move away from the project area to the activities mentioned above for fear of being hunted or caught. Overall, the impact on fauna of the area is insignificant in nature.

6.6.12 Disposal of Mucking Material

Inevitable earthwork operations during project construction will open up scars on the land around the project area. This impact is temporary and minor negative in nature.

Mitigation:

- Proper landscaping should be given due consideration along with re-establishment of the local/indigenous vegetation;
- The excavated materials that are unsuitable for use will need to be stored, transported and disposed of appropriately at designated sites.

6.6.13 Disruption of Existing Public Utilities/ Infrastructure

There may be some disruption to the already existing utilities like electricity poles, underground telephone lines, water supply lines, gas pipelines and power transmission lines etc. in the project area during the construction phase. Deep excavation for the construction may damage the structure stability of the surrounding building/service roads and may result in foundation collapse of the structure. This impact is permanent and negative in nature.

Mitigation:

- Rehabilitation of existing utilities before construction to avoid any inconvenience to the residents of the project area or provide them with alternate arrangement during the construction period;
- Before starting the excavation, proper planning shall be done and soil investigations shall be thoroughly conducted to develop understanding of the area. Furthermore, following shall be considered:

    - Unnecessary excavation should be avoided;
    - Excavations shall be carried out carefully to avoid damaging infrastructure in the surroundings of the project area; and
    - Temporary retaining structures shall be provided.

6.6.14 Traffic Management

During the construction phase, the movement of heavy machinery and transportation of raw material and equipment may cause traffic problems. As a result, the daily activities of the people

of nearby localities as well as of the visitors may be disturbed, which will require proper mitigation measures. This impact is temporary and minor negative in nature.

Mitigation:

- Proper traffic management plan will be needed to avoid traffic jams/public inconvenience;
- Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents.
- The executing agency is required to maintain liaison between the Traffic Police, local residents/ travelers and the contractor to facilitate traffic movement during construction stage.

6.6.15 Social Impacts

A. Positive Social Impact

There will be a long-term, positive impact on the social landscape of the project area. Social impacts could result from an influx of migrant workers and associated induced development. This will ensure a rise in the Standard Residential apartments for locals and outsiders, which will further affect the wider economy. As far as possible, local labor within the project influence area will be hired for construction purposes.

Construction of the proposed project will generate the employment opportunities for the population living in the surrounding areas. This will be a potential positive impact.

Due to the construction of the proposed Project, economic activity will be generated in the project area as the laborer and semi-skilled staff will have an opportunity to work for the construction of the proposed project. This will help in developing their skills and capacities.

B. Negative Social Impact

The generation of solid waste, sewage, fugitive dust and gaseous emissions can impact on public health and safety, if not properly managed.

Construction activities have potential to pose occupational risks, some of which could be life-threatening, for example, fatal falls if workers do not use safety harness when working at heights. In addition, falling debris could injure workers if personal protective equipment (PPE) are not provided or properly used. Back injury could occur if workers lift heavy objects using inappropriate body posture.

Other potential hazards might be; driving equipment with improper brake system, lack of concentration while working and exposure to hazardous wastes such as paints, cement, adhesives and cleaning solvents. This impact is expected to be short term.

Mitigations

- Regular drills shall constantly follow on various possible incidences. This will test the response of the stakeholders. Such drills will keep workers alert and ensure response mechanism in the case of incidences are improved.
- Use signage to warn staff and/ or visitors that are not involved in construction activities.
- Restrict non-essential staff from the construction sites.
- Strict instructions shall be given for drivers of heavy equipment.
- Supervision of works shall be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work.
- Develop evacuation procedures to handle emergency situations.
- Truck drivers should maintain a speed limit of not more than 20Km/hr.
- Speed controls by temporary speed bumps where necessary within the construction site.
- Clear marking of work site hazards and training in recognition of hazard symbols.
- Training of all personnel in fire prevention and protection.
- Regular inspection, testing and maintenance of equipment and machinery.
- Provide full first aid kits at the construction yard.
- Use of water sprays to arrest dust.
- Containment of hazardous materials.
- Provide adequate protective gear to construction workers.

6.6.16 Lifestyle and Culture

There are chances of arising of issues related to cultural differences/conflict between the Contractor's workforce and the local inhabitants, conflicts arising due to the mixing of local and migratory job seekers as the use of local resources and products will be increased. In this situation, local residents may resist contractor's workforce attitudes, cultural clashes particularly when local/international contractors are engaged, social disturbance and dissatisfaction with employing outsiders may arise. This impact is temporary and minor negative in nature.

Mitigations

- Timely public notification and announcement of mobilizing equipment; and
- Local labors should be employed for construction works.

6.6.17 Heavy Vehicles on the Existing Road Network & Sensitive Receptors

The plying of heavy vehicles on the existing road network may result in air pollution (if unpaved roads), noise pollution due to tire-road friction especially near sensitive receptors and damage to roads and traffic congestion. However, the impacts would be temporary and moderate negative in nature.

Mitigations

- Any vehicle with an open load carrying area used for transport of potentially dust producing materials shall have properly fitted side and tailboards. Materials having potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulin in good condition. The tarpaulin shall be properly held and extended to at least 300 mm over the edges of the sideboard and tailboard;
- The Contractor shall not use any vehicles either on or off road with grossly excessive noise pollution. Noise mufflers shall be installed and maintained in good condition on all motorized equipment under the control of the contractor;
- Timely maintenance of affected roads to avoid any inconvenience to the road commuters.

6.6.18 Possibility of Finding the Artifacts

During excavation, there is a chance of finding artifacts in that case, the contractor shall immediately report through Supervision Consultant to Directorate General (DG) of Archeological Department, Government of Pakistan to take further suitable action to preserve those antiques or sensitive remains. Chance finds procedure is given in **Annex-XII** and if need to be adopted in case of any accidental discover of cultural heritage.

6.7 Anticipated Impacts during Operational Phase

The anticipated potential environmental impacts related to the proposed project have been studied for the operational stage of the Project and are discussed as under.

6.7.1 Ecology

A. Flora

During the operation stage, landscaping will be done. Raising of new plants/ trees at available spaces will have a positive and permanent impact. No negative impacts are envisaged on the flora during the operational phase. The presence of adequate flora, along the road, will absorb flue gases, emitted from a large number of cars, vehicles and public transport, which shall in turn improve air quality.

B. Fauna

In many ways, fauna of the project area is dependent upon flora for its resting, nesting and roosting activities. With the improved flora of the project area, due to raising of large number of trees, the fauna and especially the avi-fauna shall be attracted to the area. The birds, which were scared away due to noise and degradation of their habitat, shall return to the area. Plantation on both sides shall not only reduce the noise and air pollution but will also be a source of attraction for the birds.

6.7.2 Surface and Groundwater

The estimated water consumption at full development of project will be about 1.5 million gallons per day. Water storage will also be required for emergency response in case of a fire. Prolonged water consumption may in the long run lower/deplete the underground water table. This will be a moderate negative impact.

Mitigation:

An effective Water Conservation Plan will be developed and employees of the building be trained in operational water conservation measure such as use of water efficient/ economy appurtenances and reuse of wastewater for gardening. Less water consumption will also lead to the construction of a smaller wastewater treatment plant. Following operational measures will be adopted for water conservation:

- The water taps will be regularly checked for any leakage and buckets will be used for holding water.
- It will be made sure that all faucets, circulating pumps etc. do not leak and are properly maintained;
- Leakage or dripping faucet, pump or toilet will be immediately reported;
- Utility bills will be kept in track for the consumption of water;
- Water-saving equipment will always be used and purchased;
- Treated water from wastewater treatment plant will be used for watering of lawns and other services.
- An effective employee training program about water conservation will be established.

6.7.3 Air Pollution

During operational stage of the proposed Building, the continuous operation of generators, air conditioners etc. may deteriorate the quality of air if not managed properly. Increase in traffic volume and traffic congestion during office starting and closing time will also deteriorate the air quality of the project area. This will be a minor negative impact.

Mitigation:

In order to mminimize air pollution, following mitigation measures are recommended:

- Traffic management plan will be prepared and implemented by the Project Proponents especially for office starting and closing time to ensure smooth flow of vehicles. Office timings will be adjusted to stagger timings from nearby offices/ schools;
- An air quality monitoring and improvement plan will be developed to keep the air pollution levels from generators, air conditioners, plant room etc.;
- Indoor air quality will be monitored on regular basis for parameters like CO, CO2, NO2, VOC's,

etc. and appropriate mitigation measures will be implemented;

- Fresh air will be regulated to maintain the acceptable indoor CO2 level in the space and achieve saving in energy on partial occupancy;
- For control of indoor air quality (IAQ), carbon filters will be used in addition to normal filters to remove odor from circulating air. In addition, ducted return air instead of from ceiling plenum will be provided;
- Vehicles with excessive smoke emissions will not be allowed to enter the proposed Building;
- Basements will be ventilated to exhaust smoke and other gases emitted by vehicles. CO2 and CO sensors will be provided to monitor air inside the basements to maintain acceptable level of these gases. The exhausted air from the basements will be filtered to arrest smoke and odor to ensure clean air environment around the building;
- Use of gas generators will be preferred for low emissions; and
- Regular maintenance of HVAC System.

6.7.4 Noise Pollution

Noise is considered as an interference to and imposition upon comfort, health and the quality of life. Given the conditions like exposure limit and time, noise may have both physiological as well as psychological effects on human health. Physiological effects include dizziness, nausea, unusual blood pressure variation, physical fatigue, loss of hearing, etc. While reduced mental capability and irritations may attribute to psychological effects.

During the operational stage, noise levels are anticipated to increase. Noise will be generated due to increased commercial activity, movement of vehicles in the parking area, operation of chillers, pumps, generators etc. for which proper mitigation measures are required. This will be a moderate negative impact.

Mitigation:

- Noise in the halls, departments will be controlled through proper sound proofing/ rubber lining of walls which will be built into the design/interior decoration of the Building.
- Noise levels of generators, plant rooms etc. will be monitored and workers of the area will be provided with ear muffs and noise protection gears.
- The ambient noise standards in the Country (NEQS) will be followed. There will also be prohibition on the use of horns near the building.

6.7.5 Wastewater

Wastewater generated from the Building will be approximately 80% of the water consumed i.e., 1.2 MGD. It is anticipated that wastewater will increase the pollution load in terms of Biological Oxygen demand (BOD), Chemical Oxygen Demand (COD) etc. This will be a minor negative impact.

Mitigation:

The proponents of the project will construct primary level treatment before its discharge in the public sewer.

6.7.6 Solid Waste

Most of the solid waste generated from the Islamabad Technopolis will be paper and food waste. In addition to domestic waste different hazardous and chemical wastes will also be generated from the production areas which may cause contamination/ pollution, nuisance to the employee/workers, deteriorate the aesthetics of the area and can also become a breeding place of mosquitoes. This will be a negative impact but reversible in nature.

Mitigation:

- Proper waste storage bins will be provided at each floor.
- Adequate measures to reduce reuse and recycle paper waste will be adopted.
- Remaining waste will be collected and disposed of at a proper disposal site approved by CDA.

6.7.7 Emergency Response

The operation of the proposed project will involve large numbers of visitors who may become ill or have work related accidents. In addition, disasters such as earthquakes and fires may occur which have to be considered for minimizing their impacts. This will be a moderate negative impact. Emergency response plan is attached as **Annex- XIII.**

Mitigation:

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

6.7.8 Traffic Management

During the operational phase, the number of vehicles entering/ exiting the technology zone will increase. This may result in traffic congestion, problems to the pedestrians, and overcrowding of the existing road, especially at peak hours. This will be a moderate negative impact.

Mitigation:

- There will be prohibition of roadside parking in front of the Building and provision of separate routes for entry and exit to avoid any traffic congestion.
- Office timings will also be adjusted to stagger timings from nearby offices/ schools.
- There will be prohibition of Signalization of intersection, addition of lane to cater traffic and improvement of junction geometry.

6.7.9 Topography

The topography in the Project area will change due to the construction of Project building and access road. Visual changes to the topography will be of permanent nature and need no mitigation measures except that the project design would consider aesthetic concerns such as the Tree Plantation which is already recommended in the EIA Report.

6.7.10 Drinking Water Contamination

Water pollution can originate at the internal water network. If the pipes are not cleaned properly, they may lead to bacteriological contamination of the potable/drinking water and thus will lead to infectious diseases/health problems to the employees of the building. This is a moderate negative impact.

Mitigations:

- The Management of STZA will install water filtration units with required capacity of 1.5 MGD to avoid any bacterial contamination in the drinking water;
- Water dispensers will also be used in the building;
- Water Quality Monitoring will also be conducted on quarterly basis and the quality will be maintained according to NEQS for drinking water.

6.8 Cumulative Impacts

Cumulative impacts refer to changes to the environment caused by the combined impact of past, present and future human activities and natural processes. Formerly, no major intervention has been done in the project area. However, few development works are underway in the vicinity of project area. The combined effects of these activities with the proposed project activities can

aggravate the environmental issues including air and noise pollution. Furthermore, it will also have a grave impact on the micro environmental parameters of the project area.

Mitigations:

- All the ongoing and proposed projects around the project area should be identified;
- A liaison should be made with the implementing agencies/ departments of the other projects to rectify the environmental damages caused by the combined effect of these projects.

6.9 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. Furthermore, there will be no movement of private vehicles as electric buses shall be used within Islamabad Technopolis for the movement around.

It is pertinent to mention that 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.

6.10 Positive Impacts

Any project cannot be undertaken unless it possesses more positive impacts than the environmental and social damages associated with it. Following are some of the positive impacts of the project:

- Provision of institutional and legislative support for the technology sector with internationally competitive and export-oriented structures and eco-systems;
- Attraction of foreign direct investment;
- Development of collaboration eco-system connecting academia, research and technology industry;
- Control of technology sharing;
- Infrastructure development:
- Initiation of innovation in production system and products;
- Increase in the standards and quality of technology goods and services;

- Increase in productivity and decrease in the costs of production through high-tech interventions;
- Intensive innovation and futuristic entrepreneurship;
- Job creation and poverty abatement;
- Increase in land values;
- Controllable waste & pollution discharge points
- Commercialization of technological knowledge; and
- Enhancement of economy and GDP growth.

7. ENVIRONMENTAL MANAGEMENT PLAN

7.1 General

This section aims to address the measures which are needed to be adopted during each phase of the project to avoid, contain, mitigate or compensate the potential impacts identified in **Section 6**. Environmental Management Plan (EMP) is the major part of this section and forms the gist of the EIA study. EMP not only includes Best Management Practices (BMPs) but also includes Monitoring Indicators, frequency, responsibility and estimated Environmental Budget. This ensures that mitigation, monitoring and management consideration form a part of the documentation used for decision making and the basic benefit of defining the responsibilities is to make sure that the suggested mitigation measure will be implemented at construction and operation stages of the project. Summary of the mitigation measures for potential impacts have also been given in this section to support EMP. Moreover, framework for the implementation of EMP has been discussed in this section. Following sub plans are also the part of this section.

- Environmental Monitoring Plan
- Tree Plantation Plan
- Environmental Training cost

7.2 Objectives of Environmental Management Plan (EMP)

The main objectives of the EMP are to:

- Provide the details of the Project impacts along with the proposed mitigation measures and the corresponding implementation activities;
- To ensure that all necessary corrective actions are carried out in time to counter any adverse environmental impact;
- Provide a procedure for timely action in the face of unanticipated environmental situation;
- Define the role and responsibilities of the Project Proponent (Pakistan Public Works Department), Contractor, Supervisory Consultants and other key players and effectively communicate environmental issues among them;
- Define a monitoring mechanism, reporting frequency and identify monitoring parameters to ensure that all the mitigation measures are completely and effectively implemented;
- Design the training and capacity building plan for enhancing the capacities of the key stakeholders on environmental and social management; and
- Identify the resources required to implement the EMP and outline the corresponding financing arrangements.

7.3 Environmental Management Plan (EMP)

Environmental Monitoring is undertaken during both the construction and operational phases to ensure the effectiveness of the proposed mitigation measures/BMPs. Responsibilities for the collection and analysis of data as well as the reporting requirements have been outlined in the Environmental Management Plan (EMP) below in **Table 7.1**. Implementation of environmental mitigation measures during construction is a key to avoiding and reducing

short- and long-term potential environmental impacts. Environmental cost has also been given in the EMP. Once conditions or mitigation measures have been defined in the environmental review process, they should be included in technical specifications of the contract documents. This incorporation of the environmental consideration into the tender and contract document is a fundamental pre-requisite for effective implementation of the EMP.

7.4 Implementation of Environmental Management Plan (EMP)

The following staff will be involved in the implementation of EMP:

- PIMS- Project Implementation Unit (PIU)
- Environmental Engineer (EE) of Supervision Consultant (SC);
- Environmental and Social Expert (ESE) of the Contractor.

The Project Director shall be made bound through contractual documents to implement the suggested mitigation measures in the EMP. The whole EMP will be included as a clause of the contract documents. The organizational setup for implementation of EMP is given below in **Figure 7.1.**

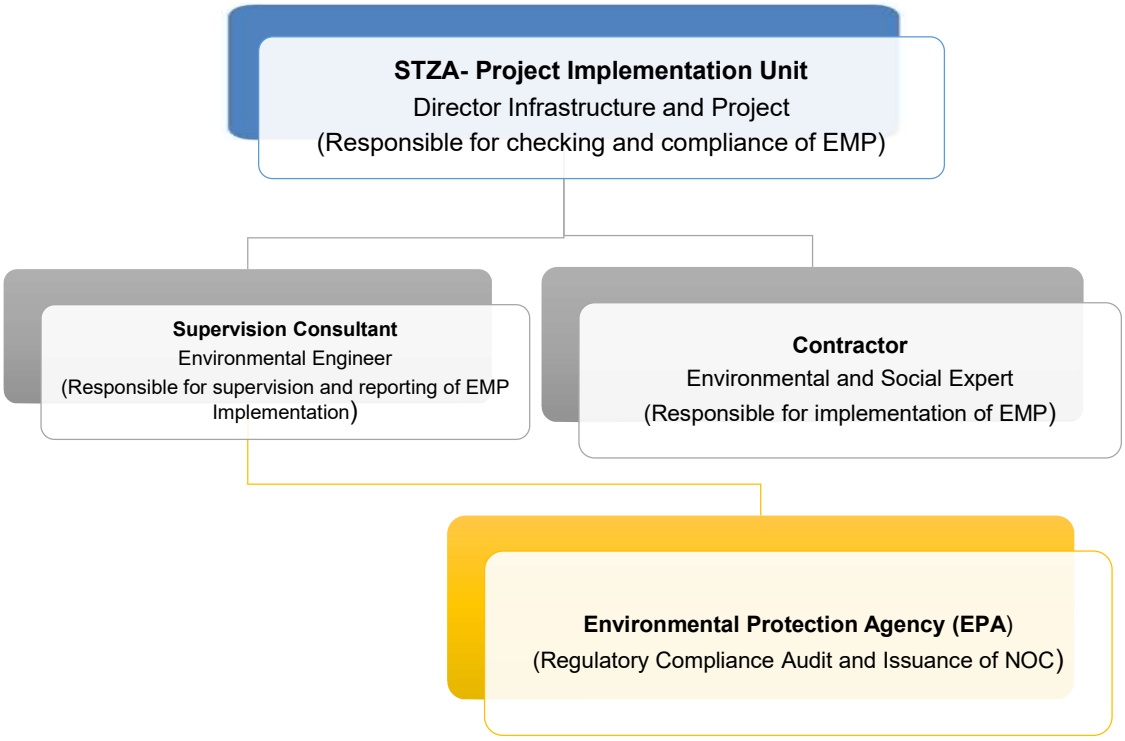

Figure 7.1: Organizational Setup for implementation of EMP during Construction Phase

7.5 Roles and Responsibilities of the Functionaries involved in EMP Implementation

A. STZA

An Environmental Representative of STZA will review the Environmental Monitoring Reports and will direct the Environmental Monitoring Engineer of Monitoring Consultant to provide any necessary information to assure efficient monitoring of the EMP.

B. Supervision Consultant: Environmental Engineer

Supervision Consultant will have responsibility for assuring implementation of EMP. This includes the following:

- Ensuring that the required environmental training is provided to the staff concerned.
- The Supervision Consultant (SC) will be responsible for carrying out visits to the construction sites to review the environmental performance of the contractors.
- Monitoring the progress of environment related activities.
- Make sure that the contractor is implementing the additional measures suggested by the Monitoring Consultant in monthly environmental monitoring reports.

C. Construction Contractor: Site Environmental Engineer

The Site Environmental Engineer of the contractor will carry out the implementation of the mitigation measures at the construction site. The contractor will be bound through contract to take actions against all the special and general provisions of the contract document.

D. Responsibilities of Environmental Protection Department (EPA)

EPA is the regulatory authority for issuance of NOC for this proposed project. As part of its mandate, protection of environment (water, air and noise) is their responsibility. Therefore, the agency will undertake an audit (as and when required) of the activities of the project (both phases) with respect to the protocols as defined in EMP. The specific responsibilities are as follow;

- Audit of the activities being undertaken by the client and all other organizations as given in the proposed institutional plan.
- Liaison with the Proponent and supervisory consultant to check compliance of measures as given in the EMP during operation phase.

7.6 Reporting Mechanism

Contractor's environmental engineer will be responsible for implementation of mitigation measures and their records while monitoring consultant will determine if the mitigation is in place and its effectiveness or any corrective action is required. Monitoring consultant will prepare a monthly compliance report based on his finding and record provided by the contractor environmental engineer on monthly basis. Monthly compliance report will be

submitted to STZA environmental compliance officer. The Environmental Engineer will also be responsible for submitting a monthly EMP compliance report for the project to STZA.

7.7 Non-Compliance of the EMP

The implementation of the proposed EMP involves inputs from various functionaries as discussed earlier. The contractor will be primarily responsible for ensuring implementation of the mitigation measures proposed in the EMP, which will be part of the contract documents. The provision of the environmental mitigation cost will be made in the total cost of project, for which the contractor will be Monitoring Consultants on the basis of monthly compliance reports. However, if the contractor fails to comply with the implementation of EMP and submission of the monthly compliance reports, deductions will be made from the payments to the Contractor claimed under the heads of environmental components.

Table 7.1: Environmental Management Plan

Sr. No.	Parameters	Target	Mitigation	Responsibility
Pre-Construction/Design Phase				
1.	Design & Layout Planning	The project design and layout planning are a critical task and need to be robust, environmentally sustainable and socially acceptable.	▪ All structural, layout and engineering designing of Islamabad Technopolis should be in strict accordance with the applicable by-laws and engineering parameters.	DC, STZA
2.	Social Issues	Provision of routes for the natives of the local areas to avoid any temporary hindrance.	▪ 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.	DC, STZA
3.	Selection Water Source	Need of a sustainable supply of water which to overcome further scarcity the existing water resources	▪ 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.	DC, STZA
4.	Traffic Congestion/ Parking Issue	To avoid any traffic congestion or parking issues for the people of local areas	▪ The individual buildings should also keep provision of parking facilities based on their daily influx of people; and ▪ Re-strengthen of NIH road, Mohra Nur road	DC, STZA

Sr. No.	Parameters	Target	Mitigation	Responsibility
			and IT park road (2+2), for better traffic management.	
5.	Additional Load on Existing Utilities	The existing utilities must not be affected and alternate arrangements should be made during project's implementation	▪ 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.	DC, STZA
6.	Seismic Hazard	To minimize the structural damage due to seismic hazards	▪ The proposed project shall be designed and constructed to withstand low to moderate earthquakes. For seismic hazard analysis,	DC, STZA

Sr. No.	Parameters	Target	Mitigation	Responsibility
			updated structural and seismic evaluations will be consulted.	
7.	Resources Conservation	To protect the physical cultural resources	▪ 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.	DC, STZA
8.	Emergency Response	To efficiently meet the emergency situations	▪ 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	DC, STZA

Sr. No.	Parameters	Target	Mitigation	Responsibility
			will be kept, to meet any emergency in case of water flooding the basement.	
9.	Fire Fighting System & Storage	To avoid any incident provision of an efficient firefighting system & storage	▪ Storage for firefighting should be provided in water storage reservoir; ▪ Water sprinkler system and Siamese couplings should also be part of firefighting system; ▪ Special provisions for fire safety in the building will also be considered during the design phase.	DC, STZA
10	Visual impact	Restoration of the area by plantation of trees and green belts.	▪ 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.	DC, STZA
Sr. No	***Project Component or Impact***	***Target***	***Mitigation***	***Responsibility***
Construction Phase				
1.	Soil & Deep Excavation	To minimize soil erosion and contamination	▪ 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;	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			▪ 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;	

Sr. No.	Parameters	Target	Mitigation	Responsibility
			▪ 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. ▪	
2.	Construction Camps/Camp Sites	To minimize the impacts of construction sites	▪ 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	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			comprised of a training manual, use of safety equipment, emergency preparedness and code of ethics.	
3.	Health and safety	To minimize health risks	▪ Providing basic medical training to specified work staff and basic medical service and supplies to workers; ▪ Obligatory insurance against accidents for laborer's/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 laborers; ▪ 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;	STZA, CC & SC
4.	Air Quality	To minimize air pollution	▪ 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	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			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.	

Sr. No.	Parameters	Target	Mitigation	Responsibility
5.	Noise and Vibration	To minimize noise pollution and impacts of vibration	▪ 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	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
6.	Dust	To avoid dust issue	▪ 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.	
7.	Solid Waste	To minimize the nuisance due to solid waste	▪ 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; ▪ 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;	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			▪ 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	
8.	Disposal of Construction Waste/ Excavated Material	To manage the excavated material and dispose of wastes adequately	▪ 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	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			the waste generated from the construction activities.	
9.	Sanitation Waste Disposal	To manage and dispose of wastes adequately	▪ The contractor will provide pit latrines, septic tanks for labor camps to treat the sanitary wastewater before its discharge into public sewer.	STZA, CC & SC
10.	Surface water/ Groundwater Quality	To avoid contamination of surface and groundwater	▪ 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;	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			▪ 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.	
11.	Biodiversity Conservation and Natural Resources	To conserve natural resources	▪ 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 ▪ A tree plantation program will be formulated by the PHA in consultation with the CDA/RDA along the project area at available sites.	STZA, CC & SC
12.	Disposal of Mucking Material		▪ Proper landscaping should be given due consideration along with re-establishment of the local/indigenous vegetation;	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			▪ The excavated materials that are unsuitable for use will need to be stored, transported and disposed of appropriately at designated sites.	
13.	Disruption of Existing Public Utilities/ Infrastructure		▪ Rehabilitation of existing utilities before construction to avoid any inconvenience to the residents of the project area or provide them with alternate arrangement during the construction period; ▪ Before starting the excavation, proper planning shall be done and soil investigations shall be thoroughly conducted to develop understanding of the area. Furthermore, following shall be considered: ▪ ▪ Unnecessary excavation should be avoided; ▪ Excavations shall be carried out carefully to avoid damaging infrastructure in the surroundings of the project area; and ▪ Temporary retaining structures shall be provided.	STZA, CC & SC
14.	Traffic Management		▪ Proper traffic management plan will be needed to avoid traffic jams/public inconvenience; ▪ Movement of vehicles carrying construction materials should be restricted during the daytime to reduce traffic load and inconvenience to the local residents. ▪ The executing agency is required to maintain liaison between the Traffic Police, local residents/ travelers and the contractor to facilitate traffic movement during construction stage.	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
15.	Social Impacts		▪ Regular drills shall constantly follow on various possible incidences. This will test the response of the stakeholders. Such drills will keep workers alert and ensure response mechanism in the case of incidences are improved. ▪ Use signage to warn staff and/ or visitors that are not involved in construction activities. ▪ Restrict non-essential staff from the construction sites. ▪ Strict instructions shall be given for drivers of heavy equipment. ▪ Supervision of works shall be done regularly to ensure that safety conditions are met while any deviation from safety regulations is immediately reclaimed following the best practices regarding safety at work. ▪ Develop evacuation procedures to handle emergency situations. ▪ Truck drivers should maintain a speed limit of not more than 20Km/hr. ▪ Speed controls by temporary speed bumps where necessary within the construction site. ▪ Clear marking of work site hazards and training in recognition of hazard symbols. ▪ Training of all personnel in fire prevention and protection. ▪ Regular inspection, testing and maintenance of equipment and machinery. ▪ Provide full first aid kits at the construction yard. ▪ Use of water sprays to arrest dust. ▪ Containment of hazardous materials.	STZA, CC & SC

Sr. No.	Parameters	Target	Mitigation	Responsibility
			▪ Provide adequate protective gear to construction workers.	
16.	Lifestyle and Culture		▪ Timely public notification and announcement of mobilizing equipment; and ▪ Local labors should be employed for construction works.	STZA, CC & SC
17.	Heavy Vehicles on the Existing Road Network & Sensitive Receptors		▪ Any vehicle with an open load carrying area used for transport of potentially dust producing materials shall have properly fitted side and tailboards. Materials having potential to produce dust shall not be loaded to a level higher than the side and tail boards and shall be covered with clean tarpaulin in good condition. The tarpaulin shall be properly held and extended to at least 300 mm over the edges of the sideboard and tailboard; ▪ The Contractor shall not use any vehicles either on or off road with grossly excessive noise pollution. Noise mufflers shall be installed and maintained in good condition on all motorized equipment under the control of the contractor; ▪ Timely maintenance of affected roads to avoid any inconvenience to the road commuters.	STZA, CC & SC
Operation Phase				
1.	Surface and Groundwater	To conserve and protect water resources	▪ The water taps will be regularly checked for any leakage and buckets will be used for holding water. ▪ It will be made sure that all faucets, circulating pumps etc. do not leak and are properly maintained;	STZA & EPA

Sr. No.	Parameters	Target	Mitigation	Responsibility
			▪ Leakage or dripping faucet, pump or toilet will be immediately reported; ▪ Utility bills will be kept in track for the consumption of water; ▪ Water-saving equipment will always be used and purchased; ▪ Treated water from wastewater treatment plant will be used for watering of lawns and other services. ▪ An effective employee training program about water conservation will be established.	
2.	Air Quality	To minimize air pollution	▪ Traffic management plan will be prepared and implemented by the Project Proponents especially for office starting and closing time to ensure smooth flow of vehicles. Office timings will be adjusted to stagger timings from nearby offices/ schools; ▪ An air quality monitoring and improvement plan will be developed to keep the air pollution levels from generators, air conditioners, plant room etc.; ▪ Indoor air quality will be monitored on regular basis for parameters like CO, CO2, NO2, VOC's, etc. and appropriate mitigation measures will be implemented; ▪ Fresh air will be regulated to maintain the acceptable indoor CO2 level in the space and achieve saving in energy on partial occupancy; ▪ For control of indoor air quality (IAQ), carbon filters will be used in addition to normal filters to remove odor from circulating air. In addition,	STZA & EPA

Sr. No.	Parameters	Target	Mitigation	Responsibility
			ducted return air instead of from ceiling plenum will be provided; ▪ Vehicles with excessive smoke emissions will not be allowed to enter the proposed Building; ▪ Basements will be ventilated to exhaust smoke and other gases emitted by vehicles. CO2 and CO sensors will be provided to monitor air inside the basements to maintain acceptable level of these gases. The exhausted air from the basements will be filtered to arrest smoke and odor to ensure clean air environment around the building; ▪ Use of gas generators will be preferred for low emissions; and ▪ Regular maintenance of HVAC System.	
3.	Noise Pollution	To reduce/ contain noise pollution	▪ Noise in the halls, departments will be controlled through proper sound proofing/ rubber lining of walls which will be built into the design/interior decoration of the Building. ▪ Noise levels of generators, plant rooms etc. will be monitored and workers of the area will be provided with ear muffs and noise protection gears. ▪ The ambient noise standards in the Country (NEQS) will be followed. There will also be prohibition on the use of horns near the Building.	STZA & EPA
4.	Wastewater	To manage, treat and dispose wastewater adequately	▪ The proponents of the project will construct septic tank for primary and secondary treatment by designing it for 1 – 2 days of retention time to bring the wastewater quality	STZA & EPA

Sr. No.	Parameters	Target	Mitigation	Responsibility
			within the NEQS (Annexure-IV) before its discharge in the public sewer. The treated wastewater will be reused for watering the lawns etc.	
5.	Solid waste	Proper handling of the Solid waste to avoid the odor.	▪ Proper waste storage bins will be provided at each floor. ▪ Adequate measures to reduce reuse and recycle paper waste will be adopted. ▪ Remaining waste will be collected and disposed of at a proper disposal site approved by CDA.	STZA
6.	Emergency Response	To meet the emergency situations	▪ An Emergency Response Plan for earthquakes and manmade disasters will be developed by the Building Management. ▪ Emergency Response Plan will be implemented in close consultation with the Fire Fighting Department, bomb disposal squad and paramedics. ▪ In addition, training of the staff/employees regarding the emergency procedures/plans will be regularly conducted.	STZA & 1122
7.	Traffic Management	To manage traffic and avoid congestions	▪ There will be prohibition of roadside parking in front of the Building and provision of separate routes for entry and exit to avoid any traffic congestion. ▪ Office timings will also be adjusted to stagger timings from nearby offices/ schools.	STZA & ICT Traffic Police
8.	Drinking Water Contamination	To ensure provision of safe drinking water	▪ The Management of STZA will install water filtration units with required capacity of 1.5 MGD to avoid any bacterial contamination	STZA

Sr. No.	Parameters	Target	Mitigation	Responsibility
			in the drinking water; ▪ Water dispensers will also be used in the building; ▪ Water Quality Monitoring will also be conducted on quarterly basis and the quality will be maintained according to NEQS for drinking water (attached as Annexure-V).	

KEY

DC	Design Consultant	CC	Construction Contractor
STZA	Special Technology Zone Authority		
SC	Supervision Consultant		
EPA	Environment Protection Agency		

7.8 Environmental Monitoring

Environmental Monitoring is undertaken during both the construction and operational phases to ensure the effectiveness of the proposed mitigation measures. Certain environmental parameters are selected and quantitative analysis is carried out. The results of analysis are compared with the guidelines; standards and pre-project condition to investigate whether the EMP and its implementation are effective for the mitigation of impacts or not. Parameters to be analyzed during construction and operation of the project and responsibilities for monitoring and reporting have been discussed below. A cost estimate for this measurement of parameters is given in **Table 7.2.**

A. Construction Phase

A. Air Quality

Air quality monitoring will be carried out quarterly basis during the construction phase at the representative locations.

The following parameters will be monitored:

- CO
- O^3
- NO_X
- SO_2
- $PM_{2.5}$, PM_{10}

B. Groundwater Quality

Groundwater quality monitoring will be done quarterly during the construction phase at the representative locations. The parameters mentioned in NEQS will be monitored to assess groundwater quality.

C. Surface Water Quality

Surface water quality monitoring will be done quarterly during the construction phase at the representative locations. The parameters mentioned in NEQS for disposal in inland waters will be monitored to assess surface water quality.

D. Noise Levels

The noise levels monitoring will be carried out on quarterly basis at representative locations in the project area.

B. Operational Phase

A. Air Quality

Air quality monitoring will be done quarterly during the operational phase at the representative locations. The following parameters will be monitored:

- CO
- O_3
- NO_X
- SO_2
- $PM_{2.5}$, PM_{10}

B. Ground Water Quality

Groundwater quality monitoring will be done quarterly during the operation phase at the representative locations. The parameters mentioned in NEQS will be monitored to assess groundwater quality.

C. Surface Water Quality

Surface water quality monitoring will be done quarterly during the operation phase at the representative locations. The parameters mentioned in NEQS for disposal in inland waters) will be monitored to assess surface water quality.

D. Noise Levels

The noise level monitoring will be carried out quarterly at representative locations in the project area.

7.9 Responsibilities for Monitoring and Reporting

The Construction Contractor (CC) will be responsible for environmental monitoring and reporting throughout the construction phase under the supervision of Environmental Engineer of Supervision Consultant (SC) while implementing agency will be responsible for monitoring at operation phase. Contractor will submit the monthly report to SC. SC will review the report and will give its observations. Monthly report will be submitted to EPA through client.

This should be included in general clauses of the contract and contractor should be paid separately.

Table 7.2: Budget Estimate for Environmental Monitoring During the Construction and Operation Phases

Components	Parameters	No. of Samples (No. of Samples x Frequency x Year)	Frequency	Responsibility	Duration	Cost (Rs.)
Construction Phase (1.5 year)						
Ground Water Quality	All NEQS parameters	3x4x1.5 = 18	Quarterly @ Rs 30,000/ sample	Contractor/ STZA	-	540,000
Surface Water Quality	All NEQS parameters	3x4x1.5 = 18	Quarterly @ Rs 30,000/ sample	Contractor/ STZA	-	540,000
Air Quality	All NEQS parameters	3x4x1.5 = 18	Quarterly @ Rs 60,000/ sample	Contractor/ STZA	24 hours	1,080,000
Noise Level	-	3x4x1.5 = 18	Quarterly @ Rs 2,000/ sample	Contractor/ STZA	24 hours	36,000
					TOTAL	**2,196,000**
Operation Phase (5 year)						
Ground Water Quality	All NEQS parameters	3x4x5 = 60	Quarterly @ Rs 30,000/ sample	STZA/ Federal EPA	-	1,800,000
Surface Water Quality	All NEQS parameters	3x4x5 = 60	Quarterly @ Rs 30,000/ sample	STZA/ Federal EPA	-	1,800,000
Air Quality	All NEQS parameters	3x4x5 = 60	Quarterly @ Rs 60,000/ sample	STZA/ Federal EPA	24 hours	3,600,000
Noise Level	-	3x4x5 = 60	Quarterly @ Rs 2,000/ sample	STZA/ Federal EPA	24 hours	120,000
					Total	**7,320,000**
					Grand Total	**9,516,000**

Key
STZA- Special Technology Zone Authority
EPA – Environmental Protection Agency

7.10 Environmental Technical Assistance and Training Plan

In order to raise the level of professional and managerial staff, there is a need to upgrade their knowledge in the related areas. The CC and STZA should play a key role in this respect and arrange the trainings.

An environmental and social training program is to be carried out before the implementation of the project. Contractor's environmental awareness and appropriate knowledge of environmental protection is critical to the successful implementation of the EMP because without appropriate environmental awareness, knowledge and skills required for the implementation of the mitigation measures, it would be difficult for the contractor(s) workforce to implement effective environmental protection measures. A suitable training program is proposed to train the contractor(s) staff who will be involved in the construction phase and the professional staff from the client involved at the operational stage of the project.

STZA will engage TA consultant to manage the environmental training program. The objective of the TA will be to help in establishment of appropriate systems, and to train senior STZA staff responsible for managing environment, operations, and planning, who can then impart training at a broader level within and outside the STZA (i.e., the training of trainers). The TA consultant will organize training courses for STZA and contractor staff to train them in specialized areas such as air and noise pollution monitoring; develop environment operation manuals in consultation with the EPA. The details of this training program are presented in **Table 7.3** and the cost of HSE is given in **Table 7.4.**

Table 7.3: Personnel Training Program/ TA Services

Provided by	Contents	Trainees/Events	Duration
TA consultants/ organizations specializing in environmental management and monitoring	Short seminars and courses on: Environmental laws and regulations, daily monitoring and supervision	Three seminars for STZA and Contractor project staff	3 days
TA consultants/ organizations specializing in social management and monitoring	Short seminars and courses Social awareness	Three seminars for project staff dealing in Social/lands matters	3 days
TA consultants/ organizations specializing in Occupational, health and safety issues	Short lectures relating to Occupational Safety and Health	Two seminars for contractor's staff	4 days

Table 7.4: Budget Estimate for Training of Workers & Institutional Strengthening Cost

Sr. No.	Training	Participants	Description	Quantity	Amount (PKR)
Training Cost of Workers					
1	Environment code of practices	Contractor Staff	Awareness & applicability of environmental code of practices	Once	100,000
2	Awareness workshop regarding Covid 19 and other vector borne diseases	Contractor Staff	Risk, Prevention and available treatment	Once	100,000
3	Waste Management	Contractor Staff	Awareness associated with waste Storage, collection and safe disposal	Once	100,000
4	Workshop on Emergency Response	Contractor Staff	Potential natural and other hazard/emergencies and dealing with emergency to minimize damage	Once	300,000
5	Workshop on Community/ occupational health and safety	Contractor Staff	Awareness on EHS Guidelines	Once	350,000
6	Gender Aspects	Contractor Staff	Awareness on gender inequalities/GBV	Once	400,000
TOTAL					**1,350,000**

Table 7.5: Institutional Strengthening

Sr. No.	Description	Duration	Unit	Rate (PKR)	Amount (PKR)
1.	Environmental/ HSE Expert	18	Months	250,000	4,500,000
				Grand Total	**4,500,000**

7.11 Health and Safety Cost

The cost to ensure occupational health and safety is summarized below in **Table 7.6**.

Table 7.6: Budget Estimate for HSE

Sr. No.	Description	Quantity	Unit	Rate (PKR)	Amount (PKR)
1	Medical screening for workers	500	Persons	5,000	2,500,000
2	Tarpaulins	2	L.S.	30,000	60,000
3	Handling of hazardous material	18	Month	20,000	360,000
4	Handling of solid waste	18	Month	50,000	900,000
5	DCP Fire extinguishers in case of fire	5	Each	3,500	17,500
	CO2 Fire extinguishers in case of fire	5	Each	10,000	50,000
	Fire alarm	3	Each	10,000	30,000
6	Special Measures for Covid-19	-	L.S.	-	1,000,000
7	Cost of Personal Protective Equipment (PPE) Break-up cost given in Table 7.7	-	L.S.	-	8,390,000
				TOTAL	**13,307,500**

Table 7.7: Break-up Cost of Personal Protective Equipment (PPE)*

Item No.	Description	Quantity	Unit	Rate (PKR)	Amount PKR
1	Ear plugs	1,000	Each	100	100,000
2	Helmets	500	Each	1500	750,000
3	Safety shoes	500	Each	3000	1,500,000
4	Protective goggles	1,000	Each	2000	2,000,000
5	Gloves	1,250	Each	300	375,000
6	Dust Mask	36,000	Each	100	3,600,000
7	Face Sheild	20	Each	2000	40,000
8	First Aid Kit	5	Each	5000	25,000
				Total	**8,390,000**

7.12 Tree Plantation Plan

Approximately 604 trees will be cut during construction of our project components (road infrastructure & boundary wall etc.). Loss of trees should be mitigated by transplanting 6500 trees (6 -10 ft height) in project area with a ratio of 1:10. Details of trees, to be cut due to infrastructure development of the project, is represented in **Table 7.8** and age summary of trees is shown in **Figure 7.2.**

Table 7.8: Detail of Trees in Respective Age Ranges

Sr. No.	Age (Years)	Acacia modesta	Dalbergia sissoo	Ficus carica	Broussonetia papyrifera	Melia azedarach	Albizia lebbeck	Popular	Ficus bengalensis	Sepium Sebi Ferum	Morus alba	Total Trees
1	1-10	7	58	2	10	4	0	32	0	1	1	**115**
2	11-20	43	92	20	4	1	0	7	0	1	2	**170**
3	21-30	74	30	14	0	0	0	0	0	3	0	**121**
4	31-40	95	1	1	0	0	2	0	0	1	0	**100**
5	41-50	66	1	0	0	0	0	0	0	0	0	**67**
6	51-60	25	0	0	0	0	0	0	0	0	0	**25**
7	61-70	5	0	0	0	0	0	0	0	0	0	**5**
8	71-80	0	0	0	0	0	0	0	1	0	0	**1**
Total		**315**	**182**	**37**	**14**	**5**	**2**	**39**	**1**	**6**	**3**	
Grand Sum												**604**

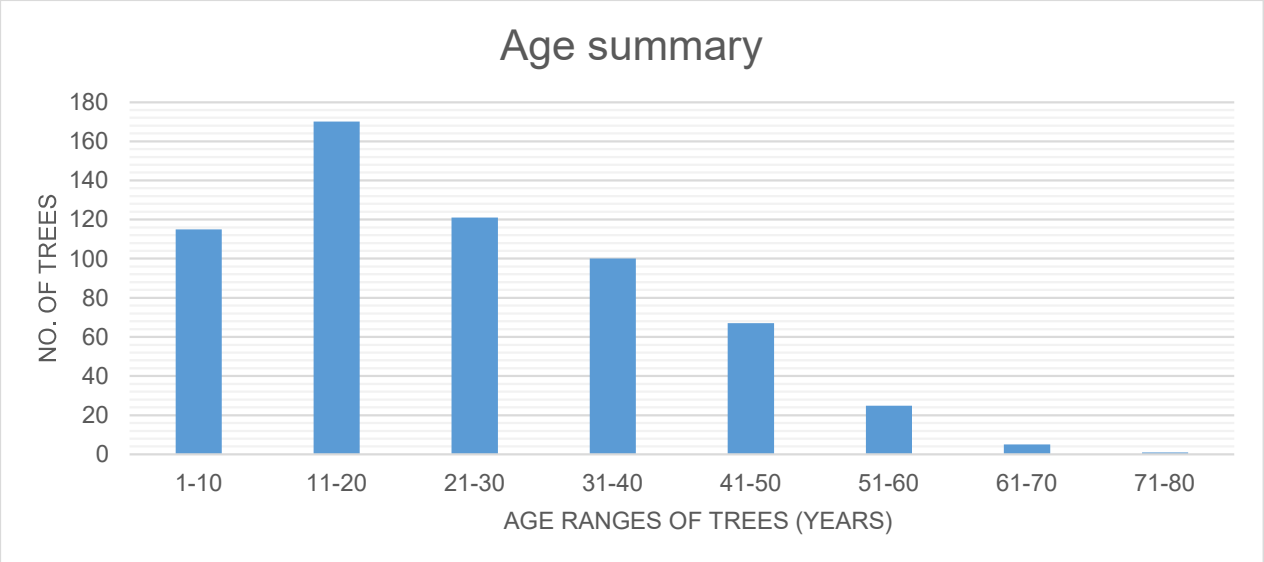

Figure 7.2: Age Summary of Total Trees

A. Trees Survey Analysis

During age determination of existing trees that are to be removed for construction of roads in above mentioned project area, multiple factors were taken into consideration.

- Soil type, temperature range, average annual rainfall, average annual growth rate of distinct

plant species, stem girth, tree height and crown spread were observed.

- Maximum and minimum temperature is of great importance for different type of plants. Different types of plants have different optimum temperature ranges in which they flourish vigorously. If temperature is less or more than that range then their growth is affected.
- Location of a specific tree is also very important for tree age calculation. Accessibility of sufficient sun light for photosynthesis, ample supply of water and availability of enough space for expansion of crown are those important items that affect plant growth. Sometimes due to these factors growth of those tree species is also badly affected that have high average annual growth rate.
- Sometimes tree is near bank of a stream. Its growth will be faster as compared to those surrounding trees that cannot get required amount of water.
- Some trees grow totally under shade or semi shade. As adequate amount of light required for photosynthesis does not reach up to them, their growth will be slow as compared to those trees that get sufficient amount of sun light.
- Sometimes plant to plant distance is very less and trees can not properly grow due to non-availability of sufficient space.

The age determination of trees at site is carried out by considering and giving due weightage to all above mentioned elements along with average annual growth rate of a specific plant.

B. Green Areas

Six (06) green areas are provided in Islamabad Technopolis. Detail of these areas is follows in **Table 7.9.**

Table 7.9: Green Areas

Sr. No.	Green Areas	Area Covered
1.	Park 1	5.34 Acres
2.	Park 2	3.76 Acres
3.	Park 3	2.96 Acres
4.	Park 4	1.00 Acres
5.	Park 5	0.56 Acres
6.	Park 6	2.15 Acres
Total		**15.77 Acres**

Three groves of ornamental shrubs shall be grown in each park i.e., Park 1, Park 2, Park 3, Park 4, Park 5, Park 6, Thus a total of Eighteen groves of ornamental shrubs shall be raised. Each grove shall consist of four shrubs. Therefore, the number of shrubs required comes to 72. In addition to it, American Grass equal to 15.77 Acres, in the shape of carpet, shall also be required to raise grass in the green areas.

C. Plantation Cost

The cost of 6500 tress & O&M of one (01) year is given in below **Table 7.10**. Pictures of proposed trees species are attached as **Annex-XIV.**

Table 7.10: Cost Estimates for Plantation Against Removed Trees

Sr. No.	Plants	Pot Size	Plant Size	Unit	Rate (Rs)	Quantity	Total
1	**Palms**			No.		**350**	**1,950,000**
1.1	Phoenix canariesnsis	24"	7'-10'	-	5500	50	275000
1.2	Syagrus romanzoffiana	24"	8'-10'	-	6000	50	300000
1.3	Washingtonia	24"	8'-10'	-	3000	50	150000
1.4	Livistona chinensis	24"	8'-10'	-	6000	50	300000
1.5	Roystonea regia	24"	8'-10'	-	3500	50	175000
1.6	Phoenix rupicola	24"	7'-8'	-	5500	50	275000
1.7	Wodyetia bifurcata	24"	7'-8'	-	5000	50	250000
1.8	Bismarkia nobilis	24"	8'-10'	-	4500	50	225000
2	**Shady trees**					**6,150**	**7,580,000**
2.1	Cassia fistula	18"	7'-10'	-	1200	400	480000
2.2	Syzygium cumini	18"	7'-10'	-	1000	200	200000
2.3	Pinus roxburghii	18"	6'-8'	-	1500	300	450000
2.4	Diospyros malabarica	18"	6'-8'	-	1100	200	220000
2.5	Ficus virens	18"	7'-10'	-	800	300	240000
2.6	Sapium sebiferum	18"	6'-8'	-	1200	300	360000
2.7	Putranjiva roxburghii	18"	7'-10'	-	1200	400	480000
2.8	Callistemon viminalis	18"	7'-10'	-	900	200	180000
2.9	Bauhinia variegata	18"	6'-8'	-	800	200	160000
2.10	Terminalia arjuna	18"	7'-10'	-	1000	200	200000
2.11	Pongamia pinnata	18"	7'-10'	-	1000	300	300000
2.12	Terminalia mantaly	18"	7'-10'	-	850	300	255000
2.13	Cassia javanica	18"	6'-8'	-	3000	300	900000
2.14	Delonix regia	18"	6'-8'	-	1300	300	390000
2.15	Jacaranda mimosifolia	18"	6'-8'	-	1000	300	300000
2.16	Erythrina suberosa	18"	7'-10'	-	1200	150	180000
2.17	Tabebuia aurea	18"	6'-8'	-	1200	150	180000
2.18	Ficus amstel king	18"	7'-10'	-	900	300	270000
2.19	Ficus hawaii	18"	6'-8'	-	1000	250	250000
2.20	Albizia lebbeck	18"	7'-10'	-	1100	250	275000
2.21	Grevillea robusta	18"	5'-8'	-	1800	100	180000
2.22	Alstonia scholaris	18"	7'-10'	-	1000	200	200000

Sr. No.	Plants	Pot Size	Plant Size	Unit	Rate (Rs)	Quantity	Total
2.23	Magnolia grandiflora	18"	5'-8'	-	3000	150	450000
2.24	Chorisia insignis	18"	6'-8'	-	1500	200	300000
2.25	Melia azedarach	18"	6'-8'	-	900	200	180000
	Sub Total (Palms +Shady Trees)						**9,530,000**
2.26	Transportation charges			%	5	-	476,500
2.27	Mortality			%	15	-	1,429,500
2.28	Contractors Profit (of total cost)			%	20	-	2,287,200
						Sub Total (RS.)	**13,723,200**
2	**Input Requirements (Transportation charges included)**						
2.1	Fertilizer (NPK) for palms (350 Numbers)			Kg/plant	162	1.2	68,040
2.2	Fertilizer (NPK) for shady tress (6,150 Numbers)			Kg/plant	162	1	996,300
2.3	FYM for palms & shady trees (6,500 Numbers)			Kg/plant	8	4	208,000
2.4	Pesticide (for 6,500 Number trees)			Each	40	1	260,000
	Sub Total						***1,532,340***
2.5	Contractors Profit (of total cost)			%	-	20	306,468
						Sub Total (RS.)	**1,838,808**
3	**Development AND MAINTENANCE (For 1 Year)**						
3.1	Horticulturist (01 number)			Man-Month	100,000	12	1,200,000
3.2	Head Gardner (02 number)			Man-Month	40,000	24	960,000
3.3	Gardner (22 numbers)			Man-Month	27,000	264	7,128,000
3.4	Miscellaneous (Vehicle expenditures, wear & tear of tools etc.)			%	-	10	928,800
3.5	Contractors Profit (of total cost)			%	-	20	2,043,360
						Sub Total (RS.)	**12,260,160**
						Grand Total (RS.)	**27,822,168**

Note: Input requirements may vary depending upon the climatic conditions, soil type and pest attack. Payment will be made as per application.

7.13 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**

Annexures

ANNEX-I

NEQS

REGISTERED No. M - 302
L.-7646

The Gazette of Pakistan

EXTRAORDINARY
PUBLISHED BY AUTHORITY

ISLAMABAD, FRIDAY, NOVEMBER 26, 2010

PART II

Statutory Notifications (S. R. O.)

GOVERNMENT OF PAKISTAN

MINISTRY OF ENVIRONMENT

NOTIFICATIONS

Islamabad, the 18th October, 2010

S. R. O. 1062(I)/2010.—In exercise of the powers conferred under clause (c) of sub-section (I) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Environmental Quality Standards for Ambient Air.

National Environmental Quality Standards for Ambient Air

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of measurement
		Effective from 1st July, 2010	Effective from 1st January 2013	
Sulphur Dioxide (SO_2)	Annual Average*	80 $\mu g/m^3$	80 $\mu g/m^3$	-Ultraviolet Fluorescence method
	24 hours**	120 $\mu g/m^3$	120 $\mu g/m^3$	
Oxides of Nitrogen as (NO)	Annual Average*	40 $\mu g/m^3$	40 $\mu g/m^3$	- Gas Phase Chemiluminescence
	24 hours**	40 $\mu g/m^3$	40 $\mu g/m^3$	

[2944(2010)/Ex. Gaz.] *Price: Rs. 5.00*

Pollutants	Time-weighted average	Concentration in Ambient Air		Method of measurement
		Effective from 1st July, 2010	Effective from 1st January 2013	
Oxides of Nitrogen as (NO_2)	Annual Average*	40 $\mu g/m^3$	40 $\mu g/m^3$	- Gas Phase Chemiluminescence
	24 hours**	80 $\mu g/m^3$	80 $\mu g/m^3$	
O^3	1 hour	180 $\mu g/m^3$	130 $\mu g/m^3$	-Non dispersive UV absorption method
Suspended Particulate Matter (SPM)	Annual Average*	400 $\mu g/m^3$	360 $\mu g/m^3$	- High Volume Sampling, (Average flow rate not less than 1.1 m3/minute).
	24 hours**	550 $\mu g/m^3$	500 $\mu g/m^3$	
Respirable Particulate Matter, PM_{10}	Annual Average*	200 $\mu g/m^3$	120 $\mu g/m^3$	-β Ray absorption method
	24 hours**	250 $\mu g/m^3$	150 $\mu g/m^3$	
Respirable Particulate Matter, $PM_{2.5}$	Annual Average*	25 $\mu g/m^3$	15 $\mu g/m^3$	-β Ray absorption method
	24 hours**	40 $\mu g/m^3$	35 $\mu g/m^3$	
	1 hour	25 $\mu g/m^3$	15 $\mu g/m^3$	
Lead Pb	Annual Average*	1.5 $\mu g/m^3$	1 $\mu g/m^3$	- ASS Method after sampling using EPM 2000 or equivalent Filter paper
	24 hours**	2 $\mu g/m^3$	1.5 $\mu g/m^3$	
Carbon Monoxide (CO)	8 hours**	5 mg/m^3	5 mg/m^3	- Non Dispersive Infra Red (NDIR) method
	1 hour	10 mg/m^3	10 mg/m^3	

*Annual arithmetic mean of minimum 104 measurements in a year taken twice a week 24 hourly at uniform interval.

** 24 hourly /8 hourly values should be met 98% of the in a year. 2% of the time, it may exceed but not on two consecutive days.

S. R. O. 1063(I)/2010.— In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Standards for Drinking Water Quality.

National Standards for Drinking Water Quality

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Bacterial			
All water intended for drinking (e.Coli or Thermotolerant Coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water entering the distribution system (E.Coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample	Must not be detectable in any 100 ml sample	Most Asian countries also follow WHO standards
Treated water in the distribution system (E. coli or thermo tolerant coliform and total coliform bacteria)	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample In case of large supplies, where sufficient samples are examined, must not be present in 95% of the samples taken throughout any 12 month period.	Most Asian countries also follow WHO standards
Physical			
Colour	≤ 15 TCU	≤ 15 TCU	
Taste	Non objectionable/Acceptable	Non objectionable/Acceptable	
Odour	Non objectionable/Acceptable	Non objectionable/Acceptable	
Turbidity	〈 5 NTU	〈 5 NTU	
Total hardness as $CaCO_3$	< 500 mg/l	----	
TDS	〈 1000	〈 1000	
pH	6.5 – 8.5	6.5 – 8.5	
Chemical			
Essential Inorganic	***mg/Litre***	***mg/Litre***	
Aluminium (Al) mg/l	≤ 0.2	0.2	

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Antimony (Sb)	≤ 0.005 (P)	0.02	
Arsenic (As)	≤ 0.05 (P)	0.01	Standard for Pakistan similar to most Asian developing countries
Barium (Ba)	0.7	0.7	
Boron (B)	0.3	0.3	
Cadmium (Cd)	0.01	0.003	Standard for Pakistan similar to most Asian developing countries
Chloride (Cl)	< 250	250	
Chromium (Cr)	≤ 0.05	0.05	
Copper (Cu)	2	2	
Toxic Inorganic	***mg/Litre***	***mg/Litre***	
Cyanide (CN)	≤ 0.05	0.07	Standard for Pakistan similar to Asian developing countries
Fluoride (F)*	≤ 1.5	1.5	
Lead (Pb)	≤ 0.05	0.01	Standard for Pakistan similar to most Asian developing countries
Manganese (Mn)	≤ 0.5	0.5	
Mercury (Hg)	≤ 0.001	0.001	
Nickel (Ni)	≤ 0.02	0.02	
Nitrate (NO_3)*	≤ 50	50	
Nitrite (NO_2)*	≤ 3 (P)	3	
Selenium (Se)	0.01(P)	0.01	
Residual chlorine	0.2-0.5 at consumer end 0.5-1.5 at source	—	
Zinc (Zn)	5.0	3	Standard for Pakistan similar to most Asian developing countries

* indicates priority health related inorganic constituents which need regular monitoring.

Properties/Parameters	Standard Values for Pakistan	Who Standards	Remarks
Organic			
Pesticides mg/L		PSQCA No. 4639-2004, Page No. 4 Table No. 3 Serial No. 20- 58 may be consulted.***	Annex II
Phenolic compounds (as Phenols) mg/L		≤ 0.002	
Polynuclear aromatic hydrocarbons (as PAH) g/L		0.01 (By GC/MS method)	
Radioactive			
Alpha Emitters bq/L or pCi	0.1	0.1	
Beta emitters	1	1	

*** PSQCA: Pakistan Standards Quality Control Authority.

Proviso:

The existing drinking water treatment infrastructure is not adequate to comply with WHO guidelines. The Arsenic concentrations in South Punjab and in some parts of Sindh have been found high then Revised WHO guidelines. It will take some time to control arsenic through treatment process. Lead concentration in the proposed standards is higher than WHO Guidelines. As the piping system for supply of drinking water in urban centres are generally old and will take significant resources and time to get them replaced. In the recent past, Lead was completely phased out from petroleum products to cut down Lead entering into environment. These steps will enable to achieve WHO guidelines for Arsenic, Lead, Cadmium and Zinc. However, for bottled water, WHO limits for Arsenic, Lead, Cadmium and Zinc will be applicable and PSQCA Standards for all the remaining parameters.

S. R. O. 1064(I)/2010.—In exercise of the powers conferred under clause (c) of sub-section (1) of section 6 of the Pakistan Environmental Protection Act, 1997 (XXXIV of 1997), the Pakistan Environmental Protection Agency, with the prior approval of the Pakistan Environmental Protection Council, is pleased to establish the following National Environmental Quality Standards for Noise.

National Environmental Quality Standards for Noise

S. No.	Category of Area / Zone	Effective from 1st July, 2010		Effective from 1st July, 2012	
		Limit in dB(A) Leq *			
		Day Time	Night Time	Day Time	Night Time
1.	Residential area (A)	65	50	55	45
2.	Commercial area (B)	70	60	65	55
3.	Industrial area (C)	80	75	75	65
4.	Silence Zone (D)	55	45	50	45

Note: 1. Day time hours: 6.00 a. m to 10.00 p. m.

2. Night time hours: 10.00 p. m. to 6.00 a.m.

3. Silence zone: Zones which are declared as such by the competent authority. An area comprising not less than 100 meters around hospitals, educational institutions and courts.

4. Mixed categories of areas may be declared as one of the four above-mentioned categories by the competent authority.

*dB(A) Leq: Time weighted average of the level of sound in decibels on scale A which is relatable to human hearing.

[No. F. I(12)/2010-11-General.]

MUHAMMAD KHALIL AWAN,
Section Officer (PEPC).

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Annex-II

Land Ownership Verification Letter

&

Board Approval of Layout Plan

CAPITAL DEVELOPMENT AUTHORITY
(Estate Management Directorate – II)

****

No.CDA/EM-27 (3306)/2021/ 1428 Islamabad April. 21 2021.

Subject:- **VERIFICATION OF OWNERSHIP OF LAND MEAUSRING 140 ACRES (677,600 SQUARE YARD) WITHIN THE NATIONAL INSTITUTE OF HEALTH (NIH) ISLAMABAD OFFERED TO SPECIAL TECHNOLOGY ZONES AUTHORITY ISLAMABAD FOR CREATION OF SPECIAL T3ECHNOLOGY ZONE (STZ)**

The following information in connection with handing over possession of the land mentioned below is furnished to Deputy Director Land Survey Division, CDA for necessary action. The signature of the person who will take over possession of land is verified and attested below;-

1. Special Technology Zones Authority (STZA) is to date offeree of land measuring 140 acres (677,600 Square Yard) within the National Institute of Health (NIH), Islamabad.
2. Mr. Atif Bilal, Director Special Projects, STZA has been authorized by the Special Technology Zones Authority (STZA) to take over possession of plot.
3. Special Technology Zones Authority (STZA) is taking over possession of land for the 1st time.
4. The possession fee of Rs.2000/- has already been paid by Special Technology Zones Authority (STZA).

SIGNATURE OF REP.

1. _____
2. _____
3. _____

CNIC No.17201.0244822-1

Deputy Director-II
Estate Management (EM-II) CDA,

Dy. Director Land Survey Division, CDA.

Copy to;-

Mr. Atif Bilal
Director Special Projects,,
Special Technology Zones Authority (STZA)
Islamabad.

21/04/2021

Deputy Director-II
Estate Management (EM-II) CDA,

14th CDA BOARD MEETING FOR THE YEAR-2022 HELD ON 11-11-2022 03:00 at P.M & 14-11-2022 at 01:00 P.M

AGENDA ITEMS

	S.No	Items	Presenter
	1.	Confirmation of Minutes of 12th and 13th Board meetings-2022.	
	2.	Revamping of Enforcement-Placement under P&D Wing.	Member (P&D)
	3.	Allotment of plot for construction of Child Protection Centre in Islamabad.	Member (P&D)
	4.	Allocation of Vacant land to the Federal Government Employees Housing Authority (FGEHA).	Member (P&D)
	5.	Integration plan of Gandhara Heritage and Cultural centre with Citizen club Building F-9,Park, a Project by CDA.	Member (P&D)
	6.	Request for allotment of land from CDA for Satellite Ground Station control facility and space projects of SUPARCO.	Member (P&D)
	7.	Amendment in Clause 8.15 of SRO 1575 (I)/2019 Planning Parameters for CDA agro farms plots in /zone-IV and sector H-9, Islamabad. (Sub Division of Agro Farms and P&V Scheme).	Member (P&D)
	8.	Approval of layout plan and building bye laws of Special Technology Zone Authority (STZA), Islamabad.	Member (P&D)
	9.	Proposed Recruitment of Professional Town Planners / Officers in Planning Wing on Contract Basis and Engagement of Essential Staff on Internship Basis.	Member (P&D)
13th BM ('22)-4	10.	Amendment in the ICT Zoning Regulation, 1992 (Zone-3)	Member (P&D)
	11.	Establishment of Waste Transfer Station (WTS)- Implementation of Court Orders dated 04-08-2022 in Writ Petition No. 4337/2021 titled Naeem Zafar & Others versus Chairman CDA Islamabad & Others	Member Envt.
	12.	Implementation of Court Orders dated 04-08-2022 in Writ Petition No. 4337/2021 titled Naeem Zafar & Others versus Chairman CDA Islamabad & Others	Member Envt.
	13.	Consultancy for Development of Integrated Waste Management Plan for ICT.	Member (Envt)
	14.	Restoration of property No.324, Sector F-11/1, Islamabad.	Member (Estate)
	15.	Restoration of property No.26, Street No.32, Sector F-7/1, Islamabad.	Member (Estate)
	16.	Delay in allotment of plot.	Member (Estate)
	17.	Shifting/Relocation of DD-EM-I(East) and DD-Estate Affectees.	Member (Estate)
	18.	Re-structuring of Directorate of Metro bus (Operations), CDA, Establishment of Directorate of Metro Bus (Infrastructure), CDA and Hiring of additional resources for smooth operations.	Member (Engg)
	Additional Agenda Item		
	1.	Approval of Auction of Plots -2022	Member Estate
	Non Agenda Items		
	NA-I	Proposed Re-Sizing of Commercial Plots in the Layout Plan of Margallah Markaz in Northern Strip of Sector E-11/3, titled "Margallah Markaz E-11" Islamabad	Member (P&D)
	NA-II	Examination Of Enforceable Rights Of Highest Bidders In Plot 9,9-A Orchard Scheme, Murree Road, And Clarification On Board Decision On Non-Agenda Item 9292/1151/09/723/Bf 1,3 &5 -1-09 (To The Extent Of 9,9-A Orchard Scheme Murree Road, Islamabad) / Consideration Of The Applications Of Highest Bidders	Member Estate

ii. Professor Iftikhar Husain Arif, Poet, Writer.
iii. Mr. Nayyar Ali Dada, Architect

It has further been decided that necessary amendment may be made in the regulations by

a) incorporating Secretary, National heritage & Cultural Division in the management.
b) deletion of clause related to inclusion of diplomatic core representative.

Accordingly, notification of Management Committee may be got issued from Ministry of Interior.

Action by: Member (P&D)

14.6 **REQUEST FOR ALLOTMENT OF LAND FROM CDA FOR SATELLITE GROUND STATION CONTROL FACILITY AND SPACE PROJECTS OF SUPARCO.**

11594/1403/BM/'22
11,14-11-'22/14th

DECISION

Proposal contained in para-09 of the summary is approved regarding allotment of 10 Acre land to SUPARCO subject to the condition that approval of the honorable Prime Minister of Pakistan is mandatory, and accordingly a summary will be moved to the Prime Minister for approval.

Action by: Member (P&D)

14.7 **AMENDMENT IN CLAUSE 8.15 OF SRO 1575 (I)/2019 PLANNING PARAMETERS FOR CDA AGRO FARMS PLOTS IN ZONE-IV AND SECTOR H-9, ISLAMABAD. (SUB DIVISION OF AGRO FARMS AND P&V SCHEME).**

11595/1403/BM/'22
11,14-11-'22/14th

DECISION.

The Board decided that a report may be sought from the pending applicants (around 30 in numbers) about the record of agriculture produce of their farms and inspect their sites to check adherence of building by-laws and other regulations. The agenda was accordingly deferred.

Action by: Member (P&D)

14.8 **REQUEST FOR APPROVAL OF LAYOUT PLAN OF SPECIAL TECHNOLOGY ZONE (STZ) ON LAND MEASURING 140 ACRES WITHIN THE NATIONAL INSTITUTE OF HEALTH (NIH) AREA, ISLAMABAD /APPROVAL OF LAYOUT PLAN AND BUILDING BYE LAWS OF SPECIAL TECHNOLOGY ZONE AUTHORITY (STZA), ISLAMABAD**.

11596/1403/BM/'22
11,14-11-'22/14th

DECISION.

The Board approved the layout plan and building bye laws being in conformity with the regulations of CDA and decided that a summary be submitted to the Federal Government conveying complete details of buildings and part of the LOP situated in Zone-III to seek permission for utilization of land which is not in accordance with the prevailing regulations of Zone-III.

Action by: Member (P&D)

14.9 **PROPOSED RECRUITMENT OF PROFESSIONAL TOWN PLANNERS / OFFICERS IN PLANNING WING ON CONTRACT BASIS AND ENGAGEMENT OF ESSENTIAL STAFF ON INTERNSHIP BASIS**.

11597/1403/BM/'22
11,14-11-'22/14th

DECISION

The Board approved the proposal contained in para-03(i) of the summary subject to the condition that 08 Nos. of internship is in accordance with the need base instead of 'against the vacant posts' and that the internship would be on annual basis. The Board also

ANNEX-III

Approval Letter from

Projector Director Small Dam

9-88
9-85

s Organization
Department
he Punjab

OFFICE OF THE PROJECT DIRECTOR

SMALL DAMS CIRCLE – I
ISLAMABAD
Phone No:- 051-9255756
Fax No:- 051-9255757
Email:- so_smalldam1@irrigation.punjab.gov.pk

No. PDC-I/2022/ 2865-66 I R IV D. , Dated. 2-19 /2022

o,

The Chief Engineer,
Irrigation Potohar Zone,
Rawalpindi/Islamabad.

ubject: - **REQUEST FOR THE SUPPLY OF WATER FROM RAWAL DAM TO ISLAMABAD TECHNOPOLIS SPECIAL TECHNOLOGY ZONE.**

eference:- Executive Engineer Small Dams Division Islamabad office letter No.EE/SDD/2022/4959-61/34AII dated 30.08.2022

Mr.Imran Bhanbhro, Head of Contracts Management, Special Technology Zone Authority, Islamabad submitted an application bearing No.F.22/STZA/2022/02 dated 18.05.2022 to the Project Director, Small Dams Circle-I, Islamabad stating therein that Special Technology Zone Authority (STZA) has been established by the Government of Pakistan with a mandate to provide world-class digital and physical infrastructure through setting up Special Technology Zones (STZs) across the country.

Islamabad Technopolis is the flagship project of Special Technology Zones Authority, and 140 acres land has been allotted by CDA at Mohra Jejan Islamabad.

It was requested to provide 2.5 MGD raw water from Rawal Dam to meet with water demand for Islamabad Technopolis Special Technology Zone . The application was sent to Executive Engineer, Small Dams Division, Islamabad to examine it in view of availability of water. Executive Engineer, Small Dams Division, Islamabad has submitted the report vide his letter under reference. The report reveals that the total availability of water in the dam as per hydrographic survey conducted in 2019 is 28,310 Acre-Feet out of which 25,901 Acre-Feet water is being supplied to WASA & CDA.

Moreover, a request for supplying 2 MGD additional water to CDA has already been recommended. The total commitment of water to WASA & CDA comes to be about 27000 Acre-Feet. The balance availability of water in the Rawal Dam is left about 1300 Acre-Feet. Under the above mentioned scenario, 1.5 MGD water can be provided to the Islamabad Technopolis Special Technology Zone.

MISC (G)/Drawing Branch/RWO Rawal Dam

It is clarified that the availability of water in the Dam is assessed assuming that there will be no inflow during the period of 9 months in a year, but the past data reveals that there are certain inflows in that period of 9 months.

It is further added that the land allotted for Islamabad Technopolis Special Technology Zone is falling near the Ojri Disty off taking from Rawal Dam. The capacity of the Disty is enough to carry 1.5 MGD additional water. The commitment of supplying water will be subject to the following conditions.

1. The supply of water shall be subjected to the availability of Raw Water in Rawal Dam.
2. Agreement shall remainin force for **five years** from the date of commencement of water supply.
3. The rates of Raw Water as calculated (attached as Annex-A) is @ Rs.7.67 per 1000 Gallons. The Raw Water rate shall increase after revision of Yardstick (attached as Annex-B)
4. Charged rate to Islamabad Technopolis Special Technology Zone @ Rs.7.67 per 1000 Gallons, which shall be subject to an annual escalation of 10%.

In view of the above it is recommended that the case for supplying 1.5 MGD Raw Water for drinking purpose to Islamabad Technolopolis Special Technology Zone from Rawal Dam may kindly be transmitted to Administrative Department for seeking approval.

PROJECT DIRECTOR
Small Dams Circle-I
Islamabad

.A/As Above

C.

Executive Engineer, Small Dams Division, Islamabad for information.

MISC (G)/Drawing Branch/RWD Rawal Dam

ANNEX-IV

Traffic Impact Analysis Report

TRAFFIC IMPACT ASSESSMENT (TIA) REPORT

TABLE OF CONTENTS

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LIST OF FIGURES

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LIST OF TABLES

Page No.

LIST OF ABBREVIATIONS

ADT	Average Daily Traffic
HTV	Heavy Transport Vehicle
ITE	Institute of Transportation Engineers
LTV	Light Transport Vehicle
LOS	Level of Service
GFA	Gross Floor Area
MCC	Manual Classified Counts
NESPAK	National Engineering Services Pakistan
TIA	Traffic Impact Assessment
TMP	Traffic Management Plan
TVC	Traffic Volume Count

1. INTRODUCTION

1.1 GENERAL

The urban transportation problem is a complex bundle of interrelated problems. The provision of transportation services for the population is becoming increasingly difficult due to the dynamic expansion of urban areas. Currently, traffic congestion is considered an extensive global problem, result from high population concentration, expansion of infrastructure, motor vehicles, and increase of rideshare and delivery service activities. It causes unfavorable impacts upon the society, economy, and environment of any urban areas by wasting energy and time, decreasing productivity, and causing pollution, stress and restricts stable urban economic growth. New multi-story cluster developments in many large and medium cities of South Asia, are facing these challenges and their mobility pattern is also severely affecting the city normal traffic flow. For the sustainable economic development of any city, congestion alleviation and ensuring an excellent transport system in the “new development” areas is one of the most important tasks. The economic development has been leading urban traffic states to more critical situations and cities in developing countries are facing this problem the most because traffic congestion is very frequent and has become a normal phenomenon in big cities. A good transportation system in city is very important for sustainable urban development.

Traffic Impact Assessment (TIA) is a valuable tool for assessing potential impacts of traffic generated by a proposed development to the surrounding transportation system. TIA generally includes a description of the scope and intensity of the proposed project, a summary of the projected impacts and any required improvements to ensure that the roadway facilities can safely accommodate the proposed development. The goal is to ensure that the transportation system will operate safely and efficiently within the design horizon of the study.

A simple definition of traffic impact analysis (TIA) is given as "a specialized study which assesses the effects that a particular development's traffic will have on the surrounding transportation network”. “Development" in the above definition will refer to a provision of Islamabad Technopolis on Park Road. The special study is done during the planning stages of the development.

A Traffic Management Plan (TMP) is a site-specific plan that covers the real-time design, implementation, operations and circulation of traffic during operational hours of proposed facility by considering peak and off-peak timings in the access road corridor. TMP describes procedures and protocols for site access, traffic routing and management, and policy with respect to vehicle and employee transportation during peak and off-peak hours. This particular TIA/ TMP also addresses “new development” related traffic associated with the development in the vicinity.

Islamabad Technopolis are impeccable areas of traffic attractions exacerbated by the increase of rapid population density, enormous urbanization, and increasing economic and commercial activities. This study detailed the traffic congestion states and the factors influencing traffic congestion due to Islamabad Technopolis. The traffic congestion state in

the study area has been assessed through Level of Service (LOS). The outcome of this study will indicate how new traffic generation will cause congestion around Islamabad Technopolis areas and will disturb normal flow of traffic. Rapid increase in vehicle population, poor public transport, pedestrians' behavior, illegal road occupancy, and fragile enforcement of laws are also leading factors towards congestion and it will worsen traffic condition around Islamabad Technopolis in future.

1.2 PROJECT BACKGROUND

Growth in traffic in Islamabad City has put tremendous pressure on infrastructure of the city, particularly on the road network. The traffic volumes on roads, streets and intersections have reached saturation point mainly due to rapidly growing population of the Islamabad and Rawalpindi. The high population growth has resulted in tremendous traffic load on infrastructure of the city. The construction of "*Islamabad Technopolis"* could increase traffic load on infrastructure of the Islamabad city.

Moreover, it can also cause congestion in the vicinity during peak hours due to additional traffic pressures going to be created by this new development. Commuter's safety is the primary goal of this TIA. Figure 1.1 shows Pakistan map, Figure 1.2 shows Islamabad City Location, Figure 1.3 shows Detailed Satellite Image-Based Map of Islamabad City and Figure-1.4 shows the major road network around the project area site.

Figure 1-1: Detailed Map of Pakistan

Figure 1-2: Islamabad City Location

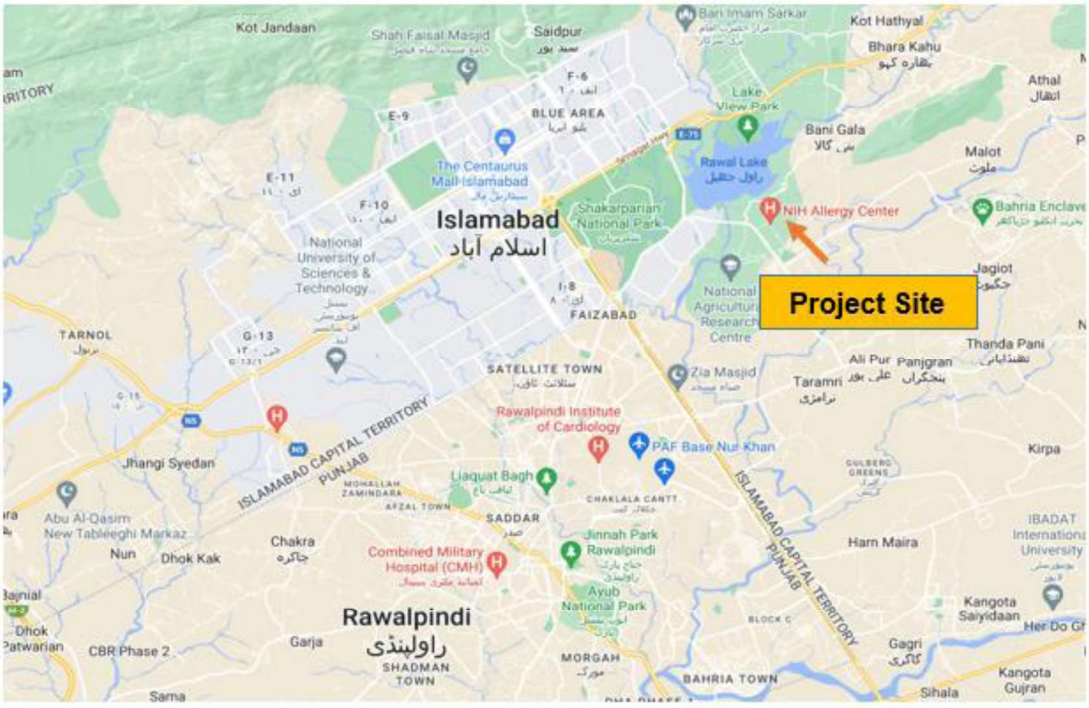

Figure 1-3: Detailed Satellite Image-Based Map of Islamabad City

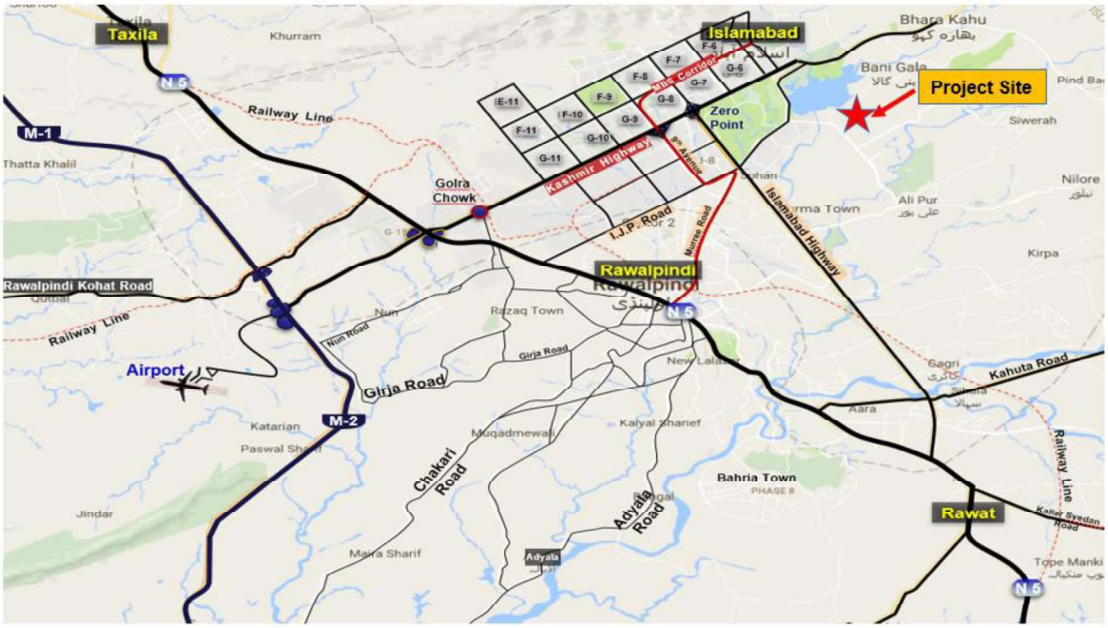

Figure 1-4: Major Road Network Around Project Site Area

1.3 EXISITING ROAD NETWORK

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

1.3.1 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.

1.3.2 Jinnah Avenue

This road is an approach road to our proposed development and Bahria Enclave 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.

1.3.3 Lehtrar Road

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

1.4 PROJECT DESCRIPTION

Brief layout plan of the proposed Islamabad Technopolis is shown in Figure 1.5, while current road network with lanes around development is shown in Figure 1.6.

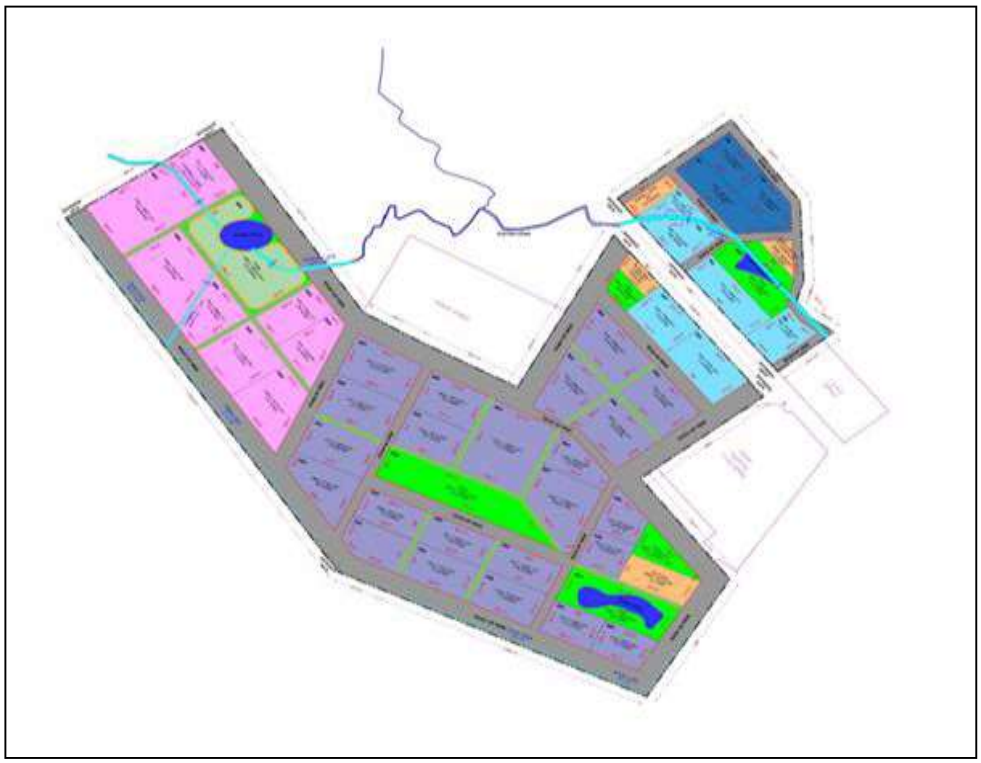

Figure 1-5: Tentative Master Plan of Project Site Area

Figure 1-6: Current Road Network with Lanes Around Development

2. TRAFFIC SURVEY AND DATA COLLECTION

2.1 INTRODUCTION

Traffic surveys were planned and conducted on three (03) different locations in the vicinity of proposed site. The basic objective of TIA is to accommodate access/ egress traffic, evaluate the level of services (LOS) and to provide safe and efficient traffic movement plan with the generated traffic of proposed facility.

NESPAK conducted Manual Classified Counts (MCC's) to collect actual existing traffic condition at significant road sections/ segments/ junctions in the vicinity of project site.

2.2 MANUAL CLASSIFIED COUNTS (MCC)

Three (03) MCC points were selected for the study by NESPAK on the adjacent road network directly affected by the development of proposed Islamabad Technopolis as follows and shown in figure 2.1;

1. Park Road – Jinnah Avenue Intersection
2. Park Road – Lehtrar Road Intersection
3. Park Road – Bani Gala Road

Traffic volume counts (TVC) were conducted to determine the number of vehicles passing through a specified point/ segment on a road. These counts have immense significance in traffic evaluation, planning, design, and operation. Manual Classified Counts (MCCs) have been carried out at two locations by deputing staff at roadside. These counts were undertaken for 15 min. intervals in order to cover movements and identify peak hourly volumes. Vehicles were classified for MCC's into the following categories given in Table 2.1:

Table 2-1: Modal Types

Sr. No.	Modal Type
1	Animal Driven
2	Bicycle
3	Motorcycle/ Scooter
4	Rickshaw, Qingqi (Motorcycle Rickshaw)
5	Car, Taxi, Jeep, Land Cruisers, Single/ Twin-Cabin
6	Hiace Wagon
7	Loader Pickup
8	Med Bus, Flying Coach
9	Large Bus
10	2 Axle Truck
11	3+ Axle Truck
12	Tractor Trolley

Special traffic survey counting forms were used by the surveyors to record the traffic data. All the traffic survey staff was trained prior to the start of work. All the work was supervised on site by experienced staff. In order to assess the vehicle wise traffic volumes currently plying on the road network NESPAK conducted MCC on above mentioned points. The details of the above-mentioned surveys are given below:

Table 2-2: Survey Schedule Type and Duration of MCC

Sr. No.	Locations	Date / Day	Type of Survey (s)	Survey Duration
1	Park Road – Jinnah Avenue Intersection	17-03-2022	MCC	24-HOURS
2	Park Road – Lehtrar Road Intersection	19-03-2022	MCC	24-HOURS
3	Park Road – Bani Gala Road Intersection	17-03-2022	MCC	24-HOURS

Figure 2-1: Survey Points for MCC's

2.3 AVERAGE DAILY TRAFFIC

Average Daily Traffic (ADT) is required to be adjusted for daily variations during a week. For the purpose of estimating daily variations in traffic during a week, traffic counts have been conducted for different days of a week to get weekly factor. Average Daily Traffic (ADT) for all vehicle classifications for manual classified counts (MCC) has been estimated as given in Table 2.4 to Table 2.6 and Directional split is shown in Figure 2.2 to 2.4.

2.4 TRAFFIC GROWTH ESTIMATES

Traffic forecasts have been made for 2022-2050 for the proposed "Islamabad Technopolis" by using the growth rates based on the following factors affecting traffic growth directly or indirectly. Future rates of traffic growth (% / Annum) are shown in Table 2.3.

- Growth of registered vehicles in Punjab.
- Growth of registered vehicles in Islamabad city.
- Rate of increase in fuel consumption by the transport sector in Pakistan
- Trend in GDP growth.

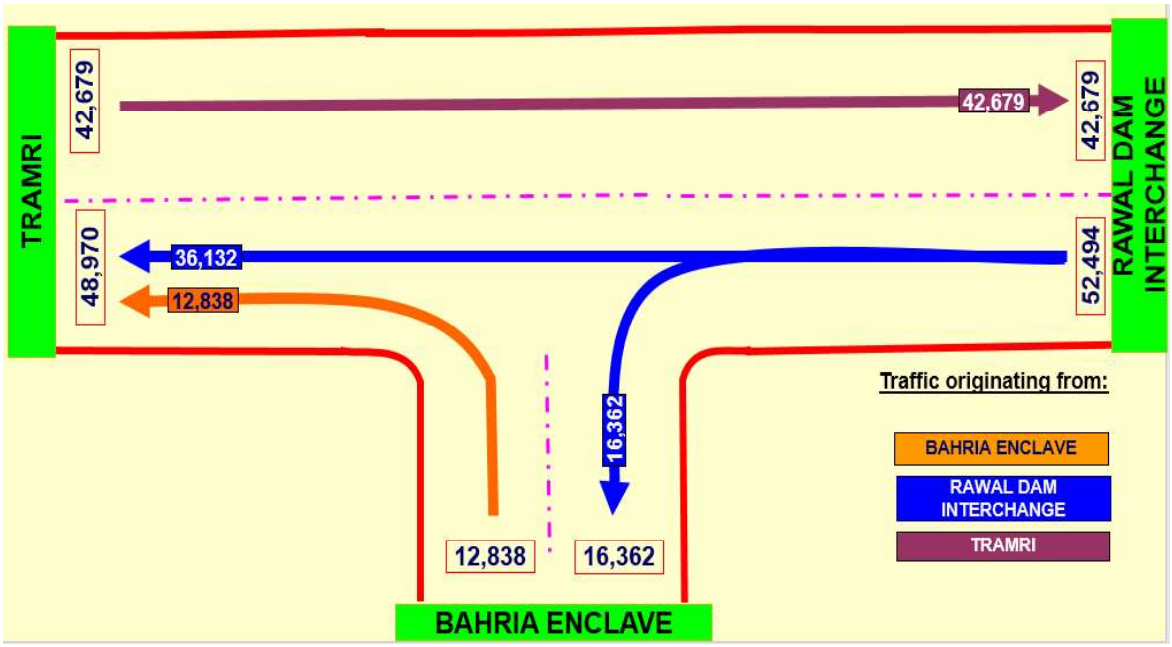

Figure 2-2: Directional Spit of Traffic at Park Road – Jinnah Ave Intersection (2022)

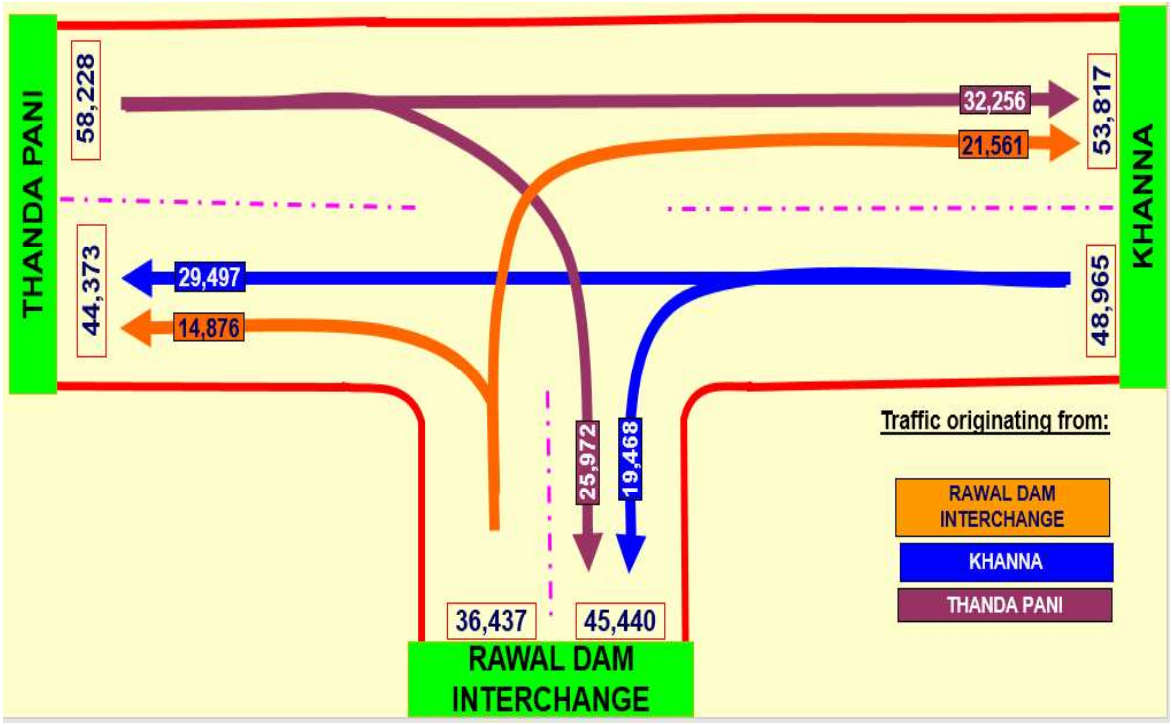

Figure 2-3: Directional Spit of Traffic at Park Road – Lehtrar Road Intersection (2022)

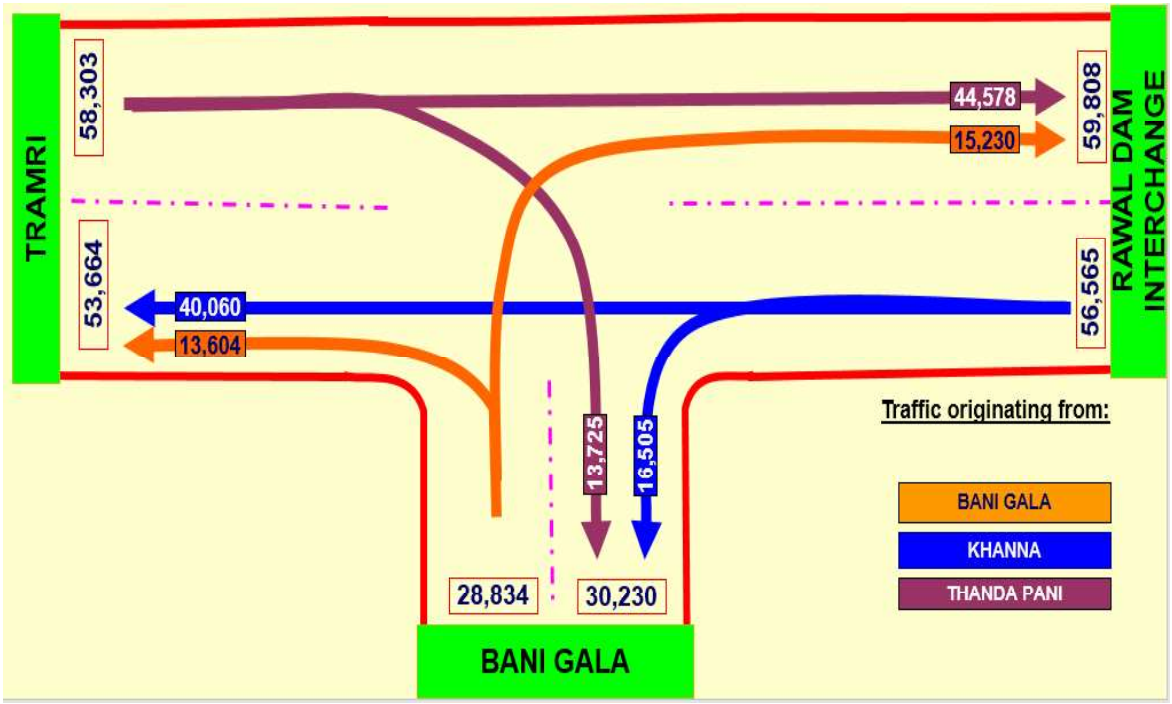

Figure 2-4: Directional Spit of Traffic at Park Road – Bani Gala Road Intersection (2022)

Table 2-3: : Future Rates of Traffic Growth (% / Annum)

YEARS	MOTOR CYCLE	RICKSHAW	CAR/JEEP/ TAXI/PICK-UP/	BUS / MINI-BUS	LOADER TRUCKS
2022	5.2002	5.2167	4.6255	3.3952	3.5439
2023	5.0149	5.0298	4.4916	3.3306	3.4906
2024	4.8461	4.8596	4.3671	3.2692	3.4396
2025	4.6915	4.7037	4.2510	3.2106	3.3909
2026	4.5492	4.5604	4.1424	3.1547	3.3443
2027	4.4176	4.4279	4.0405	3.1012	3.2995
2028	4.2955	4.3050	3.9448	3.0501	3.2566
2029	4.1818	4.1905	3.8546	3.0010	3.2154
2030	4.0756	4.0837	3.7694	2.9540	3.1757
2031	3.9760	3.9836	3.6888	2.9088	3.1374
2032	3.8825	3.8896	3.6124	2.8654	3.1006
2033	3.7944	3.8010	3.5398	2.8236	3.0650
2034	3.7113	3.7175	3.4709	2.7834	3.0307
2035	3.6327	3.6386	3.4052	2.7445	2.9975
2036	3.5582	3.5637	3.3425	2.7071	2.9654
2037	3.4875	3.4927	3.2827	2.6709	2.9343
2038	3.4203	3.4252	3.2255	2.6360	2.9042
2039	3.3563	3.3610	3.1707	2.6022	2.8750
2040	3.2952	3.2997	3.1182	2.5695	2.8467
2041	3.2369	3.2412	3.0679	2.5378	2.8192
2042	3.1812	3.1852	3.0195	2.5071	2.7926
2043	3.1278	3.1316	2.9730	2.4773	2.7666
2044	3.0766	3.0803	2.9283	2.4484	2.7414
2045	3.0275	3.0311	2.8852	2.4204	2.7169
2046	2.9804	2.9838	2.8437	2.3932	2.6930
2047	2.9350	2.9383	2.8036	2.3667	2.6698
2048	2.8914	2.8945	2.7649	2.3409	2.6471
2049	2.8494	2.8524	2.7276	2.3159	2.6250
2050	2.8089	2.8118	2.6915	2.2915	2.6035

Table 2-4: ADT at DC-1 Park Road – Jinnah Ave Intersection (2022)

Directions		Animal Drawn	Bi-Cycle	Motor Cycle	Rick-shaw	Car/ Taxi/ Jeep	Pajero / Suzuki Pickup	Hiace / Wagon	Mini Bus/ Coaster	Bus	Loader pickup	Tractor Trolley	Trucks				Total Traffic
From	To												2-Axle	3-Axle	4-Axle	Trailer / 5-Axle & above	
Tramri	Rawal Dam Interchange	1	43	14709	48	22844	1083	1336	167	163	1905	19	165	184	7	5	**42,679**
Rawal Dam Interchange	Tramri	16	14	9882	125	21923	1159	1114	239	273	985	48	159	184	4	7	**36,132**
Rawal Dam Interchange	Bahria Enclave	9	22	5709	47	9335	234	75	16	45	514	25	98	229	3	0	**16,362**
Bahria Enclave	Tramri	4	39	4347	42	7230	158	110	24	59	573	47	72	127	3	4	**12,838**
Total Traffic at Junction		**31**	**118**	**34,647**	**262**	**61,333**	**2,633**	**2,635**	**447**	**540**	**3,978**	**139**	**493**	**724**	**16**	**16**	**108,011**

Table 2-5: ADT at DC-2 Park Road – Lehtrar Road Intersection (2022)

Directions		Animal Drawn	Bi-Cycle	Motor Cycle	Rick-shaw	Car/ Taxi/ Jeep	Pajero / Suzuki Pickup	Hiace / Wagon	Mini Bus/ Coaster	Bus	Loader pickup	Tractor Trolley	Trucks				Total Traffic
From	To												2-Axle	3-Axle	4-Axle	Trailer / 5-Axle & above	
Rawal Chowk	Khanna	12	48	8840	459	9672	375	1033	176	45	529	139	119	44	41	29	**21,561**
	Thanda Pani	11	7	5904	165	7161	375	341	55	33	448	87	99	179	4	8	**14,876**
Thanda Pani	Khanna	143	257	10508	1897	13031	897	1457	869	427	1371	915	432	19	15	19	**32,256**
	Rawal Chowk	25	69	10180	315	12579	391	768	137	97	861	177	160	148	35	29	**25,972**
Khanna	Thanda Pani	8	28	11051	712	13327	1013	1055	399	173	1440	137	96	41	4	13	**29,497**
	Rawal Chowk	16	59	8377	279	8116	596	395	41	19	1304	97	112	17	17	23	**19,468**
Total Traffic at Junction		**215**	**468**	**54,860**	**3,827**	**63,885**	**3,647**	**5,049**	**1,677**	**795**	**5,953**	**1,552**	**1,017**	**448**	**116**	**121**	**143,631**

Table 2-6: ADT at DC-3 Park Road – Bani Gala Intersection (2022)

Directions		Animal Drawn	Bi-Cycle	Motor Cycle	Rick-shaw	Car/ Taxi/ Jeep	Pajero / Suzuki Pickup	Hiace / Wagon	Mini Bus/ Coaster	Bus	Loader pickup	Tractor Trolley	Trucks				Total Traffic
From	To												2-Axle	3-Axle	4-Axle	Trailer / 5-Axle & above	
Rawal Dam Interchange	Tramri	35	50	12021	156	23103	1310	1240	290	310	1124	58	167	166	13	16	**40,060**
	Bani Gala	16	45	6084	40	9756	194	66	20	28	115	27	63	50	3	0	**16,505**
Tramri	Rawal Dam Interchange	1	61	15586	58	23578	1153	1428	163	174	1914	23	187	177	47	27	**44,578**
	Bani Gala	5	47	5167	39	7958	144	77	14	29	160	19	38	22	3	3	**13,725**
Bani Gala	Rawal Dam Interchange	13	53	5855	42	8926	97	53	15	13	54	23	40	45	3	0	**15,230**
	Tramri	4	34	4864	34	8159	144	77	14	29	160	19	38	22	3	3	**13,604**
Total Traffic at Junction		**74**	**291**	**49,578**	**369**	**81,480**	**3,041**	**2,940**	**515**	**584**	**3,528**	**169**	**533**	**481**	**72**	**48**	**143,703**

Figure 2-5: Existing Daily Traffic on Current Road Network (2022)

Figure 2-6: Existing Peak Hour Traffic on Current Road Network (2022)

3. DEVELOPMENT OF TRAFFIC MANAGEMENT PLAN

Traffic Impact Assessment (TIA) is a transportation planning process which leads to accommodate traffic on the current roadway as per travel demand on those roadways; deficiencies in the system can be identified. It is also an important tool in planning future network enhancements and analyzing currently proposed projects.

3.1 TRAFFIC ROUTING AND VOLUMES

Traffic associated with the Islamabad Technopolis have only one main road through which it has to move to reach on main arteries of the city. For a better traffic movement Transport planner should ensure that traffic is routed on the available roads around the project site in such a way that potential impact to the vicinity area and roads will be minimized.

3.2 DEVELOPMENT TRAFFIC

3.2.1 Trips Generated By The Proposed Facility

The project vehicle trip generation for the proposed development has been estimated using total number of average day trips generated from each facility on project site. These trip generations are based on rates published in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 10th Edition.

As much accurate planning information of each building is not available nor the information regarding new developments in the surrounding of proposed development is available. So their trip generation is not available to us. For proper and more accurate estimation, future development in the vicinity of Islamabad Technopolis should be known.

Therefore, with these shortcomings to estimate trips with available information regarding Islamabad Technopolis, landuse clause 610 used for healthcare facility, landuse clause 312 used for Business Hotel, landuse clause 710 used for Office + Allied Education, landuse clause 110 used for Production Zone, landuse clause 221 used for Apartments, and landuse clause 820 used for Commercial Area. Based on the ITE rates, the project is expected to generate 65,676 trips during the average weekday and by assuming 11% traffic in peak hour the trips for this proposed facility are 7,224 trips in peak hour. The average day trips and peak hour trips generated are shown in Table 3.1 and 3.2 respectively.

Table 3-1: Average Day Trips Generated Due to Proposed Development

Sr. No.	Landscape Area	Stories	Area (Acre)	GFA*	Total No of Vehicular Trips Generated
1	Healthcare (Code 610)	6	1.73	263,998	4276
2	Business Hotel (312)	9	2.15	393,502	732
3	Office + Allied Education (710)	8	2.32	201,926	2019

Sr. No.	Landscape Area	Stories	Area (Acre)	GFA*	Total No of Vehicular Trips Generated
4		8	2.09	182,152	1821
5		8	2.08	181,312	1813
6		8	2.3	200,176	2001
7		8	1.22	106,300	1063
8		8	1.22	106,300	1063
9		8	2.24	195,460	1954
10		8	1.83	159,030	1590
11		8	3.74	326,174	3261
12		8	1.33	115,928	1159
13		8	2.2	191,300	1913
14		8	1.83	159,348	1593
15		8	2.69	233,938	2339
16		8	1.37	119,184	1191
17		8	1.37	119,184	1191
18		8	2.05	178,578	1785
19		8	1.96	170,962	1709
20		8	1.44	125,454	1254
21		8	1.6	139,472	1394
22		8	1.54	133,846	1338
23		8	1.78	155,210	1552
24		8	1.5	130,706	1307
25		8	1.74	151,586	1515
26	Production Zone (Code 110)	3	1.71	89,351	397

Sr. No.	Landscape Area	Stories	Area (Acre)	GFA*	Total No of Vehicular Trips Generated
27		3	3.88	202,532	826
28		3	1.68	87,698	390
29		3	1.68	87,698	390
30		3	3.06	159,884	664
31		3	1.72	89,872	399
32		3	2.47	128,989	547
33		3	2.47	128,989	547
34	Apartments (221)	8	2	173,900	946
35		8	1.33	115,984	630
36		8	1.31	113,702	618
37	Commercial Area (820)	7	1.41	215,198	4218
38		7	1.93	294,116	5765
39		7	1.46	221,911	4349
40		7	0.72	110,089	2158
Generated Trips					**65,676**

*GFA = Gross Floor Area in Sq-ft

Table 3-2: Peak Hour Trips Generated Due to Proposed Development

Sr. No.	Landscape Area	Stories	Area (Acre)	GFA*	Total No of Vehicular Trips Generated
1	Healthcare (Code 610)	6	1.73	263,998	470
2	Business Hotel (312)	9	2.15	393,502	80
3	Office + Allied Education (710)	8	2.32	201,926	222
4		8	2.09	182,152	200
5		8	2.08	181,312	199

Sr. No.	Landscape Area	Stories	Area (Acre)	GFA*	Total No of Vehicular Trips Generated
6		8	2.3	200,176	220
7		8	1.22	106,300	117
8		8	1.22	106,300	117
9		8	2.24	195,460	215
10		8	1.83	159,030	175
11		8	3.74	326,174	359
12		8	1.33	115,928	127
13		8	2.2	191,300	210
14		8	1.83	159,348	175
15		8	2.69	233,938	257
16		8	1.37	119,184	131
17		8	1.37	119,184	131
18		8	2.05	178,578	196
19		8	1.96	170,962	188
20		8	1.44	125,454	138
21		8	1.6	139,472	153
22		8	1.54	133,846	147
23		8	1.78	155,210	171
24		8	1.5	130,706	144
25		8	1.74	151,586	167
26	Production Zone (Code 110)	3	1.71	89,351	44
27		3	3.88	202,532	91
28		3	1.68	87,698	43

Sr. No.	Landscape Area	Stories	Area (Acre)	GFA*	Total No of Vehicular Trips Generated
29		3	1.68	87,698	43
30		3	3.06	159,884	73
31		3	1.72	89,872	44
32		3	2.47	128,989	60
33		3	2.47	128,989	60
34	Apartments (221)	8	2	173,900	104
35		8	1.33	115,984	69
36		8	1.31	113,702	68
37	Commercial Area (820)	7	1.41	215,198	464
38		7	1.93	294,116	634
39		7	1.46	221,911	478
40		7	0.72	110,089	237
Generated Trips					**7,224**

Project site adjacent proposed road network is shown in Figure 3.1. Proposed traffic routing is shown in Figure 3.2 & 3.3, it will cater all type of traffic for both Light Transport Vehicle (LTV) and Heavy Transport Vehicle (HTV) inbound and outbound from Islamabad Technopolis. It also shows percentage trip distribution for traffic routing and number of trip distribution for traffic routing respectively.

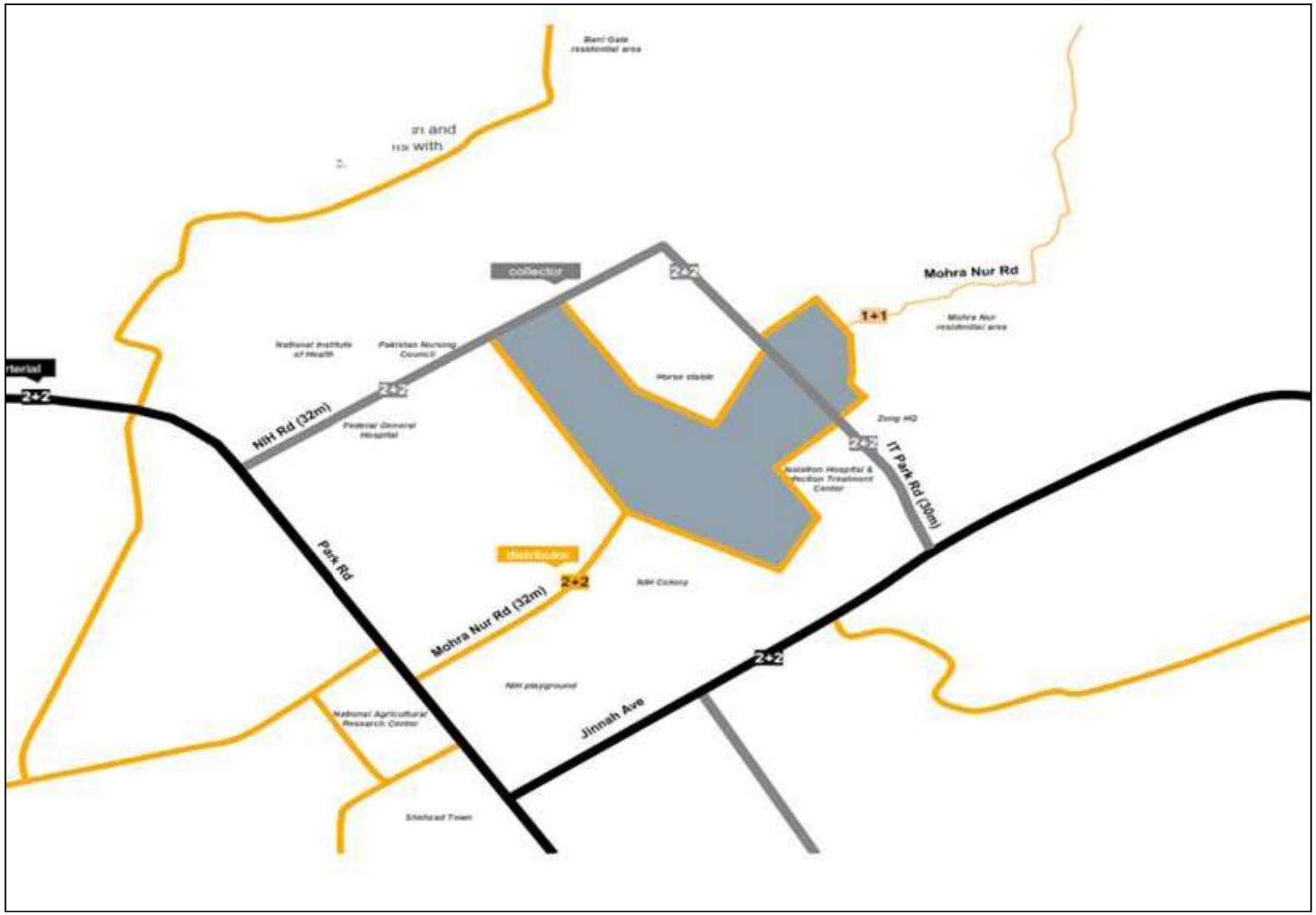

Figure 3-1: Proposed Road Network for Traffic Routing from Proposed Development

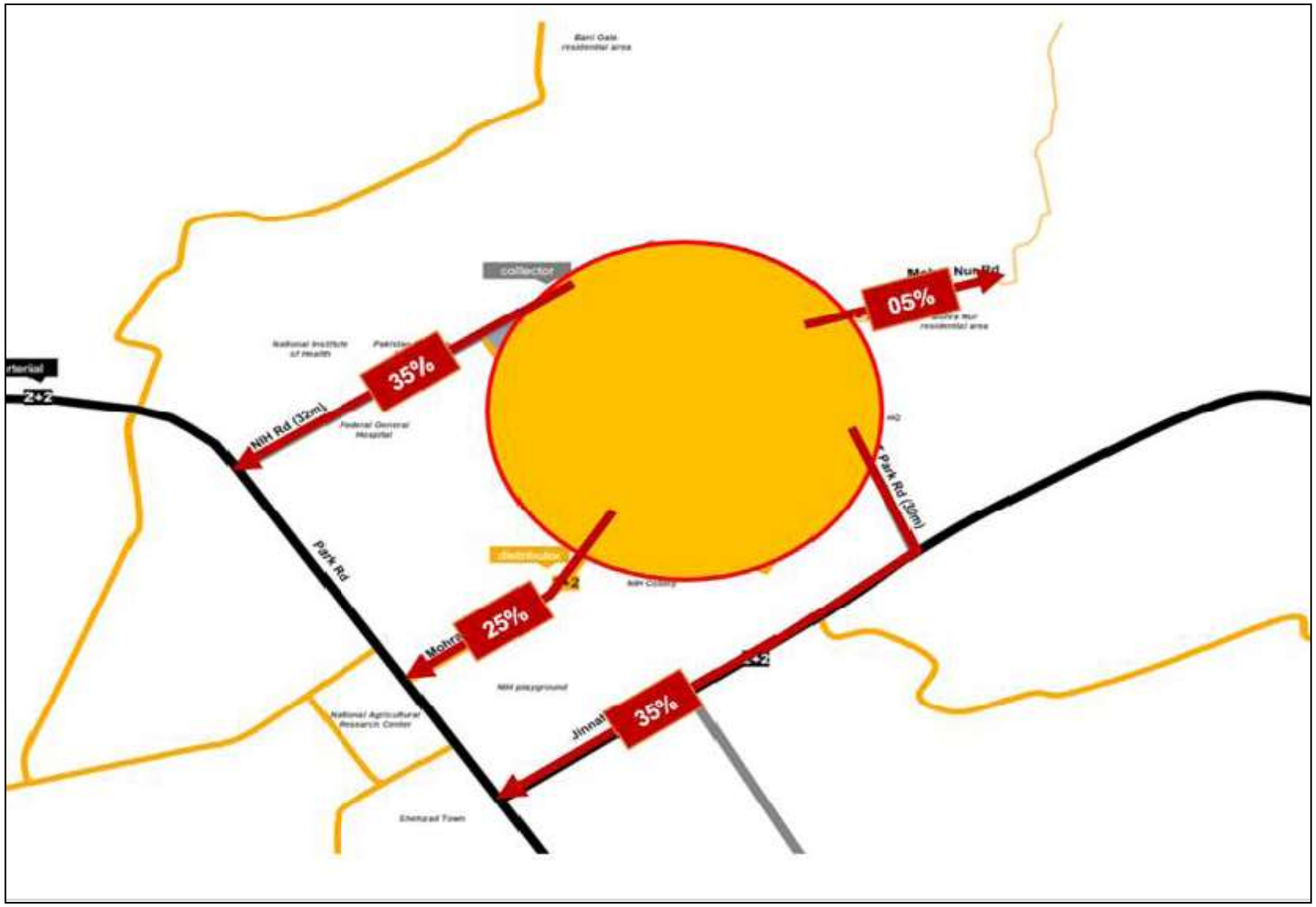

Figure 3-2: Percentage Trip Distribution for Traffic Routing

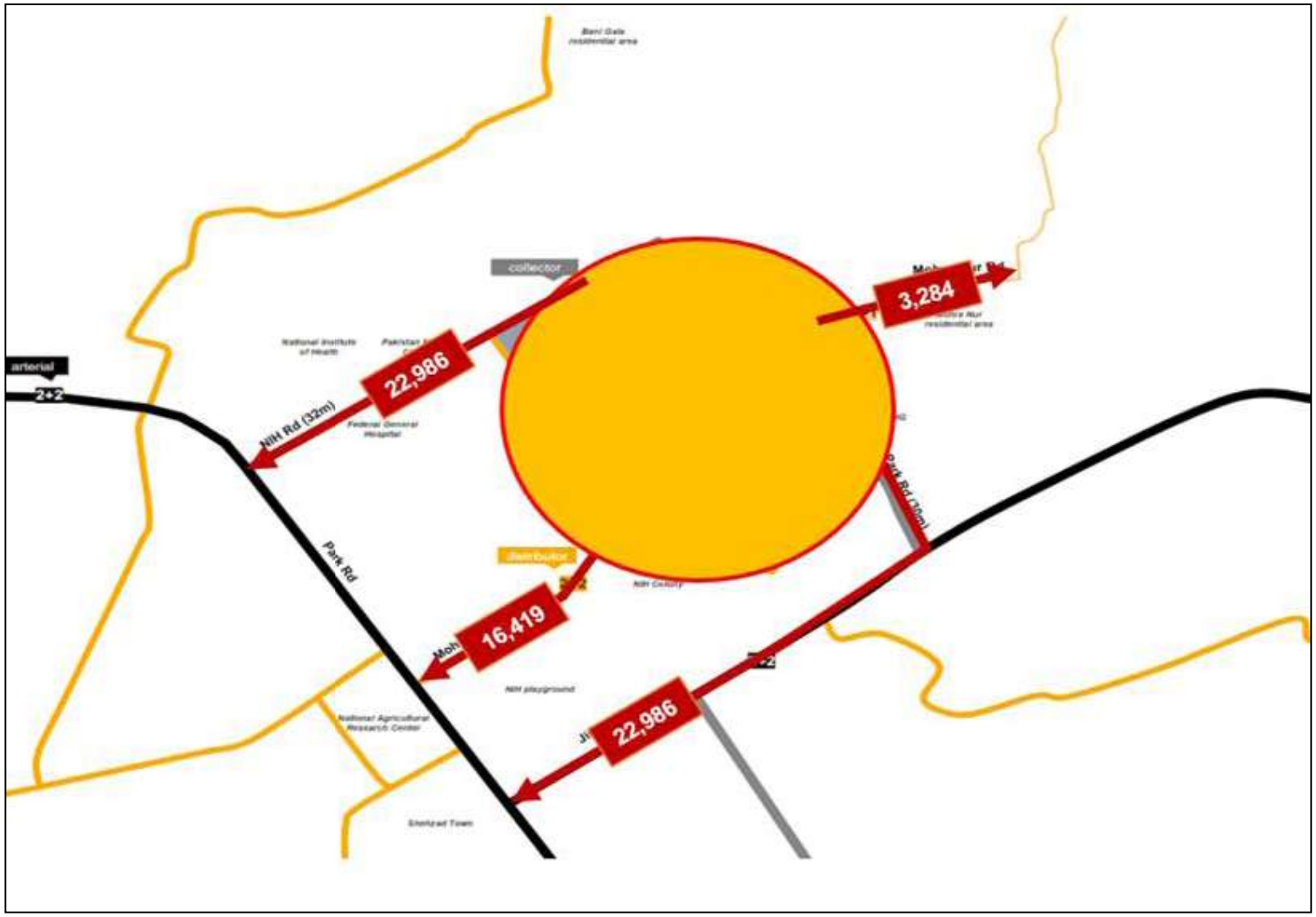

Figure 3-3: Number of Trip Distribution for Traffic Routing

3.3 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 3.3 shown below the LOS without project and with project scenario.

Table 3-3: 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 necessary measures should be taken immediately to avoid traffic jams and unnecessary delays.

3.4 CONCLUSION

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, 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.

ANNEX-V

Interconection Study of 80 MW Load for Islamabad Technopolis

Islamabad
Electric Supply Company Limited

No. 122-24 /TSW/56 Dated: 11-02-2022

Special Technology Zones Authority,
Plot No. 61, 16th Floor, State Life Tower,
Jinnah Avenue, Blue Area,
Islamabad

Subject: **INTERCONNECTION STUDY OF 80MW LOAD FOR ISLAMABAD SPECIAL TECHNOLOGY ZONE AT CHAK SHAHZAD ISLAMABAD.**

Ref:
1. M/s ARCO Energy letter No. IESCO/STZA/0010
2. This office letter No. 23 Dated 11-01-2022
3. Your office letter No. 12801 Dated 27-12-2021
4. This office letter No. 895 dated 10-11-2021.
5. This office letter No. 838 dated 03-11-2021.
6. Your office letter No. 10186-87 dated 18-10-2021.

In this regard, it is intimated that this office as per comments/recommendations of Deputy Manager (Transmission Planning) MIRAD has already approved interconnection arrangements for 80 MW Load of ISTZ vide this office referred letter mentioned at serial # 02 above and further meeting in this matter is not required as need of load flow study is not required after sanctioning of interconnection arrangements.

However, regarding queries mentioned by your consultant, it is intimated that this office vide referred letter mentioned at serial # 04 above communicated changes required in load flow study submitted vide your referred letter at serial # 06 above, like, non-segregation of load, switching off of EHV Grid Station during last year and carrying out N-1 study from one source to another. Further, your office has communicated that stability study is not required for sanctioning of load and same study is carried out for generation integration only, although this statement was not justified as stability studies has to be carried out for industrial loads but IESCO in good gesture and by keeping in view the importance and sensitivity of project has considered the load of ISTZ during different interconnection studies carried out by DM Transmission Planning and accordingly sanctioned the interconnection arrangements. Further, overloading mentioned was during 4th and 5th year i-e 2025-26 and 2026-27 of study during complete N-1 study from one source to another.

It is further informed that, this office approved interconnection arrangements as proposed by consultant and no additional scope was added for ISTZ.

The scope of work proposed vide this office referred letter at serial # 02 above was as under:

i. Construction of 132kV Grid Station with three Power Transformers having capacity 132/11.5KV 31.5/40MVA PTF.

O/O C,E (TSW) Finance Building IESCO H/Q,
Street No. 40, Sector G-7/4,
E-mail ce_tsw@iesco.com.pk
Islamabad ☎ 051-9252896 🖷 051-9252346

ii. Three Transformer Bays.

iii. Construction of 132kV D/C Transmission Line through In-out from University to Tramari circuit having length 5 to 7 KM.

iv. Two Line Bay.

v. One PT Bay.

vi. 11kV capacitor Banks having capacity 8 MVAR for each PTF.

vii. In case of One Point metering under C-3 Tariff, Metering CT & Metering Bay including Separate Metering Panel is proposed.

viii. Three sets (1+8+1) of MV Panels for 40MVA PTF in addition to Bus coupler.

ix. MCP and Relays Panel along with allied accessories.

1. The short circuit rating of Equipment 40kA and 25kA for 132kV and 11kV voltage level respectively is recommended by consultant.
2. NOC of Environment protection agency will be ensured from ISTP.
3. Approval by the "this office" does not relieve the sponsor/consultant of his responsibility to do work in accordance with the SoP, rules and regulation, Grid Code etc.

Keeping in view above, it is suggested that matter may be considered as resolved and further meetings or exchange of data is not required.

Chief Engineer (TSW)
Technical Services Wing
IESCO, Islamabad

Copy to:

1. Chief Engineer (P&E), IESCO Islamabad.
2. C.E.O, ARCO Energy Consultants, 515 Eden Tower, 82-E/1, Main Boulevard, Gulberg-III, Lahore.

➢ Master File/Relevant File

O/O C,E (TSW) Finance Building IESCO H/Q,
Street No. 40, Sector G-7/4,
E-mail ce_tsw@iesco.com.pk
Islamabad ☎ 051-9252896 🖷 051-9252346

ANNEX-VI
Environmental Monitoring, Sampling and Testing Report

CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: **ESPAK/081I/22/AA/2076/00171** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Point 1- Ambient Air near NIH Colony **Monitoring Location:** Islamabad Technopolis (Special Technology Zone). GPS (33°41'06.5"N 73°08'53.0"E)

Date of Sample Collection: 11/05/2022 **Grab / Composite:** Continuous - 24 Hours

Sample Collected/Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 17/05/2022

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	10 mg/m³ (1 Hour)	0.1-0.9 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Carbon Monoxide (CO)	5 mg/m³ (8 Hours)	0.5-0.6 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
3	Sulfur Dioxide (SO_2)	120 µg/m³	14.9 µg/m³	UV Fluorescence (UVF)	Within Prescribed Limits
4	Ozone (O_3)	130 µg/m³ (1 Hour)	2.9-6.9 µg/m³	Non Dispersive UV Absorption	Within Prescribed Limits
5	Oxides of Nitrogen as NO	40 µg/m³	13.3 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
6	Oxides of Nitrogen as NO_2	80 µg/m³	22 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
7	Particulate Matter $PM_{2.5}$	35 µg/m³	**38 µg/m³**	Particulate Sensor	Exceeding Prescribed Limits
8	Particulate Matter PM_{10}	150 µg/m³	**152 µg/m³**	Particulate Sensor	Exceeding Prescribed Limits
9	Suspended Particulate Matter (SPM)	500 µg/m³	253 µg/m³	High Volume Sampler (HVS)	Within Prescribed Limits
10	Lead (Pb)	1.5 µg/m³	0.05 µg/m³	ASS (ICP-AES) after Sampling by HVS	Within Prescribed Limits

NEQS: National Environmental Quality Standards for Ambient Air, 2010

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: **ESPAK/081I/22/AA/2076/00171** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.)

1. **Sample Analyzed By:** Waqas Ahmad (Analyst (ICP-AES)), Muhammad Tahir (Analyst (Field))

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 18/05/2022

---------- End of Report ----------

CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: **ESPAK/081I/22/AA/2077/00172** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Point 2- Ambient Air near Horse Stable **Monitoring Location:** Islamabad Technopolis (Special Technology Zone). GPS (33°41'16.8"N 73°08'56.7"E)

Date of Sample Collection: 12/05/2022 **Grab / Composite:** Continuous - 24 Hours

Sample Collected/Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 17/05/2022

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	10 mg/m³ (1 Hour)	0.1-1.5 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Carbon Monoxide (CO)	5 mg/m³ (8 Hours)	0.5-0.7 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
3	Sulfur Dioxide (SO_2)	120 µg/m³	16.1 µg/m³	UV Fluorescence (UVF)	Within Prescribed Limits
4	Ozone (O_3)	130 µg/m³ (1 Hour)	3.4-13.7 µg/m³	Non Dispersive UV Absorption	Within Prescribed Limits
5	Oxides of Nitrogen as NO	40 µg/m³	13.8 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
6	Oxides of Nitrogen as NO_2	80 µg/m³	21.9 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
7	Particulate Matter $PM_{2.5}$	35 µg/m³	**37.1 µg/m³**	Particulate Sensor	Exceeding Prescribed Limits
8	Particulate Matter PM_{10}	150 µg/m³	**151 µg/m³**	Particulate Sensor	Exceeding Prescribed Limits
9	Suspended Particulate Matter (SPM)	500 µg/m³	305 µg/m³	High Volume Sampler (HVS)	Within Prescribed Limits
10	Lead (Pb)	1.5 µg/m³	0.04 µg/m³	ASS (ICP-AES) after Sampling by HVS	Within Prescribed Limits

NEQS: National Environmental Quality Standards for Ambient Air, 2010

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: **ESPAK/081I/22/AA/2077/00172** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.)

1. **Sample Analyzed By:** Waqas Ahmad (Analyst (ICP-AES)) Muhammad Tahir (Analyst (Field))

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik

General Manager

Date: 18/05/2022

---------- End of Report ----------

CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: **ESPAK/081I/22/AA/2078/00173** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Point 3- Ambient Air near Mohra Nur Road **Monitoring Location:** Islamabad Technopolis (Special Technology Zone). GPS (33°41'28.4"N 73°09'19.0"E)

Date of Sample Collection: 13/05/2022 **Grab / Composite:** Continuous - 24 Hours

Sample Collected/Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 17/05/2022

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
1	Carbon Monoxide (CO)	10 mg/m³ (1 Hour)	0.01-1.6 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
2	Carbon Monoxide (CO)	5 mg/m³ (8 Hours)	0.8-0.9 mg/m³	Non Dispersive Infrared Absorption (NDIR)	Within Prescribed Limits
3	Sulfur Dioxide (SO_2)	120 µg/m³	18.4 µg/m³	UV Fluorescence (UVF)	Within Prescribed Limits
4	Ozone (O_3)	130 µg/m³ (1 Hour)	4-15 µg/m³	Non Dispersive UV Absorption	Within Prescribed Limits
5	Oxides of Nitrogen as NO	40 µg/m³	14.9 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
6	Oxides of Nitrogen as NO_2	80 µg/m³	26.1 µg/m³	Chemiluminescence Detection	Within Prescribed Limits
7	Particulate Matter $PM_{2.5}$	35 µg/m³	33.8 µg/m³	Particulate Sensor	Within Prescribed Limits
8	Particulate Matter PM_{10}	150 µg/m³	138 µg/m³	Particulate Sensor	Within Prescribed Limits
9	Suspended Particulate Matter (SPM)	500 µg/m³	230 µg/m³	High Volume Sampler (HVS)	Within Prescribed Limits
10	Lead (Pb)	1.5 µg/m³	0.04 µg/m³	ASS (ICP-AES) after Sampling by HVS	Within Prescribed Limits

NEQS: National Environmental Quality Standards for Ambient Air, 2010

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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CHEMICAL ANALYSIS TEST REPORT (AMBIENT AIR)

Reference Number: **ESPAK/081I/22/AA/2078/00173** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.)

1. **Sample Analyzed By:** Waqas Ahmad (Analyst (ICP-AES)), Muhammad Tahir (Analyst (Field))

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 18/05/2022

---------- End of Report ----------

NOISE MONITORING REPORT

Reference Number: **ESPAK/081I/22/N/2079/00174** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Noise

Date of Sample Collection: 11/05/2022 **Grab / Composite:** Continuous - 24 Hours

Sample Collected/Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 12/05/2022

Method/Equipment Used: Sound Level Meter

S. No	Measurement Point	Limit Values (NEQS)	Noise Level in dB(A) Leq	Remarks
1	Point 1- near NIH Colony Islamabad Technopolis (Special Technology Zone). GPS (33°41'06.5"N 73°08'53.0"E – Day Time	65 dB(A)	60 dB(A)	Within Prescribed Limits
2	Point 1- near NIH Colony Islamabad Technopolis (Special Technology Zone). GPS (33°41'06.5"N 73°08'53.0"E – Night Time	55 dB(A)	55 dB(A)	Within Prescribed Limits

NEQS: National Environmental Quality Standards for Noise in Commercial Area, 2010 Day Time Hours (6:00 am to 10:00 pm) Night Time Hours (10:00 pm to 6:00 am)

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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- **Only parameters marked with asterisk (*) are ISO 17025:2017 accredited.**

1. **Sample Analyzed By:** Muhammad Tahir, Analyst (Field)

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 18/05/2022

---------- End of Report ----------

NOISE MONITORING REPORT

Reference Number: **ESPAK/081I/22/N/2080/00175** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Noise

Date of Sample Collection: 12/05/2022 **Grab / Composite:** Continuous - 24 Hours

Sample Collected/Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 13/05/2022

Method/Equipment Used: Sound Level Meter

S. No	Measurement Point	Limit Values (NEQS)	Noise Level in dB(A) Leq	Remarks
1	Point 2 near Horse Stable Islamabad Technopolis (Special Technology Zone). GPS (33°41'16.8"N 73°08'56.7"E) – Day Time	65 dB(A)	60 dB(A)	Within Prescribed Limits
2	Point 2 near Horse Stable Islamabad Technopolis (Special Technology Zone). GPS (33°41'16.8"N 73°08'56.7"E) – Night Time	55 dB(A)	**58 dB(A)**	Exceeding Prescribed Limits

NEQS: National Environmental Quality Standards for Noise in Commercial Area, 2010 Day Time Hours (6:00 am to 10:00 pm) Night Time Hours (10:00 pm to 6:00 am)

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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- **The report data is not intended to be used legally by the client.**
- **Only parameters marked with asterisk (*) are ISO 17025:2017 accredited.**

1. **Sample Analyzed By:** Muhammad Tahir, Analyst (Field)

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 18/05/2022

---------- End of Report ----------

NOISE MONITORING REPORT

Reference Number: **ESPAK/081I/22/N/2081/00176** **Date:** 18/05/2022

Name of Industry/Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Noise

Date of Sample Collection: 13/05/2022 **Grab / Composite:** Continuous - 24 Hours

Sample Collected/Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 14/05/2022

Method/Equipment Used: Sound Level Meter

S. No	Measurement Point	Limit Values (NEQS)	Noise Level in dB(A) Leq	Remarks
1	Point 3 near Mohra Nur Road Islamabad Technopolis (Special Technology Zone). GPS (33°41'28.4"N 73°09'19.0"E) – Day Time	65 dB(A)	56 dB(A)	Within Prescribed Limits
2	Point 3 near Mohra Nur Road Islamabad Technopolis (Special Technology Zone). GPS (33°41'28.4"N 73°09'19.0"E) – Night Time	55 dB(A)	53 dB(A)	Within Prescribed Limits

NEQS: National Environmental Quality Standards for Noise in Commercial Area, 2010 Day Time Hours (6:00 am to 10:00 pm) Night Time Hours (10:00 pm to 6:00 am)

- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report, is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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1. **Sample Analyzed By:** Muhammad Tahir
   Analyst (Field)

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 18/05/2022

---------- End of Report ----------

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: **ESPAK/081I/22/DW/2082/00422** **Date:** 18/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Ground Water at NIH Colony Islamabad Technopolis (GPS: 33°40'56.9"N 73°08'56.4"E)

Date Sample Received: 13/05/2022 **Grab / Composite:** Composite

Date of Sample Collection: 11-12 May 2022

Sample Collected / Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 18/05/2022

S. No	Parameters	Limit Values (NSDWQ)	Concentration	Method / Equipment Used	Remarks
1	pH*	6.5-8.5	7.2	SMWW 4500H$^+$B	Within Limits
2	Total Dissolved Solids (TDS)*	<1000 mg/L	576 mg/L	SMWW 2540C	Within Limits
3	Chloride (as Cl^-)*	<250 mg/L	30 mg/L	SMWW 4500Cl^-B	Within Limits
4	Cadmium (Cd)*	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
5	Chromium (Cr)*	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
6	Copper (Cu)*	2.0 mg/L	ND	U.S. EPA-200.7	Within Limits
7	Lead (Pb)*	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
8	Manganese (Mn)*	≤0.5 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
9	Nickel (Ni)*	≤0.02 mg/L	ND	U.S. EPA-200.7	Within Limits
10	Zinc (Zn)*	5.0 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
11	Antimony (Sb)	≤0.005 mg/L	ND	U.S. EPA-200.7	Within Limits
12	Aluminum (Al)	≤0.2 mg/L	ND	U.S. EPA-200.7	Within Limits
13	Arsenic (As)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
14	Boron (B)	0.3 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
15	Barium (Ba)	0.7 mg/L	0.3 mg/L	U.S. EPA-200.7	Within Limits
16	Mercury (Hg)	≤0.001 mg/L	ND	U.S. EPA-200.7	Within Limits
17	Selenium (Se)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
18	Total Coliforms	----	**>8.0 MPN/100mL**	SMWW 9221 B	---
19	Fecal Coliform Bacteria	Must not be detectable in any 100mL sample	**>8.0 MPN/100mL**	SMWW 9221 F	Exceeding Limits
20	E. Coli	Must not be detectable in any 100mL Sample	ND	SMWW 9221 F	Within Limits
21	Color	≤15 TCU	Nil	SMWW 2120 C	Within Limits
22	Taste	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: **ESPAK/081I/22/DW/2082/00422** **Date:** 18/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

S. No	Parameters	Limit Values (NSDWQ)	Concentration	Method / Equipment Used	Remarks
23	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
24	Turbidity	<5 NTU	0.9 NTU	SMWW 2130B	Within Limits
25	Total Hardness as $CaCO_3$	<500 mg/L	468 mg/L	SMWW 2340C	Within Limits
26	Cyanide (CN^-)	≤0.05 mg/L	ND	SMWW 4500 CN^- F	Within Limits
27	Fluoride (F^-)	≤1.5 mg/L	0.3 mg/L	U.S. EPA 9214	Within Limits
28	Nitrate (NO_3^-)	≤50 mg/L	23.5 mg/L	SMWW 4500NO_3^-B	Within Limits
29	Nitrite (NO_2^-)	≤3 mg/L	0.2 mg/L	SMWW 4500NO_2^-B	Within Limits
30	Residual Chlorine	0.2-0.5 mg/L	ND	SMWW 4500-Cl B	----
31	Phenolic Compounds (as Phenols)	NGVS	ND	SMWW 5530 C	----
32	Pesticides	NGVS	ND	Screening Method	----

NSDWQ: Pakistan National Standards for Drinking Water Quality, 2010
SMWW: Standard Methods for the Examination of Water and WasteWater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
USEPA: United States Environmental Protection Agency
NGVS: No Guideline Value Set
ND: Not Detected

- Laboratory tests and measurements were carried out at 25 ± 2 °C and 50 ± 10 % Relative Humidity conditions unless stated otherwise.
- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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1. **Sample Analyzed By:**

Waqas Ahmad	Sana Ashraf	Javeria Abid	Abdullah Ali	Khizra Bano
Analyst (ICP-AES)	Analyst (Chemical)	Analyst (Chemical)	Analyst (Chemical)	Analyst(Microbiology)

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 18/05/2022

---------- End of Report ----------

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: **ESPAK/081I/22/DW/2083/00423** **Date:** 18/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Ground Water at Horse Stabal Islamabad Technopolis (GPS: 33°41'16.5"N 73°08'56.6"E)

Date Sample Received: 13/05/2022 **Grab / Composite:** Composite

Date of Sample Collection: 11-12 May 2022

Sample Collected / Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 18/05/2022

S. No	Parameters	Limit Values (NSDWQ)	Concentration	Method / Equipment Used	Remarks
1	pH*	6.5-8.5	7.5	SMWW 4500H$^+$B	Within Limits
2	Total Dissolved Solids (TDS)*	<1000 mg/L	288 mg/L	SMWW 2540C	Within Limits
3	Chloride (as Cl^-)*	<250 mg/L	20 mg/L	SMWW 4500Cl^-B	Within Limits
4	Cadmium (Cd)*	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
5	Chromium (Cr)*	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
6	Copper (Cu)*	2.0 mg/L	ND	U.S. EPA-200.7	Within Limits
7	Lead (Pb)*	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
8	Manganese (Mn)*	≤0.5 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
9	Nickel (Ni)*	≤0.02 mg/L	ND	U.S. EPA-200.7	Within Limits
10	Zinc (Zn)*	5.0 mg/L	0.3 mg/L	U.S. EPA-200.7	Within Limits
11	Antimony (Sb)	≤0.005 mg/L	ND	U.S. EPA-200.7	Within Limits
12	Aluminum (Al)	≤0.2 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
13	Arsenic (As)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
14	Boron (B)	0.3 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
15	Barium (Ba)	0.7 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
16	Mercury (Hg)	≤0.001 mg/L	ND	U.S. EPA-200.7	Within Limits
17	Selenium (Se)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
18	Total Coliforms	----	ND	SMWW 9221 B	----
19	Fecal Coliform Bacteria	Must not be detectable in any 100mL sample	ND	SMWW 9221 F	Within Limits
20	E. Coli	Must not be detectable in any 100mL Sample	ND	SMWW 9221 F	Within Limits
21	Color	≤15 TCU	Nil	SMWW 2120 C	Within Limits
22	Taste	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: **ESPAK/081I/22/DW/2083/00423** **Date:** 18/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

S. No	Parameters	Limit Values (NSDWQ)	Concentration	Method / Equipment Used	Remarks
23	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
24	Turbidity	<5 NTU	0.4 NTU	SMWW 2130B	Within Limits
25	Total Hardness as $CaCO_3$	<500 mg/L	200 mg/L	SMWW 2340C	Within Limits
26	Cyanide (CN^-)	≤0.05 mg/L	ND	SMWW 4500 CN^- F	Within Limits
27	Fluoride (F^-)	≤1.5 mg/L	0.2 mg/L	U.S. EPA 9214	Within Limits
28	Nitrate (NO_3^-)	≤50 mg/L	5.5 mg/L	SMWW 4500NO_3^-B	Within Limits
29	Nitrite (NO_2^-)	≤3 mg/L	0.1 mg/L	SMWW 4500NO_2^-B	Within Limits
30	Residual Chlorine	0.2-0.5 mg/L	ND	SMWW 4500-Cl B	----
31	Phenolic Compounds (as Phenols)	NGVS	ND	SMWW 5530 C	----
32	Pesticides	NGVS	ND	Screening Method	----

NSDWQ: Pakistan National Standards for Drinking Water Quality, 2010
SMWW: Standard Methods for the Examination of Water and WasteWater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
USEPA: United States Environmental Protection Agency
NGVS: No Guideline Value Set
ND: Not Detected

- Laboratory tests and measurements were carried out at 25 ± 2 °C and 50 ± 10 % Relative Humidity conditions unless stated otherwise.
- Uncertainty of Measurement (UoM) data will be provided on request, where available. The statement of conformity, if provided in the report is based on the decision rule of simple acceptance or rejection with equal shared risk due to measurement uncertainty.

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1. **Sample Analyzed By:**

Waqas Ahmad	Sana Ashraf	Javeria Abid	Abdullah Ali	Khizra Bano
Analyst (ICP-AES)	Analyst (Chemical)	Analyst (Chemical)	Analyst (Chemical)	Analyst(Microbiology)

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 18/05/2022

---------- End of Report ----------

CHEMICAL ANALYSIS TEST REPORT (WASTE WATER)

Reference Number: **ESPAK/081I/22/WW/2084/00283** **Date:** 21/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Sample -1 Waste Water at NIH Colony Islamabad Technopolis (GPS: 33°40'48.8"N 73°08'59.8"E)

Date Sample Received: 13/05/2022 **Grab / Composite:** Composite

Date of Sample Collection: 11-12 May 2022

Sample Collected / Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 18/05/2022

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
1	pH value (H^+)*	6-9	6.9	SMWW 4500H^+ B	Within Prescribed Limits
2	Biochemical Oxygen Demand (BOD_5) at 20 ^oC	80 mg/L	56 mg/L	SMWW 5210 B	Within Prescribed Limits
3	Chemical Oxygen Demand (COD)*	150 mg/L	75 mg/L	SMWW 5220 D	Within Prescribed Limits
4	Total Suspended Solids (TSS)	200 mg/L	33 mg/L	SMWW 2540 D	Within Prescribed Limits
5	Total Dissolved Solids (TDS)*	3500 mg/L	336 mg/L	SMWW 2540 C	Within Prescribed Limits
6	Phenolic Compounds (as Phenol)	0.1 mg/L	ND	SMWW 5530 C	Within Prescribed Limits
7	Grease and Oil	10 mg/L	ND	U.S. EPA 9071 B	Within Prescribed Limits
8	Chloride (as Cl^-)*	1000 mg/L	17 mg/L	SMWW 4500Cl^- -B	Within Prescribed Limits
9	Fluoride (as F^-)	10 mg/L	0.2 mg/L	U.S. EPA 9214	Within Prescribed Limits
10	Cyanide (as CN^-)	1.0 mg/L	ND	SMWW 4500 CN- F	Within Prescribed Limits
11	An-ionic detergents (as MBAS)	20 mg/L	0.6 mg/L	SMWW 5540 C	Within Prescribed Limits
12	Sulfate (SO_4^{2-})	600 mg/L	30 mg/L	SMWW 4500 - SO_4^{2-} C	Within Prescribed Limits
13	Sulfide (S^{2-})	1.0 mg/L	ND	SMWW 4500 - S^{2-} F	Within Prescribed Limits
14	Ammonia (NH_3)	40 mg/L	7.0 mg/L	SMWW 4500-NH_3- D	Within Prescribed Limits
15	Chlorine (Cl)	1.0 mg/L	ND	SMWW 4500-Cl B	Within Prescribed Limits
16	Cadmium (Cd)*	0.1 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
17	Chromium (Trivalent and Hexavalent)*	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
18	Copper (Cu)*	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
19	Iron (Fe)*	8.0 mg/L	0.5 mg/L	U.S.EPA-200.7	Within Prescribed Limits
20	Lead (Pb)*	0.5 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
21	Manganese (Mn)*	1.5 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Prescribed Limits
22	Mercury (Hg)	0.01 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
23	Selenium (Se)	0.5 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
24	Nickel (Ni)*	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
25	Silver (Ag)	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
26	Zinc (Zn)*	5.0 mg/L	0.2 mg/L	U.S. EPA-200.7	Within Prescribed Limits

CHEMICAL ANALYSIS TEST REPORT (WASTE WATER)

Reference Number: **ESPAK/081I/22/WW/2084/00283** **Date:** 21/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
27	Arsenic (As)	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
28	Barium (Ba)	1.5 mg/L	0.2 mg/L	U.S. EPA-200.7	Within Prescribed Limits
29	Boron (B)	6.0 mg/L	0.1 mg/L	U.S.EPA-200.7	Within Prescribed Limits
30	Total Toxic Metals	2.0 mg/L	0.3 mg/L	Calculated Value	Within Prescribed Limits
31	Color	NGVS	**22 TCU**	SMWW 2120 C	----
32	Total Coliform Bacteria	NGVS	**>16000 MPN/100mL**	SMWW 9221 B	----
33	Fecal Coliform Bacteria	NGVS	**>16000 MPN/100mL**	SMWW 9221 F	----
34	E.Coli	NGVS	**>16000 MPN/100mL**	SMWW 9221 F	----

NEQS: National Environmental Quality Standards for Municipal & Liquid Industrial Effluents, 2000
SMWW: Standard Methods for the Examination of Water and WasteWater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
USEPA: United States Environmental Protection Agency
ND: Not Detected

- Laboratory tests and measurements were carried out at 25 ± 2 °C and 50 ± 10 % Relative Humidity conditions unless stated otherwise.
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1. **Sample Analyzed By:**

Waqas Ahmad	Javeria Abid	Abdullah Ali	M.Shahid	Sana Ashraf
Analyst (ICP-AES)	Analyst (Chemical)	Analyst (Chemical)	Analyst (Chemical)	Analyst (Chemical)

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 21/05/2022

---------- End of Report ----------

CHEMICAL ANALYSIS TEST REPORT (WASTE WATER)

Reference Number: **ESPAK/081I/22/WW/2126/00284** **Date:** 21/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Sample-2 Waste Water from Sewerage Drain at Islamabad Technopolis (GPS: 33°41'30.2"N 73°09'20.4"E)

Date Sample Received: 16/05/2022 **Grab / Composite:** Composite

Date of Sample Collection: 13-14 May 2022

Sample Collected / Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 21/05/2022

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
1	pH value (H^+)*	6-9	7.3	SMWW 4500H^+ B	Within Prescribed Limits
2	Biochemical Oxygen Demand (BOD_5) at 20 ^oC	80 mg/L	46 mg/L	SMWW 5210 B	Within Prescribed Limits
3	Chemical Oxygen Demand (COD)*	150 mg/L	92 mg/L	SMWW 5220 D	Within Prescribed Limits
4	Total Suspended Solids (TSS)	200 mg/L	165 mg/L	SMWW 2540 D	Within Prescribed Limits
5	Total Dissolved Solids (TDS)*	3500 mg/L	746 mg/L	SMWW 2540 C	Within Prescribed Limits
6	Phenolic Compounds (as Phenol)	0.1 mg/L	0.02 mg/L	SMWW 5530 C	Within Prescribed Limits
7	Grease and Oil	10 mg/L	ND	U.S. EPA 9071 B	Within Prescribed Limits
8	Chloride (as Cl^-)*	1000 mg/L	83 mg/L	SMWW 4500Cl^- -B	Within Prescribed Limits
9	Fluoride (as F^-)	10 mg/L	0.4 mg/L	U.S. EPA 9214	Within Prescribed Limits
10	Cyanide (as CN^-)	1.0 mg/L	0.11 mg/L	SMWW 4500 CN- F	Within Prescribed Limits
11	An-ionic detergents (as MBAS)	20 mg/L	3.8 mg/L	SMWW 5540 C	Within Prescribed Limits
12	Sulfate (SO_4^{2-})	600 mg/L	41 mg/L	SMWW 4500 - SO_4^{2-} C	Within Prescribed Limits
13	Sulfide (S^{2-})	1.0 mg/L	ND	SMWW 4500 - S^{2-} F	Within Prescribed Limits
14	Ammonia (NH_3)	40 mg/L	9.0 mg/L	SMWW 4500-NH_3- D	Within Prescribed Limits
15	Chlorine (Cl)	1.0 mg/L	ND	SMWW 4500-Cl B	Within Prescribed Limits
16	Cadmium (Cd)*	0.1 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
17	Chromium (Trivalent and Hexavalent)*	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
18	Copper (Cu)*	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
19	Iron (Fe)*	8.0 mg/L	0.3 mg/L	U.S.EPA-200.7	Within Prescribed Limits
20	Lead (Pb)*	0.5 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
21	Manganese (Mn)*	1.5 mg/L	0.3 mg/L	U.S. EPA-200.7	Within Prescribed Limits
22	Mercury (Hg)	0.01 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
23	Selenium (Se)	0.5 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
24	Nickel (Ni)*	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
25	Silver (Ag)	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
26	Zinc (Zn)*	5.0 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Prescribed Limits

CHEMICAL ANALYSIS TEST REPORT (WASTE WATER)

Reference Number: **ESPAK/081I/22/WW/2126/00284** **Date:** 21/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

S. No	Parameters	Limit Values (NEQS)	Concentration	Method / Equipment Used	Remarks
27	Arsenic (As)	1.0 mg/L	ND	U.S. EPA-200.7	Within Prescribed Limits
28	Barium (Ba)	1.5 mg/L	0.9 mg/L	U.S. EPA-200.7	Within Prescribed Limits
29	Boron (B)	6.0 mg/L	ND	U.S.EPA-200.7	Within Prescribed Limits
30	Total Toxic Metals	2.0 mg/L	0.9 mg/L	Calculated Value	Within Prescribed Limits
31	Color	NGVS	40 TCU	SMWW 2120 C	----
32	Total Coliform Bacteria	NGVS	**400 MPN/100mL**	SMWW 9221 B	----
33	Fecal Coliform Bacteria	NGVS	**180 MPN/100mL**	SMWW 9221 F	----
34	E.Coli	NGVS	**180 MPN/100mL**	SMWW 9221 F	----

NEQS: National Environmental Quality Standards for Municipal & Liquid Industrial Effluents, 2000
SMWW: Standard Methods for the Examination of Water and WasteWater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
USEPA: United States Environmental Protection Agency
ND: Not Detected

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1. **Sample Analyzed By:**

Waqas Ahmad	Javeria Abid	Abdullah Ali	M.Shahid	Sana Ashraf
Analyst (ICP-AES)	Analyst (Chemical)	Analyst (Chemical)	Analyst (Chemical)	Analyst (Chemical)

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 21/05/2022

---------- End of Report ----------

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: **ESPAK/081I/22/DW/2127/00430** **Date:** 21/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

Address: 1-C, Block-N, Model Town Extension, Lahore

Telephone No.: ----

Nature of Sample: Sample-3 Ground Water from Bahria Enclave Security Office Islamabad Technopolis (GPS: 33°41'30.0"N 73°09'21.5"E)

Date Sample Received: 16/05/2022 **Grab / Composite:** Composite

Date of Sample Collection: 13-14 May 2022

Sample Collected / Sent By: Muhammad Tahir, Analyst (Field), ESPAK

Date of Completion of Analysis: 21/05/2022

S. No	Parameters	Limit Values (NSDWQ)	Concentration	Method / Equipment Used	Remarks
1	pH*	6.5-8.5	6.9	SMWW 4500H⁺B	Within Limits
2	Total Dissolved Solids (TDS)*	<1000 mg/L	992 mg/L	SMWW 2540C	Within Limits
3	Chloride (as Cl^-)*	<250 mg/L	120 mg/L	SMWW 4500Cl^-B	Within Limits
4	Cadmium (Cd)*	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
5	Chromium (Cr)*	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
6	Copper (Cu)*	2.0 mg/L	ND	U.S. EPA-200.7	Within Limits
7	Lead (Pb)*	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
8	Manganese (Mn)*	≤0.5 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
9	Nickel (Ni)*	≤0.02 mg/L	ND	U.S. EPA-200.7	Within Limits
10	Zinc (Zn)*	5.0 mg/L	0.1 mg/L	U.S. EPA-200.7	Within Limits
11	Antimony (Sb)	≤0.005 mg/L	ND	U.S. EPA-200.7	Within Limits
12	Arsenic (As)	≤0.05 mg/L	ND	U.S. EPA-200.7	Within Limits
13	Boron (B)	0.3 mg/L	ND	U.S. EPA-200.7	Within Limits
14	Barium (Ba)	0.7 mg/L	0.5 mg/L	U.S. EPA-200.7	Within Limits
15	Mercury (Hg)	≤0.001 mg/L	ND	U.S. EPA-200.7	Within Limits
16	Selenium (Se)	0.01 mg/L	ND	U.S. EPA-200.7	Within Limits
17	Total Coliforms	----	ND	SMWW 9221 B	----
18	Fecal Coliform Bacteria	Must not be detectable in any 100mL sample	ND	SMWW 9221 F	Within Limits
19	E. Coli	Must not be detectable in any 100mL Sample	ND	SMWW 9221 F	Within Limits
20	Color	≤15 TCU	Nil	SMWW 2120 C	Within Limits
21	Taste	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits

CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Reference Number: **ESPAK/081I/22/DW/2127/00430** **Date:** 21/05/2022

Name of Industry / Client: National Engineering Services Pakistan (Pvt.) Limited (NESPAK)

S. No	Parameters	Limit Values (NSDWQ)	Concentration	Method / Equipment Used	Remarks
22	Odor	Non Objectionable / Acceptable	Acceptable	Organoleptic	Within Limits
23	Turbidity	<5 NTU	0.2 NTU	SMWW 2130B	Within Limits
24	Total Hardness as $CaCO_3$	<500 mg/L	497 mg/L	SMWW 2340C	Within Limits
25	Cyanide (CN^-)	≤0.05 mg/L	ND	SMWW 4500 CN^- F	Within Limits
26	Fluoride (F^-)	≤1.5 mg/L	0.3 mg/L	U.S. EPA 9214	Within Limits
27	Nitrite (NO_2^-)	≤3 mg/L	ND	SMWW 4500NO_2^-B	Within Limits
28	Residual Chlorine	0.2-0.5 mg/L	ND	SMWW 4500-Cl B	----
29	Phenolic Compounds (as Phenols)	NGVS	ND	SMWW 5530 C	----
30	Pesticides	NGVS	ND	Screening Method	----

NSDWQ: Pakistan National Standards for Drinking Water Quality, 2010
SMWW: Standard Methods for the Examination of Water and WasteWater 23rd Edition, American Public Health Association, American Water Works Association, Water Environment Federation USA (2017)
USEPA: United States Environmental Protection Agency
NGVS: No Guideline Value Set
ND: Not Detected

- Laboratory tests and measurements were carried out at 25 ± 2 °C and 50 ± 10 % Relative Humidity conditions unless stated otherwise.
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1. **Sample Analyzed By:**

Waqas Ahmad	Sana Ashraf	Javeria Abid	Abdullah Ali	Khizra Bano
Analyst (ICP-AES)	Analyst (Chemical)	Analyst (Chemical)	Analyst (Chemical)	Analyst(Microbiology)

2. **Name of Chief Analyst with Seal:** Muhammad Arfan

3. **Signature of Incharge of the Environmental Laboratory:**

Name: Imran Malik
General Manager
Date: 21/05/2022

---------- End of Report ----------

TEST REPORT

Ref. #: PGG/LAB/2022-3648/DW

Date: 10-Aug-22

Name of Client	NESPAK
Location	Rawal Lake, Islamabad

Sample Description:

Nature of sample	Waste Water
Sampling By	Pak Green Laboratories
Sample source	Rawal Lake
Sample Type	24 hrs Composite
Sample Code	WW-829
Sampling Location:	Rawal Lake
Date of sampling	18-19 July-22

Summary of Test Result:

Physical Parameters	Non- complaince
Biological Parameters	Non-Compliance
Chemical Parameters	Compliance

Remarks:
Parameters with * are exceeding PEQS limit.

Terms & Conditions:

- Analysis was conducted on the request of proponent for his own use/baseline study.
- Report cannot be used regarding compliance of any complaint, EPO or any other court case.
- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client. Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The left-over sample (if so available) shall be retained for fifteen days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.

Lab. Analyst	Chief Analyst	Laboratory Incharge

Pak Green Enviro-Engineering (Pvt.) Ltd. 46-M, Gulberg-III, Lahore, Pakistan

Ref. #: PGG/LAB/2022-3648/DW

Date: 10-Aug-22

Results:

Sr. No.	Parameters	Unit	Method / Technique	PEQS	Results
1.	Temperature	°C	APHA-2550 B	40	27.9
2.	pH ^	—	APHA-4500-H⁺ B	6-9	8.011 at 27.9°C
3.	Biological Oxygen Demand (BOD_5 at 20 °C)^	mg/L	APHA-5210 D	80	18.0
4.	Chemical Oxygen Demand (COD) ^	mg/L	APHA-5220 B	150	30
5.	Total Suspended Solids (TSS) ^	mg/L	APHA-2540 D	200	130
6.	Total Dissolved Solids (TDS) ^	mg/L	APHA-2540 C	3500	270
7.	Chloride (as Cl^{1-}) ^	mg/L	APHA-4500-Cl B	1000	15
8.	Cadmium (Cd)^	mg/L	APHA-3111 B	0.1	BDL
9.	Chromium (Trivalent & Hexavalent)^	mg/L	APHA-3111 B	1.0	0.021
10.	Copper (Cu)^	mg/L	APHA-3111 B	1.0	0.00853
11.	Lead (Pb)^	mg/L	APHA-3111 B	0.5	BDL
12.	Mercury (Hg)	mg/L	APHA-3112 B	0.01	BDL
13.	Selenium (Se)	mg/L	APHA-3114 C	0.5	BDL
14.	Nickel (Ni)	mg/L	APHA-3111 B	1.0	0.0004
15.	Antimony (Sb)	mg/L	APHA-3111 B	≤0.005	BDL
16.	Aluminum (Al)	mg/L	APHA-3111 D	≤ 0.2	BDL
17.	Zinc (Zn)^	mg/L	APHA-3111 B	5.0	0.0770
18.	Arsenic (As)	mg/L	APHA-3114 C	1.0	0.0014
19.	Barium (Ba)	mg/L	APHA-3111 D	1.5	BDL
20.	Manganese (Mn)^	mg/L	APHA-3111 B	1.5	0.0727
21.	Boron (B)	mg/L	APHA-3111 D	6.0	BDL
22.	Cyanide (as CN^{1-}) Total	mg/L	APHA-4500-CN F	1.0	BDL

Pak Green Enviro-Engineering (Pvt.) Ltd. 46-M, Gulberg-III, Lahore. Pakistan

Head Office: 46-M, Gulberg III, Lahore-Pakistan. Ph: +9242-35441444 Cell: 0303-4442334

Ref. #: PGG/LAB/2022-3648/DW

Date: 10-Aug-22

Sr. No.	Parameters	Unit	Method / Technique	*PEQS*	Results
27.	E Coli	MPN/ 100ml	APHA-9221 F	Must not be detectable in any 100 ml sample	1044*
28.	Total Coli-form	MPN/ 100ml	APHA-9221 D	Must not be detectable in any 100 ml sample	1819*
29.	Fecal Coliform	MPN/ 100ml	APHA-9221 E	Must not be detectable in any 100 ml sample	507*
30.	Color	TCU	APHA-2120 C	≤ 15	0.00
31.	Taste	-	APHA-2160 C	Non-Objectionable / Acceptable	Taste Scale 9
32.	Odor	-	APHA-2150 B	Non-Objectionable / Acceptable	Non-Objectionable
33.	Turbidity	NTU	APHA-2130 B	< 5	60*
34.	Total Hardness^	mg/L	APHA-2340 C	<500	130
35.	Nitrate^	mg/L	APHA-4500-NO_3^{-1}-E	≤ 50	BDL
36.	Nitrite^	mg/L	APHA-4500-NO_2^{-1}-B	≤ 3	BDL
37.	Residual Chlorine (Cl_2)	mg/L	APHA-Cl-B	0.2-0.5 at consumer end 0.5-1.5 at source	BDL
38.	Pesticides, Herbicides & Fungicides	mg/L	ASTM-D5175	0.15	BDL
39.	Seatalable Soilds	mg/L	-	-	130

PEQS: Punjab Environmental Quality Standards
BDL: Below Detection Limit
Comments: Water is not recommended for drinking purpose without treatment

^ PNAC Accredited

Pak Green Enviro-Engineering (Pvt) Ltd. 46-M, Gulberg-III, Lahore, Lahore, Pakistan

ANNEX-VII

Social Survey Tool

NATIONAL ENGINEERING SERVICES PAKISTAN (PVT) LIMITED

ISLAMABAD SPECIAL TECHNOLOGY ZONE (ISTZ)

Socioeconomic Baseline Survey

Interview Schedule

Name of Interviewer: M. Ali. Date: 16-/03/2022.
a) Settlement: Diplomatic Enclave. (b) Union Council:
c) Tehsil: Chak Shehzad (d) District: Islamabad

1. Name of Respondent: M. Hamza. Job: Newmal Area.
2. Sex: Male. CNIC: 61101-1491650-3.
3. Father's name: Zahid Sultan.
4. Contact Number: 0316-8842779.
5. What is your age?

1. 15-25 2. 26-35 3. 36-45 4. Above 45

6. Marital Status.

1. Married 2. Unmarried

7. What is your caste /ethnic group? Rajpoot.
8. What is your mother tongue? Urdu.
9. What is your Religion? Islam.
10. What is your Qualification?

1. Illiterate 2. Primary 3. Middle
4. Metric 5. Intermediate 6. Above Inter (B.Sc IT)

11. What is your profession? Own Business.
12. What is your average monthly income (Rs)?

1. Below 10,000 2. 10,001 to 15,000
3. 15,001 to 20,000 4. 20,001 to 25,000
5. 25,001 to 30,000 6. Above 30,000

13. What is type of your family system?

1. Joint 2. Nuclear 3. Extended

14. Total number of family members living with you?

Number 7

15. What is employment status of your family members?

1.	Govt. Employee	2.	Private Employee
3.	Self Employed	4.	Unemployed
5.	Household		

16. What are your major sources of income?

1.	Agriculture	2.	Livestock (meat, hides & wool)
3.	Trade /Business	4.	Poultry
5.	General Labor	6.	Any other (specify) Business (Auto Shop).

17. How much is your average monthly expenditures (Rs)?

1.	Below 10,000	2.	10,001 to 15,000
3.	15,001 to 20,000	4.	20,001 to 25,000
5.	25,001 to 30,000	6.	Above 30,000

18. What is type of ownership of your house?

1. Owned	2. Government	3. Rented
4. Free on Landlord property	5. Relative House	6. Any other

19. What is nature of construction of your house?

1.	Kacha	2.	Pacca	3.	Semi-pacca

20. Which of the following facilities are available in this locality?

1. Electricity	2. Water Supply	3. Gas
4. Telephone	5. Sewerage	6. Solid Waste Management
7. Public Transport		

A. What are the sources of water in this locality?

1.	Public Water Supply	2.	Hand Pumps
3.	Water Bore	4.	Any other

i. Are you satisfied with the water quality?

1.	Yes	2.	No

ii. What is the reason of dissatisfaction?

1. Dirty Water	2. Low Pressure	3. Bad Taste	4. Odor in Water

B. Is there any collection system of solid waste in your community?

1. Collected by the government 2. No collection service 3. Settlement/Society own collection system

i. If yes, how often garbage pickers visit?

1.	Daily	2.	Weekly	3.	Once in a month

C. Principal mode of transport from this locality to major urban centers?

1. Public 2. Private 3. Both

21. Which of the following Health Facility is present in or nearby your residential area?

1. BHU 2. RHC 3. THQ 4. Any Other NIH (National Institute of Health).

i. Are you satisfied with existing Health facility? 1. Yes 2. No

In case of No, what are the reasons of dissatisfaction and major disease in this area?

_____

22. Major diseases in the project area?

1. _____ 2. _____ 3. _____

23. Any Non-Government Organization (NGO) working in the area?

Name of Organization	Area of Interest
NGO Worker (Name not Satisfied)	

24. Which of the following Educational Facility is available in or nearby your residential area?

1. Primary 2. Middle 3. Matric 4. Above Urdu University. Comsats University.

i. Are you satisfied with existing educational facility in your area?

1. Yes 2. No

25. Is there any historical /archeological monument in this locality?

1. Yes 2. No

If yes,

Name _____ Distance _____

26. Is there any shrine /mosque /graveyard in this locality?

1. Yes 2. No

If yes, then what is that?

Shrine _____

_____

Mosque _____

_____

Graveyard Yes.

27. Do you know about the proposed project?

1. Yes 2. No

28. In your opinion, should this Project be implemented here?

1. Yes 2. No

29. Do you think that this project is useful for achieving high-tech industrial growth?

1. Yes 2. No

30. Do you think that this project will be useful for providing most modern infrastructure facilities and amenities?

1. Yes 2. No

31. Do you think that this project will create highly skilled job opportunities?

1. Yes 2. No

32. Do you think that this project upskill youth for future?

1. Yes 2. No

33. Do you think that this project will act as a catalyst for enhancing the IT exports of Pakistan?

1. Yes 2. No

34. Do you think that this project will attract Foreign Direct Investments (FDI) through development of a knowledge ecosystem driven by innovation and collaboration?

1. Yes 2. No

35. In your opinion, what will be possible impacts of this project?

During Construction: Air pollution (Respondent is having Allergy).
~~Traffic Noise.~~
~~Trees Cutting.~~

After Construction: Grace of Area will be increase.
Living Quality will be improved.
Land Value will be increase.

36. What do you think about the positive and negative impacts of the proposed subproject?

+Ve (1) Business Area Develop - people will be attracted.

-Ve (2) No.

37. What would you suggest to minimize or mitigate for the likely Negative Impacts of the proposed subproject?

Suggestions:

(1) Tree plantation.

(2) Jobs provision. Electricity should be convert to Solas.

38. What protective measures do you suggest to safeguard your interests?

people will be provided job.

39. In your opinion, what are some pressing needs of this area?

Gas provision.
Drinking water should be clean
Filteration Plant should be installed.
Sewerage System in Streets should be renew.

Name & Signature of Interviewer

Respondents:-

ANNEX-VIII

Resources Conservation Plan

Resource Conservation Plan

1. Introduction:

The resources in this world are not infinite. We are completely dependent on the resources of the earth to fulfill all our day to day requirements. Sustainable development calls for the need to conserve resources, especially the non-renewable resources.

2. Objective of the plan:

The Resource Conservation Plan is intended to make an effort towards achieving sustainable development. The objective of the resource conservation plan is to:

- Minimize the use of natural resources; and
- Mitigate/ prevent pollution contaminating the natural resources.

3. Planning:

Careful estimations of quantities of material, fuel, water and energy required directly or indirectly shall be done to avoid excessive or unnecessary wastage of these materials. In addition to this, pollution prevention strategies shall also be devised to prevent contamination of resources.

- The estimations include the following:
    1. Estimation of construction material required for the project
    2. Estimation of fuel consumption for construction machinery, construction vehicles and generators etc.
    3. Estimations of the energy requirements during all the stages of the project
    4. Estimations of water consumption for construction activities and construction camp sites.
- Strategies shall be planned to reduce loads on the identified resources to be consumed;
- Best management practices shall be devised to control or reduce pollution resulting from the activities during different stages of the project; and
- An inspector shall be assigned responsibility to oversee the ongoing activities to check the compliance of the planned strategies.

4. Execution of the plan:

The planned strategies shall be implemented to conserve the natural resources including but not limited to the following:

Material

- Material supplied shall be in conformance with the estimated quantities and excess material shall be returned to the supplier;
- Material wastage shall be avoided by using best management practices;
- Waste produced during the project execution shall be disposed of safely to the designated disposal sites through approved contractors; and
- Reuse of the materials shall be appreciated.

Fuel/Energy

- Reduce trips and optimize routes to and from the construction site for all kinds of activities;
- Regular maintenance of equipment and vehicles to avoid leaks and sustain efficient fuel consumption;
- Switch off/plug off idle equipment and vehicles to avoid wastage of fuel;
- Minimize warm up time, unnecessary acceleration and deceleration of the construction equipment and vehicles;
- Avoid unnecessary burning of fuel for cooking in construction camps;
- Avoid unnecessary heating/cooling systems during extreme weathers;
- Construction shall start in early hours of the day to avoid heat in summers and utilization of day light; and
- Alternate energy sources shall be considered for electricity generations during construction and operation to conserve fossil fuel as it is non-renewable resource.

Water

- Avoid using potable water for sprinkling, curing and washing of equipment/vehicles. Surface water or treated effluent can be used instead;
- Wastage of water should be controlled through providing proper valves and through controlling pressure of the water;
- Unnecessary equipment washings should be avoided;
- Awareness amongst workers shall be raised to conserve water and immediately report for any leaks detected; and
- Ensure protection of canal water from contamination resulting from construction activities.

Pollution:

- Emissions shall be reduced/controlled as far as possible and direct discharges to air shall be avoided by strictly adhering to the mitigation measures outlined in EIA report;
- Waste water shall not be discharged directly into the canal and must be managed as per the recommendations presented in EIA; and
- Construction & demolition waste and municipal solid waste shall not be dumped/ burnt openly and shall be handled according to the preventative measure given in EIA study.

5. Checking and Corrective Actions

The proponent shall bind the construction contractor through contract agreement to comply with the strategies outlined in the Resource Conservation Plan. The proponent shall also appoint an Inspector who shall monitor the daily onsite activities and shall report any issues/ concerns raised in relation to Resource Conservation Plan. The inspector shall recommend adequate corrective actions to mitigate the issues raised.

ANNEX-IX
Construction Health and Safety Checklist

CONSTRUCTION HEALTH AND SAFETY CHECKLIST

GENERAL INTRODUCTION

This checklist identifies some of the hazards most commonly found on construction sites. The questions it asks are intended to help the safety supervisor decide whether the construction site is a safe and healthy place to work.

ACCESS ON SITE

- Can everyone get to their place of work safely?
- Are access routes free from obstructions and clearly signposted?
- Are holes protected with clearly marked and fixed covers to prevent falls?
- Are temporary structures stable, adequately braced and not overloaded?
- Will permanent structures remain stable during any refurbishment or demolition work?
- Is the site tidy, and are materials stored safely?
- Is lighting adequate, especially when work is being carried on after dark outside or inside tunnels?

WELFARE

- Are toilets readily available and are they kept clean and properly lit?
- Are there washbasins, hot and cold (or warm) running water, soap and towels?
- Are the washbasins large enough to wash up to the elbow and are they kept clean?
- Is there somewhere to change, dry and store clothing?
- Is there a place where workers can sit, make hot drinks and prepare food?
- Are drinking water and cups provided?
- Can everyone who needs to use them get to the welfare facilities easily and safely?

SCAFFOLDS

- Are scaffolds erected, altered and dismantled by competent people?
- Are all uprights provided with base plates (and where necessary, timber sole plates)?
- Are all uprights, ledgers, transoms and braces in position?
- Is the scaffold tied to the structure in enough places to prevent collapse?
- Are there double guard rails and toe boards or other suitable protection at every edge, to prevent falling?
- Are brick guards provided to prevent materials falling from scaffolds?
- Are the working platforms fully boarded and are the boards arranged to avoid tipping or tripping?
- Are there effective barriers or warning notices in place to stop people using an incomplete scaffold, e.g. where working platforms are not fully boarded?

- Is the scaffold strong enough to carry the weight of materials stored on it and are these evenly distributed?
- Does a competent person inspect the scaffold regularly, e.g. at least once a week if the working platform is two meter or above in height or at suitable intervals if less than two meters, and always after it has been altered or damaged and following extreme weather events?
- Are the results of inspections recorded and kept?
- Have proprietary scaffolds been inspected and are they being used in accordance with suppliers' instructions?
- Have the wheels of scaffolds been locked and outriggers deployed when in use and are the platforms empty when they are moved?

POWERED ACCESS EQUIPMENT

- Has the equipment been installed by a competent person?
- Are the operators trained and competent?
- Is the safe working load clearly marked?
- Is the equipment inspected by a competent person?
- Does the working platform of the powered access equipment have adequate, secure guard rails and toe boards or other barriers to prevent people and materials falling off?
- Have precautions been taken to prevent people being struck by the (i) moving platform; and (ii) falling materials?

TRAFFIC, VEHICLES AND PLANT

- Are vehicles and pedestrians kept apart? If not, do you:
    - Separate them as much as you can and use barriers?
    - Tell people about the problem, and what to do about it?
    - Display warning signs?
    - Can zero tail swing excavators be used or is there adequate clearance around slewing vehicles?
- Can reversing be avoided, e.g. by using a one-way system, or if not, are properly trained signalers used?
- Are vehicles and plant properly maintained?
- Have drivers received proper training and are they competent for the vehicles or plant they are operating?
- Are loads properly secured?
- Have you made sure that passengers are only carried on vehicles designed to carry them?
- Have you made sure that plant and vehicles are not used on dangerous slopes?

CRANES

- Is the crane suitable for the job?
- Has the lift been properly planned by an 'appointed person'?

- Is the crane on a firm, level base? Are the riggers properly set?
- Who is the appointed ‘crane supervisor’ responsible for controlling the lifting operation on site?
- Are the crane driver and signaler trained and competent?
- Is the load secure?
- Has the signaler and slinger been trained to give signals and to attach loads correctly?
- Have you made arrangements to make sure the driver can see the load or has a signaler been provided to help?
- Are people stopped from walking or working beneath a raised load?
- Does the crane have a current report of thorough examination and record of inspection?

EXCAVATIONS

- Is there adequate support for the excavation, or has it been sloped or battered back to a safe angle?
- Is there a safe method used for putting in the support, without people working in an unsupported trench?
- Is there safe access into the excavation, e.g. a sufficiently long and secured ladder?
- Are there barriers or other protection to stop people and vehicles falling in?
- Are properly secured stop blocks provided to prevent tipping vehicles falling in?
- Could the excavation affect the stability of neighboring structures or services?
- Are materials, spoil and plant stored away from the edge of the excavation to reduce the chance of a collapse?
- Is the excavation regularly inspected by a competent person?

MANUAL HANDLING

Are there heavy materials such as concrete lintels, curbstones or bagged products which could cause problems if they have to be moved by hand? If so, can you:

- choose lighter materials;
- use wheelbarrows, hoists, tail handlers and other plant or equipment so that – manual lifting of heavy objects is kept to a minimum;
- order materials such as cement and aggregates in 25-kilogram bags;
- Avoid the repetitive laying of heavy building blocks weighing more than 20 kilograms; and
- Have people been instructed and trained how to lift safely?

HAZARDOUS SUBSTANCES

- Have you identified all harmful substances and materials, such as asbestos, lead, solvents, paints, cement and dust?
- Have you checked whether a licensed contractor is needed to deal with asbestos on site?
- Have you identified and put into place precautions to prevent or control exposure to hazardous substances by:

    - Doing the work in a different way, to remove the risk entirely;
    - Using a less hazardous material; and
    - Using tools fitted with dust extraction?
- Have workers had information and training so they know what the risks are from the hazardous substances used and produced on site, and what they need to do to avoid the risks?
- Have you got procedures to prevent contact with wet cement (as this can cause both dermatitis and cement burns)?
- Have you arranged health surveillance for people using certain hazardous substances?

NOISE

- Have workers had information and training so they know what the risks are from noise on site, and what they need to do to avoid those risks?
- Have you identified and assessed workers' exposure to noise?
- Can the noise be reduced by using different working methods or selecting quieter plant, e.g. by fitting breakers and other plant or machinery with silencers?
- Are people not involved in the work kept away from the source of the noise?
- Is suitable hearing protection provided and worn in noisy areas?
- Have hearing protection zones been marked?
- Have you arranged health surveillance for people exposed to high levels of noise?

HAND-ARM VIBRATION

- Have workers had information and training so they know what the risks are from hand-arm vibration (HAV) on site, and what they need to do to avoid those risks?
- Have you identified and assessed risks to workers from prolonged use of vibrating tools such as concrete breakers, angle grinders or hammer drills?
- Has exposure to HAV been reduced as much as possible by selecting suitable work methods and plant?
- Are reduced-vibration tools used whenever possible?
- Have vibrating tools been properly maintained?
- Have you arranged health surveillance for people exposed to high levels of hand-arm vibration, especially when exposed for long periods?

ELECTRICITY AND OTHER SERVICES

- Have all necessary services been provided on site before work begins and have you also identified existing services present on site (e.g. electric cables or gas mains) and taken effective steps (if necessary) to prevent danger from them?
- Are you using low voltage for tools and equipment, e.g. battery-operated tools or low-voltage systems?
- Where mains voltage has to be used, are trip devices (e.g. residual current devices (RCDs)) provided for all equipment?

- Are RCDs checked daily by users and properly maintained?
- Are cables and leads protected from damage?
- Are all connections to the system properly made and are suitable plugs used?
- Are tools and equipment checked by users, visually examined on site and regularly inspected and tested by a competent person?
- Where there are overhead lines, has the electricity supply been turned off, or have other precautions been taken, such as providing goal posts or taped markers?
- Have hidden electricity cables and other services been located (e.g. with a locator and plans) and marked, and have you taken precautions for safe working?

CONFINED SPACES

- Do you work in confined spaces where there may be an inadequate supply of oxygen or the presence of poisonous or flammable gas? If so, have you taken all necessary precautions?
- Confined spaces include tanks, sewers and manholes; they do not have to look dirty to be dangerous?

TOOLS AND MACHINERY

- Are the right tools or machinery being used for the job?
- Are all dangerous parts guarded, e.g. gears, chains drives, projecting generator shafts?
- Are guards secured and in good repair?
- Are tools and machinery maintained in good repair and are all safety devices operating correctly?
- Are all operators trained and competent?

FIRES AND EMERGENCIES

General

- Are there emergency procedures, e.g. for evacuating the site in case of fire or for rescue from a confined space?
- Do people on site know what the procedures are?
- Is there a means of raising the alarm, and does it work?
- Is there a way to contact the emergency services from site?
- Are there adequate escape routes and are these kept clear?
- Is there adequate first-aid provision?

Fire

- Is the quantity of flammable materials, liquids and gases on site kept to a minimum?
- Are they properly stored?
- Are suitable containers used for flammable liquids?

- Are flammable gas cylinders returned to a ventilated store at the end of the shift?
- Are smoking and other ignition sources banned in areas where gases or flammable liquids are stored or used?
- Are gas cylinders, associated hoses and equipment properly maintained and in good condition?
- When gas cylinders are not in use, are the valves fully closed?
- Is flammable and combustible waste removed regularly and stored in suitable bins or skips?
- Are suitable fire extinguishers provided?

PROTECTING THE PUBLIC

- Is the work fenced off from the public?
- Are the public protected from falling material?
- Have you provided a safe route through road works or pavement scaffolding for people with prams, wheelchair users and visually impaired people?
- When work has stopped for the day:
- Is the boundary secure and undamaged?
- Are all ladders removed or their rungs boarded so that they cannot be used?
- Are excavations and openings securely covered or fenced off?
- Is all plant immobilized to prevent unauthorized use?
- Are bricks and materials safely stacked?
- Are flammable or dangerous substances locked away in secure storage places?

ANNEX-X

Construction Waste Management Plan

CONSTRUCTION WASTE MANAGEMENT PLAN

1. GENERAL INTRODUCTION

Construction work refers to a wide range of materials depending on their origin; they are categorized as excavation material, demolition materials and worksite waste material. Construction waste material of the proposed project consists mainly of concrete, masonry, limestone, sandstone, metal, and wood. In addition to this, significant amount of municipal waste will also generate from the construction camps. The solid waste generation estimated to be 308 kg/day for 500 construction workers during construction phase of the proposed project.

2. ORIGINS AND CAUSES OF CONSTRUCTION WASTE

Origins of Waste	Causes of Waste
Contractual	▪ Errors in contract documents; and ▪ Contract documents incomplete at commencement of construction.
Design	▪ Design changes; ▪ Design and detailing complexity; ▪ Design and construction detail errors; ▪ Unclear and unsuitable specifications; and ▪ Poor coordination and communication (late information, last minute client requirements, slow drawing revision and distribution).
Procurement	▪ Ordering errors (i.e. ordering items not in compliance with specification); ▪ Over allowances (i.e. difficulties to order small quantities); and ▪ Supplier errors.
Transportation	▪ Damage during transportation; ▪ Difficulties for delivery vehicles accessing construction sites; ▪ Insufficient protection during unloading; and ▪ Inefficient methods of unloading
On-Site Management and Planning	▪ Lack of on-site waste management plans; ▪ Improper planning for required quantities; ▪ Delays in passing information on types and sizes of materials and components to be used; ▪ Lack of on-site material control; and ▪ Lack of supervision.
Material Storage	▪ Inappropriate site storage space leading to damage or deterioration; ▪ Improper storing methods; and ▪ Materials stored far away from point of application.
Material Handling	▪ Materials supplied in loose form; ▪ On-site transportation methods from storage to the point of application; and ▪ Inadequate material handling.
Site Operation	▪ Accidents due to negligence; ▪ Unused materials and products; ▪ Equipment malfunction; ▪ Poor craftsmanship; ▪ Use of wrong materials resulting in their disposal; ▪ Time pressure; and ▪ Poor work ethics.
Residual	▪ Waste from application processes (i.e. over preparation of mortar);

Origins of Waste	Causes of Waste
	▪ Off-cuts from cutting materials to length; ▪ Waste from cutting uneconomical shapes; and ▪ Packaging.
Other	▪ Weather ▪ Vandalism ▪ Theft

3. CONSTRUCTION WASTE MANAGEMENT PLAN

i) Waste Management Goals

The contractor established goal that this project will generate at least 50 percent less waste into landfills and the processes shall be employed to ensure that this goal is met. These shall include prevention of damage to materials to be incorporated into the work due to mishandling, improper storage, contamination, inadequate protection, minimizing poor quantity estimation, and through design.

ii) Responsibility

a) The Contractor shall be responsible for the implementation of the administrative portions of this program, including the notification of subcontractor management, the training of the site supervisor and the onsite posting of this plan.

b) The site supervisor shall be responsible for the implementation of the onsite portions of this program including the training of subcontractor personnel.

iii) Waste Prevention Planning

a) In addition to other requirements specified herein it is a requirement for the work of this project that the contractor comply with the applicable city waste disposal requirements.

b) Of the inevitable waste that is generated, the waste materials designated in this specification shall be salvaged for reuse and or recycling where practical and possible. Waste disposal in landfills shall be minimized as much as possible.

c) Project Construction Documents: The Contractor will contractually require all subcontractors to comply with the Construction Waste Management Plan (WMP)". A copy of the WMP will accompany all subcontractor agreements and require subcontractor participation.

d) The "Construction Waste Management Plan" shall be implemented and executed as follows and as on the chart:
   i) Salvageable materials will be diverted from disposal where feasible;
   ii) There will be a designated area on the construction site reserved for materials that can be recycled;
   iii) Areas shall be marked to designate what recycle materials are to be stored there; and
   iv) Hazardous waste shall be managed by a licensed hazardous waste vendor.

iv) Communication and Education Plan

a) This Waste Management Plan will be posted onsite;

b) Each subcontractor will be made aware of the intent of this project with respect to reduction of waste and recycling. Onsite recycling containers and/or areas will be plainly marked;

c) The subcontractor will be expected to make sure all their crews comply with the Waste Management Plan;
d) All recycling containers and areas will be clearly marked;
e) Lists of acceptable and unacceptable materials will be posted at the site; and
f) All subcontractors will be informed in writing of the importance of non-contamination with other materials or trash.

v) Motivation Plan

The Contractor will conduct a pre-award meeting for subcontractors. Subcontractors under consideration will be required to attend the meeting to review project goals and requirements with the project team. Attendance will be a prerequisite for award of subcontracts. This document will be an attachment to every subcontract. Copies of the attachment will be posted prominently at the job site.

vi) Expected Project Waste, Disposal, and Handling

The following chart identifies waste materials expected on the proposed project, their expected disposal methods and handling procedures. New items may be added as needed.

Material	Disposal Method	Handling Procedure
Land Clearing Debris	Keep separate for reuse and or wood sale. Suitable materials may be delivered to a composting site. Separate topsoil and rock for future landscaping use.	Keep separated in designated areas onsite.
Clean Dimensional Wood and Palette Wood	Keep separate for reuse by on-site construction or by site employees for either heating stoves or reuse in home projects. May be offered to public.	Keep separated in designated areas onsite.
Painted or Treated Wood	Reuse, off site recycle, and landfill.	Keep separated in designated areas onsite. Place in "Trash" container.
Concrete	Recycle when possible.	Keep separated in designated areas onsite.
Concrete Masonry Units	Keep separate for re-use by on-site construction or by site employees	Keep separated in designated areas onsite
Metals	Recycle off site when possible. Separate copper wire when possible.	Keep separated in designated areas onsite. Place in "Metals" container.
Gypsum drywall (unpainted)	Recycle with supplier when possible.	Keep scraps separate for recycling – stack on pallets in provided onsite. All scrap drywall should be taken back by contractor to drywall supplier
Paint	Reuse onsite; donate to Habitat for Humanity Restore.	Keep separated in designated areas onsite
Insulation	Reuse and landfill.	Keep separated in designated areas onsite.
Glass	Recycle locally.	Keep separated in designated areas onsite.
Plastics	Plastic Bottles: recycle locally; be aware of plastics that are acceptable to recycle facility.	Keep separated in designated areas onsite.

vii) Waste Disposal Company:

Municipal Corporation Islamabad (MCI)
Address: Mayor Office (Old Naval Headquarters), Sector G-6 Islamabad
Telephone No.: +92-51-9209224
Email: contactus@mci.gov.pk

viii) Recycle Hauler

a) To be determined;
b) Contact Address; and
c) Some or all recycle may be hauled by the authorized representative.

ix) Possible Recycle Locations and Acceptable Materials

a) Coordinate with companies in Islamabad or which are registered with MCI that accept materials for recycle; and
b) Using the above as a resource, a list will be kept indicating local opportunities for recycle of expected materials. New locations should be added as needed.

ANNEX-XI

Sanitation Plan

Sanitation Plan

1. Introduction

This plan outlines the measures that can improve conditions of sanitation at construction sites during construction and operation phase.

2. Purpose of the plan

The plan intends to ensure sanitation including the control of water supplies, excrete and wastewater disposal, refuse disposal, vectors of diseases, housing conditions, food supplies and handling, atmospheric conditions, and the safety of the working environment.

3. Management of Sanitation During Construction Phase:

i) Responsibility:

The Health and safety Inspector designated by construction contractor shall also inspect sanitation conditions and ensure safe working environment for workers.

ii) Location of Camp Sites

The construction camps shall be located at least 500 m away from residential community. The accommodation and ancillary facilities for labour shall be constructed and maintained to standards and scales approved by the Resident Engineer.

The camps must be located such that the drainage from and through the camps shall not endanger any domestic or public water supply.

All sites must be managed to avoid ditches/depressions to minimize nuisance due to stagnant water.

iii) Water Supply

An adequate and convenient water supply, approved by the appropriate health authority, must be provided in each camp for drinking, cooking, bathing and laundry purposes.

Potable water supply systems for labour camps occupants shall meet the drinking water quality standards of Pakistan. In addition, the design of water system facilities shall be based on the suppliers Engineer's estimates of water demands. The drinking water must be monitored regularly for drinking water quality parameters.

At all construction camps and other workplaces, good and sufficient water supply shall be maintained to eliminate chances of waterborne/water-related/water-based diseases to ensure the health and hygiene of the workers.

iv) Toilet Facilities and Hygiene

Within the premises of every workplace, toilets and urinals shall be provided in an accessible place, and the accommodation, separately for each of these, as per standards prevailing in the country.

Toilet facilities adequate for the capacity of the camp must be provided. Each toilet room must be located so as to be accessible.

A toilet room must be located within 200 feet of the camp. No toilet may be closer than 100 feet to kitchen and sleeping area. These toilets must be distinctly marked by signs printed in native language of the persons occupying the camp, or marked with easily understood pictures or symbols.

Urinals troughs in privies must drain freely into the pit or vault, and the construction of this drain must be such as to exclude flies and rodents from the pit. Proper facility for hand washing and other cleaning activities to be provided, e.g;

- Provide individual hand towels from a sanitary dispenser and receptacles for disposing of waste towels;
- Providing hand soap and industrial hand cleaner for removing paints and other contaminants;
- Prohibited use of gasoline or solvent for hand washing; and
- Keep the floor of facilities dry to prevent spills and falls.

v) Waste Disposal

The sewage system for the camp must be designed, built and operated in compliance with the relevant legislation so that no health hazard occurs and no pollution to the air, ground or adjacent watercourse takes place.

Garbage bins must be provided in the camps and regularly emptied and the garbage disposed off in a hygienic manner. Unless otherwise arranged for by the local sanitary authority, arrangement for disposal of excreta should be done in the already existing sewerage system in the area.

On completion of the works, all such temporary structures shall be cleared away, all rubbish burnt, excreta tank and other disposal pits or trenches filled in and effectively sealed off and the outline site left clean and tidy, at the Contractor's expense, to the entire satisfaction of the engineer.

vi) Maintenance of Sanitary Facility

Proper maintenance of toilets and other sanitary facilities should assure by health and safety inspector. Toilets and other sanitary facilities shall be cleaned at least four times daily and at least twice during working hours and kept in a strict sanitary condition. Receptacles shall be tarred inside and outside at least once a year.

All buildings, rooms and equipment and the grounds surrounding them shall be maintained in a clean and operable condition and be protected from rubbish accumulation. All necessary means shall be employed to eliminate and control any infestations of insects and rodents within all parts of any labor camp.

4. Management of Sanitation During Operational phase:

A proper sanitation plan is to be adopted for maintaining the hygienic conditions during the operational phase of the project. These include

- Site Clearance;
- Storm Water Clearance;
- Sewage/ Drainage Clearing and
- Solid Waste Management

i) Site Clearance:

The construction contractor shall assure the clearance of construction machinery, vehicle and other equipment used during the construction period after the completion of the project.

ii) Storm Water/Sewage Clearance:

One of the main issue that may arise during construction and operational phase is the clogging of drainage/sewer pipelines as a result of construction material, oil spillage from vehicles, throwing of solid waste by the road users due to lack of bins into the nearby drainage/sewer pipes, etc. the blockage of these drainage pipes will cause over flow of water on road, which will have negative impacts on the road in form of deterioration of road surface as well as standing water acts as a source of water-through disease in the area.

Responsible Authorities:

In case of storm water drains/sewer pipes clogging the concerned department is responsible for un-clogging of these sewer and drainage pipelines.

iii) Solid Waste Management:

Municipal solid waste produced as a result of commercial activities, by road users and from nearby residential community should be collected and managed properly by the concerned department. Waste bins should be placed along the road/bridges, regular cleaning of the road should be carried out using mechanical sweepers twice a day and at least one sweeper should be deputed for the whole stretch of project site to assure regular cleaning.

iv) Awareness and Training:

A training and awareness sessions shall be conducted for workers before commencement of the project. The implementation of sanitation plan would be more effective if the importance of hygiene; sanitation and safety are known to the workers.

ANNEX-XII

Chance Find Procedure

CHANCE FIND PROCEDURES

Project may involve deep excavation. Therefore, the possibility of chance find is not ignorable. In case of any chance find, the contractor will immediately report through Supervision Consultant to Directorate General (DG) of Archeological Department, Government of Pakistan to take further suitable action to preserve those antique or sensitive remains. Representative of the DG will visit the site and observed the significance of the antique, artifact and Cultural (religious) properties and significance of the project. The report will be prepared by representative and will be given to the DG. The documentation will be completed and if required suitable action will be taken to preserve those antiques and sensitive remains.

In case any artifact, antiques and sensitive remains are discovered, chance find procedures should be adopted by contractor workers as follows:

- Stop the construction activities in the areas of chance find;
- Delineate the discovered site or area;
- Consult with the local community and provincial Archeological Department
- The suggestion of the local communities and the concerned authorities will be suitably incorporated during taking the preventive measures to conserve the antique, artifact and cultural (religious) properties
- Secure the site to prevent any damage or loss of removable objects. In case of removable antiquities or sensitive remain, a night guard shall be arranged until the responsible local authorities take over;
- After stopping work, the contractor must immediately report the discovery to the Supervision Engineer.

The contact Address of Archeology Department is given below:

Archeology Department
9 Ataturk Ave, Shakar Parian, Islamabad, Islamabad Capital Territory

Tel: 042-9222757
042-9217086

ANNEX-XIII

Emergency Response Plan

Emergency Response Plan

1. Introduction

Emergency management can be defined as the organization, coordination and implementation of a range of measures to prevent, mitigate, respond to, overcome and recover from the consequences of emergency events affecting the community, its assets and the environment.

2. Purpose of Plan

This plan intends to provide a framework for safety and security to infrastructure, people and vehicles. It assigns responsibility to organizations and individuals for carrying out specific actions at projected times and places in an emergency situation that exceeds the capability or routine responsibility of any one agency.

The emergency response plan provides guidance to:

- Prevent any potential sources causing hazard to the resources during all stages of the project;
- Coordinate between various organizations to take actions in case of emergencies;
- Protect people and property in emergencies and disasters;
- Develop procedures to respond to the emergencies efficiently;
- Identify and ensure availability of personnel, equipment, facilities, supplies, and other resources for use in order to provide timely and efficient response and recovery operations; and
- Confirm that measures taken in an incident are adequate to recover the affected resources or further improvements are needed.

3. Planning

i. Emergency Response Team

A group/team shall be dedicated to identify and control potential emergencies during the construction and operation of the project. The roles and responsibilities of the group members shall be clearly defined.

The primary responsibilities of the group are described below:

- Identify the potential hazard or risk sources that can lead to emergency situations; Ensure availability of adequate resources, procedures and communication system to deal with the identified emergency situations;

- Ensure awareness and training of the staff to facilitate implementation of the emergency response plan;
- Maintaining the records of any previous incidents; and
- Post-event analysis to bridge the gaps of the existing risk prevention procedures.
- The emergency response team shall include but not limited to the following;
    1. Team Leader
    2. Safety Engineer
    3. Reporting officer/Inspector

Team Leader

- Approve/ modify devised measures to prevent or mitigate the risks associated with the identified risk sources
- Arrange resources for dealing with potential emergencies including, financial, equipment and personnel required to deal with emergencies.
- Assure that the Emergency Response plan is adequate, effective and can be implemented practically.

Safety Engineer

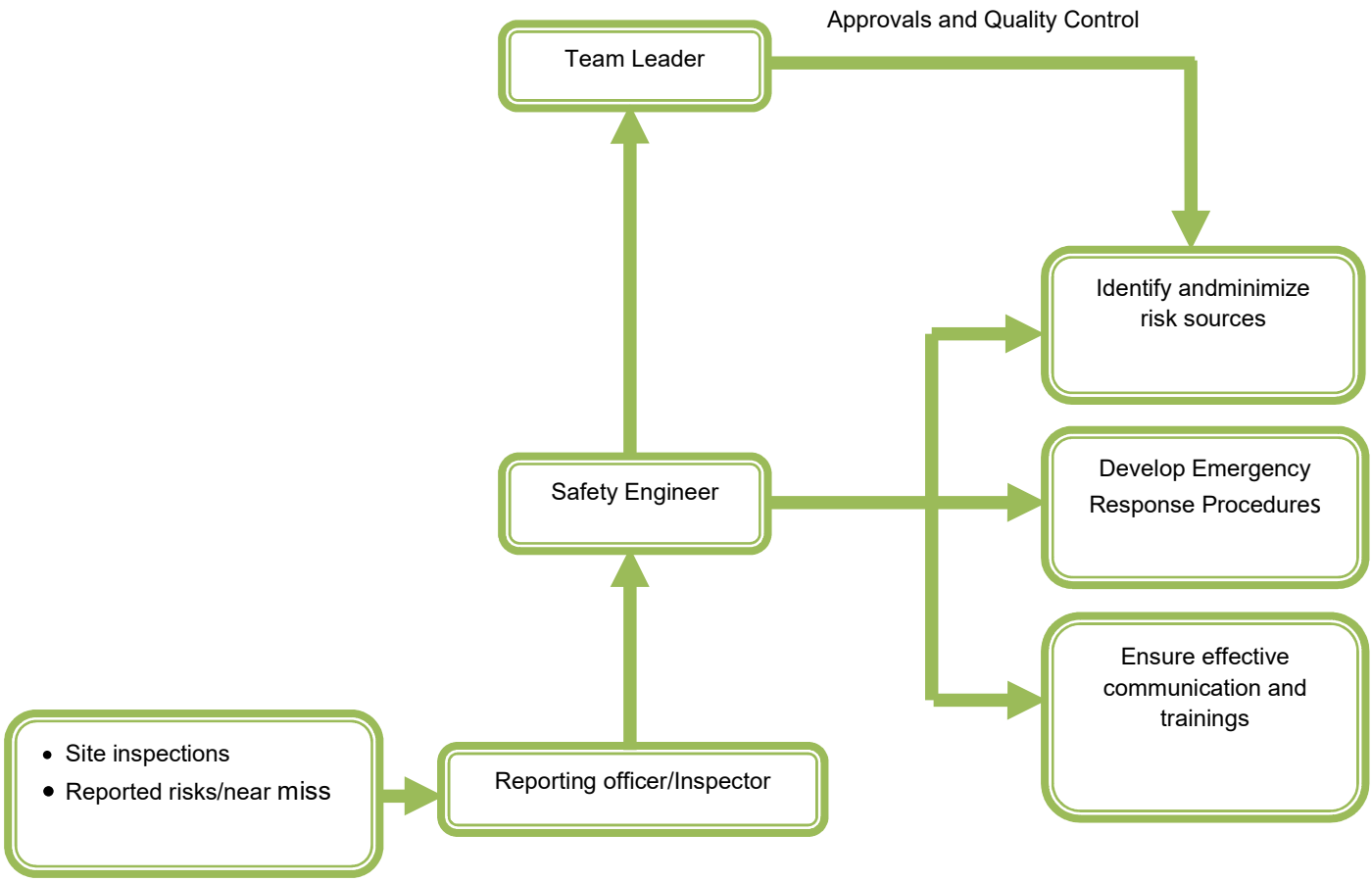
- Analyze the Identified risk sources and devise measures to prevent or mitigate the risks in close consultation with the Team Leader;
- Develop and implement the Emergency Response Procedures, in case of the possible emergencies arise;
- Ensure effective internal and external communication; and
- Provide regular trainings and arrange drills to make people aware of dealing with emergencies.

Reporting officer/Inspector

- Regular inspections of the site, to identify potential risks associated with equipment, materials and work practices;
- Anybody from the site can notify the reporting officer about potential risk and/or near misses on the site;
- Record any identified risks and mitigation measures to control the identified risk; and
- Notify the issue and control measures taken thereby to the safety engineer.

The designation, roles and responsibilities of each member shall be clearly defined and communicated to the employees.

An outline of the framework of responsibilities is presented in the following organizational chart:



ii. <u>Hazard Identification</u>

A comprehensive identification and evaluation of the hazards/risks likely to cause an emergency shall be done by Emergency Response Team (ERT). Major potential emergencies identified in road projects are as follows:

- Structural failure
- Disruption of Utility (Power, Water, Telecommunications, Gas, etc)
- Accidents
- Vehicle accident
- Fog
- Smoke
- Power/equipment failure or Vandalism

- Fire
- Earthquake
- Terrorism including bombing
- Disease Outbreak

iii. Prevention and Mitigation

The ERT shall work to eliminate or reduce the impact of identified emergencies and increasing the resilience of an affected community to recover from the consequences of such events. These activities include:

- Design considerations to control flooding, earthquakes and adequate lightening for fog etc.;
- Regular inspection and maintenance of construction machinery and the structural integrity;
- Review of work schedules based on weather updates; and
- Security controls based onpolitical situations.

4. Emergency Preparedness

The ERT shall be prepared withall necessary resourcesand the personnel's shall be trained regularly

i. Resources

Finance and administration

The financial resources shall be reserved for dealing with any emergencies arising on site during construction and operation. Responsibilities of the person managing the resources in case of emergencies shall be clearly defined and the required resources shall be adequate and updated regularly.

Equipment

All the necessary equipment needed in an event of emergencies shall be madeavailable, as a minimum, the equipment needed include;

- Personal Protective Equipment
- Alarms/ Warnings
- Fire extinguishers
- Crowd control, flashlights, signs, barricades
- First Aid Facility

- Detection instruments, e.g.; personal alarm kits; smoke detection instruments
- Tools to fix minor vandalism

Communication

All external and internal communication systemsshall be made available. Local emergency numbers shall be clearly posted and communicated to the personnel involved in construction and during operation.

The local emergency numbers are given below, which shall be regularly updated.

Emergency Numbers

	Service	Islamabad (051)
1	Edhi Ambulance	115
2	Emergency Police	15
3	Rescue	1122
4	Fire Brigade Center	16

Trainings

Personnel shall be made aware of the importance of safety, potential emergencies and how to respond in case of emergencies .One day training and mock exercise shall be done to prepare, the personnel to deal with emergencies.

5. Emergency Response

Response includes actions taken to reduce the impacts of an emergency event, and to limit the threat to life, property and the environment.

The emergencies can be dealt with:

- On-Site Management of the situation
- Off-site coordination to arrange necessary resources to support the on-site management
- Providing advice and reports of the situation to stakeholders

i. Emergency Response Procedure

Any person can report about an emergency, anon-site worker, an outside agency, or the public. Circumstances change during the course of an emergency in different events, thus,the procedure will vary as per the specific situation on ground. However, a basic action plan to be followed in an emergency is discussed below. This order ofresponse is applicable to almost any emergency and should be followed in sequence.

Assess the situation

The most important thing to do in case of emergency is to stay calm and avoid panic. Assess the situation, the cause and most immediate requirement to control, limit and/or manage the immediate, ongoing, or further damage.

Immediate control

The most senior person on the scene should take control and contact, or delegate someone to contact emergency services as posted and communicated by ERT and inform the reporting officer of ERT and explain the situation. The area of emergency shall be restricted by barricades, tapes and adequate signage, if and as required.

Protection from further losses

1. Once the site is restricted, to provide protection and reduce further losses, the source causing the emergency shall be controlled including equipment, materials, environment and accident scene from continuing damage or further hazards to the area and people .e.g. suppress fire, prevent objects from falling, shut down equipment or utilities, and take other necessary measures as required depending upon the type of emergency
2. Provide first aid if required or in doing so.
3. Designate people to emergency duties. e.g.: assign personnel to guide emergency services on arrival.
4. Headcount People/personnel to identify any missing persons.
5. People/ personnel shall be directed to safe location.
6. Arrange diversions for the traffic to reduce disturbance to the flow of traffic, if and as far as possible.
7. Preserve the accident scene until experts mark it safe; only disturb what is essential to maintain life or relieve human suffering and prevent immediate or further losses.

ii. Communication

Emergency service providers

The emergency service providers' needs to be kept informed of the situation. On site, personnel from the emergency services shall be guided towards the emergency scene, brief about the event, ongoing and potential hazards and cause(s), if known.

Emergency Response Team and Management

Members of ERT shall be immediately informed and the management shall also be kept informed.

Public

Timely notifications to public shall be disseminated through electronic and print media depending upon the requirement and urgency of the emergency so that they can adopt alternate routes and avoid the hazards associated with the emergency encountered.

Utilities

In case of disruption of utilities, the utility control authorities shall be immediately contacted to control the situation.

6. Recovery

Emergency affected individuals, communities and infrastructure shall be restoredin terms of emotional, economic, and physical well-being including the following as a minimum:

- A detailed analysis and assessment of causes of emergency , extent of damage and gaps if any, in managing the emergency;
- Recovery/replacement of the assets and infrastructure;
- Reinstatement of disrupted services;
- Road and bridge repairs;
- Up-dation of safety arrangements and Emergency response procedures to ensure better safety and security in any other arising emergencies.

Annexure-XIV

Species and Ages of Trees

CLIENT	SPECIAL TECHNOLOGY ZONES AUTHORITY	PROJECT	CONSULTANCY SERVICES FOR MASTER PLANNING, INFRASTRUCTURE DESIGN, EIA AND CONSTRUCTION SUPERVISION OF ISLAMABAD TECHNOPOLIS
CONSULTANT	NATIONAL ENGINEERING SERVICES PAKISTAN (PVT.) LTD. HEAD OFFICE - NESPAK HOUSE, I-C, BLOCK-N, MODEL TOWN EXTENSION, LAHORE, PAKISTAN.	DRAWN	ADNAN
		SUBMITTED	
		RECOMMENDED	
		CHD./VER.	
		APPROVED	
REV. / DATE / DESCRIPTION			
04 / 03 / 02 / 01			
DRAWING TITLE	LAYOUT PLAN OF TREES SURVEY	SCALE	
DATE	August, 2022	DRAWING No.	4384/11/FR/2J101
REV.	0		

Flora Survey of STZA

Sr. No.	ROW	Road No.	SPECIES ON ROAD											SPECIES ON MEDIAN										PARAMETERS		
			1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia azedarach (Bakain/Daraik)	6. Albizia lebbeck (Kala Sirin)	7. Poplar	8. Ficus bengalensis (Banyan/ Bargad)	9. Sapium sebi ferum (Chinese Tahli)	10. Morus alba (Desi Toot)	Species on Median (Nos)	1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia Azedarach (Bakain)	6. Albizia Lebbeck (Siris)	7. Ziziphus Jujuba (Berry)	8. Piple	9. Sapium sebi ferum (Chinese Tahli)	Circumference (in)	Height (ft)	Estimated Age (Years)
1				1																			11	21	8
2						1																	24	23	10
3				1																			10	15	5
4				1																			18	16	8
5				1																			21	22	10
6													3 tali		3								12,6,10	18,14,15	8,5,7
7				1																			17	18	8
8				1																			33	28	18
9				2																			23,9	29,11	13,5
10			2																				35,37	33,34	38,40
11			1																				22	38	24
12													4 tali		4								39,37,39,42	48,20,47,49	22,24,25,24
13			1																				23	25	25
14				1																			10	17	6
15			1																				40	38	45
16				1																			22	36	18
17													3 keekar	3									20,23,21	35,27,19	25,28,25
18													5 tali		5								30,28,26,16,28	30,26, 24,18,24	15,14,16,7,14
19				3																			21,24,21	29,28,29	11,13,11
20				5																			24,28,25,24,28	22,24,22,26,26	12,12,12,13,13
21													1 (Tali)		1								28	42	19
22						1																	18	25	5
23													2 (tali)		2								13,24	35,30	15,14
24													3 (tali)		3								24,18,13	28,28,30	14,12,8
25				2																			27,29	35,24	18,12
26			3																				12,29,23	21,35,24	10,33,25
27	120'	R1	1										1 (keekar)	1									28,19	21,22	33,20
28			2																				12,45	16,51	12,50
29			1																				30	45	33
30													1 keekar	1									35	54	38
31			4																				33,27,10,27	39,30,24,14	36,30,10,30
32			2																				47,34	51,35	50,38
33			2																				47,33	48,35	50,38
34													2 (tali)		2								27,31	38,39	18,19
35				1																			47	48	30
36				3																			42,35,36	40,38,39	25,20,20
37						1																	38	48	13
38									1														28	35	15
39				3																			28,16,24	35,12,22	13,7,10
40				5																			12,18,40,28,22	16,24,36,24,24	7,11,18,14,11
41				2																			24,34	35,35	15,17
42													3 tali		3								24,18,18	30,28,28	15,14,14
43				3																			27,33,31	30,35,30	14,16,18
44			7																				30,29,40,32,37,30,44	31,35,36,42,49,52,33	33,33,45,37,42,34,48
45			7																				33,28,42,37,35,41,40	37,43,49,55,32,30,40	38,33,47,42,38,43,43
46													8 keekar	8									24,32,26,35,37,23,28,34	33,40,42,35,38,41,33,44	28,35,31,40,35,35,30,38
47			5																				26,31,37,26,42	36,34,40,39,35	31,35,36,31,48
48				5																			40,35,39,36,37	35,35,40,30,30	18,17,18,15,15
49													5 tali		5								42,38,30,36,40	40 ft all	24,20,17,18,19
50					5																		16,17,13,18,15	23,25,25,26,22	21,23,23,24,20
Sub Total (R1)			39	42	5	3	0	0	1	0			0	13	28	0	0	0	0	0	0	0			
1					4																		39,38,39,18	30,30,30,19	20,20,20,13
2			1																				44	55	48
3			1																				38	40	42
4						1																	18	17	4
5													1 Dry Tali		1								47	48	30
6				1																			17	18	7
7													3 Kekar	3									38,17,18	48,22,28	42,21,22
8	120'	R2		6																			18,22,17,21,24,28	18,20,25,27,18	7,8,7,8,10,9
9			3																				33,26,28	42,38,38	36,29,30
														1									13	23	15
10													1Keekar, 1 tali		1								10	35	12
11				2																			18,16	18,12	8,6
12			4																				16,22,24,32	24,33,38,42	20,26,28,35
13				2																			32,36	38,38	20,20
14											1												12	22	10
15				2																			16,18	20,20	7,7
Sub Total (R2)			9	13	4	1	0	0	0	0	1		0	4	2	0	0	0	0	0	0	0			
1			3																				62,16,66	46,22,51	60,20,60
2													1 Tali		1								40	39	20
3				1																			28	25	14
4			4																				17,12,15,18	16,18,18,17	20,13,18,20
5			4																				36,52,52,54	40,40,50,52	42,55,55,56
6													4 Keekar	4									17,11,15,18	9,12,15,17	20,10,15,20
7			2																				40,21	40,30	45,25
8													2 Keekar	2									35,30	40,28	39,35
9			3																				34,62,48	35,60,55	38,55,50
10			4																				58,21,27,27	20,18,22,22	55,25,30,30
11			3																				27,26,34	35,33,35	29,29,38
12			3																				55,16,18	35,17,17	55,21,23
13	120'	R3	3																				33,25,22	35,22,22	35,28,24
14													2 Keekar	2									22,28	25,25	25,29
15			3																				55,59,35	60,55,42	52,55,38
16			2																				60,70	71,61	62,70
17					3																		35,40,42	30,42,42	25,30,30
18													1 Mulberry				1						25,65	30,40	10
19													1 Injir			1							33	32	27
20			3																				34,30,29	40,43,35	38,34,32
21			5																				37,33,33,36,35"	21,26,27,30,33	40,36,36,38,38
22													1 Sepium									1	22	25	13
23													2 tali		2								6,8	14,14	4,4
24								2															84,85	70,62	50,50
25											1												6	20	6
Sub Total (R3)			42	1	3	0	0	2	0	0	1		0	8	3	1	1	0	0	0	0	1			
1			2																				37,22	18,30	39,25
2					2																		28,30	26,28	12,13
3	25'	R4	3																				33,31,27	35,30,27	35,33,30
4			3																				22,33,19	26,30,29	26,35,23
5			2																				23,21	24,23	26,25

Flora Survey of STZA

Sr. No.	ROW	Road No.	SPECIES ON ROAD										Species on Median (Nos)	SPECIES ON MEDIAN									PARAMETERS		
			1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia azedarach (Bakain/Daraik)	6. Albizia lebbeck (Kala Sirin)	7. Poplar	8. Ficus bengalensis (Banyan/ Bargad)	9. Sapium sebi ferum (Chinese Tahli)	10. Morus alba (Desi Toot)		1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia Azedarach (Bakain)	6. Albizia Lebbeck (Siris)	7. Ziziphus Jujuba (Berry)	8. Pipli	9. Sapium sebi ferum (Chinese Tahli)	Circumference (in)	Height (ft)	Estimated Age (Years)
Sub Total (R4)			10	0	2	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			3																				21,18,16	21,21,27	25,20,18
2	25'	R5	3																				30,27,21	30,26,28	33,30,24
3					2																		21,24	33,37	23,28
4			2																				38,36	22,20	43,40
Sub Total (R5)			8	0	2	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			4																				21,33,31,25	30,30,29,33	25,35,33,30
2			3																				25,27,38	40,33,50	30,30,42
3	25'	R6	1																				32	35	35
4			3																				33,38,27	40,35,35	38,42,30
5				1																			48	54	26
6					2																		22,24	16,18	15,17
Sub Total (R6)			11	1	2	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			4																				33,45,36,42	35, 40, 30, 42	37,49,39,45
2	25'	R7	4																				33,39,36,34	33,39,35,37	37,42,40,38
3			3																				36,31,41	40,34,39	40,35,45
4					2																		23,24	24,34	20,23
Sub Total (R7)			11	0	2	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1				4																			11,12,13,12	12,18,18,14	5,6,6,6
2			2																				14,20	22,22	16,24
3				2																			32,27	30,24	15,12
4			3																				32,34,38	30,30,28	35,38,40
5			3																				36,34,34	38, 38, 40	38,36,36
6	80'	R8	3																				12,18,12	20,20,20	16,20,16
7			2																				33,58	24,30	36,62
8			2																				18,22	30,24	20,24
9			1																				22	24	24
10			2																				28,38	30,28	30,42
11			2																				33,35	28,30	36,38
12			1																				52	38	50
13			3																				28,54,42	31,32,34	35,50,45
Sub Total (R8)			24	6	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			2																				38,44	33,35,	21,25
2			2																				50,38	41,42	50,42
3			3																				12,14,12	10,10,10	10,16,10
4			2																				30,34	22,20	35,37
5				2																			12,14	18,20	6,4
6	50	R-9	3																				18,28,18	24,26,22	23,33,23
7				2																			14,14	28,28	12,12
8				2																			18,20	22,28	10,12
9			3																				18,24,28	28,30,32	20,28,30
10			2																				14,16	20,22	16,12
11				2																			12,16	20,20	5,7
12					1																		33	26	17
Sub Total (R9)			17	8	1	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			2																				42,15	16,14,	45,20
2	25	R-10	1																				17,	18	22
3			2																				10,13	15,16	7,8
Sub Total (R10)			5	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1				1																			40	50	22
2					1																		45	36	32
3			1																				21	60	25
4						3																	38,42,24	55,60,36	15,18,10
5			3																				26,50,55	40,60,60	31,52,53
6													4(Mulberry)				4						15,30,17,17	40,35,10,10	8,12,6,6
7				4																			36,43,47,18	45,45,45,45	20,25,20,20
8												2											27,10	40,18	15,4
9				3																			14,14,10	25,23,15	8,8,7
10			2																				24,18	23,24	26,20
11	120	R-11		4																			28,18,12,18	30,24,18,30	13,11,6,10
12				4																			38,18,28,30	40,24,35,24	21,8,14,12
13				2																			48,52	40,45	24,24
14				2																			38,42	36,34	18,18
15				2																			58,48	50,50	25,25
16				2																			42,44	29,35	20,22
17				1																			36	40	18
18									7														50,12,35,35,35,32,22	70,40,70,70,70,60,45	18,5,12,8,12,11,10
19													3 DRY (Talli)		3								52,48,48	60,60,55	30,28,26
20				2																			40,38	60,70	25,25
21				1																			68	45	20
22				5																			32,38,31,42,41	45,55,45,45,45	18,24,18,20,20
Sub Total (R11)			6	33	1	3	0	0	7	0		2	0	0	3	0	4	0	0	0	0	0			
1											2												55, 60	65,60	30,30
2											1												48	65	25
3			1																				54	45	60
4													4 Tali		4								18,18,22,26	25 all	4,5,5,5
5			3																				28,36,48	38,48,60	32,40,45
6													1 keekar	1									36	48	40
7			2																				30,32	40,45	34,34
8			2																				40,38	28,28	44,42
9													1 keekar	1									38	40	42
10			2																				38,45	40,50	40,50
11			2																				63,80	48,70	60,70
12		R-12											2 Keekar	2									54,40	36,42	55,45
13			3																				26,38,55	18,40,60	31,40,55
14													1 keekar	1									46	40	50
15			1																				48	60	50
16			2																				47,84	55,70	50,70
17													3 Keekar	3									44,38,42	35,35,38	45,40,45
18			2																				70,50	40,35	60,55
19			2																				30,55	22,35	35,55
20			3																				38,42,48	38,32,32	42,44,50
21													1 Keekar	1									65	50	60
22			1																				58	42,44	60
23										1													120	65	75

Flora Survey of STZA

Sr. No.	ROW	Road No.	SPECIES ON ROAD										Species on Median (Nos)	SPECIES ON MEDIAN									PARAMETERS		
			1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia azedarach (Bakain/Daraik)	6. Albizia lebbeck (Kala Sirin)	7. Poplar	8. Ficus bengalensis (Banyan/ Bargad)	9. Sapium sebi ferum (Chinese Tahli)	10. Morus alba (Desi Toot)		1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia Azedarach (Bakain)	6. Albizia Lebbeck (Siris)	7. Ziziphus Jujuba (Berry)	8. Pipli	9. Sapium sebi ferum (Chinese Tahli)	Circumference (in)	Height (ft)	Estimated Age (Years)
Sub Total (R12)			**26**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**3**		**0**	**9**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1									30														27,24,22(22 other all)	30 all	12,11,10 (10 other all)
2	50'	R-13	5																				18,16,23,25,29	33 all	22,20,26,28,34
3							2																18,23	25,30	5,6
4							1																16	24	4
Sub Total (R13)			**5**	**0**	**0**	**0**	**3**	**0**	**30**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1							1																20	18	4
2	50'	R-14		3																			38,48,38	48,46,45	22,24,24
3					1																		38	30	24
Sub Total (R14)			**0**	**3**	**1**	**0**	**1**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1					4																		36,38,24,21	30,40,40,20	25,30,18,15
2					2																		20,18	20,20	15,15
3					3																		18,16,20	22,22,24	12,12,15
4	50'	R-15					1																32	30	12
5									1														27	30	8
6					2																		27,30	20,30	14,14
7					2																		10,10	10,9	7,6
8												1											44	40	20
Sub Total (R15)			**0**	**0**	**13**	**0**	**1**	**0**	**1**	**0**		**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			1																				34	24	38
2			4																				12,14,18,18	15,18,18,16	12,14,14,14
3				2																			13,18	18,23,	7,12
4			3																				46,44,38	40,42,38	48,48,42
5			4																				18,26,26,26	40,40,22,26	20,30,30,30
6			3																				38,34,36	22,36,36	42,38,40
7	80'	R-16	5																				40,44,38 other 3	40,40,40,35, 35	42,50,42,42,42
8				1																			48	35	23
9				3																			18,22,40	30,28,42	15,15,24
10			2																				18,18	30,28	21,21
11			1																				42	35	47
12				1																			44	42	25
Sub Total (R16)			**23**	**7**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1				4																			20,20,18,16	24,23,21,21	11,11,8,8
2	25'	R-17	3																				20,22,22	30,36,32	23,24,24
3				1																			24	30	14
4						2																	22,22	36,36	10,10
Sub Total (R17)			**3**	**5**	**0**	**2**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			1																				36	15	40
2	25'	R-18		3																			28,28,30	28,36,38	13,13,14
3				2																			24,24	26,28	12,12
Sub Total (R18)			**1**	**5**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
				2																			28,26	32,34	15,16
1				1																			32	28	15
2			2																				32,36	30,30	37,42
3	50'	R-19	4																				23,25,28,30	30,30,30,30	28,30,32,33
4			1																				38	35	44
5			2																				22,18,	16,18,	25,20
6			4																				38,36,65,70	35,40,50,35	42,40,53,55
7				2																			30,34	32,32	15,16
Sub Total (R19)			**13**	**3**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1	25'	R-20	1																				65	42	55
Sub Total (R20)			**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1	25'	R-21	2																				13,16	14,11	15,18
Sub Total (R21)			**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1				1																			23	27	12
	80'	R-22	2																				12,10	15,15	12,12
2				3																			28,28,28	30,35,40	14,14,18
3				2																			22,24,	30,35	10,13
Sub Total (R22)			**2**	**6**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			2																				10,22	10,19	12,26
2			1																				14	15	18
3	25'	R-23		1																			14	30	10
4			2																				12,10	18,15	15,14
5			2																				40,36	35,45	45,42
6			2																				50,36	40,35	50,40
Sub Total (R23)			**9**	**1**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			2																				22,26	18,16	26,28
2	25'	R-24	3																				12,14,12	20,20	17,17,17
3			2																				23,38	20,42	27,43
4			2																				36,48	40,35	40,50
Sub Total (R24)			**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			1																				24	23	25
2				1																			26	25	13
3				2																			48,48	50,42	22
4	25'	R-25		2																			20,22	20,20	9,10
5				1																			18	20	8
6			2																				32,30	20,26	36,36
7			2																				40,36	20,18	45,40
8				2																			22,24,	24,24	10,11
Sub Total (R25)			**5**	**8**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
Total Trees			281	142	36	9	5	2	39	1	5	3		34	40	1	5				0	1			
													Total on Median	**81**										

Total Trees on Road	523
Total Trees on Roads and	**604**

Species	Total Trees	Percentage
Keekar	315	52,15
Tali	182	30,13
Injir	37	6,13
Mulberry	14	2,32
Bakain	5	0,83
Siris	2	0,33
Popular	39	6,46
Rohr	1	0,17
Sepium Sebi Ferum	6	0,99
Desi Toot	3	0,50
Sum	**604**	**100,00**

Flora Survey of STZA

Sr. No.	ROW	Road No.	SPECIES ON ROAD											SPECIES ON MEDIAN										PARAMETERS		
			1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia azedarach (Bakain/Daraik)	6. Albizia lebbeck (Kala Sirin)	7. Poplar	8. Ficus bengalensis (Banyan/ Bargad)	9. Sapium sebi ferum (Chinese Tahli)	10. Morus alba (Desi Toot)	Species on Median (Nos)	1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia Azedarach (Bakain)	6. Albizia Lebbeck (Siris)	7. Ziziphus Jujuba (Berry)	8. Piple	9. Sapium sebi ferum (Chinese Tahli)	Circumference (in)	Height (ft)	Estimated Age (Years)
1				1																			11	21	8
2						1																	24	23	10
3				1																			10	15	5
4				1																			18	16	8
5				1																			21	22	10
6													3 tali		3								12,6,10	18,14,15	8,5,7
7				1																			17	18	8
8				1																			33	28	18
9				2																			23,9	29,11	13,5
10			2																				35,37	33,34	38,40
11			1																				22	38	24
12													4 tali		4								39,37,39,42	48,20,47,49	22,24,25,24
13			1																				23	25	25
14				1																			10	17	6
15			1																				40	38	45
16				1																			22	36	18
17													3 keekar	3									20,23,21	35,27,19	25,28,25
18													5 tali		5								30,28,26,16,28	30,26, 24,18,24	15,14,16,7,14
19				3																			21,24,21	29,28,29	11,13,11
20				5																			24,28,25,24,28	22,24,22,26,26	12,12,12,13,13
21													1 (Tali)		1								28	42	19
22						1																	18	25	5
23													2 (tali)		2								13,24	35,30	15,14
24													3 (tali)		3								24,18,13	28,28,30	14,12,8
25				2																			27,29	35,24	18,12
26			3																				12,29,23	21,35,24	10,33,25
27	120'	R1	1										1 (keekar)	1									28,19	21,22	33,20
28			2																				12,45	16,51	12,50
29			1																				30	45	33
30													1 keekar	1									35	54	38
31			4																				33,27,10,27	39,30,24,14	36,30,10,30
32			2																				47,34	51,35	50,38
33			2																				47,33	48,35	50,38
34													2 (tali)		2								27,31	38,39	18,19
35				1																			47	48	30
36				3																			42,35,36	40,38,39	25,20,20
37						1																	38	48	13
38									1														28	35	15
39				3																			28,16,24	35,12,22	13,7,10
40				5																			12,18,40,28,22	16,24,36,24,24	7,11,18,14,11
41				2																			24,34	35,35	15,17
42													3 tali		3								24,18,18	30,28,28	15,14,14
43				3																			27,33,31	30,35,30	14,16,18
44			7																				30,29,40,32,37,30,44	31,35,36,42,49,52,33	33,33,45,37,42,34,48
45			7																				33,28,42,37,35,41,40	37,43,49,55,32,30,40	38,33,47,42,38,43,43
46													8 keekar	8									24,32,26,35,37,23,28,34	33,40,42,35,38,41,33,44	28,35,31,40,35,35,30,38
47			5																				26,31,37,26,42	36,34,40,39,35	31,35,36,31,48
48				5																			40,35,39,36,37	35,35,40,30,30	18,17,18,15,15
49													5 tali		5								42,38,30,36,40	40 ft all	24,20,17,18,19
50					5																		16,17,13,18,15	23,25,25,26,22	21,23,23,24,20
Sub Total (R1)			39	42	5	3	0	0	1	0			0	13	28	0	0	0	0	0	0	0			
1					4																		39,38,39,18	30,30,30,19	20,20,20,13
2			1																				44	55	48
3			1																				38	40	42
4						1																	18	17	4
5													1 Dry Tali		1								47	48	30
6				1																			17	18	7
7													3 Kekar	3									38,17,18	48,22,28	42,21,22
8	120'	R2		6																			18,22,17,21,24,28	18,20,25,27,18	7,8,7,8,10,9
9			3																				33,26,28	42,38,38	36,29,30
														1									13	23	15
10													1Keekar, 1 tali		1								10	35	12
11				2																			18,16	18,12	8,6
12			4																				16,22,24,32	24,33,38,42	20,26,28,35
13				2																			32,36	38,38	20,20
14											1												12	22	10
15				2																			16,18	20,20	7,7
Sub Total (R2)			9	13	4	1	0	0	0	0	1		0	4	2	0	0	0	0	0	0	0			
1			3																				62,16,66	46,22,51	60,20,60
2													1 Tali		1								40	39	20
3				1																			28	25	14
4			4																				17,12,15,18	16,18,18,17	20,13,18,20
5			4																				36,52,52,54	40,40,50,52	42,55,55,56
6													4 Keekar	4									17,11,15,18	9,12,15,17	20,10,15,20
7			2																				40,21	40,30	45,25
8													2 Keekar	2									35,30	40,28	39,35
9			3																				34,62,48	35,60,55	38,55,50
10			4																				58,21,27,27	20,18,22,22	55,25,30,30
11			3																				27,26,34	35,33,35	29,29,38
12			3																				55,16,18	35,17,17	55,21,23
13	120'	R3	3																				33,25,22	35,22,22	35,28,24
14													2 Keekar	2									22,28	25,25	25,29
15			3																				55,59,35	60,55,42	52,55,38
16			2																				60,70	71,61	62,70
17					3																		35,40,42	30,42,42	25,30,30
18													1 Mulberry				1						25,65	30,40	10
19													1 Injir			1							33	32	27
20			3																				34,30,29	40,43,35	38,34,32
21			5																				37,33,33,36,35"	21,26,27,30,33	40,36,36,38,38
22													1 Sepium									1	22	25	13
23													2 tali		2								6,8	14,14	4,4
24								2															84,85	70,62	50,50
25											1												6	20	6
Sub Total (R3)			42	1	3	0	0	2	0	0	1		0	8	3	1	1	0	0	0	0	1			
1			2																				37,22	18,30	39,25
2					2																		28,30	26,28	12,13
3	25'	R4	3																				33,31,27	35,30,27	35,33,30
4			3																				22,33,19	26,30,29	26,35,23
5			2																				23,21	24,23	26,25

Flora Survey of STZA

Sr. No.	ROW	Road No.	SPECIES ON ROAD										Species on Median (Nos)	SPECIES ON MEDIAN									PARAMETERS		
			1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia azedarach (Bakain/Daraik)	6. Albizia lebbeck (Kala Sirin)	7. Poplar	8. Ficus bengalensis (Banyan/ Bargad)	9. Sapium sebi ferum (Chinese Tahli)	10. Morus alba (Desi Toot)		1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia Azedarach (Bakain)	6. Albizia Lebbeck (Siris)	7. Ziziphus Jujuba (Berry)	8. Pipli	9. Sapium sebi ferum (Chinese Tahli)	Circumference (in)	Height (ft)	Estimated Age (Years)
Sub Total (R4)			10	0	2	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			3																				21,18,16	21,21,27	25,20,18
2	25'	R5	3																				30,27,21	30,26,28	33,30,24
3					2																		21,24	33,37	23,28
4			2																				38,36	22,20	43,40
Sub Total (R5)			8	0	2	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			4																				21,33,31,25	30,30,29,33	25,35,33,30
2			3																				25,27,38	40,33,50	30,30,42
3	25'	R6	1																				32	35	35
4			3																				33,38,27	40,35,35	38,42,30
5				1																			48	54	26
6					2																		22,24	16,18	15,17
Sub Total (R6)			11	1	2	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			4																				33,45,36,42	35, 40, 30, 42	37,49,39,45
2	25'	R7	4																				33,39,36,34	33,39,35,37	37,42,40,38
3			3																				36,31,41	40,34,39	40,35,45
4					2																		23,24	24,34	20,23
Sub Total (R7)			11	0	2	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1				4																			11,12,13,12	12,18,18,14	5,6,6,6
2			2																				14,20	22,22	16,24
3				2																			32,27	30,24	15,12
4			3																				32,34,38	30,30,28	35,38,40
5			3																				36,34,34	38, 38, 40	38,36,36
6	80'	R8	3																				12,18,12	20,20,20	16,20,16
7			2																				33,58	24,30	36,62
8			2																				18,22	30,24	20,24
9			1																				22	24	24
10			2																				28,38	30,28	30,42
11			2																				33,35	28,30	36,38
12			1																				52	38	50
13			3																				28,54,42	31,32,34	35,50,45
Sub Total (R8)			24	6	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			2																				38,44	33,35,	21,25
2			2																				50,38	41,42	50,42
3			3																				12,14,12	10,10,10	10,16,10
4			2																				30,34	22,20	35,37
5				2																			12,14	18,20	6,4
6	50	R-9	3																				18,28,18	24,26,22	23,33,23
7				2																			14,14	28,28	12,12
8				2																			18,20	22,28	10,12
9			3																				18,24,28	28,30,32	20,28,30
10			2																				14,16	20,22	16,12
11				2																			12,16	20,20	5,7
12					1																		33	26	17
Sub Total (R9)			17	8	1	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1			2																				42,15	16,14,	45,20
2	25	R-10	1																				17,	18	22
3			2																				10,13	15,16	7,8
Sub Total (R10)			5	0	0	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0			
1				1																			40	50	22
2					1																		45	36	32
3			1																				21	60	25
4						3																	38,42,24	55,60,36	15,18,10
5			3																				26,50,55	40,60,60	31,52,53
6													4(Mulberry)				4						15,30,17,17	40,35,10,10	8,12,6,6
7				4																			36,43,47,18	45,45,45,45	20,25,20,20
8												2											27,10	40,18	15,4
9				3																			14,14,10	25,23,15	8,8,7
10			2																				24,18	23,24	26,20
11	120	R-11		4																			28,18,12,18	30,24,18,30	13,11,6,10
12				4																			38,18,28,30	40,24,35,24	21,8,14,12
13				2																			48,52	40,45	24,24
14				2																			38,42	36,34	18,18
15				2																			58,48	50,50	25,25
16				2																			42,44	29,35	20,22
17				1																			36	40	18
18									7														50,12,35,35,35,32,22	70,40,70,70,70,60,45	18,5,12,8,12,11,10
19													3 DRY (Talli)		3								52,48,48	60,60,55	30,28,26
20				2																			40,38	60,70	25,25
21				1																			68	45	20
22				5																			32,38,31,42,41	45,55,45,45,45	18,24,18,20,20
Sub Total (R11)			6	33	1	3	0	0	7	0		2	0	0	3	0	4	0	0	0	0	0			
1											2												55, 60	65,60	30,30
2											1												48	65	25
3			1																				54	45	60
4													4 Tali		4								18,18,22,26	25 all	4,5,5,5
5			3																				28,36,48	38,48,60	32,40,45
6													1 keekar	1									36	48	40
7			2																				30,32	40,45	34,34
8			2																				40,38	28,28	44,42
9													1 keekar	1									38	40	42
10			2																				38,45	40,50	40,50
11			2																				63,80	48,70	60,70
12		R-12											2 Keekar	2									54,40	36,42	55,45
13			3																				26,38,55	18,40,60	31,40,55
14													1 keekar	1									46	40	50
15			1																				48	60	50
16			2																				47,84	55,70	50,70
17													3 Keekar	3									44,38,42	35,35,38	45,40,45
18			2																				70,50	40,35	60,55
19			2																				30,55	22,35	35,55
20			3																				38,42,48	38,32,32	42,44,50
21													1 Keekar	1									65	50	60
22			1																				58	42,44	60
23										1													120	65	75

Flora Survey of STZA

Sr. No.	ROW	Road No.	SPECIES ON ROAD										Species on Median (Nos)	SPECIES ON MEDIAN									PARAMETERS		
			1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia azedarach (Bakain/Daraik)	6. Albizia lebbeck (Kala Sirin)	7. Poplar	8. Ficus bengalensis (Banyan/ Bargad)	9. Sapium sebi ferum (Chinese Tahli)	10. Morus alba (Desi Toot)		1. Acacia modesta (Phulai/palosa)	2. Dalbergia sissoo (Shisham/ Tahli)	3. Ficus carica (Injir)	4. Broussonetia papyrifera (paper Mulberry/Kagzi Toot)	5. Melia Azedarach (Bakain)	6. Albizia Lebbeck (Siris)	7. Ziziphus Jujuba (Berry)	8. Pipli	9. Sapium sebi ferum (Chinese Tahli)	Circumference (in)	Height (ft)	Estimated Age (Years)
Sub Total (R12)			**26**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**3**		**0**	**9**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1									30														27,24,22(22 other all)	30 all	12,11,10 (10 other all)
2	50'	R-13	5																				18,16,23,25,29	33 all	22,20,26,28,34
3							2																18,23	25,30	5,6
4							1																16	24	4
Sub Total (R13)			**5**	**0**	**0**	**0**	**3**	**0**	**30**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1							1																20	18	4
2	50'	R-14		3																			38,48,38	48,46,45	22,24,24
3					1																		38	30	24
Sub Total (R14)			**0**	**3**	**1**	**0**	**1**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1					4																		36,38,24,21	30,40,40,20	25,30,18,15
2					2																		20,18	20,20	15,15
3					3																		18,16,20	22,22,24	12,12,15
4	50'	R-15					1																32	30	12
5									1														27	30	8
6					2																		27,30	20,30	14,14
7					2																		10,10	10,9	7,6
8												1											44	40	20
Sub Total (R15)			**0**	**0**	**13**	**0**	**1**	**0**	**1**	**0**		**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			1																				34	24	38
2			4																				12,14,18,18	15,18,18,16	12,14,14,14
3				2																			13,18	18,23,	7,12
4			3																				46,44,38	40,42,38	48,48,42
5			4																				18,26,26,26	40,40,22,26	20,30,30,30
6			3																				38,34,36	22,36,36	42,38,40
7	80'	R-16	5																				40,44,38 other 3	40,40,40,35, 35	42,50,42,42,42
8				1																			48	35	23
9				3																			18,22,40	30,28,42	15,15,24
10			2																				18,18	30,28	21,21
11			1																				42	35	47
12				1																			44	42	25
Sub Total (R16)			**23**	**7**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1				4																			20,20,18,16	24,23,21,21	11,11,8,8
2	25'	R-17	3																				20,22,22	30,36,32	23,24,24
3				1																			24	30	14
4						2																	22,22	36,36	10,10
Sub Total (R17)			**3**	**5**	**0**	**2**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			1																				36	15	40
2	25'	R-18		3																			28,28,30	28,36,38	13,13,14
3				2																			24,24	26,28	12,12
Sub Total (R18)			**1**	**5**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
				2																			28,26	32,34	15,16
1				1																			32	28	15
2			2																				32,36	30,30	37,42
3	50'	R-19	4																				23,25,28,30	30,30,30,30	28,30,32,33
4			1																				38	35	44
5			2																				22,18,	16,18,	25,20
6			4																				38,36,65,70	35,40,50,35	42,40,53,55
7				2																			30,34	32,32	15,16
Sub Total (R19)			**13**	**3**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1	25'	R-20	1																				65	42	55
Sub Total (R20)			**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1	25'	R-21	2																				13,16	14,11	15,18
Sub Total (R21)			**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1				1																			23	27	12
	80'	R-22	2																				12,10	15,15	12,12
2				3																			28,28,28	30,35,40	14,14,18
3				2																			22,24,	30,35	10,13
Sub Total (R22)			**2**	**6**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			2																				10,22	10,19	12,26
2			1																				14	15	18
3	25'	R-23		1																			14	30	10
4			2																				12,10	18,15	15,14
5			2																				40,36	35,45	45,42
6			2																				50,36	40,35	50,40
Sub Total (R23)			**9**	**1**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			2																				22,26	18,16	26,28
2	25'	R-24	3																				12,14,12	20,20	17,17,17
3			2																				23,38	20,42	27,43
4			2																				36,48	40,35	40,50
Sub Total (R24)			**9**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
1			1																				24	23	25
2				1																			26	25	13
3				2																			48,48	50,42	22
4	25'	R-25		2																			20,22	20,20	9,10
5				1																			18	20	8
6			2																				32,30	20,26	36,36
7			2																				40,36	20,18	45,40
8				2																			22,24,	24,24	10,11
Sub Total (R25)			**5**	**8**	**0**	**0**	**0**	**0**	**0**	**0**			**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**			
Total Trees			281	142	36	9	5	2	39	1	5	3		34	40	1	5				0	1			
													Total on Median	**81**										

Total Trees on Road	523
Total Trees on Roads and	**604**

Species	Total Trees	Percentage
Keekar	315	52,15
Tali	182	30,13
Injir	37	6,13
Mulberry	14	2,32
Bakain	5	0,83
Siris	2	0,33
Popular	39	6,46
Rohr	1	0,17
Sepium Sebi Ferum	6	0,99
Desi Toot	3	0,50
Sum	**604**	**100,00**

Proposed Tree Species for Islamabad Technopolis

Albizia lebbeck

Alstonia_scholaris_

Bauhinia variegata

Bismarckia nobilis

callistemon-viminalis

Cassia fistula

Cassia_javanica

Chorisia insignis

 Delonix-regia	 Diospyros malabarica
 Erythrina suberosa)	 Ficus amstel king
 Ficus Hawaii	 ficus-virens
 Grevillea_robusta	 Jacaranda_mimosifolia

Livistona-chinensis

Magnolia grandiflora

Melia azedarich

Melia azedarich

Phoenix_rupicola_

Pinus roxburghi

Pongamia pinnata

Putranjiva roxburghi

Roystonea-regia

Sapium sebiferum

Syagrus_romanzoffiana

Syzygium cumini

Tabeubia aurea

Terminalia arjuna

Terminalia mantaly

Washingtonia

Wodyetia bifurcata