The air emissions may cause health impacts such as dryness and roughness of the throat; eye, nose, throat irritations and coughing etc. to the workers and staff of contractor. These emissions may also affect the bio-physical environment. These impacts would be temporary and minor negative in nature. Synthetic paints and varnishes will emit VOCs and CFCs.

The overall impact on the quality of air during the construction phase will, however, be temporary and limited to the project's implementation phase only.

Mitigation:

- All vehicles, machinery, equipment and generators used during construction activities should be kept in good working condition and be properly tuned and maintained in order to minimize the exhaust emissions;
- Blowing of dust from potential sources at the worksite should be avoided by shielding them from the exterior, for example using polythene curtains or raising a fence of corrugated sheets around areas of active constructions;
- Blowing of dust and particulate matter from stockpiled loose materials (e.g. sand, soil) should be avoided either by sheeting them with tarpaulin or plastic sheets or by sprinkling them with light shower of water;
- Open burning of solid waste from the contractor's camps should be strictly banned;
- Preventive measures against dust should be adopted for on-site mixing and unloading operations. Regular water sprinkling of the site should be carried out to suppress excessive dust emission(s);
- Only good quality oils, petroleum products, additives and spares should be used in the machinery, generators, and the construction vehicles. Usage of used oil should be strictly prohibited;
- Emissions from power generators and construction machinery are important point sources at the construction sites. Proper maintenance and repair are needed to minimize the hazardous emissions; and
- Environment friendly synthetic paints and varnishes will be used during the construction phase which will be free from VOCs and CFCs.
- NEQS applicable to gaseous emissions generated by construction vehicles, equipment and machinery should be enforced during construction works.

As all the traffic diversion routes are paved/metal roads, therefore, dust pollution or particulate matter won't be a problem. However, some of dust problems caused during the construction phase of the project could be effectively mitigated by the implementation of simple procedures by the Contractor including but not limited to the following:

- Service roads (used for earthmoving equipment and general transport) should be regularly sprayed with water during dry weather;
- All excavation work should be sprinkled with water;
- Construction workers should be provided with masks for protection against the inhalation of dust;
- Vehicle speed in the project area should be prescribed not more than 20 km/hr and controlled accordingly; and
- Vehicles used for construction should be tuned properly and regularly to control emission of exhaust gases.

6.6.5 Noise and Vibrations

The operation of generators and movement of vehicles on access road and main road near the Project site may create noise and vibration issues in the proposed site. The impact is local, negative, medium, definite and long term.

Noise is a by-product of human activity, and area of exposure increases as function of mobility and construction activities. Sources of noise during construction are heavy machinery such as excavators, stabilizers, concrete mixing plant, pneumatic drills, stone crushers and other equipment. Exposure to continuous higher noise levels may induce the following health impacts on the workers such as increase in blood pressure, hypertension etc. Noise generated by construction machinery is likely to affect sensitive receptors located near the construction site. This impact is temporary and moderate negative in nature.

Table 6.1 presents the damage risk criteria for hearing loss, noise level above 110 dB(A) can be tolerated for half an hour only.

Table 6.3: Damage Risk Criteria for Hearing Loss

Sr. No.	Maximum Allowable Duration per day (Hours)	Noise-Level in dB (A)
1	8	90
2	6	92
3	4	95
4	3	97
5	2	100
6	1 ½	102
7	1	105
8	½	110
9	¼ or less	115 (Max.)

Source: Occupational Safety and Health Administration, OSHA, USA

Mitigation:

- Use of horn should not be allowed in and around the Islamabad Technopolis;
- Trees should be planted along the boundary as a noise barrier;
- Employees working close to generators for extended periods should be encouraged to wear ear protection;
- To reduce the noise produced from loose vibrating parts all the noisy equipment's should be maintained and tuned periodically;
- In the building, proper insulation should be provided to absorb the ambient noise;
- Traffic Signs/Rules should be installed /placed in and around the Islamabad Technopolis premises;
- Strict enforcement of speed limits inside the Islamabad Technopolis premises;

- According to NEQs, 2010 “an area comprising not less than 100 meters around hospitals, educational institution and courts must be declared as Silence Zone where noise level must not be higher than 50 dB(A) during the day time and 45 dB(A) during the night time. Hence, the area surrounding the proposed Project site i.e. not less than 100 meters must be declared as ‘Silence Zone’ and the penalties/fine must be allocated by EPA-Pakistan & Traffic Police for the violation of NEQS 2010; and
- Traffic Management Plan should be devised with traffic police to avoid heavy traffic jams

6.6.6 Dust

Substantial quantity of dust in and around the active construction area may be generated from the excavation operations, traffic/machinery movement and transportation of construction material at the Project Site. Prolonged exposure to dust might result in respiratory tract infections and asthmatic problems to the construction workers, the natives of the area and commuters. This will be a moderate negative impact.

Mitigation:

The majority of dust problems caused during the construction phase of the Project will be effectively mitigated by the implementation of simple procedures by the Contractor including but not limited to the following:

- All excavation work will be sprinkled with water;
- Construction workers will be provided with masks for protection against the inhalation of dust; and
- Vehicle speed on the roads along the Project Site will be prescribed and controlled accordingly.

6.6.7 Solid Waste (Construction Waste and Hazardous Waste)

Due to construction activities, municipal, construction and hazardous waste will be generated from construction activities and contractors’ camps.

Insecure and unhygienic disposal of municipal solid waste particularly garbage and trash may cause degradation of soil and land. Insecurely disposed of heaps of waste containing kitchen garbage and food waste from construction camps can serve as breeding grounds for the disease spreading vectors and rodents.

Empty containers containing the toxic, flammable and corrosive materials may pose hazard to the workers. This may result in health risk to work force and public, if disposal site is improperly selected. Waste Management plan is attached as **Annex-X**.

Construction waste includes insulation, nails, electrical wiring, rebar, wood, plaster, scrap metal, paper bags, cement, and bricks. Improper dumping of waste may generate odor, soil and water pollution, and disease vectors.

These impacts are negative, local, medium, short term and definite.

Mitigation:

- The waste generated from the camp site should be disposed at approved sites;
- Burning of waste shall be prohibited;
- Proper labeling of waste containers, including the identification and quantity of the contents, hazard contact information should be carried out;
- Method of storage at the construction site that may be applied for toxic or hazardous waste is presented below:

Type of Waste	Method of Storage
Paints (containing organic solvents and heavy metals)	Designated concreted area
Cables, PVC Pipes, and Plastic films	Separate storage
Waste solvents (used acids or alkalis), thinners and paints	Labeled drums or containers; designated concreted area
Empty containers and drums (used to contain chemicals, paint, solvents, thinners, pesticide, insecticide, anti-mosquito oil, and diesel)	Labeled drums or containers; designated concreted area
Oil and Chemical Sludge	Designated concreted area

- Training of employees involved in the transportation of hazardous material regarding emergency procedures should be ensured;
- Waste pile should be controlled so that it does not spread and start to impede other activities, and stays at a height that it does not become a safety hazard. Barricades may also be placed around the pile to delineate the safe distance for other workers;
- Residual and hazardous wastes such as oils, fuels, and lubricants should be disposed of via licensed third parties;
- Liquid waste, such as grey water, sewage, slurry and other wastewater should be collected from source by a designated tanker, and taken off-site for disposal at safe disposal facility;
- If the waste pile contains plastic, paper and other light-weight material it should be covered with a net, and tarpaulin or similar to stop waste from blowing around;
- If disposal is required, the site should be selected preferably from barren and infertile lands, and sites should be located away from residential areas, water bodies and any other sensitive land uses;
- Construction workers and supervisory staff should be encouraged and educated to practice waste minimization, reuse and recycling to reduce quantity of the waste;
- Waste disposal plan must be reviewed during the entire construction phase in the light of changing weather conditions;

- Construction waste such as waste wood can be recovered and recycled into wood for new building projects, and cement, bricks, and plaster can be crushed and reused in other construction and building projects.
- Waste containers with proper color coding should be provided on site to store different type of waste i.e.:
    - White: Gypsum – gypsum and plasterboard products
    - Grey: Inert – clean concrete, rubble, hardcore, brick and block that will not decompose or create a hazard when buried.
    - Black: Mixed general waste – any waste except contaminated waste that cannot be recycled in other skips on the site.
    - Blue: Metal – all types of clean metal, including rebar offcuts, and scrap metal.
    - Green: Wood – all types of clean, untreated timber and wood products.
    - Brown: Packaging – paper products.
    - Orange: Hazardous – only for contaminated waste such as asbestos, paint tins, mastic tubes, and tarmac;

6.6.8 Disposal of Construction Waste/Excavated Material

Dumping of construction wastes/excavated material in the surrounding area may limit the use of land in the Project Area. This will be a minor negative impact.

Mitigation:

Management of Construction activities will be done in a way to ensure minimum degradation to the soil around the Project area and dumping of excavated waste will be done at a designated Site approved by CDA. The contractors will be bound by contractual obligations to take care of the waste generated from the construction activities.

6.6.9 Sanitation Waste Disposal

During the construction stage, the sanitary wastewater will be generated at the workers' camp(s). If this wastewater is allowed to stagnate in water ponds on the site, it can create unhygienic conditions and some of the wastewater may also percolate the soil, thereby, polluting the groundwater. Sanitation plan is attached as **Annex-XI.**

Mitigation:

The contractor will provide pit latrines, septic tanks for labor camps to treat the sanitary wastewater before its discharge into public sewer.

6.6.10 Surface and Groundwater

Water resources in the project area may get contaminated due to the disposal of construction waste generated during the project activity. Also, there is a possibility that various materials like fuel, lubricants oil and other oily products, which are used during the construction phase may contaminate groundwater, if they are not handled properly. During the construction phase, the sanitary wastewater will be generated at the workers' camp(s). If this wastewater is allowed to stagnate in water ponds on the site, it can percolate into the soil, thereby, contaminating groundwater.

Persistent and prolonged withdrawal of groundwater higher than the safe yield limits of the aquifer can initiate early depletion of aquifer. This situation can result in reduced water supplies for other users who share the same groundwater resource. Abstraction of the groundwater over and above the safe yield limit can produce serious hydrological and environmental consequences.

Islamabad is already facing water scarcity issues and further abstraction can lead to:

- Early depletion of the aquifer resources;
- Persistent lowering of the water table;
- Reduced availability or non-availability of the groundwater to the neighboring communities sharing the same aquifer

These impacts are temporary and major negative in nature.

Mitigation:

- Protection of groundwater reserves from any source of contamination such as the construction and oily waste that will degrade its potable quality;
- The solid waste will be disposed of in designated landfill sites to sustain the water quality for domestic requirements;
- Water required for construction is obtained in such a way that the water availability and supply to nearby communities remain unaffected;
- Permission must be sought from relevant authorities i.e., CDA before using the water resources;
- Regular water quality monitoring according to determined sampling schedule;
- Prohibit washing of machinery and vehicles in surface waters, provide sealed washing basins and collect wastewater in sedimentation/retention pond;
- Continuous withdrawal and over pumping of groundwater should be avoided. Instead, intermittent pumping be carried out to conserve the groundwater resources;
- Take precautions construct temporary or permanent devices to prevent water pollution due to increased siltation; and
- Wastes must be collected, stored and taken to approve disposal site.

6.6.11 Biodiversity Conservation and Natural Resources

A. Flora

Plants of different species will be affected by execution of the project. The cutting of these plants will cause a negative impact on flora of the tract. Following impacts are expected to be envisaged on flora of the project area:

- During the entire construction period dust laden polluted air will form a dust film on leaves thus blocking sunshine and stomata consequently hindering photosynthesis processes causing detrimental effect on the plant health;
- Exhaust of noxious gases from movement of heavy machinery will further pollute air which will adversely affect health and vigour of plants located in nearby recreational parks;
- Establishment of Contractors camps and warehouses for storage of equipment, material etc. shall involve clearing of vegetation from the area, causing a negative impact; and
- During construction activities the Contractor's workers may damage the vegetation and trees (for use as fire-wood to fulfil the camps requirements).

To minimize the impacts on flora, following measures will be adopted during construction stages:

- Efforts shall be made to avoid the removal of green belts, however, if removal of trees is unavoidable; compensatory plantation shall be done and ten (10) trees shall be planted in compensation of one affected tree.
- Camp sites will be established on waste/barren land rather than social and commercial land. However, if such type of land is not available, it will be ensured that minimum clearing of the vegetation is carried out and minimum damage is caused to trees and undergrowth;
- Construction vehicles, machinery and equipment will remain confined within their designated areas of movement;
- The Contractor's staff and labour will be strictly directed not to damage any vegetation such as trees or bushes;
- Contractor will provide gas cylinders at the camps for cooking purposes and cutting of trees/bushes for fuel will not be allowed; and

B. Fauna

As the project area is modified urban area hence there are no significant faunal species present in the project area. So, there will be no significant negative impact of fauna by the execution of the project. However, mammals, such as dogs, cats, etc will avoid these areas for fear of being persecuted. Same will be the case with reptiles. Some reptiles might be killed during digging and piling operations. Similarly, birds will try to find shelter and food somewhere else and will tend to