

**Specialized Healthcare & Medical
Education Department, Government of
Punjab**

**Environmental Impact Assessment
of Establishment of Nawaz Sharif
Institute of Cancer Treatment and
Research, Lahore**



Septmeber 2024

Final Report



Infrastructure Development Authority Punjab

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Executive Summary

Title of the Project

This report presents the findings of "Environmental Impact Assessment (EIA) of the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore".

The EIA study aims to identify the possible environmental and social impacts of the proposed project on its immediate surroundings on both short and long-term basis, suggesting mitigation measures and identifying the responsible agencies to implement those measures.

Location of the Project

The proposed project is the establishment of Nawaz Sharif Institute of Cancer Treatment and Research (NSICTR), Lahore.

The Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, is located in Valencia Town, along the Pine Avenue Road which is further connected to Defence Road. The coordinates of the proposed project are 31°23'57.39"N and 74°14'53.17"E.

Name of Proponent

The proponent/responsible authority for the sponsoring, operation, and maintenance is the Specialized Healthcare & Medical Education Department, Punjab.

The authorized representative for the project is Professor Dr. Mehmood Ayaz, Vice Chancellor, King Edward Medical University, Lahore.

Organization Preparing the EIA Report

M/s Infrastructure Development Authority Punjab (IDAP), an autonomous body established under the Infrastructure Development Authority of the Punjab Act 2016 for planning, designing, construction and maintenance of public sector infrastructure projects in the province. IDAP has prepared an Environmental Impact Assessment of Establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore.

Outline of the Project

The rising number of Cancer patients in the province has led the government of Punjab to build a state-of-the-art Cancer hospital in Valencia town, Lahore housing all the necessary needs of Cancer Treatment and Recovery. The project is a dire need of today, a hospital that would provide Cancer treatment and recovery under one roof. According to the study conducted by Globocan, it is estimated that there is an addition of 185,748 patient diagnosed with cancer per year in Pakistan. The proposed hospital would not only provide international standard cancer care hospital facilities but it would also serve as center of excellence for research.

This project will have phase wise following facilities in a single campus.

The Hospital will provide a responsive healing environment for cancer patients and their families and improve the quality of life for all members of community. It will be a provider of high-quality cancer patient-focused health care that is readily accessible, cost-effective and meet the needs of the communities it will serve. This project will provide quality, subsidized health care services.

It will ensure access to superior quality integrated health care for our community and expand access for underserved populations within the community. Also, it will create a supportive team environment for patients, employees, and clinical staff.

The Nawaz Sharif Cancer Hospital will be approximately a 915 beds facility which is to be constructed in two phases on a plot size of approximately 333.0 Kanal located in the Southwest of Lahore at Pine Avenue Road.

The site has a direct approach from a Triple Carriage way not far from the junctions of the intra city highway (motorway) and the City Ring Road, thus making it a desirable location for patients coming from other cities.

In Phase-I, 615 beds facility will be constructed which includes 280 Bedded Main Hospital Building (482,000Sft), 150 Bedded Cancer Care Clinic (118,000 Sft), 75 Bedded Hospice and Palliative Care (43,283 Sft), 110 Bedded Bone Marrow Transplant Center (197,140 Sft), Doctors Accommodation (50,000 Sft) along with external development and allied building works.

In Phase-II, 300 bedded New Block of Hospital Building (158,000 Sft) will be constructed along with Parking Plaza (104,569 Sft) for 300 cars to cater the growing needs of the patients' and visitors parking. A total construction of around 1,150,000 Sq.ft covered area has been planned in two phases over the above-mentioned plot. The total cost of the project is estimated to be approximately **PKR 52,773 million** and is expected to be completed in a period of Thirty-Four (34) months.

Environmental Baseline Conditions

In order to assess and evaluate the impacts and related mitigation measures in the project area, existing conditions of the physical, biological and socio-economic environment were studied as under:

Physical Environment

Topography: At the time of investigations, project land is barren land with scarce shrubs and grasses. A topographic survey plan for the proposed project site indicates the ground surface is generally flat.

Geology and Soil: Lahore city is situated at an average elevation of 210 meters above mean sea level. The alluvial subsoils are of late Pleistocene and were formed by the flood plains of river Ravi. These consist of clay, silt and sand. The thickness of clay increases with distance from the riverbed.

A geotechnical investigation of the project site reveals the project area is mainly comprised of Lean Clay / Silty Clay / Silty Sand / Poorly graded Sand.

Land Use: At the time of investigations, project land was mainly covered with some trees, grass and shrubs. A topographic survey plan for the proposed project site was provided by IDAP. According to information deduced from the plan, the ground surface is generally flat.

Surface Water: There is drain passing in the North of the project site. The drain is mainly used for disposal of wastewater and rainwater.

Ground Water: Groundwater is present at a depth of 20 m below EGL. The proposed project will also install bore wells to extract water during the operational phase.

A chemical analysis test of the groundwater in the project site was conducted. The samples of groundwater were collected on 13th July 2024 and were received by the Green Crescent Environmental Consultants Pvt. Ltd. on 15th July 2024 for analysis.

The parameters that were analyzed include pH, Odor, Taste, Color, Turbidity, Total Hardness, Total Dissolved Solid (TDS), Ammonia, Chloride, Cyanide (CN), Flouride (F), Nitrite, Nitrate, Phenolic Compound, Residual Chlorine, Aluminum (Al), Cadmium, Copper, Chromium, Mercury, Antimony (Sb), Nickel, Zinc, Arsenic, Barium, Manganese, Iron, Boron, Lead, Selenium, Total Coliforms and Faecal Coliforms (Ecoli) whose concentrations/results were 7.25, Odorless, Sweet, <1.0 Pt/Co, <0.1 NTU, 204.0 mg/L, 772.0 mg/L, <0.002 mg/L, 65.04

mg/L, <0.01 mg/L, <0.01 mg/L, <0.01 mg/L, 0.1 mg/L, <0.01 mg/L, <0.1 mg/L, <0.028 mg/L, <0.0028 mg/L, <0.0045 mg/L, <0.0054 mg/L, <0.0008 mg/L, ND, <0.008 mg/L, <0.0033 mg/L, <0.01 mg/L, <0.031 mg/L, <0.0016 mg/L, <0.1 mg/L, <0.1 mg/L, <0.013 mg/L, ND, Absent and Absent respectively.

It was found that all these parameters are within the permissible limit.

Climate: Lahore lies 217 meters above sea level. The Lahore region comes under the normal composite zone, according to the climatic zone map. It lies near the hot, dry zone, and in summer, the wind direction is such that the wind blows northeast towards the southwest of the city, affecting the climate of the Lahore region.

The effect of the hot, dry zone starts from March and remains till September as the wind direction is southwest which means from the hot, dry zone towards the Lahore region. The main features of this season are that the winds blow are hot and full of dust during the daytime but are cooler at night.

Lahore features a five-season semi-arid climate: foggy winter (15 Nov – 15 Feb) with few western disturbances causing rain; pleasant spring (16 Feb – 15 April); summer (16 April – June) with dust, rainstorms and heat wave periods; rainy monsoon (July – 15 September); and dry autumn (16 September – 14 November).

Air Quality: The ambient air quality monitoring was carried out from 13th July to 14th July 2024, at the project site.

The concentrations of NO₂, NO, NO_x, SO₂, CO, O₃, PM₁₀, PM_{2.5}, TSP and lead air borne particles were monitored as 25.27µg/m³, 19.03µg/m³, 44.30µg/m³, 19.07µg/m³, 1.84mg/m³, 14.37µg/m³, 119.62µg/m³, 23.34µg/m³, 177.96µg/m³ and 0.21µg/m³ respectively. The recorded concentrations of all the parameters meet the PEQS limits (i.e., 80 µg/m³, 40 µg/m³, 120 µg/m³, 120 µg/m³, 5 mg/m³, 130 µg/m³, 150 µg/m³, 35 µg/m³, 500 µg/m³ and 1.5µg/m³).

Therefore, it is concluded that presently, there is no air pollution at the project site, and the site is suitable for hospital facility. Proper plantation on open spaces of the project site will help to enhance and maintain the air quality of the area in future.

Noise and Vibration: The 24 hours average noise level at nighttime was 57.67 dB(A) whereas, it was 66.40 dB(A) at daytime. The hourly noise variation throughout the day reveals that noise levels exceeded the PEQs limit values. It may be due to the fact that the project site is near the road and commercial area.

Ecological Environment

Flora: In the Lahore district, the most important species of trees are Kikar (Acacia Arabica), Shisham or Tahli (Delbergia sissoo), Beri (Zizyphus jujube); Toot (Morus alba); Sharin (Albizzia lebbek); Dherek (Melia azeharach); Phulai (Acacia modesta); Pipal (Ficus religiosa); and Bohr (Ficus bengalensis), which are planted for shade.

The project site is barren flat land scarce vegetation. There is only one tree (Kikar) at the project site.

Fauna: The mammalian species reported from Lahore include Asiatic Jackal, Jungle Cat, Palm Squirrel, Bush Rat, Indian Mongoose, Indian Crested Porcupine, Indian Hare, Indian False Vampire, Soft Field Rat, House Mouse, Roof Rat, Asiatic House Shrew and Wild Boar. Although, no fauna in the project site was found in the survey conducted on 05 – 08 - 2024.

Socio-Economic and Cultural Environment

The socio-cultural and socio-economic conditions of the project area, namely the Valencia Town, are described in the report. This town may get direct positive or negative impacts from the development of the proposed project.

Public Consultation

During the public & stakeholder consultation, meetings were held with the Proponent's Environmental Management Team, university academia (UET Lahore), Environmental Inspector, Environmental consultants/practitioners, private hospitals and clinics, and community living around the project site. The project activities that impact the physical, biological and socio-economic environment of the project area were highlighted to them. Stakeholders concerns regarding various aspects, existing environment, and impacts of the project were noted, and mitigation measures are proposed in the EIA report.

Generally, the people of the project area are in favour of the project and stated that this project would create employment opportunities for the local people during the construction and operational phase, as well as there is a need for a hospital in the project area. Residents stated about the issue of lack of healthcare facility at the project area, which will be reduced if the proposed hospital is constructed.

Major Impacts and Recommended Mitigation Measures

Physical Environment

Impacts: Soil-related issues include soil erosion, slope stability, and soil contamination. The land excavation and filling, construction activities and maintenance of equipment/vehicles may cause these issues. The quality of soil would be affected, as soil contamination would occur because of the disposal of untreated wastewater or direct disposal of chemical and onsite preparation of materials. Oils, chemical spills, and waste from campsites may also deteriorate the quality of the soil.

Dumping of construction wastes/excavated material in the surrounding area may limit the use of land in the project area. The solid waste may be generated due to different construction activities, and it will mainly include surplus excavated and construction material.

Construction machinery and project vehicles will release exhaust emissions containing Carbon Monoxide (CO), Oxides of Sulfur (SO_x), Oxides of Nitrogen (NO_x), and Particulate Matter (PM). In addition, various burning activities involved in road construction will also cause air pollution.

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

Noise and vibration will be generated by construction machinery and vehicles.

The quality of water may deteriorate in the area. During the deep excavation, the aquifer may be hit, and the quality of water will be depleted. Because of the preparation of construction material on-site, leachate may be produced and percolated through the soil. It may then reach the water table and contaminate the water that may be consumed by the local people.

The activities during the construction and operational phase of the proposed project will affect the community living in the vicinity of the project site. Therefore, there is a need to implement mitigation measures during the construction and operational phase to minimize the potential negative impacts on these areas.

Mitigations: Soil erosion can be minimized by appropriate land clearing, levelling, and grading. Excavated slopes will not be left untreated/unattended for long durations, and appropriate slope stabilization measures will be taken as per the design.

For the domestic sewage from the contractor's camp, a septic tank with a soaking pit will be constructed having adequate capacity. Waste oils will be collected in drums and sold to the recycling contractor.

The recyclable waste from the project site (such as cardboard, drums, broken/used parts, etc.) will be sold to recycling contractors, or where appropriate, to reuse/recycle. The hazardous waste will be kept separate and handled according to the nature of the waste. While storing, hazardous waste will be marked.

Appropriate sewage treatment mechanisms such as septic tanks of adequate sizes will be incorporated in the design for the treatment of sanitation water where the municipal sewage system is not available or does not exist.

Water quality analysis will be carried out at the project site and at the campsite quarterly during the construction phase.

Ecological Environment

Impacts: The project site preparation and construction activities may necessitate the removal of the natural vegetation and very limited loss of plant cover and productivity.

Most of the potential impacts of the proposed project operation on the faunal resources are associated with the damage to the natural vegetation. In addition, the wildlife may be disturbed by noise, illumination, and stack emissions.

The covered project area is small and inhibits no wildlife, while smoke, chemicals, dust particles, and noise generated by heavy machinery during the construction period are scary factors for biota. Rodents and insects would lose their abode.

Mitigations: The executing agency i.e. Infrastructure Development Authority Punjab will maintain the existing plantation cover and aesthetic beauty of the area.

Endeavours will be made to enhance the environment through a plantation of trees.

All preventive measures will be adopted to control the spill-over of chemicals and other effluents on the ground to protect soil fauna and ensure microbial activity in accordance with PEQS.

Special measures will be adopted to minimize impacts on birds, such as avoiding noise-generating activities.

The measures to restore natural vegetation loss in the area will benefit the area's fauna as well.

After completion of the project, the proponent will rehabilitate the land by planting trees and ornamental flowers on disturbed and undisturbed areas.

Socio-Economic Environment

Impacts: The project may pose some safety hazards to the population near the project area during the demolition as well as the construction phase of the project.

Construction workers may be susceptible to eye and respiratory diseases due to their routine exposure to dust and exhaust emissions on site. Injuries could happen primarily by occupational-related accidents, animal bites, etc. Activities such as land clearing, earthworks, and construction of facilities present various occupational hazards to the workers on the project site.

There are no reported sites of the archaeological or historically significant site at the project site. However, in case an artefact of such significance is found during the construction activities, the Archeology Department, the Government of Punjab will be informed.

Mitigations:

Eye and respiratory diseases will be mitigated through routine health screening and training of contractor's employees. The physical injury will be mitigated through the provision of

appropriate training and emergency response procedures. Protected fencing will be fixed around the construction site.

The provision of Personal Protective Equipment (PPE) to the workers will be ensured. Protective fencing will be fixed around the construction site.

Unauthorized access within the construction area will not be allowed. A vehicle speed of 20 km/hr at the project site will be implemented. Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance caused by light pollution.

Environmental Management Plan and Proposed Monitoring

The purpose of the Environmental Mitigation Plan (EMP) is to minimize the potential environmental impacts due to the project. The EMP reflects the commitment of the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, to safeguard the environment as well as the surrounding population.

The EMP provides a delivery mechanism to address the adverse environmental impacts, to enhance the project's benefits and to introduce standards of best practices to be adopted for all phases of the project.

The contractor will prepare a Quarterly Environmental Monitoring Report of project activities carried out during the construction phase of the project. These reports will be submitted to the Environmental Protection and Climate Change Department, Lahore (Pak-EPCCD) for their review and consideration. The total estimated Environmental Mitigation and Monitoring Cost is **Rs. 351.1 million**.

Conclusion and Recommendations

On the basis of the overall impact assessment, more specifically, the nature and magnitude of the residual environmental impacts identified during the present EIA, it is concluded that the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore is likely to cause environmental impacts during its constructional and operational phase. However, these impacts can be mitigated, providing that the proposed project activities are carried out, as mentioned in the report, and the mitigation measures included in this report are completely and effectively implemented.

The project will **positively contribute to providing quality healthcare facilities** for the residents of Punjab.

There are no remaining issues that warrant further investigation. This EIA is considered adequate for the environmental and social justification of the project.

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List of Abbreviations

AI	Artificial Intelligence
EIA:	Environmental Impact Assessment
EMP:	Environmental Management Plan
EPCCD:	Environmental Protection and Climate Change Department
HCWM:	Health Care Waste Management
GPD:	Gallons per Day
HSE:	Health, Safety and Environment
NSICTR	Nawaz Sharif Institute of Cancer Treatment and Research
NCS:	National Conservation Strategy
NOC:	No Objection Certificate
PEPA:	Pakistan Environmental Protection Act 1997
PEQS:	Punjab Environment Quality Standards
PEPC:	Pakistan Environmental Protection Council
PPE:	Personal Protective Equipment
ToR:	Terms of Reference
HWM:	Hospital Waste Management
BMT:	Bone Marrow Transplant

List of Units

%:	Percent (age)
°C:	Degree centigrade
cm:	Centimeter
dB (A):	Decibel
ft²:	Square foot
ft³:	Cubic foot
Km:	Kilo meter
Km/h:	Kilometer/hour
m:	Meter
m²:	Square meter
m³:	Cubic meter
MT:	Metric Ton

1 Introduction

1.1 Project Background and Overview

Cancer is a serious disease characterized by uncontrolled cell growth and is a significant cause of mortality worldwide. The International Agency for Research on Cancer (IARC) reports that, in Pakistan, there were approximately 0.18 million new cancer cases, 0.11 million cancer fatalities, and 0.32 million prevalent cases within a five-year period. These numbers reflect a growing public health crisis that requires immediate and sustained attention. By 2040, it is estimated that there will be 28.4 million new cancer cases globally, highlighting the urgency of addressing this issue. In 2020 alone, there were about 19.3 million new cancer cases, excluding non-melanoma skin cancer, and around 10 million cancer deaths.

According to the study conducted by Globocan, it is estimated that there is an addition of 185,748 patient diagnosed with cancer per year in Pakistan.

Such statistics underscore the need for robust healthcare infrastructure to manage and treat cancer effectively¹.

Breast cancer has become increasingly frequent in Pakistan, with the country representing the highest rate of breast cancer in Asia. One in nine women in Pakistan is at risk of developing breast cancer in her lifetime, and the nation has one of the highest breast cancer mortality rates globally. The rising incidence of breast cancer necessitates specialized facilities and expertise to provide timely and effective care. Lips and mouth cancer is the second most common cancer in Pakistan and the most frequent among males, accounting for 15.9% of cases when both genders are considered. This high prevalence is linked to cultural practices such as the use of smokeless tobacco products, including gutkha and paan, which contain over 30 toxic substances that significantly increase cancer risk¹.

The current healthcare infrastructure in Pakistan is insufficient to manage the increasing number of cancer cases. Existing cancer treatment centers are often overwhelmed, leading to long wait times for diagnosis and treatment. This delay can be detrimental to patient outcomes, as early detection and timely intervention are crucial for successful cancer treatment. Furthermore, many facilities lack the advanced diagnostic and treatment technologies necessary to provide comprehensive cancer care. This gap in healthcare services highlights the need for a new, state-of-the-art cancer hospital equipped with modern technology and specialized staff.

Establishing a new cancer hospital in Pakistan is essential to address these challenges. Such a facility would provide access to cutting-edge diagnostic tools and treatment options, including surgery, chemotherapy, radiation therapy, and targeted therapies. By offering a comprehensive range of services under one roof, the hospital would improve the quality of care available to cancer patients and reduce the burden on existing healthcare centers. Moreover, a new hospital would help mitigate geographical disparities in healthcare access, particularly benefiting rural populations who currently face significant barriers to receiving timely cancer care.

In addition to providing high-quality care, a new cancer hospital would play a crucial role in training healthcare professionals and conducting cancer research. Pakistan faces a shortage of trained oncologists, specialized nurses, and other healthcare professionals needed to deliver effective cancer care. A dedicated cancer hospital could serve as a training center, offering education and professional development opportunities to build a skilled workforce. Furthermore, the hospital could become a hub for cancer research, contributing to the global

¹ Ali, A. et al. (2022) "The Burden of Cancer, Government Strategic Policies, and Challenges in Pakistan: A Comprehensive Review," *Frontiers in Nutrition*, 9, p. 940514. Available at: <https://doi.org/10.3389/FNUT.2022.940514/BIBTEX>.

understanding of cancer and the development of new treatments. This research could also inform public health strategies and policies aimed at cancer prevention and early detection.

Economically, cancer places a heavy burden on families and the healthcare system in Pakistan. The cost of advanced-stage cancer treatments is high, and many families struggle to afford the necessary care. Improved infrastructure for early detection and treatment can help reduce these costs by catching cancer in its early stages when it is more treatable and less expensive to manage. Additionally, early intervention can help patients return to their normal lives more quickly, reducing the economic impact on families and improving overall productivity. Public awareness campaigns and preventive measures initiated by a dedicated cancer hospital can also help lower cancer rates, leading to better health outcomes and supporting Pakistan's overall development.

In conclusion, the establishment of a government run new cancer hospital in Pakistan is a critical need. The rising incidence of cancer, coupled with the limitations of the current healthcare system, necessitates a dedicated facility equipped with modern technology and specialized staff. Such a hospital would improve access to high-quality cancer care, reduce geographical disparities, and play a vital role in training healthcare professionals and conducting research. Economically, it would alleviate the financial burden on families and the healthcare system by enabling early detection and treatment. By addressing these challenges, a new cancer hospital would significantly enhance cancer care in Pakistan and contribute to the country's overall health and development.

1.2 Nature, Size and Location of the Project

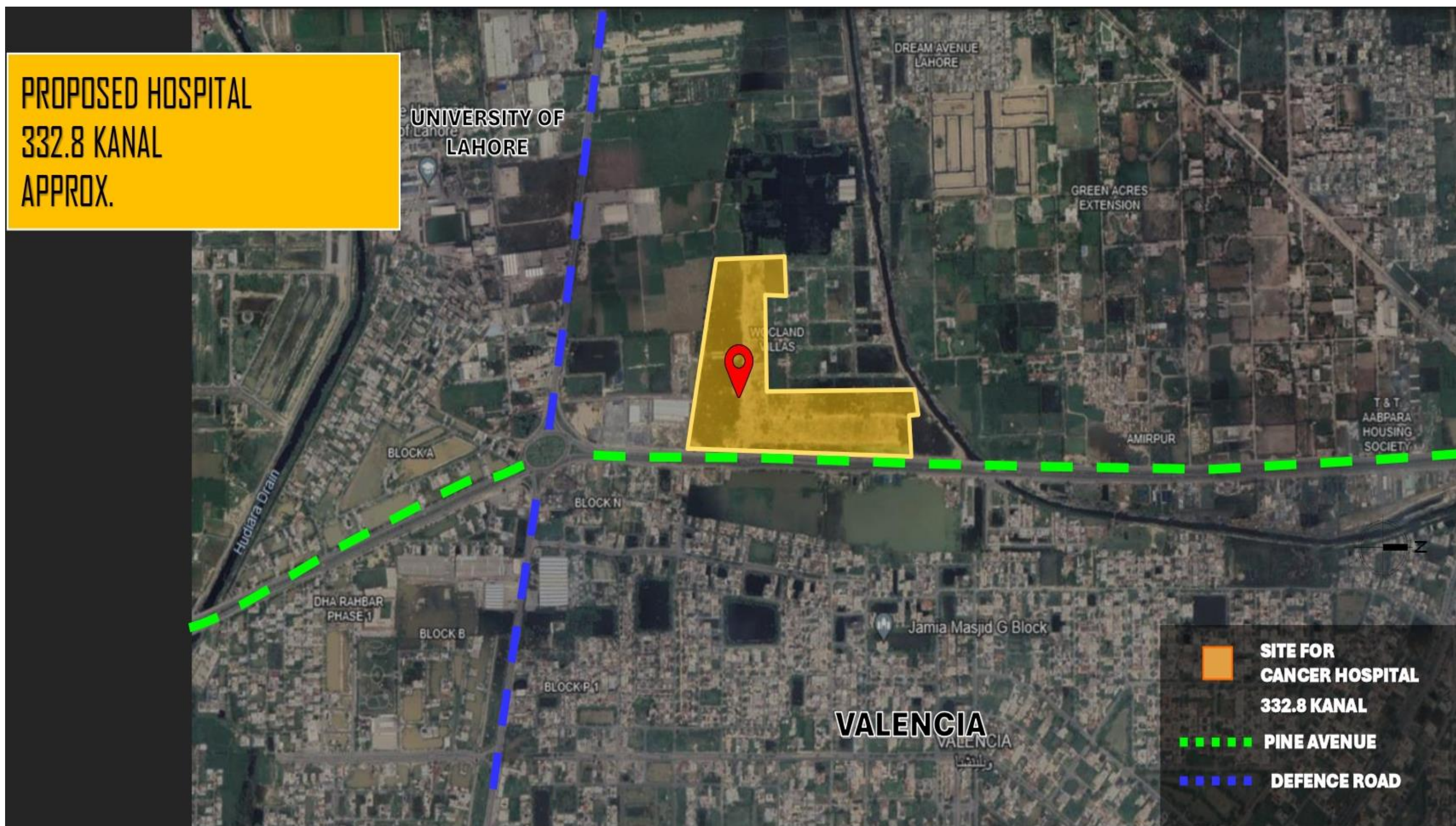
Nature: The project is the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore.

Size and Location: NSICT & R will be 915 bedded Hospital spread over an of 333 Kanal land located in the Southwest of Lahore in Valencia Town at Pine Avenue Road.

Access: Access Road to the project site is Pine Avenue road which is further connected to Defence road. The site is conveniently accessed from a triple carriageway, located near the junctions of the intracity highway (motorway) and the City Ring Road.

The map of the project location is shown in **Figure 1.1**.

Figure 1.1: Project Location Map of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore



1.3 The Proponent

The proponent/responsible authority for the sponsoring, operation, and maintenance is the Specialized Healthcare & Medical Education Department, Punjab.

The authorized representative for the project is Professor Dr. Mehmood Ayaz, Vice Chancellor, King Edward Medical University, Lahore.

1.4 Name of the Organization Preparing the Report

M/s Infrastructure Development Authority Punjab (IDAP), an autonomous body established under the Infrastructure Development Authority of the Punjab Act 2016 for planning, designing, construction of public sector infrastructure projects in the province.

IDAP will design and construct the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore project. Nawaz Sharif Institute of Cancer Treatment and Research will be handed over to the proponent for its operation.

The details of the Environmental Consultant is provided as **Annexure-1**.

1.5 Contact Persons

The authorized representative of the proponent and Environmental Consultant are the following:

For Project Proponents	Environmental Consultant
Prof. Dr. Mehmood Ayaz, Vice Chancellor King Edward Medical University Lahore Tel: 042 99214688 Email: vc@kemu.edu.pk	Mr. Ali Abdullah, Environmental Engineer 26, Second Floor, Silver City Plaza, G 11 Markaz, Islamabad Tel: +051 2363624 Cell: 0300 9110245 Email: aliabdullah071@gmail.com

1.6 Screening of the Project

The project is to Establish Nawaz Sharif Institute of Cancer Treatment and Research along the Pine Avenue Road in Lahore.

EIA is mandatory according to section 12 of the Punjab Environmental Protection Act, 1997 (Amended 2012) for all the development interventions. According to Punjab EPA (Review of IEE/EIA Regulations, 2022), the proposed projects fall under **Category J (Other Projects)** of **Schedule II**, which states that “*Any other project for which filing of an EIA is required by the Provincial Agency under sub-regulation (2) of Regulation 5 and any other project likely to cause an adverse environmental effect*” require the EIA study.

1.7 Scoping of the Project

A scoping exercise was undertaken to identify the potential issues that are to be considered in the environmental impact assessment. The scoping exercise includes the following indispensable tasks.

Spatial and Temporal Boundaries of the Project: The project site is located in Valencia Town along the Pine Avenue Road with is further connected to Defence Road. The project site occupies 333 Kanals. The establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore will be completed in 34 months, and the impacts of the construction phase will be short term. Similarly, the magnitude of impacts will moderate in nature due to the limited covered area of the project.

The spatial and temporal boundary during the operational phase of the project will be long term as the project is to Establish Nawaz Sharif Institute of Cancer Treatment and Research, Lahore.

Stakeholder Consultation: A stakeholder consultation was undertaken to document the concerns of the local community and other stakeholders and to identify issues that may require additional assessment in order to address these concerns.

Stakeholder consultation was conducted during the survey with the following objectives:

- To inform the Stakeholders, Communities and Project Affected Persons about the project.
- To gather feedback from the primary and secondary stakeholders of the project
- To identify relevant potential issues, including the socio-economic impact of the project and corresponding mitigation measures.

During the stakeholder consultation process for the project, the following key aspects were highlighted by stakeholders:

- Traffic Management Plan for Pine Avenue Road and car parking arrangements for the Hospital
- Wastewater Treatment Plant
- Hazardous Waste Management
- Energy conservation features of the building
- Concerns of the residents (Project Affected Persons, if any)

Magnitude of impact: The magnitude of the impact will be localized as Major Issue.

1.8 Environmental Impact Assessment

According to the Punjab Environmental Protection Act 1997, (Amended 2012), section 12 (1):

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

1.9 Purpose of Report

The Environmental Impact Assessment (EIA) is the assessment of the environmental consequences (positive and negative) of a plan, policy, program, or actual projects prior to the decision to move forward with the proposed action.

The EIA is the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development project prior to major decisions being taken and commitments made. Furthermore, the report will enable M/s Infrastructure Development Authority Punjab to obtain environmental approval of the Project “Establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore” from Punjab Environmental Protection Agency.

The purpose of the EIA is to ensure that decision-makers consider the environmental impacts when deciding whether or not to proceed with a project.

1.10 Scope of EIA

The project requires the Environmental Impact Assessment to identify the environmental impacts of construction and operational phases of the proposed project of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore.

The scope of EIA of the project “Nawaz Sharif Institute of Cancer Treatment and Research, Lahore” is as follows:

- The identification and assessment of all major and minor impacts during pre-construction, construction and operational phases,
- Identification of all significant impacts that may require detailed assessment,
- Propose mitigation measures to minimize, eliminate or compensate the potential adverse impacts that may arise during pre-construction, construction, and operational phases of the project,
- Public consultation with all the stakeholders of the proposed project,
- Preparation of Environmental Management Plan,
- Conclusions and recommendations, and
- Preparation of an Environmental Report for submission to Punjab Environmental Protection and Climate Change Department.

The Terms of Reference for the EIA report has been attached in **Annexure-2**.

1.11 Approach and Methodology

1.11.1 Approach for EIA

The approach for conducting EIA of the project “Nawaz Sharif Institute of Cancer Treatment and Research, Lahore” is to follow the requirement of Punjab Environmental Protection Act 1997 (Amended 2012) and Punjab Environmental Protection Agency (Review of IEE/EIA) Regulations, 2022.

1.11.2 Kick-off Meeting with the Proponent

The kick-off meeting was held between the Specialized Healthcare & Medical Education Department and the IDAP team. During this meeting, the list of activities for the study relevant to the environmental impact assessment of the project was discussed.

1.11.3 Collection of Secondary Data

All available published and unpublished information pertaining to the background environment was obtained and reviewed. All data sources were carefully reviewed to collect the following information:

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

The list of secondary data consulted during the EIA study is provided in **Annexure-3**. The glossary of terms used in the EIA report has been provided in **Annexure-4**.

1.11.4 Collection of Primary Data and Field Visit

The IDAP team visited the project site and adjoining areas for obtaining detailed knowledge of the environmental conditions of the area. During the field visits, the existing environmental conditions were studied.

The Rapid Social Appraisal method was applied to discover the facts, empirically verifiable observations or verify the old facts on the prevailing socio-economic and cultural conditions of the project area. Communities that were in the surrounding 1 km radius were investigated during the field survey.

The ambient air quality and noise monitoring at the project site were carried out. The survey team ensured that the mammals, birds, and other species were observed without causing any potential disturbance. The sampling locations were randomly selected, ensuring that sufficient locations are represented from each habitat type and the maximum number of species is recorded.

1.11.5 Analysis of Alternatives

The EIA report gives the details of alternatives considered during the planning and design phases of the project.

1.11.6 Public Consultation

Public consultations were held with the community living in the vicinity of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore. Different aspects of the proposed project were highlighted to the community regarding their impacts on the physical, biological, and socio-economic environment of the project area and their concerns and suggestions were solicited.

The meetings were held with the Proponent, Environmental Practitioners, Doctors, Academia, and local people. Their point of concern and suggestions regarding the project was solicited.

The information obtained from the community was used to identify concerns and issues that have been subsequently mentioned and addressed in the EIA report. The list of the people met during the public consultation is provided in **Annexure-5**.

1.11.7 Review of Legislative Requirements

The information on environmental policies, national and international laws as well as guidelines relevant to the project was reviewed, and a synopsis of all relevant laws has been narrated in the report.

1.11.8 Identification and Evaluation of Impacts

The identification of impacts is a key activity in the environmental assessment process, which is based on the professional judgment of our experienced team supported by national and international guidelines.

The potential impacts were identified with methodical consideration of likely or possible significant impacts on the environment for Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project. The aim of this task was to assess the associated risks with these impacts.

Each impact identified has been evaluated against its significance in terms of severity and likelihood of its occurrence. The impact evaluation process prioritized each potential impact and screened out insignificant or inconsequential impacts.

The significance of the impacts has been assessed in terms of the effects on the natural ecosystem, level of public concern and conformity with legislative or statutory requirements. The assessment of the severity was to consider the nature, magnitude, extent and location, timing and duration and reversibility of the potential impact. The evaluation of the significant impacts has formed the basis for the development of the Environmental Management Plan.

1.11.9 Identification of Mitigation Measures

The objective of the identification of mitigation measures is to identify practices, technologies or activities that would prevent or minimize all significant environmental impacts and propose physical and procedural controls to ensure that mitigation is effective.

On the basis of the impact evaluation performed, changes or improved practices have been suggested, where practical, in the planned activities, to prevent and control unacceptable adverse impacts resulting from normal or extreme events. Monitoring requirements and institutional arrangements for monitoring have been defined and suggested.

1.11.10 Development of Environmental Management Plan (EMP)

An Environmental Management Plan has been developed for effective implementation of the recommended mitigation measures of negative impacts during the pre-construction, construction, and operation phase. The Environmental Monitoring Plan has been developed to monitor the achievement of the Environmental Management Plan during the pre-construction, construction, and operational phases of the project.

The EMP also lays down procedures to be followed during the operation of the project and identifies the roles and responsibilities of all concerned personnel, including reporting in the operational phase.

1.12 Organization of the EIA Report

This report has been structured in the following manner:

Chapter 1 (Introduction) provides an overall introduction to the project and impact assessment methodology.

Chapter 2 (Legal Framework) describes the regulatory framework of Pakistan on the environment and its implications for the project.

Chapter 3 (Project Description) provides the description of the proposed project, its layout plan and associated activities, raw material details and utility requirements.

Chapter 4 (Project Alternatives) details the potential alternatives that were considered during the design phase.

Chapter 5 (Existing Environment) provides a description of the micro-environment and macro-environment of the proposed project site. This chapter describes the physical, ecological, and socio-economic resources land of the project area and surroundings.

Chapter 6 (Public Consultation) describes details of discussions held with primary and secondary stakeholders.

Chapter 7 (Impact Assessment and Mitigation Measures) details the potential environmental and social impacts of the proposed project on the different features of the micro and macro-environment using the matrix method.

Chapter 8 (Environmental Management Plan) explains the mitigation measures proposed for the project in order to minimize the impacts to acceptable limits. It also describes the implementation of mitigation measures on the ground and monitoring of environmental parameters against likely environmental impacts.

Chapter 9 (Conclusion) summarizes the report and presents its conclusions.

The last Chapter is followed **Annexure** that provides supporting information.

Table 1.1 shows the summary of methodologies and activities to conduct EIA.

Table 1.1: Summary of Methodologies and Activities to Conduct EIA

Project screening	<ul style="list-style-type: none">• Determine the Legal requirements of EIA is necessary
Scoping	<ul style="list-style-type: none">• Decide the potential main issues to be addressed
Baseline Data Collecion	<ul style="list-style-type: none">• Collecting relevant data on the state of environment
Impact Prediction	<ul style="list-style-type: none">• Forecasting the likely changes in the environment as a result of the development
Impact Assessment	<ul style="list-style-type: none">• Evaluation of the significance of the identified impacts
Mitigation	<ul style="list-style-type: none">• Measures taken to reduce or remedy adverse impacts, or enhance positive impacts
Environmental Management and Monitoring Plan	<ul style="list-style-type: none">• Environmental Management and Monitoring Plan (EMMP) develops for effective implementation of the recommended mitigation measures and to monitor the environmental parameters against likely environmental impacts
EIA Report Submission to EPA for approval	<ul style="list-style-type: none">• EPA reviews all the nitty gritty of the report to make sure the compliance with environmental guidelines.
Correpondance with EIA for Final Approval	<ul style="list-style-type: none">• EPA reviews the Final report submitted and communicate comments to address discrepancies, if any.• Conduct of Public Hearing of the Project
Project Approval/Rejection by EPA	<ul style="list-style-type: none">• EPA issues Environmental Approval for the Project development after client/consultant addresses the comments from EPA on Final Report.

2 Legislative Institutional Framework

2.1 Introduction

Pakistan is a signatory of multilateral international treaties, has a comprehensive set of environmental legislation covering multiple environmental issues facing Pakistan like pollution of freshwater bodies and coastal water, air pollution, deforestation, loss of biodiversity, lack of proper waste management and climate changes. The basic policy and legislative framework, along with detailed rules, regulations and guidelines required for the implementation of the policies and enforcement of legislation for the protection of the environment and overall biodiversity, are in place.

The compliance status of Nawaz Sharif Institute of Cancer Treatment and Research Project has been reviewed with reference to the legislation and existing legal framework on the environment at Pakistan and the International level as described henceforth.

2.2 National Environmental Policy, 2005

The National Environment Policy (NEP) aims to protect, conserve, and restore Pakistan's environment to improve the citizens' quality of life through sustainable development. In NEP, the further sectorial guidelines, Energy Efficiency and Renewable directly related to building energy code for newly constructed buildings, were introduced.

The NEP provides an overarching framework for addressing Pakistan's environmental issues, particular pollution of freshwater bodies and coastal waters, air pollution, lack of proper waste management, deforestation, loss of biodiversity, desertification, natural disasters, and climate change. It also provides directions for addressing the cross-sectored issues as well the underline causes of Environmental degradation and meeting international obligations.

The NEP, while recognizing the goals and objectives of National Conservation Strategy, National Environmental Plan and other existing environment-related national policies, strategies, and action plans, provides broad guidelines to the Federal Government., Provincial Government, Federally Administered Territories, and local Government for addressing environmental concerns and ensuring effective management of their environmental resources.

2.3 Laws and Regulations

Pakistan has several laws and regulations regarding the conservation and protection of the environment. However, the enactment of comprehensive legislation on the environment, in the form of an act of parliament, is a relatively new phenomenon. Most of the existing laws on environmental issues were enforced over an extended period and are context-specific. The laws relevant to the developmental projects are briefly reviewed below.

2.3.1 Punjab Environmental Protection Act, 1997 (Amended 2012)

After the 18th Constitutional Amendment in the Constitution of Pakistan, the Federal Ministry of Environment was dissolved, and the subject of the environment was handed over to provinces. EPA Punjab has formulated its own act. The major content of the act is the same as of the Pakistan Environmental Protection Act (PEPA), 1997. Minor amendments/changes have been made viz.

- The Name of the Act has been changed into "Punjab Environmental Protection (Amendment) Act, 2012".
- For the words "Federal Government", the word "Government" shall be substituted wherever occurring.
- For the words "Federal Agency", wherever occurring, the words "Provincial Agency" shall be substituted; and

- For the word “National”, wherever occurs, the word “Punjab” shall be substituted.

All the other clauses, sub-clauses, sections, and sub-sections are almost the same.

The Punjab Environmental Protection Act, 1997 (Amended 2012) is the basic legislative tool empowering the Punjab government to frame regulations for the protection of the environment. The Act is applicable to a broad range of issues and extends to air, water, soil, marine and noise pollution, as well as the handling of hazardous waste.

The discharge or emission of any effluent, waste, air pollutant or noise in an amount, concentration, or level more than the Punjab Environmental Quality Standards (PEQS) specified by the Punjab Environmental Protection Agency (Punjab EPA) has been prohibited under the Act, and penalties have been prescribed for those contravening the provisions of the Act.

The requirement for environmental assessment is laid out in Section 12 (1) of the Act. Under this section, “no proponent of a project shall commence construction or operation unless he has filed with the Provincial Agency an initial environmental examination or where the project is likely to cause an adverse environmental effect, an environmental impact assessment, and has obtained from the Provincial Agency approval in respect thereof”.

Section 12(6) of the Act states that this provision is applicable only to such categories of projects as Punjab Environmental Protection Agency (Review of IEE and EIA Regulations) 2012.

2.3.2 Punjab Environmental Protection Agency (Review of IEE and EIA Regulations), 2022

The Pakistan Environmental Protection Agency (Review of IEE and EIA Regulations), 2022 prepared by the Punjab Environmental Protection Agency under the powers conferred upon it by the Act, provide the necessary details on preparation, submission and review of the IEE and the EIA. Categorization of projects for IEE and EIA is one of the main components of the regulations.

Projects have been classified on the basis of the expected degree of adverse environmental impacts. Project types listed in Schedule-I are designated as potentially less damaging to the environment and those listed in Schedule-II as having potentially serious adverse effects. Schedule-I projects require an IEE to be conducted, provided they are not located in environmentally sensitive areas. For the Schedule-II projects, conducting an EIA is necessary. Salient features of the regulation, relevant to the proposed project are listed below:

Categories of projects requiring IEE and EIA are issued through two schedules attached to the Regulations.

- A fee, depending on the cost of the project, has been imposed for review of EIA and IEE.
- The submittal is to be accompanied by an application in prescribed format included as schedule V of the Regulations.
- The EPCCD Punjab is bound to conduct preliminary scrutiny and reply within 10 days of submittal of the report a) confirming completeness, b) asking for additional information, or c) requiring additional studies.
- The EPCCD is required to make every effort to complete the review process for IEE within 30 days and of the EIA within 45 days, of issue of the confirmation of completeness.
- EPCCD Punjab accords their approval subject to following conditions:
- Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.

- Before commencing operation of the project, the proponent is required to obtain from EPCCD Punjab a written confirmation of compliance with approval conditions and requirements of the IEE/ EIA.
- An EMP is required to be submitted with the request for obtaining confirmation of compliance.
- The EPCCD Punjab are required to issue a confirmation of compliance within 15 days of receipt of the request and complete documentation.

The IEE/EIA approval will be valid for three years from the date of the accord.

A monitoring report is required to be submitted to the EPCCD Punjab after completion of construction, followed by annual monitoring reports during operations.

The project falls in Schedule-II of the regulations. Hence, this type of project needs an EIA to be conducted.

2.3.3 Hazardous Substance Rules, 2003

Section 4: A license will be required to import or transport a hazardous substance.

Section 5: EIA of the industrial activity involving generation, collection, transport, treatment, disposal, storage, handling or import of hazardous substance will be required along with a safety and waste management plan.

The rules provide information on validity, renewal, and cancellation of license; packing; and labelling; safety precautions; entry, inspection and monitoring; safety plan; waste management plan; import; and transport of hazardous substances.

2.4 Hospital waste management rules, 2005

Ministry of Environment, Government of Pakistan, had prepared the hospital waste management rules on August 03, 2005.

According to these rules, every hospital shall be responsible for the proper management of the waste generated by it until its final disposal in accordance with the provision of the act and the rules 16 to 22.

The rules provide information on the roles and responsibilities of the waste management team, waste management plan, waste segregation, waste collection, waste transportation, waste storage, waste disposal, accident and spillages, waste minimization and reuse, inspection and hospital waste management advisory committee.

2.5 Punjab Hospital Waste Management Rules 2014

These rules are made by the Punjab Government to ensure the safe handling and disposal of hospital waste.

A summary of the key features of these rules are.

- The hospital superintendent shall form a waste management team comprising different professionals of the hospital
- The responsibilities of the waste management team shall be defined
- Every hospital's waste management team should hold a review at least once a month
- Hospital engineer shall be appointed, and responsibilities should be defined regard hospital waste management
- The waste management officer shall make the waste management plan for approval by the waste management team

- Proper procedures shall be followed to collect, store, transport and dispose of the hospital waste
- The rules also discuss the accidents and spillage and waste minimization and reuse strategies

2.6 Punjab Environmental Quality Standards (PEQS)

The PEQS, promulgated under the PEPA 1997 (Amended 2012), specify the following standards:

The maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources.

- For power plants operating on oil and coal:
 - Maximum allowable emission of Sulphur dioxide,
 - Maximum allowable increment in concentration of sulfur dioxide in ambient air,
 - The maximum allowable concentration of nitrogen oxides in ambient air, and
 - Maximum allowable emission of nitrogen oxide for steam generators as a function of heat input.
- The maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged to inland waters, sewage treatment and sea (three separate sets of numbers).
- The PEQS for liquid effluents discharged to inland waters, gaseous emission from industrial sources and emissions from motor vehicles are provided on the following website. Web site: http://epd.punjab.gov.pk/rules_regulations
 - The Punjab Environmental Quality Standards (PEQS) specify the following standards:
 - The maximum allowable concentration of pollutants (32 parameters) in municipal and liquid industrial effluents discharged into inland waters, sewage treatment facilities, and the sea (three separate sets of numbers).
 - The maximum allowable concentration of pollutants (16 parameters) in gaseous emissions from industrial sources.
 - The maximum allowable concentration of pollutants (02 parameters) in gaseous emissions from vehicle exhaust and noise emission from vehicles.
 - Maximum allowable noise levels from vehicles.
 - Ambient Noise and Air Quality Standards

These standards also apply to the gaseous emissions and liquid effluents generated by the generator, process waste etc. The standards for vehicles will apply during the construction as well as the operation phase of the project. Standards for air quality have not been prescribed yet.

2.6.1 Punjab Environmental Quality Standards for Treatment of Liquid and Disposal of Bio-Medical Waste by Incineration, Autoclaving, Microwaving and Deep Burial

The Environmental Protection Council has approved the Punjab Environmental Quality Standards for Treatment of Liquid and Disposal of Bio-medical waste by Incineration, Autoclaving, Microwaving and Deep Burial. The summary of the standards has been described below.

- The combustion efficiency, computed should be at least 99.0 %

- The minimum temperature of the primary chamber shall be 800oC.
- The gas residence time in the secondary chamber shall be at least 1 second at the temperature of around 1200oC with at least 3% oxygen in the stack emission.

Table 2.1: Emission Standards

No	Parameters	Standards	
		Limiting concentration in mg/NM ³ unless stated	Sampling Duration in minutes, unless stated
1	Particulate matter	50	30 or 1NM ³ of samples volume, whichever is more
2	Nitrogen Oxides expressed as NO ²	400	30 for online sampling or grab sample
3	HCL	50	30 or 1NM ³ of samples volume, whichever is more
4	Total Dioxins and Furans	0.1 ng TEQ/N3 (at 11% O ₂)	8 hours or 5NM ³ of sample volume, whichever is more
5	Hg and its compounds	0.05	2 hours or 1NM ³ of samples volume, whichever is more

2.6.2 PEQS for Liquid Effluent

The Punjab Environmental Quality Standards (PEQS) for the discharge of effluent from industry are presented in **Table 2.2**.

Table 2.2: PEQS for Liquid Effluent Discharge

Parameters	Into Inland Waters	Into Sewage Treatment
Temperature	≤3°C	≤3°C
pH Value	6-9	6-9
Biological Oxygen Demand (BOD) ₅ at 20°C	80	250
Chemical Oxygen Demand (COC)	150	400
Total Suspended Solids (TSS)	200	400
Total Dissolved Solids (TDS)	3500	3500
Grease & Oil	10	10
Phenolic Compounds (as phenol)	0.1	0.3
Chlorides (as Cl')	1000	1000
Fluoride (as F')	10	10
Cyanide (CN') total	1.0	1.0
An-ionic Detergents (as MBAs)	2.0	20
Sulphate (SO'')	600	1000

Parameters	Into Inland Waters	Into Sewage Treatment
Sulphide (S ²⁻)	1.0	1.0
Ammonia (NH ³)	40	40
Pesticides	0.15	0.15
Cadmium (Cd)	0.1	0.1
Chromium (trivalent & hexavalent)	1.0	1.0
Copper (Cu)	1.0	1.0
Lead (Ni)	0.5	0.5
Mercury (Hg)	0.01	0.01
Selenium (Se)	0.5	0.5
Nickel (Ni)	1.0	1.0
Silver (Ag)	1.0	1.0
Total Toxic Metals	2.0	2.0
Zinc (Zn)	5.0	5.0
Arsenic (As)	1.0	1.0
Barium (Ba)	1.5	1.5
Iron (Fe)	8.0	8.0
Manganese (Mn)	1.5	1.5
Boron (B)	6.0	6.0
Chlorine (Cl ₂)	1.0	1.0

Source: PEQS, Punjab Environmental Protection Department

2.6.3 PEQS for Gaseous Emission

The Punjab Environmental Quality Standards (PEQS) for permissible limits of gaseous emission from industry are presented in **Table 2.3**.

Table 2.3: PEQS for Gaseous Emission

Parameter	Source of Emission	Standard
Smoke	Smoke opacity not to exceed	40% or 2 Ringlemann Scale or equivalent smoke number
Particulate Matter	Boilers & Furnaces:	
	Oil Fired	300
	Coal-Fired	500
	Cement Kilns	300
	Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500
Hydrogen Chloride	Any	400
Chlorine	Any	150

Parameter	Source of Emission	Standard
Hydrogen Fluoride	Any	150
Hydrogen Sulphide	Any	10
Sulphur Oxides	Sulfuric Acid/sulphonic Acid Plants	5000
	Other Plants except power plants operating an oil and coal	1700
Carbon Monoxide	Any	800
Lead	Any	50
Mercury	Any	10
Cadmium	Any	20
Arsenic	Any	20
Copper	Any	50
Antimony	Any	20
Zinc	Any	200
Oxides of Nitrogen	Nitric Acid Manufacturing Unit	3000
	Other plants except for power plants operation on oil or coal:	
	Gas-fired	400
	Oil fired	600
	Coal-fired	1200

Source: PEQS, Punjab Environmental Protection Department

2.6.4 PEQS for Vehicular Emission

The Punjab Environmental Quality Standards (PEQS) for permissible limits of exhaust emissions from vehicles are presented in **Table 2.4**.

Table 2.4: PEQS for Vehicular Emission

Parameters	Standards (Maximum permissible limits)	Measuring Method
Smoke	40% or 2 on the Ringelmann Scale During engine acceleration mode	To be compared with Ringelmann chart at a distance of 6 meters or more
Carbon Monoxide	6%	Under idling conditions: non-dispersive infrared detection through the gas analyzer.
Noise	85 dB (A)	A sound meter at 7.5 meters from the source

Source: PEQS, Punjab Environmental Protection Agency

2.6.5 PEQS for Drinking Water, 2010

The Punjab Environmental Quality Standards (PEQS) for drinking water quality, 2016, are presented in **Table 2.5**.

Table 2.5: PEQS for Drinking Water Quality

Parameter	Standard values	WHO guidelines
Biological		
All water intended for drinking (E. Coli or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample.	Must not be detectable in any 100 ml sample.
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.
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 the case of large supplies, where sufficient samples are examined, it 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 the case of large supplies, where sufficient samples are examined, it must not be present in 95% of the samples taken throughout any 12-month period.
Physical		
Color	≤ 15 TCU	≤ 15 TCU
Taste	Non-acceptable	Non-acceptable
Odour	Non-acceptable	Non-acceptable
Turbidity	< 5 NTU	< 5 NTU
Total hardness	< 500 mg/L	---
TDS	<1000	<1000
pH	6.5- 8.5	6.5- 8.5
Chemical		
Essential Organic	mg/Litre	mg/Litre
Aluminium	≤ 0.2	0.2
Antimony	≤ 0.005	0.02
Arsenic	≤ 0.05	0.01
Barium	0.7	0.7
Boron	0.3	0.3
Cadmium	0.01	0.003
Chloride	≤ 250	250
Chromium	≤ 0.05	0.05
Copper	2	2
Toxic Inorganic		mg/Litre
Cyanide	≤ 0.05	0.07
Flouride	≤ 1.5	1.5
Lead	≤ 0.05	0.01
Mangnese	≤ 0.5	0.5
Mercury	≤ 0.001	0.001
Nickel	≤ 0.02	0.02

Parameter	Standard values	WHO guidelines
Nitrate	≤ 50	50
Nitrite	≤ 3	3
Zinc	5	3
Pesticides mg/L		PSQCA No.4639-2004. page No 4 Table No. 3serial No. 20-58
Phenolic Compounds		<0.002
Polynuclear aromatic hydrocarbons		0.01
Radioactive		
Alpha emitters bq/L	0.1	0.1
Beta emitters	1	1

Source: PEQS, Punjab Environmental Protection Department

2.6.6 PEQS for Ambient Air and Noise

The Punjab Environmental Quality Standards (PEQS) for Ambient Air and Noise, 2016, are presented in **Tables 2.6** and **2.7**.

Table 2.6: PEQS for Ambient Air

Pollutants	Time Weighted Average	Concentration in Ambient Air (ug/m ³)
Sulfur Dioxide (SO ₂)	Annual Average*	80
	24 hrs**	120
Oxides of Nitrogen as (NO)	Annual Average*	40
	24 hrs**	40
Oxides of Nitrogen as (NO ₂)	Annual Average*	40
	24 hrs**	80
Ozone (O ₃)	1 hour	130
Suspended Particulate Matter (SPM)	Annual Average*	360
	24 hrs**	500
Respirable Particulate Matter (PM ₁₀)	Annual Average*	120
	24 hrs**	150
Respirable Particulate Matter (PM _{2.5})	Annual Average*	15
	24 hrs**	35
	1 hr	15
Lead (Pb)	Annual Average*	1
	24 hrs**	1.5
Carbon monoxide (CO)	8 hrs	5 mg/m ³
	1 hr	10 mg/m ³

** Annual Arithmetic mean of minimum 1040 measurements in a year taken twice a week 24 hourly at a uniform interval.

* 24 hourly /8 hourly values should be met 98 % of the year, 2 % of the time, it may exceed.

Source: PEQS, Punjab Environmental Protection Agency

Table 2.7: PEQS for Noise

	Effective from 1 st July 2013	
	Limits in dB(A) Leq	
	Day time	Night time
Residential area	55	45
Commercial area	65	55
Industrial area	75	65
Silence area	50	45

Source: PEQS, Punjab Environmental Protection Department

2.7 Institutional Set-Up

The apex environmental body in the country is the Pakistan Environmental Protection Council (PEPC), presided by the Chief Executive of the Country. Other bodies include the Pakistan Environmental Protection Agency (Pak-EPA), provincial EPAs (for four provinces, AJK and Gilgit-Baltistan), and environmental tribunals.

The EPAs were first established under the 1983 Environmental Protection Ordinance; the PEPA 1997 further strengthened their powers. The EPAs have been empowered to receive and review the environmental assessment reports (IEEs and EIAs) of the proposed projects and provide their approval (or otherwise).

The proposed project is located at Valencia Town, Lahore. Therefore, the EIA report will be submitted to the Punjab Environmental Protection Agency, Lahore, for obtaining environmental approval for the project.

2.8 Environmental Protection Agency's Environmental Guidelines

The Environmental Protection and Climate Change Department, Punjab has prepared a set of guidelines for conducting environmental assessments. The package of regulations, of which the guidelines form a part, includes the Punjab Environmental Protection Act, 1997 (amended 2012), Punjab Environmental Quality Standards and sectorial guidelines.

2.9 The Implication of Legislations to the project

The implication of the above-mentioned legislation to the pre-construction, construction, and operational phase of Nawaz Sharif Institute of Cancer Treatment and Research would be as follows:

- Specialized Healthcare & Medical Education Department, being the proponent of the project, will ensure that construction and operational phases of the project be carried out in accordance with the EIA report and Environmental Management Plan is effectively implemented.
- The project will be subjected to four basic provisions relating to pollution control under the Punjab Environmental Protection Act, 1997 (Amended 2012), as contained in section 11, 13, 14 and 15 as follows:
 - Section 11 prohibits discharge or emission of any effluent or waste or air pollutant or noise in excess of the PEQS or the established ambient standards for air, water or land.
 - Section 13 prohibits hazardous wastes.

- Section 14 prohibits the handling of hazardous substances except under a license or in accordance with the provision of any local law or international agreement.
- Section 15 prohibits the operation of motor vehicles for each air pollutant or noise is being emitted in excess of the PEQS or the established ambient standard.

Nawaz Sharif Institute of Cancer Treatment and Research Project will follow the Punjab Hospital Waste Management Rules, 2014

3 Description of the Project

3.1 Introduction

This chapter provides a description of the project, its salient features, location, components, and various phases.

3.2 Type and Category of the Project

The proposed project is the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, which falls in Schedule II of Punjab Environmental Protection Agency (Review of IEE and EIA) Regulation 2022 under **Category H (3 Hospitals having more than 50 beds)** of Schedule II, which states that “Any other project for which filing of an EIA is required by the Provincial Agency under sub-regulation (2) of Regulation 5 and any other project likely to cause an adverse environmental effect” require the EIA study.

3.3 Objective of the Project

The main objective of the project is to establish a state-of-the-art cancer hospital in Valencia Town, Lahore, providing comprehensive treatment and recovery services to meet all the needs of cancer patients.

3.4 Project Administrative Jurisdiction

The project site lies at the Pine Avenue Road in Valencia Town which is a housing estate located within union council 144 (Haloke) in the administrative town of Nishtar in Lahore, Punjab, Pakistan.

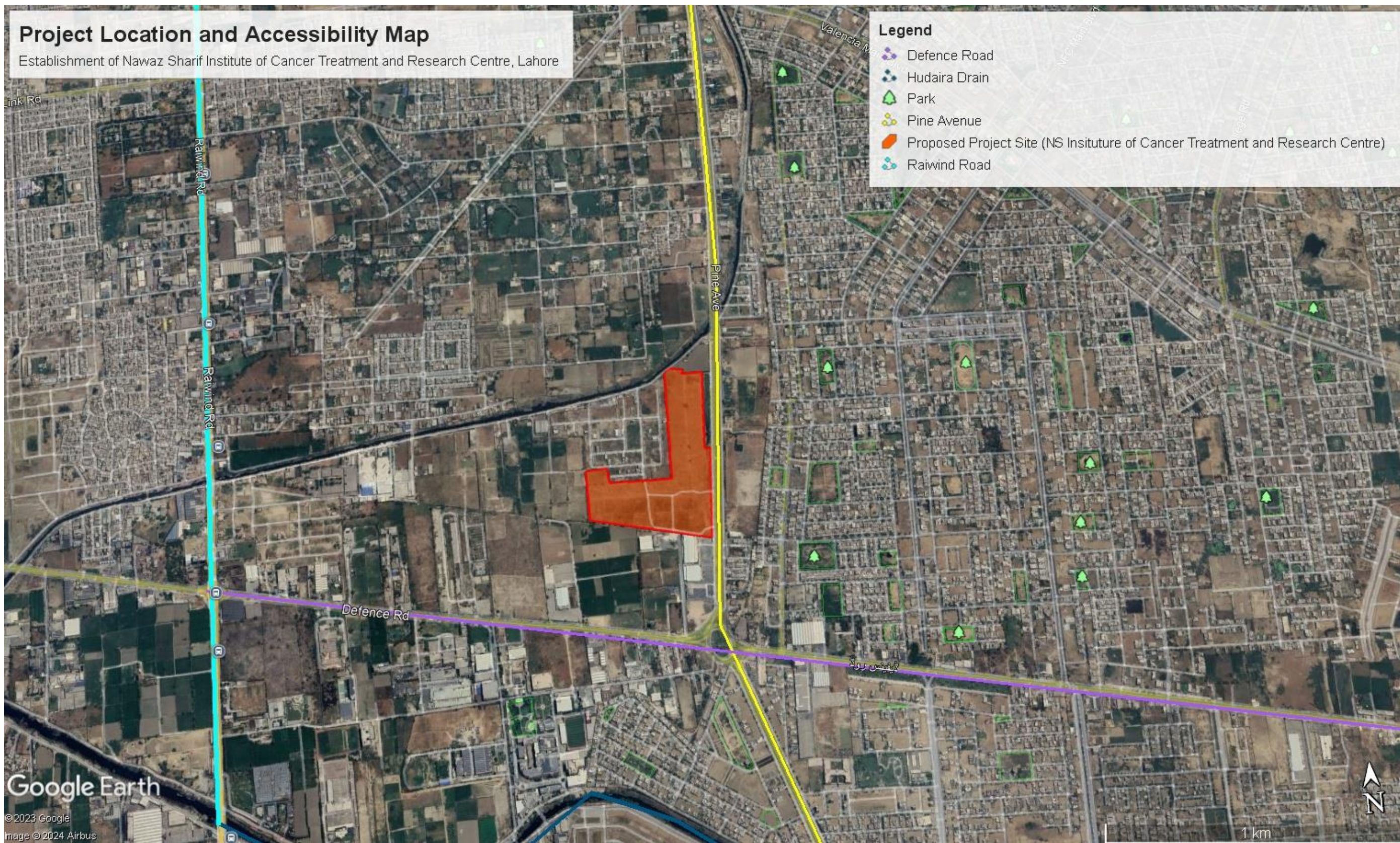
3.5 Project Location

The Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, is located in Valencia Town, along the Pine Avenue Road which is further connected to Defence Road. The coordinates of the proposed project are **31°23'57.39"N and 74°14'53.17"E**.

The surrounding areas near the project site are as follows and are shown in **Figure 3.1**.

- **East:** Pine Avenue Road + Valencia Town
- **West:** Open Area + Ali Fatima Hospital + Green International University
- **North:** Nullah + Open Area + Green Acre Housing Society + T&T Aabpara Housing Society
- **South:** The Hallmark Events + Yousuf town + The University of Lahore + Defense Road + Hudiara Drain

Figure 3.1: Location and Accessibility Map of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore



3.6 Description of the Project

Specialized Healthcare & Medical Education Department intends to establish Nawaz Sharif Institute of Cancer Treatment and Research in Valencia Town, Lahore.

The proposed project will be established on an area of 333 Kanal.

The project will house the following facilities within the campus alongwith external development and allied works:

PHASE-1	Covered Area
1. Main Hospital Building	482,000 Sft
2. Hospice & Palliative Care	43,283 Sft
3. Bone Marrow Transplant (BMT) Center	197,140 Sft
4. Cancer Care Clinic	118,000 Sft
5. Doctor Residences	50,000 Sft
PHASE-2	
1. New Block of Hospital Building	158,000 Sft
2. Parking Plaza	104,569 Sft

The Main Hospital Building consists of B+ G+3 Floors including Mumty. The total covered area of the building is 482,000 sft. Following departments and facilities are included in the Hospital Building:

1. LINAC Bunkers (Multi & Single)
2. Brachy Therapy Bunker
3. Stereotactic Surgery Bunker
4. Pet & Cyclotron
5. Radiology Department including MRI & C.T Scan
6. Catheterization Labs & Angiography
7. Pathology Labs.
8. Gamma Camera
9. DEXA Scan
10. Hot Lab
11. OPD.
12. HDU's
13. SICU.
14. MICU.
15. Major Operation Theaters.
16. Pre & Post Operation.
17. Emergency Wards.
18. Inpatient Wards.
19. Administration.
20. Executive Offices.
21. Conference Halls.
22. Lecture Theaters.
23. Library.
24. Private Rooms.
25. Private Suits.
26. CSSD & Laundry.
27. Isolation rooms
28. General Stores

29. Bio Med Workshops
30. Waste Management
31. Morgue / mortuary
32. Pharmacy Store
33. Physiotherapy Department
34. Prayer Rooms
35. Day care facility
36. Dental Psychiatry department

This Main hospital building includes the total bed count of 280 Beds with following detail:

1. Emergency Wards 20 Beds.
2. SICU 12 Beds
3. MICU 12 Beds
4. PAEDS ICU 12 Beds
5. HDU 56 Beds
6. Private Rooms 20 Beds
7. Private Suites 05 Beds
8. In-patient wards 115 Beds
9. PAEDS Oncology 18 Beds
10. Isolation Rooms 10 Beds

The Hospice & Palliative Care Building consists of G+2 Floors including Mumty. The total covered area of the building is 43,283 sft. Following departments and facilities are included in the Hospice Building:

1. Double Occupancy Rooms.
2. Isolation rooms
3. Prayer area
4. Private rooms

The Hospice & Palliative Care Building includes the total bed count of 75 Beds with following detail:

1. Double Occupancy Rooms 67 Beds
2. Private Rooms 05 Beds.
3. Isolation rooms 03 Beds.

The Bone Marrow Transplant (BMT) Center consists of B+G+4 Floors including Mumty. The total covered area of the building is 197,140 sft. Following departments and Facilities are included in Building:

1. CSSD
2. Laundry
3. Mortuary
4. General stores
5. Waste management.
6. Manifold
7. Seminar room
8. MEP rooms
9. OPD Clinics (10)
10. Pharmacy
11. BMT rooms
12. Private rooms
13. BMT Ward
14. Apheresis Facility
15. Procedure room

16. Prayer areas
17. Admin
18. Café
19. Physiotherapy
20. Venipuncture (Blood sample collection)

The Cancer Care Clinic Building consists of B+G+3 Floors including Mumty. The total covered area of the building is 118,000 sft. Following departments and Facilities are included in the Filter Clinic Building:

1. Radiation Therapy.
2. Chemotherapy.
3. Venipuncture (Blood Sample Collection).
4. Radiology.
5. Endoscopy.
6. OPD.
7. Pharmacy.
8. Clinical Support Pharmacy
9. Café.
10. Stores.
11. Medical Record Room.
12. Admin
13. Seminar room.

The building includes the total bed count of 150 Beds with following detail:

1. Adult Chemo Beds 100 Beds
2. Pead's Chemotherapy 50 Beds

The estimated cost of the project is Rs 52,773 million and will be completed in 34 months. The project is sponsored by the Specialized Healthcare & Medical Education Department, Government of Punjab executed by the Infrastructure Development Authority of Punjab. The project shall be funded by the Specialized Healthcare & Medical Education Department in respect of Building, Equipment and recurring operating expenses through Annual Development Plan, i.e., Pay and allowances, Maintenance & repair, POL, medicines & amp, surgical disposables and miscellaneous requirements of the project.

The project aims to provide low-cost but quality healthcare services to the people of the region. Hence, it will share the excessive burden of already existing facilities.

The project will also include establishment of 1 MW solar panel system to provide renewable energy during the operational phase of the project.

The quality of life and life expectancy of local residents will be improved due to availability of advanced tertiary care services in the district. The social status of community will enhance. The master layout plan of the proposed project is provided as **Figure 3.2**.

Figure 3.2: Schematic Master Layout Plan of the Proposed Project



Figure 3.3: Aerial Views (3 D) of the Proposed Nawaz Sharif Institute of Cancer Treatment and Research Centre, Lahore



Figure 3.4: Aerial Views (3 D) of the Proposed Nawaz Sharif Institute of Cancer Treatment and Research Centre, Lahore



3.7 Occupancy of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore

The estimated occupancy of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore project will be 2,415. The expected occupancy is shown in **Table 3.1**.

Table 3.1: Estimated Occupancy for Nawaz Sharif Institute of Cancer Treatment and Research, Lahore project

Sr. No.	Description	Persons
1.	Hospital Beds	915
2	Hospital Staff	1500
	Total	2,415

Source: Environmental Consultant estimates, 2024

3.7.1 Water Demand

The estimated domestic water demand of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore project per day is 97,000 Gallons per day. Water will be supplied through Tubewells. **Table 3.2** shows the calculation of daily water requirements.

Table 3.2: Daily Water Requirements

No	Description	Occupancy	Recommended Daily Water Requirement	Daily Water Consumption	Daily Water Requirement
		Number	Gal/Day/Person	Gal/day	Gal/day
1	Hospital	2415	40	96,600 GPD	96,600 GPD
Total Water Requirement					96,600 GPD
					Say
					97,000 GPD

3.7.2 Sewerage Disposal System

The sanitary sewerage system will be designed based on 80% of the daily water consumption for Nawaz Sharif Institute of Cancer Treatment and Research, Lahore project. So accordingly, the sewage of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore will be approximately 77,600 Gal/Day.

$$97,000 \text{ Gal/Day} \times 0.8 = 77,600 \text{ Gal/Day}$$

3.7.3 Drainage System

The drainage system of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore project will be connected with the existing drainage system of the area.

3.7.4 Wastewater Treatment Plant

A Sewerage Treatment Plant will be designed for the treatment and management of wastewater generated during the operational phase of the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project.

3.7.5 Water Supply

Groundwater borewells will be installed to cater the water demand of Nawaz Sharif Institute of Cancer Treatment and Research, during operational phase of the project.

3.7.6 Solid Waste Management

According to an estimate, the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project will produce approximately 222 kg of infectious waste (15% of total waste) and 682 kg of general waste. In total **2415 x 0.612 kg/capita/day = 1,477 kg** (1.47 tons) of solid waste will be produced during operational phase of the project.

The solid waste generated at the construction of the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project will be properly disposed of to ensure health safety. For construction and municipal waste, a garbage room shall be provided to receive the daily waste material for final dispose-off through garbage vans. The solid waste will be collected by hospital staff, and they will dispose of waste at a designated disposal site by LWMC.

For the proper management of the infectious waste, a yellow room will be constructed where the infectious wastes will be stored in a yellow bag. The temperature of the yellow room will be maintained at 4°C – 8°C for not more than 24 hours. The infectious waste will be disposed of by using a microwave shredder or incinerator. The hospital waste treatment facility will undergo a separate environmental approval from Punjab EPD.

The solid waste management of the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, will comply with all the clauses of the Punjab Hospital Waste Management Rules, 2014. These include:

- Formation of the waste management team
- Preparation of waste management plan
- Waste segregation
- Waste collection
- Waste transportation
- Waste storage
- Waste disposal
- Accidents and spillages
- Waste minimization and reuse
- Inspection
- Hospital waste management advisory committee

3.8 Vegetation Features of the Site

No tree cutting is involved while the project planning incorporates the best landscaping practices to enhance the green impact of the project. Project Design has sufficient provision for tree plantation and green belts and grounds.

3.9 Cost and Magnitude of Operation

The estimated cost of the proposed project is **PKR 52,773 million**. The detailed breakdown of the cost of the project is shown in **Table 3.3**.

Table 3.3: Project Cost Breakdown

S.No	Description	Amount (PKR Million)	Phase 1	Phase 2
A	CAPITAL COMPONENT			
i	Main Hospital Building (280 Beds)	9,813.73	9,813.73	
ii	New Block of Hospital Building (300 Beds)	3,116.43		3,116.43
iii	Parking Plaza (300 Cars)	871.73		871.73
iv	Cancer Care Clinic (150 Beds)	2,429.50	2,429.50	
v	BMT Center (110 Beds)	4,249.05	4,249.05	
vi	Hospice and Palliative Care Center (75 Beds)	1,158.29	1,158.29	
vii	International Consultant / Doctors Accommodation.	329.84	329.84	
viii	Masjid	54.59	54.59	
ix	Serai / Waiting Area	96.89	96.89	
x	Cafeteria	176.59	176.59	
xi	Energy Centers (CUP Building, Sub Station, Metering Room)	1,347.88	1,347.88	
xii	Boundary Wall and Gate	256.26	256.26	
xiii	External Development works (Road, Water Supply, Drainage, Sewerage, ICT Civil, External Electrification, transformer, etc.)	2,245.12	2,020.61	224.51
xiv	Ancillary Buildings (Filtration Room, Tube well room, Guard Rooms)	115.018	115.02	
xv	Solar System (1 MW)	341.60	341.60	-
	Sub Total (A)	26,602.52	22,389.85	4,212.68
B	Punjab Revenue Authority (PRA) Sales Tax on Construction Services @ 5%	1,330.13	1,119.49	210.63
	Sub Total (A+B)	27,932.65	23,509.34	4,423.31
C	REVENUE COMPONENT			
i	ICT Works (Active component)	399.56	343.35	56.21
ii	ICT Works (End User Devices)	148.00	148.00	
iii	Loose / Moveable Furniture	458.08	393.15	64.94
iv	Biomedical Equipment	16,638.80	12,959.67	3,679.13
v	Split Air Conditioners	36.95	36.95	
	Sub Total (C)	17,681.39	13,881.11	3,800.28
	Sub Total (A+B+C)	45,614.04	37,390.45	8,223.59
D	MISCELLANEOUS			
i	IDAP Executing Agency Fee @ 2%	885.68	725.42	160.26
ii	Resident Consultant supervision Fee @ 2% (excluding PRA)	885.68	725.42	160.26
iii	EIA/TIA, topographic survey, Geo Tech Investigation, Structural/MEP Design Vetting, etc. 0.5 % on Sub Total A	66.51	55.97	10.53
iv	PST (16% on services)	294.06	241.09	52.97
v	Contingencies @ 2% on Sub total A	532.05	447.80	84.25
vii	WAPDA Charges	500.00	500.00	
viii	Sui gas Connection Charges	17.50	17.50	
ix	Foreign Consultancy services (0.2 Million Dollar)	55.60	55.60	
x	Provision of Hospital Support Unit (HSU)	497.88	383.40	114.48
xi	Pay for performance (01 year)	3,423.52	1,623.52	1,800.00
	TOTAL COST	52,772.52	42,166.18	10,606.34

Source: PC-1 Document

3.10 Land Acquisition

There is no issue of land acquisition as land has already been acquired by the proponent. The land acquisition notification is provided as **Annexure – 8**.

3.11 Status of the Project

Presently, there is no construction activity at the project site.

3.12 Government Approvals

Presently, the only approval required is from Punjab Environmental Protection and Climate Change Department, to start construction of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore.

3.13 Schedule of Implementation

The construction of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project will be completed in a period of 34 months.

Table 3.4: Time Schedule for Construction of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore

Activity/Month	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34
Construction works Commencement Date	■	■	■														
Mobilization of Contractor				■	■												
Sub/Super Structural Works						■	■	■									
Architectural Finishing and MEP Works									■	■	■						
Testing and Commissioning												■	■				
Snag list														■	■		
Handing/Taking over																■	■

3.14 Project Phases

The construction of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project will be implemented in three phases, i.e., Pre-construction/ Design, Construction, and Operation.

3.15 Pre-construction/Design Phase

Site Investigation: The geotechnical and soil investigation of the project site has been carried out for determining the suitability of a site to support the structures and other development works.

Subsequently, engineering details will be worked out, and working drawings, specifications for equipment and material will be prepared.

Selection of Contractor: Once the engineering details become available, M/s Infrastructure Development Authority Punjab (IDAP) will start to work on the project.

3.16 Construction Phase

Contractor Mobilization: This component involves the transportation of construction machinery and equipment to the project site and the establishment of the contractor's camp and office. The contractor will be responsible for the activities being carried out at the project site.

Site Preparation: Usually, this activity involves the operation of heavy earth-moving machinery and substantial land clearing, levelling and grading, as well as cutting and filling activities.

The first task of this activity is to demarcate the site and other benchmarks with the help of drawings prepared during the pre-construction and design phase of the project. Once marking is complete, the land will be cleared and prepared for subsequent construction activities. The whole purpose is to maintain the harmony of the area during construction.

Construction Activities: The construction activities will be carried out using the conventional methodology and sequence of work. The activities will include excavation, masonry work, carpentry, wiring, piping, and plumbing, flooring, painting and installation of fixtures. Other activities will include the laying of cables, water supply, sewerage and storm drainage systems, junction boxes and providing connections to the individual buildings. Supervision of this whole activity will be carried out by the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project management and the consultant.

Staffing: Construction crews will have the responsibility of the civil contractor and its petty contractor. It is estimated that a maximum of 120 personnel will be working at the site at a given time during the peak construction period who will be in three different phases.

These will essentially include masons, carpenters, electricians, painters, plumbers, and general labourers. For unskilled employment, preference will be given to residents of the project area. **Table 3.5** details the staffing requirement during the construction phase of the project.

Table 3.5: Staff for the Construction Phase of the Project

No.	Description	For construction
1	Technical staff	20
2	Skilled workers (technicians, plumbers, labour)	30
3	Unskilled labour/ helper	70
Total		120

Source: Environmental Consultant Estimates, 2024

Following steps will be taken for effective management of construction crew:

- A complaint cell for the workforce will be established, where they can register their reservations related to work.
- M/s Infrastructure Development Authority Punjab will develop an effective system of communication/consultation and will ensure that the staff concerns are addressed.
- Employees will be discouraged from working excessive hours and/or missing break periods (this may involve a detailed job evaluation).
- Child labour will be avoided.
- Incidents of bullying, sexual and racial harassment will be monitored, and, where necessary disciplinary actions will be taken.
- Clear job descriptions will be developed for the workforce, and it will be ensured that the individual is matched to them.

Construction Machinery:

The following construction machinery is expected to be present at the project site:

- Dozer/ Loader
- Excavators/Jack Hammer
- Concrete Mixing Plant
- Tractor Trolley
- Water tanker
- Water and concrete pumps
- Tower Crane

The exact number of the above equipment and vehicles will vary depending upon the work schedule.

Construction Material: The construction material will include cement, sand, crush, bricks, steel bars, paint, piping material, electrical material and finishing material. The Bills of Quantities of the material will depend upon the construction activities.

Cement Mixing Plant: With the construction and operation of the concrete mixing plant, air quality, noise nuisance, water quality and visual impact induced by the barges transportation minimized significantly. All sensitive receivers around the project site and along the site would benefit from the reduction—control discharge of highly alkaline wastewater, dust, and excess noise.

Concrete mixing plant combines various ingredients to form concrete. Some of these inputs include sand, water, aggregate, fly ash, potash, and cement. The plant has a variety of parts and accessories, including mixers, cement batches, aggregate batches, conveyors, radial stackers, aggregate bins, cement bins, heaters, chillers, cement silos, batch plant

controls, and dust collectors (to minimize environmental pollution). The centre of the concrete batching plant is the mixer. Used to mix stiff consistency concrete, semi-stiff consistency concrete, lightweight aggregate concrete and so on.

This machine can be used as a separated mixing machine or used as the supporting machine of the ready-mix concrete plant. When matched with the batching plant, they can form a simple mixing plant with more environmental benefits.

Disposal of Excavated/ Construction Waste: Construction waste will be recycled by the contractor if possible. Otherwise, it will be disposed of at a designated site for excavated material/construction waste.

Electricity: The project will get proper electricity connection from Lahore Electric Supply Company (LESCO) for the construction activities and camp.

Camp Supplies: Camp supplies will be procured from Lahore and transported to the project site.

Camp Site Sanitation Facilities: Septic tank with a soakage pit at the construction will be constructed to treat sewerage generated by the campsite.

Traffic Load during Mobilization (and Demobilization): All of the constructions equipment and vehicles will be transported to the site via Defense Road.

Traffic Load for Construction Materials Supplies: It is estimated that, on average, 8-10 truckloads per day during the peak construction period will be supplying different types of construction materials to the project site during the peak construction period.

Other Supplies Water: During the construction phase, a maximum of about 5,000 gallons per day of water will be required for construction activities and human consumption. The water supply will be arranged by the contractor through water tankers.

Fuels: For the construction equipment and vehicle, diesel will be required. The peak consumption of diesel would be 1,000 litres per day during the peak construction period.

3.17 Operational Phase

Specialized Healthcare & Medical Education Department will be responsible for the operation and maintenance during the operational phase of the project.

4 Project Alternatives

4.1 Background

An analysis of available alternatives is necessary to establish that the most suitable management and technology options will opt for the project.

4.2 Management Option

The two significant alternative management options are the 'No Project Option' and 'Build as Proposed Option', were considered.

4.2.1 No Project Option

If we consider the no project option, we will lose all positive impacts associated with establishing the cancer treatment and research hospital in Lahore. This includes significant improvements in cancer care, reduction in patient load at existing hospitals, and the provision of specialized medical staff and state-of-the-art facilities dedicated to cancer treatment. Given the current state of cancer treatment facilities in Pakistan, which are often overburdened and under-resourced, this project is crucial. Patients from Lahore and surrounding regions will otherwise continue to travel long distances to receive adequate care, exacerbating the burden on already strained medical facilities.

The rising number of cancer patients in the province do not have much option for treatment other than a few private sector Hospital. The government of Punjab feels this as a dire need of today to build a complete Cancer Hospital and Research Institute.

The "No Project Option" does not appear reasonable considering the above facts. However, the anticipated negative environmental impacts can be mitigated by implementing appropriate measures.

4.2.2 Build as Proposed

The existing healthcare facilities in Valencia Town and surroundings in Lahore, primarily consist of small clinics and primary healthcare centers. There is currently no large secondary or tertiary care hospital and especially cancer hospital in the area, forcing residents to seek medical care in private hospitals located in other parts of Lahore. The fees at these hospitals are often prohibitively high, making quality healthcare inaccessible to many local residents. The lack of timely and adequate medical care has led to numerous preventable deaths, underscoring the urgent need for a comprehensive and affordable cancer and healthcare facility in Lahore.

The proposed Nawaz Sharif Institute of Cancer Treatment and Research will significantly alleviate the burden on the residents by providing advanced medical and cancer care facilities within the locality. This project will contribute to sustainable and balanced growth by offering state-of-the-art healthcare services to an underserved population.

While the construction and operation of the institute may pose certain environmental and social challenges, these can be effectively managed if the mitigation measures outlined in the Environmental Impact Assessment (EIA) report are properly implemented. Therefore, the establishment of this institute is the most viable option for addressing the healthcare needs of the community.

4.3 Site Alternatives

The project site is adjacent to the Pine Avenue Road which is further connected to Defense Road in Lahore. This site is easily accessible and has no agricultural land use or resettlement issues.

Apart from that, it is a prerequisite that hospitals should be established near or adjacent to the main road so that they can be easily accessible. The allocated project site will be easily accessible to patients. Therefore, no alternative site has been considered for the project.

4.4 Conclusion

No alternative site has been identified. If the project is not implemented, then all positive impacts related to the proposed project will be lost. So, the best option is to 'build as proposed' by mitigating its potential negative impacts.

5 Description of the Existing Environment

5.1 Introduction

This chapter describes the existing environment of the project area. In order to assess the impacts and related mitigation measures, existing environmental conditions of the physical, biological and socio-economic environment of the project area were studied.

The project site is the area falling in Valencia Town, Lahore.

5.2 Lahore

Lahore commands a strategic political and administrative role as the capital of Punjab Province and the second largest city in Pakistan. Lahore District lies between 31°15' and 31°42' N, 74°01' and 74°39' E. It is situated in the north eastern part of Pakistan, with its centre lying within 25 km of the international border with India.

Lahore occupies a focal position in the Upper Indus Plain and is located along the eastern bank (left bank) of River Ravi. Lahore is bounded on the north and west by the Sheikhpura District, on the east by Wagah, and on the south by Kasur District. Lahore city covers a total area of 1,014 km² and is still growing.

Lahore is ranked as a beta-world city and is one of Pakistan's wealthiest cities, with an estimated GDP of \$84 billion (PPP) as of 2019.

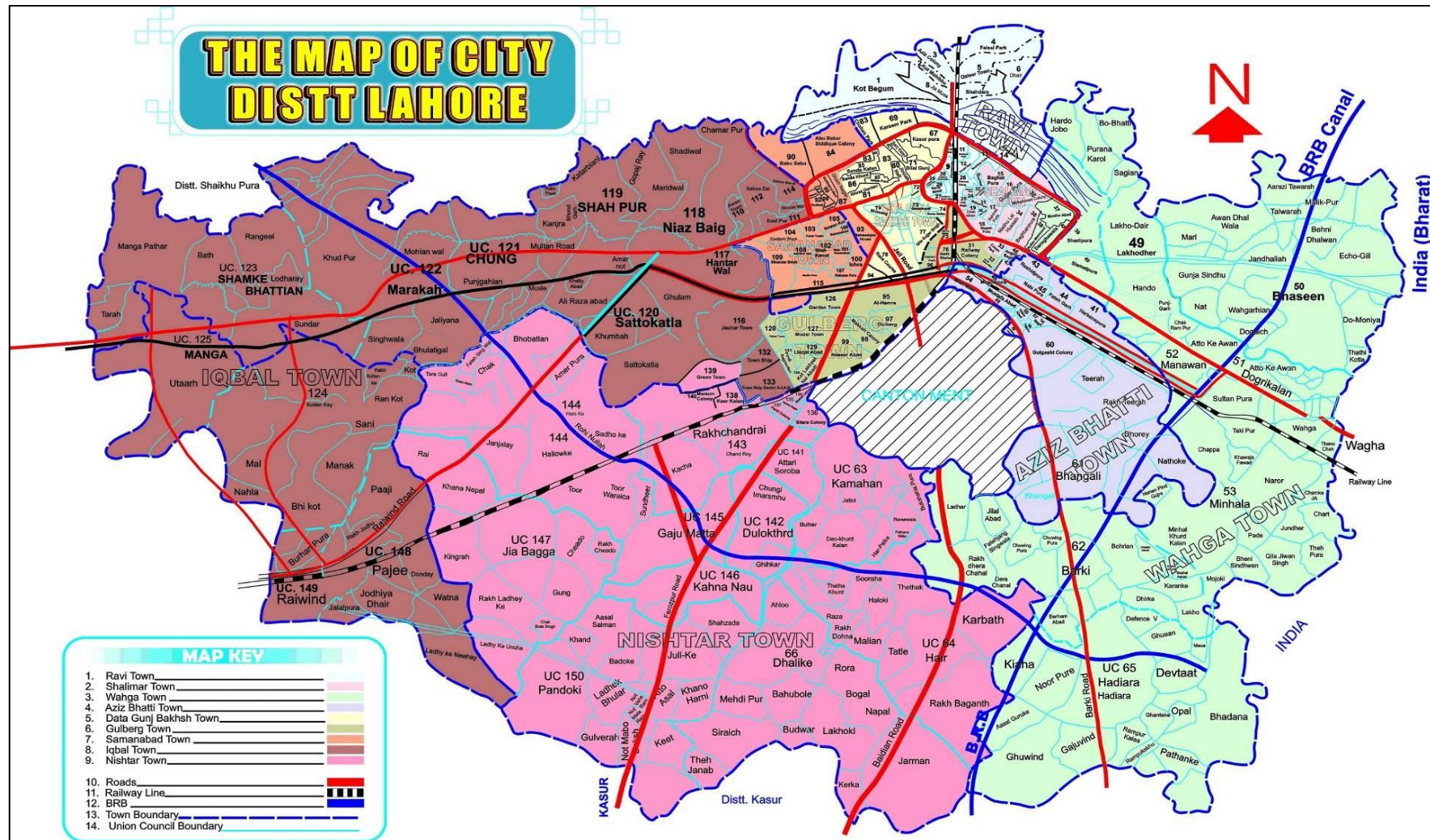
Lahore is the historic cultural centre of the Punjab region and is the largest Punjabi city in the world. The city had a long history and was once under the rule of the Hindus, Shahis, Ghaznavids, Ghurids, and the Delhi Sultanate.

Lahore was central to the independence movements of both India and Pakistan, with the city being the site of both the declaration of Indian Independence and the resolution calling for the establishment of Pakistan. Following the independence of Pakistan in 1947, Lahore became the capital of Pakistan's Punjab province.

Lahore's modern cityscape consists of the historic walled City of Lahore in the northern part of the city, which contains several heritage sites. Lahore has more Mughal-era monuments than Delhi, India, and structures from this era are now among the most iconic features of Lahore.

Lahore is one of Pakistan's most liberal and cosmopolitan cities. It exerts a strong cultural influence over Pakistan. Lahore attracts people from all over Pakistan for labor, educational and professional purposes. The key map of Lahore has been provided in **Figure 5.1**.

Figure 5.1: Map of Lahore



Ali Abdullah

5.3 Physical Environment

5.3.1 Topography and Land use

Lahore commands a strategic political and administrative role as the capital of Punjab Province and the second-largest city in Pakistan. Lahore District lies between 31°-15' and 31°-42' north latitude, 74°-01' and 74°-39' east longitude. It is situated in the north-eastern part of Pakistan, with its centre lying within 25 km of the international border with India. It occupies a focal position in the Upper Indus Plain and is located along the eastern bank (left bank) of River Ravi. Lahore is bounded on the north and west by the Sheikhupura District, on the east by Wagah, and on the south by Kasur District. Lahore city covers a total land area of 404 square kilometers (156 sq mi) and is still growing.

At the time of investigations, project land was mainly covered with a tree, some grass and shrubs. A topographic survey plan for the proposed project site was provided by IDAP. According to information deduced from the plan, the ground surface is generally flat.

5.3.2 Geology and Soils

Lahore city is situated at an average elevation of 210 meters above mean sea level. The alluvial subsoils are of late Pleistocene and were formed by the flood plains of river Ravi. These consist of clay, silt and sand. The thickness of clay increases with distance from the riverbed.

Lahore city lies on the alluvial plain called Bari Doab. Doab is a local word for the area between rivers. Bari Doab is a part of the Indo-Gangetic alluvial plain formed by the Indus River and its tributaries. It is bounded by Ravi and Chenab rivers in the northwest and west and by the Sutlej River in the southeast. The north-eastern boundaries of Doab lie near the foothills of the Himalayan Ranges.

The Bari Doab is covered by Quaternary alluvium, which overlies semi-consolidated Tertiary rocks or Metamorphic and igneous rocks of the Precambrian age. Except for a small area in the north-eastern part of Doab where basement rock was encountered, no information is available at present regarding the distribution of Tertiary and Precambrian rocks in the Doab.

The oldest rocks, the Kiranas of the Precambrian age, are completely covered by Quaternary alluvial deposits. The same deposits also cover Bari Doab. The thickness of this alluvial plain extends beyond 610 meters; out of several deep boreholes drilled in Bari Doab, only one drilled near Niazbeg in the vicinity of Lahore encountered bedrock at 383 meters depth. This is possibly due to the underground ridge of Precambrian rocks extending from Shahpur to Delhi. From this, it can be inferred that the thickness of alluvium under the city of Lahore is more than 380 meters.

Geotechnical investigations revealed that the project site is located in Punjab, which is a vast plain of alluvial material, deposited by the River Indus and its tributaries crossing the Punjab Plain. The alluvial deposits underlying the site are deposited by the old course of one of these tributaries, the river Ravi. The thickness of alluvial deposits in Lahore is thought to be more than 300 m. These alluvial deposits are underlain by the basement rocks of the Indian shield. The alluvial deposits mainly consist of sands, with intercalation of silt and clay layers of varying thickness.

A geotechnical investigation of the project site reveals the project area is mainly comprised of Lean Clay / Silty Clay / Silty Sand / Poorly graded Sand.

5.3.3 Seismology

Probabilistic seismic hazard assessment carried out for Lahore region as part of the revision of Seismic Provisions - 2007 of Building Code of Pakistan shows that the site area falls in Zone 2A. The Peak Horizontal Ground Acceleration (PGA) associated with a return period of

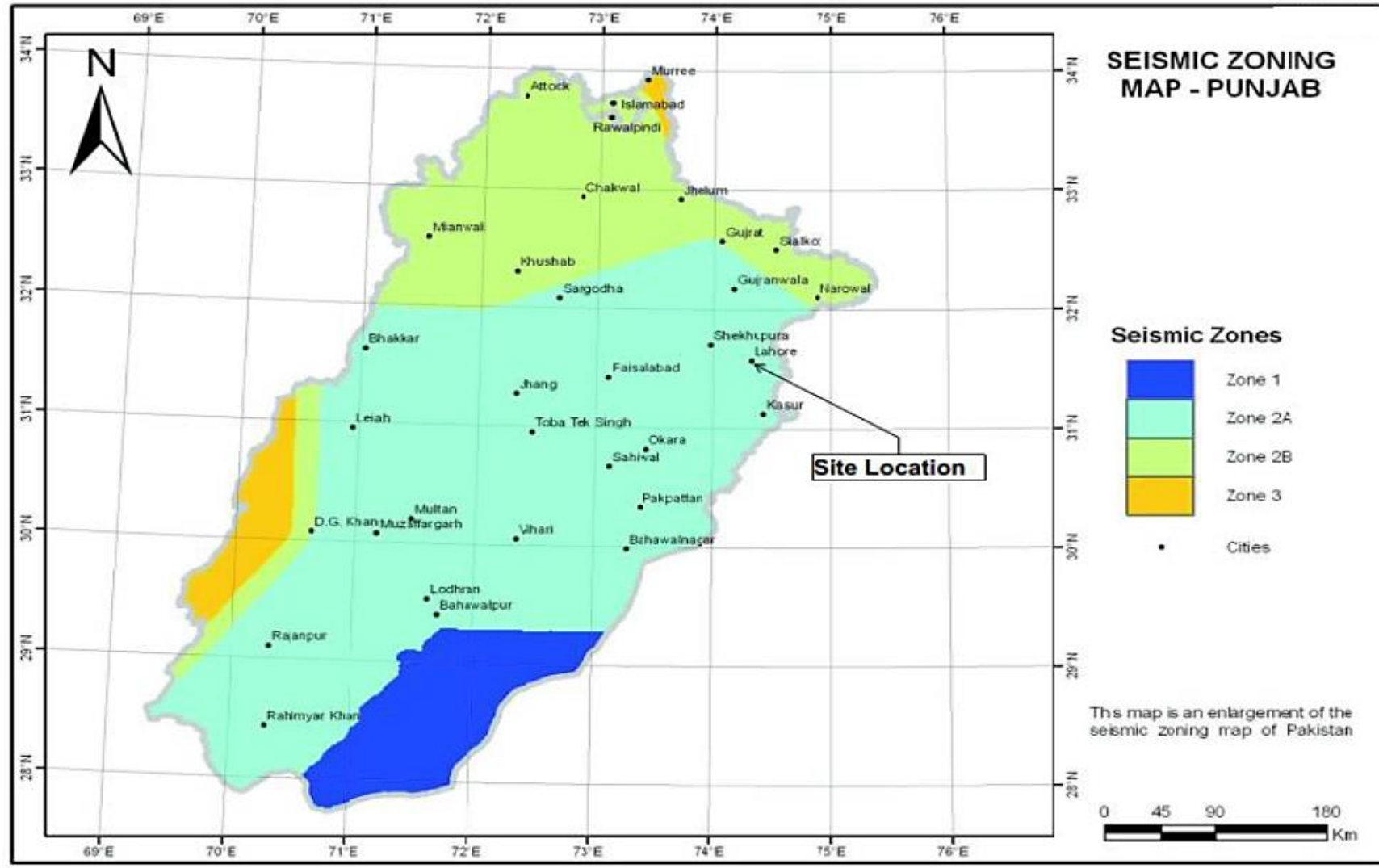
500 years (10% probability of exceedance in 50 years) is “0.16” based on the acceleration values for rock site condition. The near source factors N_a & N_v may be considered as 1 as per Building Code of Pakistan.

The seismic profile of sub-soil present at site has been characterized by using the guidelines provided in “Seismic Provisions-2007” of Building Code of Pakistan (BCP: SP, 2007). Chapter – 4, of this code describes the procedure for determining the Soil Profile Types SA through SF in accordance with Table 4.1 (BCP: SP, 2007; Section 4.4).

As per site conditions and guidelines of BCP, soil profile type SD can be used during structural design of foundations. However, as per ASCE guidelines, project area falls in site class “D” category.

Site location on Seismic Zoning Map of Punjab is given in **Figure 5.2**.

Figure 5.2: Site location on Seismic Zoning Map of Punjab



5.3.4 Climate

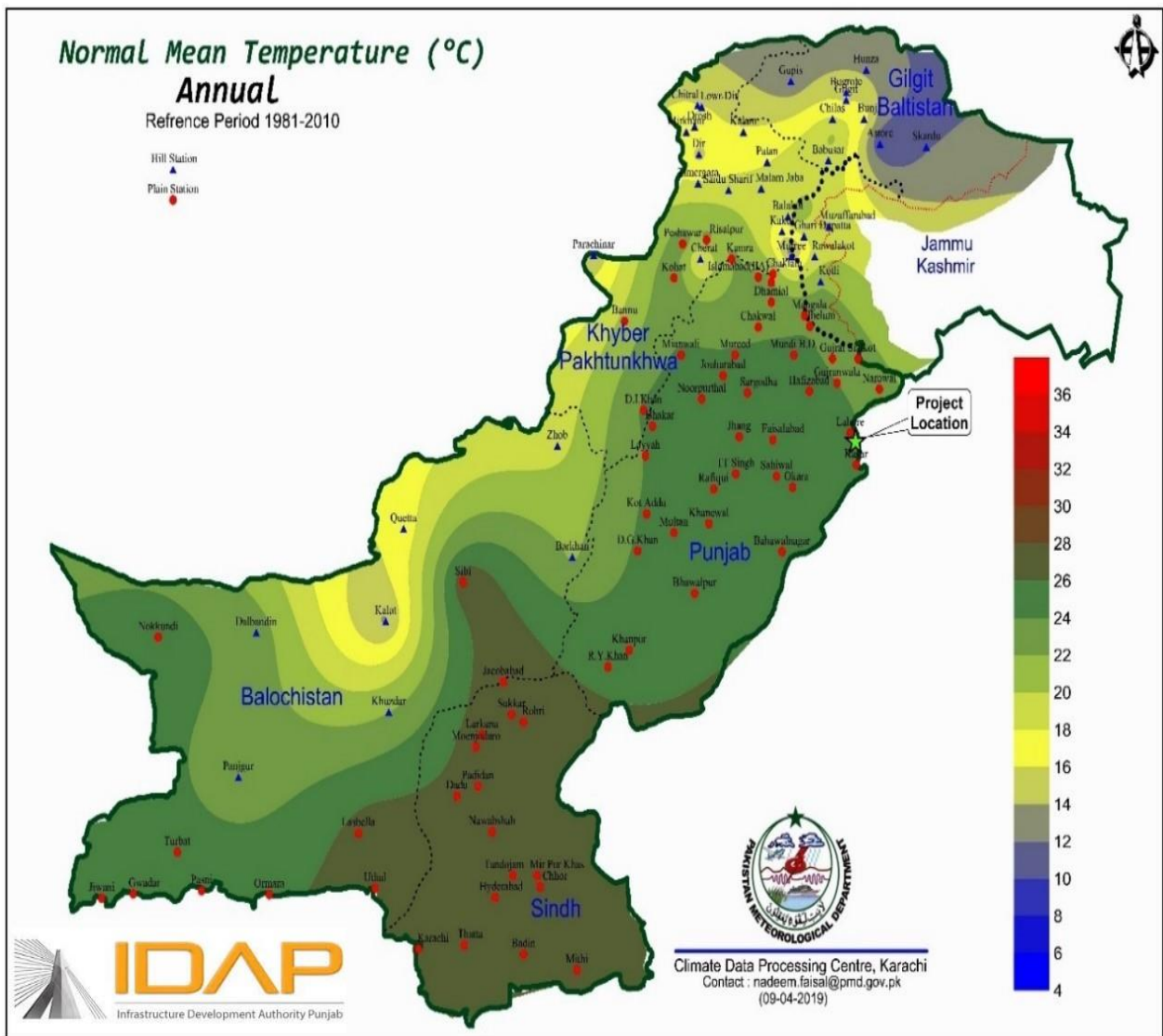
Lahore lies 217 meters above sea level. The Lahore region comes under the normal composite zone, according to the climatic zone map. It lies near the hot, dry zone, and in summer, the wind direction is such that the wind blows northeast towards the southwest of the city, affecting the climate of the Lahore region.

The effect of the hot, dry zone starts from March and remains till September as the wind direction is southwest which means from the hot, dry zone towards the Lahore region. The main features of this season are that the winds blow are hot and full of dust during the daytime but are cooler at night.

Lahore features a five-season semi-arid climate: foggy winter (15 Nov – 15 Feb) with few western disturbances causing rain; pleasant spring (16 Feb – 15 April); summer (16 April – June) with dust, rainstorms and heat wave periods; rainy monsoon (July – 15 September); and dry autumn (16 September – 14 November).

The maximum temperatures in summer are 41°C, whereas the minimum temperature in winter is 8.7°C. The average annual temperature in Lahore is 23.6°C, as can be seen in **Figure 5.3:**

Figure 5.3: Average Temperature of Lahore



5.3.5 Air Quality and Noise Level Monitoring

The ambient air quality and noise level monitoring was conducted and compared against the Punjab Environmental Quality Standards (PEQS) for Sulphur dioxide (SO₂), Oxide of Nitrogen (as NO), oxide of Nitrogen (as NO₂), Ozone (O₃), Suspended Particulate Matter (as SPM), Respirable Particulate Matter (as PM₁₀), Respirable Particulate Matter (as PM_{2.5}), and Carbon monoxide (CO) during 24 hours at the project site.

The ambient air and noise level monitoring was conducted from 13th July to 14th July 2024 for 24 hours at the project site of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore.

The ambient air quality and noise monitoring was carried out by EPCCD Punjab Certified laboratory, Green Crescent Environmental Consultants Pvt. Ltd.

5.3.6 Noise Level Monitoring

Ambient noise levels were also continuously recorded at the project site for 24 hours. The sound pressure level (dB) was frequency weighted on A-curve (dB (A)) and time-weighted (dB (A) L_{eq}) on an hourly basis.

The 24-hour monitoring period for noise level was carried out at the project site. Since the project site is located near a commercial area, therefore, commercial area zone standard of PEQS was followed for comparison.

The 24 hours average noise level at nighttime was 57.67 dB(A) whereas, it was 66.40 dB(A) at daytime. The hourly noise variation throughout the day reveals that noise levels exceeded the PEQS limit values. It may be due to the fact that the project site is near the road and commercial area.

5.3.7 The Conclusion of Ambient Air Quality and Noise Level Monitoring

The ambient air quality monitoring was carried out from 13th July to 14th July 2024, at the project site.

The concentrations of NO₂, NO, NO_x, SO₂, CO, O₃, PM₁₀, PM_{2.5}, TSP and lead air borne particles were monitored as 25.27µg/m³, 19.03µg/m³, 44.30µg/m³, 19.07µg/m³, 1.84mg/m³, 14.37µg/m³, 119.62µg/m³, 23.34µg/m³, 177.96µg/m³ and 0.21µg/m³ respectively. The recorded concentrations of all the parameters meet the PEQS limits (i.e., 80 µg/m³, 40 µg/m³, 120 µg/m³, 120 µg/m³, 5 mg/m³, 130 µg/m³, 150 µg/m³, 35 µg/m³, 500 µg/m³ and 1.5µg/m³).

Therefore, it is concluded that presently, there is no air pollution at the project site, and the site is suitable for hospital facility. Proper plantation on open spaces of the project site will help to enhance and maintain the air quality of the area in future.

The laboratory report detailing the ambient air and noise level monitoring report is attached in **Annexure-7**.

The concentrations of NO₂, NO, NO_x, SO₂, CO, O₃, PM₁₀, PM_{2.5}, TSP and lead air borne particles meet the PEQS limits. A summary of ambient air quality and noise levels results are given in **Table 5.1** below:

Table 5.1: Summary of Ambient Air Quality and Noise Results at the Project Site

Parameter	Unit	Monitoring Duration	LDL	Average Concentration at the project site	PEQS
Nitrogen dioxide (NO ₂)	µg/m ³	24Hours	1.00	25.27	80
Nitric Oxide (NO)	µg/m ³	24Hours	1.00	19.03	40

Parameter	Unit	Monitoring Duration	LDL	Average Concentration at the project site	PEQS
NO _x	µg/m ³	24Hours	1.00	44.30	120
Sulphur dioxide (SO ₂)	µg/m ³	24Hours	1.00	19.07	120
Carbon monoxide (CO)	mg/m ³	08Hours	0.01	1.84	5*
Ozone (O ₃)	µg/m ³	01Hours	-	14.37	130**
Particulate Matter (PM ₁₀)	µg/m ³	24Hours	1.00	119.62	150
Particulate Matter (PM _{2.5})	µg/m ³	24Hours	1.00	23.34	35
Total Particulate Matter (TSP)	µg/m ³	24Hours	1.00	177.96	500
Lead Air Borne Particles	µg/m ³	24Hours	-	0.21	1.5
Noise level (Daytime)	dB	-	-	66.40	65
Noise level (Nighttime)	dB	-	-	57.67	55

5.4 Surface Water

There is wastewater drain passing near north of the project site.

5.5 Groundwater

The source of water in the project area is groundwater, which ranges from approximately 250 ft to 600 ft deep. The proposed project will also install bore wells to extract water during the operational phase.

A chemical analysis test of the groundwater in the project site was conducted. The samples of groundwater were collected on 13th July 2024 and were received by the Green Crescent Environmental Consultants Pvt. Ltd. on 15th July 2024 for analysis. The parameters that were analyzed include pH, Odor, Taste, Color, Turbidity, Total Hardness, Total Dissolved Solid (TDS), Ammonia, Chloride, Cyanide (CN), Flouride (F), Nitrite, Nitrate, Phenolic Compound, Residual Chlorine, Aluminum (Al), Cadmium, Copper, Chromium, Mercury, Antimony (Sb), Nickel, Zinc, Arsenic, Barium, Manganese, Iron, Boron, Lead, Selenium, Total Coliforms and Faecal Coliforms (Ecoli) whose concentrations/results were 7.25, Odorless, Sweet, <1.0 Pt/Co, <0.1 NTU, 204.0 mg/L, 772.0 mg/L, <0.002 mg/L, 65.04 mg/L, <0.01 mg/L, <0.01 mg/L, <0.01 mg/L, 0.1 mg/L, <0.01 mg/L, <0.1 mg/L, <0.028 mg/L, <0.0028 mg/L, <0.0045 mg/L, <0.0054 mg/L, <0.0008 mg/L, ND, <0.008 mg/L, <0.0033 mg/L, <0.01 mg/L, <0.031 mg/L, <0.0016 mg/L, <0.1 mg/L, <0.1 mg/L, <0.013 mg/L, ND, Absent and Absent respectively.

It was found that all these parameters are within the permissible limit.

The laboratory report detailing the groundwater reports is attached in **Annexure-7**.

Table 5.2: Summary of Groundwater Chemical Analysis Test at the Project Site

Parameters	Analysis Method	Unit	LOR	Results	PEQS
Physical & Chemical Analysis					
pH	APHA-4500H+B	-	0.01	7.25	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Obj.
Taste	In-house	-	-	Sweet	Non-Obj.
Color	APHA-2120 B/C	Pt/Co	1.0	<1.0	≤15 TCU
Turbidity**	APHA-2130 B	NTU	0.1	<0.1	<5 NTU
Total Hardness	APHA-2340 B&C	mg/l	0.1	204.0	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	772.0	<1000
Ammonia	APHA-4500-NH ₃ -B	mg/l	0.002	<0.002	-
Chloride**	APHA-4500Cl ⁻ B	mg/l	0.24	65.04	<250
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	≤0.05
Flouride (F)**	APHA-4500F D	mg/l	0.01	<0.01	≤1.5
Nitrite	APHA-4500NO ₂ B	mg/l	0.01	<0.01	≤3 (P)
Nitrate**	APHA-4500NO ₃ C	mg/l	0.1	0.1	≤50
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.1	0.2-0.5
Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.028	≤0.2
Cadmium**	APHA-3111Cd B	mg/l	0.0028	<0.0028	0.01
Copper**	APHA-3111Cu B	mg/l	0.0045	<0.0045	2
Chromium**	APHA-3111Cr B	mg/l	0.0054	<0.0054	≤0.05 (P)
Mercury	APHA-3112Hg B	mg/l	0.0008	<0.0008	≤0.001
Antimony (Sb)**	APHA-3111Sb B	mg/l	-	ND	≤0.005 (P)
Nickel**	APHA-3111Ni B	mg/l	0.008	<0.008	≤0.02
Zinc**	APHA-3111Zn B	mg/l	0.0033	<0.0033	5.0
Arsenic	APHA-3111Ar B	mg/l	0.01	<0.01	≤0.05 (P)
Barium	APHA-3111Ba B	mg/l	0.031	<0.031	0.7
Manganese**	APHA-3111Mn B	mg/l	0.0016	<0.0016	≤0.5
Iron**	APHA-3111Fe B	mg/l	0.1	<0.1	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.1	0.3
Lead**	APHA-3111Pb B	mg/l	0.013	<0.013	≤0.05
Selenium	APHA-3111Se B	mg/l	-	ND	0.01 (P)
Microbiological Analysis					
Total Coliforms	APHA:9222 B	CFU/100ml		Absent	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		Absent	0/100ml

5.6 Biological Environment

5.6.1 Flora

In the Lahore district, the most important species of trees are Kikar (*Acacia Arabica*), Shisham or Tahli (*Delbergia sissoo*), Beri (*Zizyphus jujube*); Toot (*Morus alba*); Sharin (*Albizzia lebbek*); Dherek (*Melia azeharach*); Phulai (*Acacia modesta*); Pipal (*Ficus religiosa*); and Bohr (*Ficus bengalensis*), which are planted for shade. The trees in Rakhs mainly consist of three species: Jand (*Prosopis spicigera*), Karir (*Capparis aphylla*), and Wan (*Salvadora oleoides*). Occasionally, Rero (*Acacia ieucophhloea*) and Farash (*Tamarix articulata*) are also found. The Pilchhi (*Tamarix dioica*) is found on moist sandy soils along riverbanks and is used for wickerwork, basket making, etc. Mesquite bushes and some Eucalyptus trees grow wild in the areas along the canals, roads and barren land, but natural forest cover has been significantly reduced.

The project site is barren flat land scarce vegetation. There is only one tree (Kikar) at the project site.

5.6.2 Fauna

The faunal habitat is quite modified, with several species of wildlife having adapted to the changed habitat. These include Bengal fox, small Indian mongoose; shrew; hog deer; wild hare; rodent pests, including porcupines, fruit bats, and wild boar. The avifauna that has survived the modified habitat include doves, black partridge, cuckoos, koel, woodpeckers, parakeets, bulbuls, babblers, black drongo, bee-eaters; finches, owls; hawks; and house sparrows. The reptilian species of this modified habitat include krait, cobra, saw-scaled viper; rat snake; and monitor lizard.

Scavengers, such as jackals, are attracted to garbage dumps and human faeces for food. House sparrows breed in houses. Bank mynas and cattle egrets feed on grasshoppers that are present in the rangelands that also support cattle and buffalos. Banyan and peepal trees still grow in the villages. Green pigeons and barbets feed in these trees.

Pakistan is home to 10 of 18 known mammalian orders. The varied and interesting mammalian fauna found in Pakistan is largely due to the country being in the transitional zone between two of the world's six major zoogeographical regions, the Palearctic and Oriental. As the project area is already developed and majorly occupied by various offices which provides limited habitat for wildlife.

Figure 5.4: Pictorial presentation of flora located in the surrounding area of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore



Exhibit 1: Vegetation around Nullah in the project area



Exhibit 2: Tree at the project site



Exhibit 3: Trees at the project site



Exhibit 4: Eucalyptus trees in the project area

5.7 Socio-economic and Cultural Environment

In order to assess the present socio-economic and socio-cultural conditions of the project area, a survey was conducted of nearby settlements. For this purpose, socio-economic data were collected from the neighbouring developments and residents of the area. Following are the details of the present socio-cultural and socio-economic conditions of the Valencia Town.

5.7.1 Location

The society is connected to the central city via a vast network of highways, including Khayaban-e-Jinnah Road, M2, Ferozpur Road, Ring Road, Raiwind Road, and Multan Road, which is located across from Wapda Town. Additionally, it is in a prime location on the Defence Road, which provides easy access to Lahore's well-known attractions.

5.7.2 Language

Urdu, the national and first official language of the country, is predominantly spoken within Valencia Town. However, there are different ethnic groups in the project area that have come from various parts of Pakistan. These ethnic groups are Rajpoot, Syed, Janjuas, Awans,

Gujjars, Jats, Sheikh, Abbasi, Mughals and Qureshi and Christians, who speak different languages such as Punjabi, Pashto and Pothohari.

5.7.3 Transportation

Private and Public transport both are common in Valencia Town and the adjacent areas. The main road that passes through Valencia Town is the Defence Road, which is used to access the project site too. Taxis are also available readily all the time. People also use their personal vehicles to reach their desired destinations. To ensure the best development, the roads and other infrastructure are built with a high level of professionalism and equipment. The main boulevard and surrounding streets are broad

5.7.4 Education

There are many educational institutions for boys and girls present in Valencia Town with all basic infrastructure and highly qualified staff. There is a combination of private and public schools in the project area.

- Beaconhouse Valencia
- Dar-e-arqam School
- The Educators Valencia
- Misber College
- Academia De Avoures
- American Lycetuff
- The Smart School
- Lahore Grammar School
- Mian Grammar International School

5.7.5 Healthcare

There are few clinics and international level private hospitals in the project area:

- Evercare Hospital
- Hameeda Memorial Hospital
- Rehana Mushtaq Clinic

5.7.6 Drinking water supply

The source of drinking water in the project area is groundwater, installed bore wells to extract drinking water.

5.7.7 Archaeological Sites

There exist no documented or known sites of archaeological, historical or cultural significance at or in the immediate vicinity of the proposed site.

5.7.8 Other Facilities

All other amenities of life like electricity, natural gas, telephone, Shopping Centre, Mosques, Hotels/Restaurants and banks etc., are present in the Project area.

Figure 5.5: Project Area Map

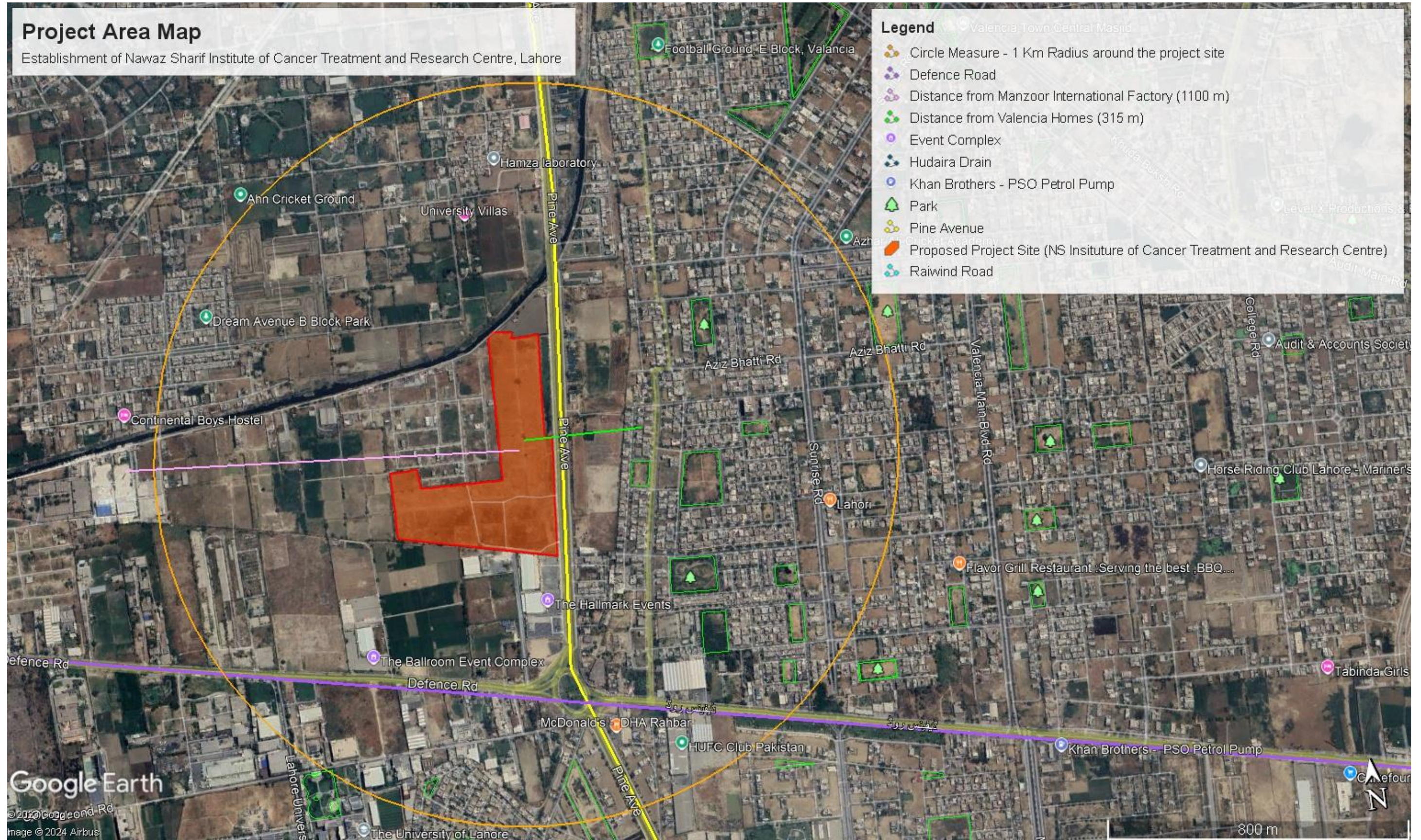


Figure 5.6: Pictorial view of the Project Area



Exhibit 5.1: A view of project site



Exhibit 5.2: A view of the project site



Exhibit 5.3: View of access road to the project site



Exhibit 5.4: View of Nullah in the project area



Exhibit 5.5: View of Al Hamd Gardens in the project area



Exhibit 5.6: View of Al Fatah Store in the project area

6 Stakeholder Consultation

6.1 Introduction

During the EIA processing, the stakeholders were involved in the public consultation to know their opinions, concerns, issues and suggestions regarding the project.

This chapter provides details of public consultations carried out with the community and stakeholders at different levels.

6.2 Approach to Public Consultation

The public consultation process has been approached to involve the community and stakeholders from the earliest stages. Public consultation has taken place during the planning and design phase of the project. The focus of attention has been the community living adjacent to the Nawaz Sharif Institute of Cancer Treatment and Research Project, as well as staff, patients and visitors who may be affected by the project.

The viewpoint of the stakeholders has been taken into account, and their concerns and suggestions for possible improvements have been included in the EIA where appropriate.

Much of the public consultation process has revolved around concerns for the mitigation of construction and operational phase impacts.

The stakeholders involved in the process were the Proponent Nawaz Sharif Institute of Cancer Treatment and Research, Doctors, IDAP, Private Hospitals, and community living around the project site.

6.3 Objectives of Consultation

The overall objective of the consultation with the stakeholders is to verify the environmental and social issues that have been presumed to arise and to identify those which are not known or are unique to the project.

- The objectives of the public consultation process are:
- Provide key project information to the stakeholders, and solicit their views on the project's potential or perceived impacts,
- Identification of potential problems and needs,
- To devise the way for collaborative problem solving,
- Develop and maintain communication links between the project proponents and stakeholders, providing opportunities to the public to influence the project design in a positive manner, and
- Ensure that views and concerns of the stakeholders are incorporated into the project design and implementation with the objectives of reducing or offsetting negative impacts and enhancing the benefits of the proposed project.

6.4 Categories of Stakeholders Contacted

Potential stakeholders for consultation and participation were identified, and discussions were held with the community living in the project area of impact, pedestrians, vendors and business/shop owners. Moreover, government and private employees, private hospitals and local public representatives were also contacted.

6.5 Major Stakeholders Involved

The stakeholders contacted during the survey belonged to different categories of people, as shown in **Table 6.1**.

Table 6.1: Categories of Stakeholders Interviewed in the Project Area

No.	Stakeholder Category
1	Staff, visitors and patients and the public in the vicinity of the project site
3	Government Organizations
4	Environment and Social Experts (Public and Private Institutes/Academia, Environmental Consultants)
5	Community living adjacent to the Nawaz Sharif Institute of Cancer Treatment and Research Project

6.6 Scoping Session

During the public consultation process, both primary and secondary stakeholders were consulted. Consultation with the primary stakeholders was in the form of informal meetings and interviews.

The consultation with the secondary stakeholders was formal since most of them are government functionaries or professionals.

During these interviews, a simple, non-technical description of the project was given, along with an overview of the project's likely impacts on people and the environment. Following the project description, a discussion was held so that people could voice their concerns.

The community was aware of the project, but they were well-informed about the project during the public consultation. The negative and positive impacts were communicated to them.

Moreover, the stakeholders are worried about the Infectious Hospital Waste disposal system as the handling and disposal of infectious waste in Pakistan is carried out without proper planning. The absence of incinerators in many hospitals can cause many serious threats to the people and community living near the disposal area. Therefore, a proper management plan should be devised to handle and dispose of the infectious solid waste.

Furthermore, the stakeholders highlighted the importance of the sewerage treatment plant during the operational phase of the proposed project. A wastewater treatment plant plan should be proposed at the Nawaz Sharif Institute of Cancer Treatment and Research Project.

On the other hand, there were also persons who gave positive gestures towards the project because the proposed project would provide employment opportunities as well as the local community will not have to take the patients to expensive hospitals in Islamabad and Lahore. Those who were aware of the project indicated their support as it will provide employment opportunities and enhance the overall healthcare of the community.

6.7 Issues Discussed

Following issues were discussed during the stakeholder consultation:

- Overall activities of the project and their possible impacts,
- Possible impacts on natural vegetation, flora and fauna,
- Possible mitigation measures and
- Beneficial factors and involvement opportunities of the local people in the set of activities of the Project.

6.8 Major Stakeholders and their Apprehensions

Meetings with major stakeholders were organized to discuss project-specific issues and their potential impacts on the local and regional environment.

Stakeholders consulted, and their valuable suggestions and comments are described hereunder:

Date & Time	Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
Proponent's Environment Management Team			
29/06/2024	Ms. Zill-e-Huma Faizi, Manager Environment and Public Health	Infrastructure Development Authority, Punjab	<ul style="list-style-type: none"> The purpose of IDAP is to get mega infrastructure projects executed efficiently, aesthetically, and transparently without compromising quality or entailing delays. We have in-house complete project management services, including design, contract management, execution, supervision, third party evaluation, and delivery to the client department. IDAP has a lot of experience in executing healthcare infrastructure development projects. Some of the projects IDAP executed are Mother and Child Hospital Mianwali, Pakistan, Kidney Liver Institute & Research Center (PKLI & RC) and Tertiarycare Hospital, Nishter-II, Multan.
Other Government Agencies			
29/06/2024	Mr. Zubair Rehman Pakistan Nuclear Regulatory Authority	Islamabad	<ul style="list-style-type: none"> Pakistan Nuclear Regulatory Authority is mandated through 'Pakistan Nuclear Regulatory Authority Ordinance No.III' in 2000 is responsible for management of Nuclear Waste Treatment and Disposal. PNRA is responsible for development of requirements and procedures for the licensing of various types of radioactive waste management facilities. Once the construction activities are completed, the Hospital will apply for license for disposal of radioactive waste which PNRA will review and assist the Hospital.
Responsible Authority			
15/08/2024	Mr. Hasnain, Environmental Inspector	Lahore	<ul style="list-style-type: none"> It is very good project for residents of Punjab and Pakistan in general as a Government Run Hospital will provide quality healthcare where as private owned Hospitals are not in the reach for middle and lower income classes. For a cancer Hospital, it is necessary to have a robust Hospital Waste Management Plan particularly all arrangements for Nuclear Waste Treatment and Disposal. As this is a mega project, regular environmental monitoring reports need to be prepared and submitted periodically.
Environmental Practitioners and Academia			
29/06/2024	Dr. Yasir Qayyum Gill Lecturer, UET Lahore	UET, Lahore	<ul style="list-style-type: none"> The establishment of the Nawaz Sharif Institute of Cancer Treatment and Research Project is a very good initiative to provide adequate affordable medical and cancer care facilities to the low-income population as patient care should be the priority of the government.

Date & Time	Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
			<ul style="list-style-type: none"> ▪ I would like to suggest that the sewerage treatment plant and incinerator should be integrated into the design of the proposed project. Moreover, the technical staff should have the adequate technical training to operate the incinerator once it has been installed. ▪ To reduce the negative effect of the project on the environment, a plantation plan should be part of the project. ▪ I would suggest that the proposed project should be designed in such a way that changes to the topography and landscape of the project area should be as minimum as possible. ▪ To reduce carbon footprint, it is necessary to use other sources of energy such as solar or wind energy. ▪ Proper PPEs should be given to the workers during the construction phase. ▪ Signages should be installed at the project site to avoid any accident or injury.
29/06/2024	Dr Asif Ali, Cardiologist	Islamabad	<ul style="list-style-type: none"> ▪ There are very limited government cancer hospitals having all the advanced healthcare facilities in Lahore; only private hospitals with high fees are available here. ▪ The people of Lahore belong mostly to a middle-class family due to which they cannot afford private hospitals and clinics. ▪ The establishment of the government cancer treatment hospital in Lahore is very necessary, and government should establish it as soon as possible.
29/06/2024	Mr. Aslam Lab Attendant, Diagnostic Center	Lahore	<ul style="list-style-type: none"> ▪ There is surely a need for a government hospitals in Lahore, and it should encompass all the health care facilities. ▪ We receive various samples for testing at our Diagnostic Center from all the private hospitals in Lahore, due to which the workload increases. ▪ Therefore, the proposed hospital should contain laboratories and facilitate the samples of other hospitals too.

6.9 Consultation with the Communities (Affected and Wider Communities)

The general consultation included workers, patients and community members at and around the project site of the Nawaz Sharif Institute of Cancer Treatment and Research Project to find out their opinion about the project.

During the roadside discussion, the community adjacent to the hospital was informed about the salient features of the project, its location, and its activities.

The respondents were both male and female. The list of people consulted during public consultation is attached in **Annexure 5**.

The viewpoints of respondents are as follows:

- The locals were very happy that a state of the art Hospital will be developed in the area. This will be beneficial for the city as a whole.
- Some of the residents had apprehensions about the construction phase of the project that it would cause dust and noise pollution. They also suggested that the construction phase should be carried out with great care to the nearby settlements.
- There must be a Sewage Treatment Plant to manage the wastewater generated during the operational phase of the Nawaz Sharif Institute of Cancer Treatment and Research Project.
- The hospital waste is infectious. Hospital waste should be burned properly in the incinerator, and the ashes should be disposed of in a proper way.
- There should be a monitoring system for the hospitals, as well. As sometimes, it is observed that hospitals dump or burn their infectious waste in the open, which is very harmful to the environment.
- Hospital should be affordable so that everyone can get cancer treatment including middle-class and underserved communities.

The community should not be disturbed in any way by the operation and construction activities.

- Proper Plantation should be done to beautify the area.
- The workers at the construction site should be equipped with PPEs, and they should be properly trained.
- There is a need to regulate the healthcare practices of un-qualified doctors and Hakeem's.
- Residents of the Valencia Town were very positive about the project as they will have easy access to the hospital.

The summary of the stakeholders and public consultation is provided in **Table 6.2**, which also includes the mitigation measures to address the major concerns of the stakeholders.

Table 6.2: Summary of Concerns and how they have been addressed in the EIA

Main Concerns of the Stakeholders	Address of the Stakeholders	Addressed in the EIA
<ul style="list-style-type: none"> • During the construction phase, dust should not be emitted into the surrounding areas. • Noise generation activities should be minimized. • A wastewater treatment Plan needs to be developed to properly manage the wastewater. • Trees should be planted to compensate for the trees that will be cut down during the construction phase. • No one should get hurt or injured during the construction phase. • The infectious hospital waste should be managed properly • The contractor should take measures to reduce traffic congestion on Defence and Raiwind Road • The project should provide job opportunities to the local community on a regular basis 	<ul style="list-style-type: none"> • The contractor will spray water on the soil to minimize fugitive dust emission. • The contractor will keep the vehicles and construction machinery properly tuned, and silencers should be used. • The proponent of the project will prepare a wastewater treatment plan. • A plantation plan will be prepared in which indigenous and native trees will be planted. • The contractor will make sure that every worker is using Personal Protective Equipment (PPEs) during the construction phase of the project. • The proponent will implement a hospital waste management plan to dispose of the infectious hospital waste. • The contractor will ensure that construction material arrives at the project during nighttime. • The local population of Lahore will be provided job opportunities. 	<ul style="list-style-type: none"> • Construction Phase Mitigation measures have been proposed (EIA chapter 7) • Mitigation measures have been proposed (EIA chapter 7) • Wastewater treatment and management plan has been prepared (EIA chapter 8) • A plantation plan for the proposed project has been prepared (EIA chapter 8) • Mitigation measures have been proposed (EIA chapter 7) • The suggestion has been noted and will be considered by the proponent. • Mitigation measures have been proposed (EIA chapter 7) • The proposed project will provide employment opportunities to the local people of Lahore during the construction as well as operational phase. (EIA chapter 7) • The suggestion has been noted and will be considered by the proponent.

Figure 6.1: Pictorial Presentation of Public and Stakeholders Consultation for Project



Exhibit 1: Consultation with the workers of the area



Exhibit 2: Consultation with the workers of the area



Exhibit 3: Consultation with Guard of the project area



Exhibit 4: Roadside Consultation with a resident



Exhibit 5: Consultation with property dealers of the project area



Exhibit 6: Consultation with a worker

7 Impact Assessment and Mitigation Measures

7.1 Introduction

This Chapter discusses the potential environmental and social impacts of the proposed activities, predicts the magnitude of the impact, assesses significance, recommends mitigation measures to minimize adverse impacts, and identifies the residual impacts of the proposed project.

The nature and the significance of the potential impact depend on the nature and magnitude of the different activities and also on the type of pollution control technologies to control or minimize the pollution related to the different activities of the project.

7.2 Impact Identification with Matrices

A Matrix has been prepared for the identification of impacts and their associated risks. The Matrix also presents the mitigation measures for the identified impacts and the change in risk after the mitigations have been adopted.

7.2.1 Impact Identification with Matrices

A Matrix has been prepared for the identification of different environmental impacts and their associated risks or benefits. The Matrix also presents the mitigation measures or environmental enhancement measures for the identified impacts and the change in risk after the mitigation techniques have been adopted.

7.2.2 Risk Assessment

The risk assessment of the project activities is carried out for all the negative impacts following the basic steps listed below:

- Identify the potential impact
- Assess the risk
- Apply the appropriate measure

Risk is assessed as the likelihood that the activity will have an effect on the environment as well as the consequence of the effect occurring. It is often described like this:

Risk = Likelihood X Consequence

The likelihood is further classified and relatively valued into Certain (5), Likely (4), Possible (3), Unlikely (2), Rare (1)

- Certain: Will undoubtedly happen/recur on a frequent basis.
- Likely: It Will probably happen/recur, but it is not a persisting issue/circumstance.
- Possible: Might happen or recur occasionally
- Unlikely: Do not expect it to happen/recur, but it may do so.
- Rare: This will probably never happen/recur.

The consequence is further classified and relatively valued into Remarkable (5), Major (4), Moderate (3), Minor (2), and Insignificant (1).

- Remarkable: Impact on a larger area and highly sensitive receptors.
- Major: Impact on a large area and slightly sensitive receptors.
- Moderate: Impact on a small area with few receptors.

- Minor: Impact on a very small area with almost no receptors.
- Insignificant: Almost no impact.

Based on the classification and values, a risk analysis matrix has been developed and presented in **Table 7.1**.

Table 7.1: Risk Analysis Matrix

Likelihood	Consequence and Value				
	Remarkable (5)	Major (4)	Moderate (3)	Minor (2)	Insignificant (1)
Certain (5)	25	20	15	10	5
Likely (4)	20	16	12	8	4
Possible (3)	15	12	9	6	3
Unlikely (2)	10	8	6	4	2
Rare (1)	5	4	3	2	1

Based on the related values in **Table 7.1** following risk impact categories are identified.

- Extreme Risk (score 20-25): require more intensive mitigation measures
- High Risk (score 10-19): Will have a large impact which requires specific mitigations
- Medium Risk (score 5-9): Will have a small impact that can be mitigated easily
- Low Risk (score 1-4): Professional judgment

7.2.3 Positive impacts

Positive impacts are also evaluated in the Matrix using the same methodology; however, a different colour scheme is used.

Based on the classification and values, a positive impact analysis matrix has been developed and presented in **Table 7.2**.

Table 7.2: Positive Impact Analysis Matrix

Likelihood	Consequence and Value				
	Remarkable (5)	Major (4)	Moderate (3)	Minor (2)	Insignificant (1)
Certain (5)	25	20	15	10	5
Likely (4)	20	16	12	8	4
Possible (3)	15	12	9	6	3
Unlikely (2)	10	8	6	4	2
Rare (1)	5	4	3	2	1

Based on the related values in **Table 7.2** following positive impact categories are identified:

- Extremely Beneficial (score 20-25): Will add a lot of value to the local environment
- Highly Beneficial (score 10-19): Will have a large positive impact on the environment
- Medium (score 5-9): Will have a small positive impact

- Low (score 1-4): Will does not have any significant impact

Table 7.3: Environmental Screening Matrix (un-mitigated) of Proposed Project

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
Pre-construction Phase Impacts								
Site Selection	Encroachment on historical/cultural values	1	3	3	Site selection has been made in a way to ensure no historical site in the Project site.	1	2	2
	Waste emissions relating to siting	2	4	8	LWMC will collect the Construction waste and dump it at the designated sites. Ash generated at the Project site shall be disposed of in an Ash Pit.	1	3	3
	Resettlement	1	5	5	No resettlement shall be caused by the Project.	1	2	2
	Historical or Archaeological or religious Site	1	5	5	No Historical or archaeological site is present on or around the Project site. However, there is a small mosque that will be demolished, and an even bigger one shall be constructed.	1	2	2
	Disruption of Surface Water	2	4	8	There will be no impact on surface water in the Project area.	1	3	2
Site Preparation	Relocation of electric poles	5	3	15	After consultation with the LESCO and sending prior notification to the community, the electrical poles will be relocated.	2	3	6
	Noise	5	3	15	Noise barriers around the construction site, along with mufflers (silencers) for vehicles and construction equipment to minimize noise.	4	2	8
	Dust generation	5	3	15	Additional water is to be applied for dust suppression during dry weather. Masks will be provided to all workers to reduce the health impacts caused by the inhalation of dust.	3	2	6
	Damage to natural vegetation	4	3	12	There are no trees on the Project site which are likely to be cut during constructional phase of project.	2	2	4

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
Positive Impacts	Improvement in Healthcare	3	3	9	The proposed Project provides major healthcare and cancer care facilities under one roof. It is being established at a strategic location so that community can benefit and have easy access to it.	4	4	16
	Increase in green cover	4	3	12	About 1000 trees shall be planted in proposed areas at and around project site to beautify the ambience and control noise and air pollution.	5	4	20
Construction Phase Impacts								
Construction Works	Land Acquisition	2	3	6	The designated land of the proposed Project already belongs to the proponent. Construction camps shall be established on site.	2	2	4
	Visual Impact	2	3	6	Dust pollution shall be controlled with water sprinkling Workers shall be provided with personal protective equipment to minimize the risks of adverse impacts of dust on workers and surrounding areas. These impacts would remain for only thirty months of the construction period.	2	2	4
	Soil Erosion and degradation	5	3	15	Minimal land clearing, levelling, and grading to reduce soil erosion. Construction of temporary reinforced walls to contain debris. Waste to be categorized and recycled.	3	2	6
	Air Quality Deterioration	5	3	15	Construction equipment to be well maintained to reduce exhaust emissions. Workers are to be provided with Personal Protective gear (e.g., masks). Water to be used for dust suppression.	3	2	8
	Loss of vegetation	5	3	15	Spilling of chemicals and other effluents on the soil shall be avoided. Tree plantation shall also be carried out.	3	2	6
	Damage to Wildlife	5	3	15	Measures to be taken to enhance natural vegetation and minimize impacts on the local bird population.	3	2	6



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Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
	Noise and Vibration	4	3	12	Barriers to be constructed in sensitive areas. Night-time activities shall not be held unless unavoidable.	3	2	6
	Quarrying Hazards	3	4	12	Exposed soils are to be stabilized with mulch and grass to prevent hazards.	3	2	6
	Safety Hazard, Public Health, and Nuisance	5	3	15	While the installation of the grid station, a health and safety officer shall be hired to train and provide important information related to health and safety, EHS officer shall also monitor the construction crew and ensure the use of PPEs.	3	2	6
	Gender Issues	3	3	9	No any gender issues will be emerged in proposed project. Strict code of conduct shall be maintained by the construction crew. Local norms shall be respected.	3	2	6
	Child Labour	2	2	4	The provisions of the Child Labour Act shall be made part of the construction contracts to ensure that no child labour is employed at the Project site or campsite	1	1	1
	Traffic Congestion	3	4	12	Construction material shall be transported in the night time to avoid traffic congestion during the day.	3	2	6
Waste Disposal	Surface (and Groundwater) quality	4	3	12	Wastewater shall be properly drained into the nearest sewerage line.	3	2	6
	Solid Waste Disposal	4	4	16	Any solid waste generated during construction shall be recycled or disposed of at the nearest waste disposal site by LWMC.	2	3	6
	Waste Effluent Disposal	4	4	16	Waste effluent generated from the septic tank shall be properly drained into the nearest sewerage line on the site.	3	3	9

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
Positive impact	Job opportunities	4	4	16	Training shall be arranged to hire a local crew for the Project.	5	4	20
Operational Phase Impacts								
Operation of the Nawaz Sharif Institute of Cancer Treatment and Research	Air Quality	3	5	15	Vehicular Traffic will emit pollutants that will be reduced by scheduled testing of vehicles, i.e., ambulances, hotel vehicles etc.	2	4	8
	Safety Hazard, Public Health & Nuisance	4	4	16	To ensure safe operations, a permanent EHS officer shall be hired to conduct scheduled training for technical staff.	3	3	9
	Noise	4	3	12	Dense canopy trees shall be planted to provide shade and absorb the generated noise.	3	3	9
	Wastewater	4	3	12	Wastewater shall be properly drained into the nearest and already existing sewerage lines of the area after treatment.	3	2	6
	Traffic congestion	3	3	9	Defensive and best driving practices shall be inculcated in the Project drivers	2	2	4
	Electromagnetic radiations	2	4	8	Proper maintenance of electric lines will be ensured.	1	3	3
	Monitoring	5	3	15	Proper monitoring plan will be implemented by the responsible authorities and individuals.	3	2	6
	Solid waste disposal	4	4	16	Private waste collection company shall be hired to collect, segregate, recycle and dispose of solid waste in the designated dumping sites.	3	3	9
	Infectious waste disposal	4	4	16	Infectious waste will be incinerated and properly disposed. Nuclear waste will be handled as per PNRA regulations.	3	3	9
Positive impact	Employment	4	4	16	Community shall be given the opportunity to work in the proposed project	5	4	20

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
	Safety and Security	4	4	16	Smart building management measures shall be adopted to improve safety and security.	5	4	20
	Reduction of waste	4	4	16	Proper waste management practices shall reduce the amount of waste.	4	5	20
	Healthcare/Cancer care Facility	4	3	12	This dedicated cancer hospital will provide comprehensive care under one roof, integrating various treatment modalities such as surgery, chemotherapy, radiation therapy, and palliative care. Secondly the project also plans to accommodate patients having terminal illness in the hospice.	4	5	20
	Value enhancement and Community Benefit	4	3	12	Cancer hospitals often serve as community resources, providing education, outreach, and screening programs aimed at cancer prevention and early detection. By promoting awareness and proactive healthcare practices, these institutions contribute to improving public health outcomes at the local and regional levels.	4	3	16
	Biodiversity Improvement	4	3	12	Environmentalists shall be hired permanently to monitor the plantations to facilitate the re-plantation when required.	4	5	20

7.2.4 Environmental Impact Characterization

During the environmental impact assessment process, the predicted impacts are characterized as follow:

- Nature (direct/indirect)
- Duration of impact (short term, medium-term, long-term)
- Geographical extent (local, regional)
- Timing (project phase: before, during and after construction)
- Reversibility of impact (reversible/irreversible)
- Likelihood of the impact (certain, likely, unlikely, rare)
- Impact consequence severity (severe, moderate, mild)
- Significance of impact (high, medium, low)

The above aspects of impact characterization are defined in **Table 7.4**.

Table 7.4: Impact Characterization of the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project

Categories	Characteristics
Nature	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes as a result of a change in another parameter.
Duration of impact	Short-term: Lasting only for the duration of the project, such as noise from the construction activities. Medium-term: Lasting for a period of a few months to a year the project before naturally reverting to the original condition such as loss of vegetation due to the clearing of the construction site, contamination of soil or water by fuels or oil. Long-term: Lasting for a period much greater than medium-term impact before naturally reverting to the original condition, such as loss of soil due to soil erosion and air emissions.
Geographical extent	Local, regional (spatial dimension)
Timing	Construction and operation
Reversibility of impact	Reversible: When a receptor resumes its pre-project condition. Irreversible: When a receptor does not or cannot resume its pre-project condition.
Likelihood of the impact	Almost Certain: Impact expected to occur under most circumstances Likely: Impact will probably occur under most circumstances Possibly: Impact may possibly occur at some time Unlikely: Impact could occur at some time Rare: Impact may occur but only under exceptional circumstances
Impact consequence severity	Major: When an activity causes irreversible damage to a unique environmental feature; causes a decline in abundance or change in distribution over more than one generation of an entire population of species of flora or fauna; it has long-term effects (period of years) on socio-economic activities of significance or regional level.

Categories	Characteristics
	<p>Moderate: When an activity causes long-term (period of years) reversible damage to a unique environmental feature; causes reversible damage or change in abundance or distribution over one generation of a population of flora or fauna; has short-term effects (period of months) on socioeconomic activities of significance on a regional level.</p> <p>Minor: When an activity causes short-term (period of few months) reversible damage to an environmental feature; slight reversible damage to a few species of flora or fauna within a population over a short period; has short-term (period of months) effects on socio-economic activities of local significance.</p> <p>Negligible: When no measurable damage to the physical, socio-economic, or biological environment above the existing level of public concern; and conformance with legislative or statutory requirements.</p>
Significance of impact	<p>Categorized as High, Medium, or Low</p> <p>Based on the consequence, likelihood, reversibility, geographical extent, and duration; the level of public concern; and conformance with legislative or statutory requirements.</p>

Subsequent to the characterization, appropriate mitigation measures were identified, in order to minimize, if not completely eliminate, the adverse impacts associated with project activities. Finally, residual impacts were identified.

The impact characterization of the predicted impacts, mitigation measures and residual impacts are discussed below:

7.3 Pre-Construction/Design Phase Impacts

7.3.1 Project Location Impacts

The impacts associated with the project location (sitting) are those which relate to its location at the designated site. These impacts are different from those which are associated with the project's construction and operational phases. The construction and operational impacts are associated with the activities such as land clearing, waste disposal, whereas the sitting impacts relate to the mere presence of a facility at the given location.

For the proposed project, the aspect of the project site, land use and design have been considered.

7.3.2 Project Location, land use and design

The land use and design should be in accordance with the building codes and bye-laws. The design of the Nawaz Sharif Institute of Cancer Treatment and Research, Valencia Town, Lahore Project should be able to withstand the risks due to seismic activity, and necessary arrangements are in place for the health and safety of the occupants.

During the land acquisition, it is likely that the owners of the lands will not be willing to vacate the land, which can cause issues to start the construction phase.

The project will increase energy consumption and will put the burden on the already existing energy crisis in the country.

The extraction of water to meet the construction as well as operational needs of the project might put pressure on groundwater resources.

In addition, more solid waste, as well as infectious hospital waste, will have to be collected, transported, and properly disposed of. As there is no sanitary landfill site in Lahore, the proposed project can contribute to the landfill crises indirectly.

The unmitigated impact associated with not following the guidelines or its design does not meet the minimum requirements are characterized as follows:

Nature :	Indirect
Duration:	Long-term
Geo extent:	Local
Reversibility:	Irreversible
Likelihood:	Possibly
Consequence:	Severe
Impact significance:	High

Mitigation Measures

Project Site: The project site lies adjacent to the Pine Avenue Road at Valencia Town and is comprised of primarily vacant space.

Land Use: The land use and design of Nawaz Sharif Institute of Cancer Treatment and Research project will be in line with the existing by-laws.

Design: The proposed structure of Nawaz Sharif Institute of Cancer Treatment and Research project will be in accordance with existing building bylaws. The following mitigation measures are proposed for earthquake and firefighting:

- The Building Bye-Laws and Codes for Hospital Buildings will be strictly adopted.
- 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.
- The adequate internal and external water distribution system will be designed, with a standby system for sufficient water, which could also supply adequate quantity for firefighting.
- Sufficient access points should be provided for access of firefighting staff to enter into the Nawaz Sharif Institute of Cancer Treatment and Research project.
- Provision for pumping out water from the basement will be kept to meet any emergency in case of water flooding the basement.
- There is provision for installation of 1 MW solar system for the building for operational phase utilization.
- Adequate water storage for firefighting will be provided in the building. The pumps for firefighting will maintain constant pressure in the system.

Visual Impacts

The Nawaz Sharif Institute of Cancer Treatment and Research project can damage the natural landscape, and visual impact will be impacted. The unmitigated impact associated with the aesthetic value of the area is characterized as follows:

Nature:	Direct
Duration:	Long-term
Geo extent:	Local
Reversibility:	Irreversible

Likelihood:	Possibly
Consequence:	Severe
Impact significance:	High

Mitigation Measures

For the project, the visual impact has been minimized at different levels, as described below:

- First of all, the design of the building should be adopted in a manner that minimizes the changes in the topography, landscape and damage to the natural vegetation.
- A plantation plan has been proposed for Nawaz Sharif Institute of Cancer Treatment and Research, Valencia Town, Lahore project, which should be followed.
- Certain areas must be marked and left untouched to preserve natural vegetation.

Residual Impacts

As a result of the above mitigation measures, the visual impacts of the project will be greatly reduced. There will be some residual impact; however, its significance is expected to be low.

7.4 Construction Phase Impacts

Various construction activities will invariably create environmental disturbances, which may have temporary impacts on the physical, biological and social environment of the area and nearby communities during the construction phase. Such impacts include the following:

- Physical Environment
 - Soil erosion and degradation
 - Air quality deterioration
 - Water Quality (Surface and groundwater)
- Biological Environment
 - Loss of Vegetation
 - Damage to wildlife
- Socio-economic Environment
 - Noise and vibration
 - Safety hazards, Public health and nuisance issues
 - Sites of Archeological or Historical Significance

7.4.1 Soil Erosion and Degradation

The soil-related issues include soil erosion, slope stability, and soil contamination. These may be caused by land clearing, levelling and grading, excavation and filling, construction activities and maintenance of equipment/vehicles.

The soil may be contaminated as a result of improper handling of fuel, oil, chemical and solid waste or untreated wastewater from the construction site. Extraction of stone or gravel and removal of topsoil from the project site may potentially lead to soil erosion.

This contaminated soil may adversely affect the natural vegetation in the area.

Nature:	Direct
Duration:	Long-term
Geo extent:	Local

Reversibility: Irreversible

Likelihood Certain

Consequence Moderate

The significance of Impact: Moderate

Mitigation Measures

- Appropriate management of topsoil will be done to prevent the loss of soil fertility.
- Construction activities will be carried out in a manner to minimize soil erosion.
- Land clearing, levelling, and grading be minimized.
- Excavated slopes will not be left untreated/unattended for long durations. Appropriate slope stabilization measures will be taken as per the design (i.e., Stone pitching).
- Temporary measures, such as the construction of temporary walls reinforced with brick lining bordering the construction areas to contain debris and spoil, will also be undertaken to avoid soil erosion and water contamination.
- The stone and gravel will not be extracted from the project area.
- Vehicles and equipment will not be repaired at the project site. If unavoidable, an impervious shield will be used to avoid any soil contamination.
- Waste oils (if any) will be collected in drums and sold to the recycling contractor.
- The recyclable waste from the project site (such as cardboard, drums, broken/used parts, etc.) will be used as appropriate or to be sold to a recycling contractor.
- All temporary structures established during the construction phase for the temporary purpose will be demolished, the land levelled and re-contoured to the original condition or better. All debris and any other material will be removed from the site.

Residual Impacts

Appropriate construction practices and management actions, as listed above, will greatly minimize soil erosion and contamination. The significance of the residual impacts is therefore expected to be 'low'.

7.4.2 Air Quality Deterioration

The construction machinery and project vehicles will release exhaust emissions containing Carbon Monoxide (CO), Oxides of Sulfur (SO_x), Oxides of Nitrogen (NO_x) and Particulate Matter (PM).

Impacts of air emissions may be carried over long distances depending upon the wind speed, direction, temperature of the surrounding air and atmospheric stability.

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

The unmitigated impacts related to air quality deterioration are characterized below:

Nature: Direct
 Duration: Temporary
 Geo extent: Local
 Reversibility: Irreversible
 Likelihood Certain

impervious sheet will be placed so that the oil and other liquids do not seep into the surface.

- The solid waste generated will be reused where possible; if not reused, they will be disposed of at the solid waste disposal site of LWMC.

Residual Impacts

If the recommended mitigation measures are effectively employed, the residual impacts of the project activities on the water quality of the area will be negligible.

7.4.4 Loss of Vegetation

The project site preparation and construction activities may necessitate the removal of the natural vegetation.

The unmitigated impacts of the proposed activities on the loss of vegetation of the area are characterized below.

Nature:	Direct
Duration:	Long Term
Geo extent:	Local
Reversibility:	Irreversible
Likelihood	Certain
Consequence	Moderate
Significance of Impact:	Insignificant Impact

Mitigation Measures

- The management of Nawaz Sharif Institute of Cancer Treatment and Research, Valencia Town, Lahore, will maintain the existing plantation cover and aesthetic beauty of the area.
- Endeavours will be made to enhance the environment through a plantation of trees.
- All preventive measures will be adopted to control the spill-over of chemicals and other effluents on the ground to protect the soil.
- The construction workforce will be provided with LPG as cooking and heating (if required) fuel. The burning of fuelwood will be strictly prohibited.
- Ornamental trees and bushes have been included in the plantation plan, which will improve the scenic and aesthetic value of the area.

Residual Impact

The trees planted under the plantation plan will take some time to grow and mature. This impact cannot be fully mitigated, and the residual impact would be medium, at least in the medium term. In the longer run, however, the planted trees and vegetation will enhance the environment of the Hospital.

7.4.5 Damage to Wildlife

The project site is small and inhibits no wildlife, while smoke, chemicals, dust particles, and noise generated by construction machinery during the construction period are scary factors for biota. Rodents and insects would lose their abode.

Impacts on wildlife may arise from the following project activities:

- Noise generated from project activities,

- Movement of personnel and vehicles,
- Lights used at the project facilities,
- Clearing of vegetation, and
- Improper disposal of wastes

The unmitigated impacts of the proposed activities on the faunal resources of the area are characterized below:

Nature:	Direct
Duration:	Medium to long-term
Geo extent:	Local
Reversibility:	Irreversible
Likelihood	Certain
Consequence	Moderate
Significance of Impact:	Significant Impact

Mitigation Measures

- The measures to prevent soil and water contamination will forestall any adverse impact on the faunal resources of the area.
- Special measures will be adopted to minimize impacts on birds, such as avoiding noise-generating activities.
- The measures to enhance natural vegetation in the area will benefit the area's fauna as well.
- The project staff will not be allowed to indulge in any hunting or trapping activities.
- Appropriate diffusers will be used to restrict the illumination within the project site.
- Nighttime construction works will not be undertaken.

Residual Impact

Despite the above mitigation measures, there will be some residual impacts of the project on the faunal resources of the area. The significance of these residual impacts is expected to be medium.

7.4.6 Noise and Vibration

Due to the movement of heavy machinery and vehicles, there would be excessive noise and vibration. Other construction activities which may result in intermittent noise and vibration include excavation for foundation, lifting and unloading of the construction materials, use of air compressors, concrete mixing plants, generators, and light towers.

The unmitigated impacts related to the noise and vibration caused by the project are characterized below:

Nature:	Direct
Duration:	Temporary
Geo extent:	Local
Reversibility:	Irreversible
Likelihood	Certain
Consequence	Moderate

Significance of Impact: Moderate negative

Mitigation Measures

- To mitigate these impacts, noise barriers will be constructed in sensitive areas.
- Construction equipment and vehicles will have exhaust mufflers (silencers) to minimize noise generation.
- Nighttime traffic and construction activities will be avoided. Staff Management of Nawaz Sharif Institute of Cancer Treatment and Research Project will be taken in confidence if such work is unavoidable.

Residual Impact

Despite the above mitigation measures, there will be some residual impacts of the project on the noise and vibration of the area. The significance of these residual impacts is expected to be low.

7.4.7 Disposal of Construction Waste/Excavated Material

Dumping of construction wastes/excavated material in the surrounding area may limit the use of land in the project area. The solid waste may be generated due to different construction activities, and it will mainly include surplus excavated and construction material. It may also be generated from the construction camp.

The indiscriminate disposal of solid waste may cause dust emissions due to the wind blowing, thereby affecting the health of the workers working or passing in the immediate vicinity of solid waste heaps. The impacts of solid waste would be temporary and minor negative in nature.

The unmitigated impacts of the proposed activities area are characterized below:

Nature:	Direct
Duration:	Medium to long-term
Geo extent:	Local
Reversibility:	Irreversible (reversible in medium to long-term)
Likelihood:	Certain
Consequence:	Severe
Impact significance:	Moderate

Mitigation Measures

- Management of construction activities will be done in a way to ensure minimal degradation to the soil around the project site.
- Dumping of excavated waste and waste generated from the construction camp will be done at a designated site approved by the LWMC.
- The contractors will be bound by contractual obligations to take care of the waste generated from the construction activities.
- Proper planning and implementation for collection, storage and disposal of construction waste will be ensured.

Residual Impact

Following the above mitigation measures, there will be low residual impacts of the project on the faunal resources of the area.

7.4.8 Traffic Management

The proposed project site is accessible via Pine Avenue Road. During the construction phase, the movement of heavy machinery and transportation of construction material and equipment may cause traffic problems.

The vehicle traffic during the construction phase of the project is expected to be 8-10 round trips for construction material supplies and movement of the construction crew during the peak construction period per day.

The unmitigated impacts associated with vehicular traffic are characterized below:

Nature:	Direct
Duration:	Short Term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Certain
Consequence:	Mild
Significance of Impact:	Medium

Mitigation Measures

- The number of trips from the project site will be minimised through astute planning.
- The project vehicles will avoid peak vehicular traffic time (morning and evening).
- The project vehicles will comply with Lahore Traffic Police rules and follow the timings set for the movement of heavy vehicular traffic.
- The movement of vehicles carrying construction materials will be restricted during the nighttime to reduce traffic load and inconvenience to the local residents.
- There will also be a provision of caution signs on the access road to alert users on construction activities in progress in order to prevent the occurrence of incidents.
- Project vehicles shall not be fitted with pressure horns.
- The speed of vehicles will be regulated during the construction phase.
- Designated parking areas will be provided for the different types of project vehicles within and around the project sites.
- Traffic Management Plan will be introduced to manage the smooth flow of vehicular traffic and to avoid traffic jams and long queues.

Residual Impacts

With the implementation of the above-mentioned mitigation measures, the residual impacts of the project related vehicular traffic on Pine Avenue Road and Defence Road will be negligible.

7.4.9 Safety Hazards, Public Health and Nuisance

The project may pose some safety hazards to the local community, workers and visitors.

The public health issues related to the project site are the possibility of contamination of local drinking water resources and dust emissions during the construction phase. The anticipated health impacts are classified into the following categories:

Dust and Pollen Allergy: One of the main problems people may face is dust and pollen allergy.

Eye and Respiratory Diseases: Construction workers may be susceptible to eye and respiratory diseases due to their routine exposure to dust and exhaust emissions on the project site.

Accidents: During the construction phase, as the traffic will increase, it may cause accidents and become a safety problem.

Physical Injuries: Injuries could happen primarily by occupational-related accidents, animal bites, etc. Activities such as land clearing, earthworks, and construction may pose various occupational hazards to the workers on site.

Psychological Disorders: Some workers may suffer from depression and anxiety disorders due to working and accommodation conditions and their relationships with fellow workers. The psychological well-being of some members of the community may be affected due to disturbances created by the project activities.

Excessive illumination at the construction site may potentially cause light pollution, creating a public nuisance.

The unmitigated impacts related to the safety hazards; public health, and nuisance are characterized as follows:

Nature:	Direct and indirect
Duration:	Short to medium term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Major
Impact significance:	High.

Mitigation Measures

- Protected fencing will be fixed around the construction site. Unauthorized access to the construction area will not be allowed.
- The local community, hospital staff, patients and visitors will be educated regarding the safety hazards at the project site.
- Defensive driving practices will be inculcated in the project drivers through training, posters and other similar measures.
- Vehicle speeds of 5 km/hr at the project site will be implemented.
- Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance caused by light pollution.
- Personnel injuries risks can be mitigated through the provision of appropriate training and emergency response procedures.
- The contractor will ensure better working conditions for its employees.
- Regular routine health screening of the contractor staff will be carried out.
- Firefighting equipment will be made available at the construction site.
- The construction site office will have first-aid kits.
- The construction crew will be provided awareness of the transmissible diseases (such as HIV/AIDS, Hepatitis B and C).
- All safety precautions will be taken to transport, handle and store hazardous substances such as fuel.

Residual Impacts

There will be a moderate level of the residual impact of safety hazards associated with vehicular traffic and construction activities. The residual public health and nuisance issues will be quite negligible after the effective implementation of the mitigation measures.

7.4.10 Solid Waste Management

Waste generation and disposal during the construction phase may result in loss of aesthetic value of the project area. Therefore, solid waste generated during the construction phase will be managed by M/s Infrastructure Development Authority Punjab to ensure safe disposal.

The unmitigated impacts related to waste generation are characterized below.

Nature:	Direct
Duration:	Medium to Long term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Moderate
Impact significance:	Medium

Mitigation Measures

- Wastes will not be disposed of in the open.
- On-site burning of waste materials will be prohibited.
- Dedicated waste segregation units/containers will be built or placed at different locations of the project site.
- Recyclable wastes, including glass, tins, and metal scrap, will be provided to recycling contractors in nearby localities. It will be ensured that the wastes are recycled or reused properly, without having any effect on the environment.
- Food waste and combustible packaging wastes that have no reuse will be stored temporarily onsite within designated waste segregation areas and burnt in a burn pit specially developed for this purpose.
- The solid waste generated during the construction phase will be collected in the waste bins and disposed of at the designated site.
- Waste material shall be properly segregated and separated to encourage the recycling of some useful waste materials, i.e., some demolished stone and concrete materials can be used as backfills.
- Use of an integrated solid waste management system through hierarchy options, i.e., source reduction, recycling, composting and reuse, shall be encouraged. This will facilitate the proper handling of solid waste during the operation stage.

Residual Impact

The residual impacts after the implementation of the above measure will be very low if solid waste is collected and disposed of properly.

7.4.11 Sites of Archaeological or Historical Significance

There is no such archaeological and historical site in the project area.

7.5 Operational Phase Impacts

The operation of the Nawaz Sharif Institute of Cancer Treatment and Research Centre, Lahore Project will interact with different components of the environment. For the successful operation of the project, proper planning is required in order to minimize the environmental impacts as well as public awareness is also very important.

For smooth operation and less environmental and health impacts, training of the hospital staff is quite important.

The impact of the operation of the Nawaz Sharif Institute of Cancer Treatment and Research Project on the surrounding environment will be associated with the issue of infectious waste storage and emissions. The project may result in the following adverse impacts.

- Solid Waste Management
- Hospital Waste Management
- Safety Hazards, Public Health and Nuisance
- Traffic Congestion

7.5.1 Solid Waste Management

Municipal solid waste will be generated during the operational phase of the proposed project. If not properly managed, it can create a nuisance for the patients, staff and visitors at the hospital and can contaminate the soil.

The unmitigated impacts related to solid waste management caused by the project are characterized as follows:

Nature:	Direct to indirect
Duration:	Medium-term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Certain
Consequence:	Moderate
Impact significance:	Medium

Mitigation Measures:

Solid Waste Management will also be an important issue during the operational phase of the Nawaz Sharif Institute of Cancer Treatment and Research Project.

- A solid waste management facility will be established where the solid waste will be collected, stored, and disposed of.
- It will be ensured that the collection of the solid waste is made separately from the infectious solid waste. The solid waste will be collected in polyethene bags.
- A storage room or space will be designed where the collected solid waste will be stored for no more than 24 hours.
- The stored waste will be transported to a designated disposal site by the LWMC for final disposal.

Residual Impacts

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

7.5.2 Hospital Waste Management

The infectious waste generated from the hospital will need to be properly managed. If the infectious waste is not properly managed, it will cause disease among the patients, staff and the people living in the surrounding.

The unmitigated impacts related to hospital waste management caused by the project are characterized as follows:

Nature:	Direct to indirect
Duration:	Long-term
Geo extent:	Local
Reversibility:	Irreversible
Likelihood:	Certain
Consequence :	High
Impact significance:	High

Mitigation Measures:

Hospital Waste Management will be an important issue during the operational phase of the Nawaz Sharif Institute of Cancer Treatment and Research Centre Project.

- The hospital waste will be categorized into two different groups, i.e., infectious waste and non-infectious waste.
- These wastes will be segregated at the source by a designated team at the hospital.
- The workers who will be responsible for the collection and handling of hospital waste will be provided with all the Personal Protective Equipment.
- The infectious wastes will be stored in a yellow bag for not more than 24 hours.
- The infectious waste will be handed over to the contractor for proper disposal.
- The non-infectious waste will be disposed of at a designated disposal site by the LWMC.

Residual Impacts

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

7.5.3 Public Health and Safety Hazards

During the operational phase of the proposed project, infectious waste will be generated from the hospital, which will need proposal disposal.

The workers who are in direct contact with the infectious hospital waste could be affected if the personal safety measures are not ensured.

The health hazards for staff are by far the most significant potential risk associated with the healthcare facility operation.

Safety hazards in healthcare facilities are generally associated with the handling of sharps (needles, cutters), gases, and other similar equipment. Open burning of hospital waste also poses safety risks for the staff carrying out this activity. These hazards include the risk of cuts, pricks, gas poisoning, burning, and other bodily injuries. The healthcare facility staffs, as well as the patients, are susceptible to these safety hazards.

The unmitigated impacts related to the safety hazards; public health, and nuisance are characterized as follows:

Nature:	Direct and indirect
Duration:	Short to medium term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Likely
Consequence:	Major
Impact significance:	High.

Mitigation Measure

In order to ensure a safe and healthy environment, the infectious hospital waste storage facility needs to carry out the following measures:

- The infection control protocol² will be strictly implemented to minimize health risks for the staff and patients.
- Proper management of hospital waste can minimize the risks both within and outside healthcare facilities. The first priority is to segregate wastes, preferably at the point of generation, into reusable and non-reusable, infectious and non-infectious components.
- Other important steps are the institution of a sharps management system, waste reduction, avoidance of infectious substances whenever possible—ensuring worker safety, providing secure methods of waste collection and transportation, and installing safe treatment and disposal mechanisms.
- Strict compliance with the procedures specified in the Punjab Hospital Waste Management Rules, 2014 (and other similar standards), in close coordination with the infection control protocol mentioned above.
- Infectious Hospital waste will be incinerated on a daily basis; if not, the infectious hospital waste (yellow bag) will not be stored for more than 24 hours.
- The infectious waste storage facility will be marked properly, and unauthorized personals will not be allowed there.
- While dealing with the storage facility, workers will wear personal protective equipment like a gas mask, gloves, safety shoes etc.
- Housekeeping around and inside the incinerator facility area will be ensured.
- Vaccination of the staff, particularly for Hepatitis A and B and tetanus.
- It will be ensured that a reliable and safe drinking water source is available at the facility. Water will be periodically tested against the national standards for drinking water.
- Thick/puncture resistant plastic bags to collect Hospital Waste and rigid/puncture-proof boxes to dispose of needles/other sharps will be used.
- Accidental events will be reported and recorded to avoid future accidents.

Residual Impacts

There will be a moderate level of the residual impact of safety hazards associated with the operational activities.

² A set of 13 infection control protocols have recently been prepared under the Infection Control Management Project, National MNCH Program.

The residual public health and nuisance issues will be quite negligible after the effective implementation of the mitigation measures.

7.5.4 Traffic Management

During the operational phase of Nawaz Sharif Institute of Cancer Treatment and Research Project, the movement of vehicles may increase traffic congestion at Pine Avenue Road and Defence Road.

The characterization of the unmitigated impacts associated with vehicular traffic is as follows:

Nature:	Direct
Duration:	Short Term
Geo extent:	Local
Reversibility:	Reversible
Likelihood:	Certain
Consequence:	Mild
Significance of Impact:	Medium

Mitigation Measures

- A traffic management plan will be prepared to avoid traffic jams/public inconvenience at above mentioned roads.
- The conclusion and recommendations of the TIA Report should be implemented.

Residual Impacts

With the implementation of the mitigation measures, the impact of the Nawaz Sharif Institute of Cancer Treatment and Research Project operation on the traffic congestion will be greatly reduced, and residual impacts are expected to be low to medium.

7.6 Positive Impacts of the Project (Potential Environment Enhancement Measures)

The project will greatly enhance the socio-economic condition as well as the environmental condition of the project area.

7.6.1 Socio-Economical Benefits

The proposed project will act as a catalyst to improve the socio-economic situation of Valencia Town in the long term. The social-economic burden will be decreased due to the availability of better medical services in the area. Time and money of community will be saved, which were expended in other hospitals in Lahore on the treatment of the cancer patient and for boarding and logging of attendants. The social status of the community will rise up.

By providing easy accessibility to a state-of-the-Art hospital facility, the local communities will gain access to prompt health care. This will help in reducing the mortality rate of patients due to the unavailability of proper medical amenities for cancer patients. Such an initiative also encourages balanced growth. This is the goal of the project as well as the government.

7.6.2 Employment

The Project will generate new jobs for technical and non-technical professionals.

7.6.3 Business Opportunity

The proposed project will provide business opportunities in the area thus, boosting up the local economy during the construction phase of the project. Generation of employment in the highly

skilled professional fields to the staff of lower scale of unskilled nature leading to reduction of unemployment and to the job satisfaction to the skilled and needy members of the society.

A large number of employment opportunities will be raised from the establishment of the project. The Medical doctors and paramedics who are trained in this discipline or intended to specialize in this field can make maximum use of training. A large number of gazette and non-gazette posts will be available for employment directly or indirectly.

7.6.4 Environmental Benefits

The proposed project will be a state-of-the-art facility with an infrastructure that would have a minimal negative impact on the environment. It will have no hazardous effect on the environment. On the other hand, the plantation of green belts to the area will provide a healthy environment and relaxation/comfort to the general public.

The establishment of the proposed project will enable a very positive impact on society by providing them with a sign of relief in different segments of society. The impact of this facility will be everlasting to improve stability through the technical assistance of experts.

7.6.5 Summary of major impacts and mitigation measures

Table 7.5: Summary of Impacts and Mitigation measures

Impact	Mitigation Measures
Pre-construction Phase Impacts	
Project Site and Design	The negative environmental impacts related to the land-use change could be effectively minimized by making provisions for the plantation of trees and landscaping within the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore.
Construction Phase	
Air Quality Deterioration	The project site will be monitored throughout to keep a record of air quality and any change in it. Vehicular traffic on unpaved tracks will be avoided as far as possible. For dust control, there will be a sprinkling of water at the project site.
Surface Water and Groundwater Contamination	Protection of the groundwater reserves from any contamination. Excavation will be done under the supervision of the site engineer, so he can decide up to which limit excavation will be done. Prohibit the washing of vehicles and machinery in the project area.
Damage to Faunal Resources	There will be a negligible impact of the proposed project on flora and fauna. The implementation of the plantation plan will benefit the area's flora and fauna as well.
Noise and Vibration	To mitigate these impacts, noise barriers will be constructed in sensitive areas. Construction equipment and vehicles will have exhaust mufflers (silencers) to minimize noise generation.
Safety Hazards, Public Health and Nuisance	There will be proper checks and balance on construction activities. There will be proper control of oil spillage and leakage of vehicles
Sites of Archaeological or Historical Significance	There are no reported sites of archaeological or historical significance on the land acquired for the project.

Impact	Mitigation Measures
Operational Phase	
Safety Hazards, Public Health and Nuisance	<p>The infection control protocols will be strictly followed to minimize health and safety risks.</p> <p>Proper Management of hospital waste will be made.</p> <p>PPEs will be worn while handling infectious hospital waste.</p> <p>Good housekeeping will be ensured.</p> <p>Workers regularly health inspections will be ensured.</p> <p>Accidental events will be reported and recorded.</p>
Solid Waste Management	Solid Waste generated during the operational phase will be collected, segregated, stored, and disposed of at a designated site by LWMC.
Hospital Waste Management	<p>The hospital waste will be categorized into two different groups, i.e., infectious waste and non-infectious waste.</p> <p>The workers who will be responsible for the collection and handling of hospital waste will be provided with all the Personal Protective Equipment.</p> <p>The infectious wastes will be stored in a yellow bag for not more than 24 hours.</p> <p>The infectious waste will be handed over to the contractor for proper disposal.</p> <p>The non-infectious waste will be disposed of along with the solid waste produced in the housing society.</p>
Traffic Congestion	A traffic management plan will be prepared to avoid traffic jams/public inconvenience at Defence Road.

8 Environmental Management Plan

8.1 Introduction

The EIA report has identified the potential impacts that are likely to arise during the construction and operational phase of the project. The EIA report has identified both positive and negative impacts at each stage of the project.

To minimize the effects of adverse impacts, the EIA has recommended mitigation measures. These mitigation measures include the use of alternative technologies, management and physical control or compensation in monetary terms.

The proposed mitigation measures have been based on the understanding of the sensitivity and behaviour of environmental receptors in the project area. The legislation controls that apply to the project and a review of good industry practices while operating in sensitive environments.

For residual impacts (impacts remaining after applying the recommended mitigation measures) and for impacts in which there can be a level of uncertainty in prediction at the EIA stage, monitoring measures have been recommended to ascertain these impacts during the project.

For the effective implementation and management of mitigation measures, an environmental management plan (EMP) has been prepared. The EMP satisfies the requirement of the Punjab Environmental Protection Act, 1997 (amended 2012).

This chapter outlines the implementation mechanism for the EMP and defines the institutional arrangements required for the implementation of the plan. The EMP provides the implementation mechanism for the mitigation measures identified during the EIA.

8.2 Purpose and Objectives of EMP

An Environmental Management Plan (EMP) provides a delivery mechanism to address the adverse environmental impacts of a project during its execution, to enhance project benefits, and to introduce standards of best practices to be adopted for all phases of the project.

The primary objectives of the EMP are to:

- Facilitate the implementation of identified mitigation measures.
- Develop a proper monitoring mechanism and identify requisite monitoring parameters to confirm the effectiveness of the proposed mitigation measures.
- Define the responsibilities of the project proponent, design and supervision consultant and contractor, and provide a means of effectively communicating environmental issues among themselves.

8.3 Management Approach/ Institutional Capacity

8.3.1 Pre-Construction and Construction Phase

The organizational roles and responsibilities are summarized below:

a) Specialized Healthcare & Medical Education Department

The overall responsibility of supervision of all the project activities rests with the project proponent, Specialized Healthcare & Medical Education Department.

M/s Infrastructure Development Authority Punjab will ensure monitoring of environmental compliance at the hospital level.

b) Project Manager

The Project Manager, M/s Infrastructure Development Authority Punjab, will be responsible for environmental compliance during the design and construction phases of the project.

The Project Manager, Infrastructure Development Authority Punjab, will carry out field activities and will be responsible for implementing various mitigation actions prescribed in the EIA report relevant to the contract. The Project Manager will make sure the Environmental Monitoring Plan is being followed and complied with on the project site. The management of Nawaz Sharif Institute of Cancer Treatment and Research will monitor the implementation of the EMP and the EIA report.

c) EPD Punjab

The Environmental Protection Department, Government of Punjab, will periodically visit the project site to monitor the compliance of environmental protection measures detailed in the EIA report.

8.3.2 Organizational Structure and Responsibilities

The organisational structure for the construction phase EMP is described as follows:

Primary Responsibilities: The primary responsibilities for the environmental performance of the project proponent, engineering consultant, and IDAP will be assumed by respective highest-ranking officers during the project.

The Project Manager, Infrastructure Development Authority Punjab, will be responsible for the compliance with the EMP of the project.

Field Management and Quality Control: The construction activities will be carried out in an environmentally sound manner during the construction phase of the project and will be the responsibility of the Site Engineer. He will be responsible for implementing EMP and EIA recommendations.

The Project Manager, Infrastructure Development Authority Punjab, will be responsible for ensuring the overall environmental soundness of all construction activities. He will ensure the implementation of EMP and EIA.

Environmental Monitoring: M/s Infrastructure Development Authority Punjab will make necessary arrangements through Engineering Consultant to monitor the key environmental data during the construction phase.

These will include the quantity of water used, record of waste produced, a record of waste disposal and project-related vehicular traffic.

8.3.3 Operation Phase

Nawaz Sharif Institute of Cancer Treatment and Research Centre will assume the main responsibility for the environmental performance of the Project during its operational phase.

An environmental monitoring plan has been developed as part of the Nawaz Sharif Institute of Cancer Treatment and Research Centre Project. The key environmental parameters, such as solid waste management, infectious hospital waste management, sewerage treatment plant, traffic count, noise, and status of implementation of plantation plan, will be monitored on a regular basis. The environmental monitoring reports will be produced and shared with the concerned authorities if required.

8.4 Legislation and Guidelines

The EIA of the Nawaz Sharif Institute of Cancer Treatment and Research Centre Project has discussed national and international legislation and guidelines that are relevant. The proponent will ensure that his staff and all its assigned design & supervision consultant and contractor are aware of this legislation and guidelines prior to the start of the project activities.

The Punjab Environmental Protection Act, 1997 (2012) is the basic environmental legislation. The act also requires that no person shall emit pollutants or noise in amount, concentration or level that exceeds the Punjab Environmental Quality Standards (PEQS). The PEQS will be followed throughout the construction and operational phases of the project.

8.5 Environmental Improvement Cell and Responsibilities

During the construction phase of the Nawaz Sharif Institute of Cancer Treatment and Research Centre Project, will form up an Environmental Improvement Cell, which will be responsible for the environmental management and supervisory affairs during the construction and operational phases of the project. The responsibilities of the Environmental Improvement Cell are as follows:

- To ensure implementation of all the proposed mitigation measures during the installation, commissioning, and operational phase of the project.
- Capacity building of the staff regarding environmental improvement and awareness.
- To develop operational guidelines and implementation schedules.
- Receiving complaints from the community. To ensure that the proposed project is implemented in an environmentally friendly manner, causing the least harm to the existing environment.

8.6 Approvals

Nawaz Sharif Institute of Cancer Treatment and Research Centre will obtain environmental approvals from the Environmental Protection Department, Government of Punjab.

8.7 Contractual Provisions

Adherence to the requirements of the EMP and EIA in terms of environmental mitigation will be required from the civil works contractor, and thus EMP will form part of their contract agreements signed.

The contractor shall be responsible for implementing the mitigation measures and monitoring various environmental parameters. The IDAP Coordinator shall monitor the contractor's performance with respect to EMP implementation.

8.8 Description of proposed mitigation actions

An Environmental Management Matrix has been developed, which is given in **Table 8.1**.

This Environmental mitigation matrix provides details about potential environmental impacts, where the impact will happen, where the impact will occur, mitigation measures, responsibility and parameters for monitoring.

Table 8.1: Environmental Mitigation Matrix of Installation of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore Project

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
Pre-construction Phase Impacts						
Seismic activities may damage structures, environment, health, and lives	At the Nawaz Sharif Institute of Cancer Treatment and Research, Lahore project site.	After an earthquake with an intensity higher than design.	The project will be designed in accordance with the revised seismic codes	Engineering Consultant	Infrastructure Development Authority Punjab	Land
Construction Phase						
Contamination of soil and groundwater	At the project site.	Construction of campsite and buildings.	<ul style="list-style-type: none"> ▪ A Septic tank with a soakage pit will be constructed for domestic wastewater from the construction camp. The outflow from the septic tank will be connected with the sanitary sewerage system of the hospital to prevent contamination of soil and groundwater. ▪ Vehicles and equipment will not be repaired at the project site. If unavoidable, an impervious shield will be used to avoid any soil contamination. ▪ Waste oils (if any) will be collected in drums and sold to the recycling contractor. ▪ Solid waste will not be disposed of in the open, and on-site burning of solid waste will be not allowed. ▪ Waste bins/containers will be placed at appropriate locations. ▪ The recyclable waste from the project site (such as cardboard, drums, broken/used parts, etc.) will be used as appropriate or to be sold to a recycling contractor. 	Contractor	Infrastructure Development Authority Punjab	Water and Soil

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
			<ul style="list-style-type: none"> All preventive measures will be adopted to control the spill-over of chemicals and other effluents on the ground to protect the soil. 			
Soil Erosion	At the project site.	Construction of campsite and land levelling for construction activities.	<ul style="list-style-type: none"> Campsite area to be kept the minimum. The construction of a campsite in the levelled area will minimize disturbance to the soil. Construction activities are carried out in a manner to minimize soil erosion. Land clearing, levelling and grading be minimized. The exposed surface will be re-surfaced and stabilized as soon as possible. Existing pathways and access roads will be used as much as possible. Appropriate slope stabilization measures will be taken as per the design (i.e., Stone pitching). Temporary measures, such as the construction of temporary walls reinforced with brick lining bordering the construction areas to contain debris and spoil, will also be undertaken to avoid soil erosion and water contamination. The hazardous waste will be kept separate and handled according to the nature of the waste. While storing, hazardous waste will be marked. 	Contractor	Infrastructure Development Authority Punjab	Land
Air Quality Deterioration	At the project site	Construction of campsite and buildings	<ul style="list-style-type: none"> Construction machinery and vehicles will be kept in good working condition and properly tuned in order to minimize exhaust emissions. Fugitive dust emissions will be minimized by spraying water on the soil, where required and appropriate. Vehicular traffic on unpaved tracks will be avoided as far as possible. 	Contractor	Infrastructure Development Authority Punjab	Air Quality Report

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
Ground Water Quality	At the project site	Construction of campsite and buildings	<ul style="list-style-type: none"> The solid waste generated will be reused where possible; if not reused, they will be disposed of at the hospital designated solid waste disposal site from where the municipal committee will take it. 	Contractor	Infrastructure Development Authority Punjab	Water Quality Report
Loss of Vegetation	At the project site	Construction of campsite and buildings	<ul style="list-style-type: none"> Removal of vegetation cover will be kept at a minimum. Un-necessary clearing will be avoided. Tree plantation will be carried out after the completion of construction activities. The construction workforce will be provided with LPG as cooking and heating (if required) fuel. The burning of fuelwood will be strictly prohibited. 	Contractor	Infrastructure Development Authority Punjab	Plantation plan implementation
Damage to Wildlife	At the project site	Construction of campsite and buildings	<ul style="list-style-type: none"> The measures to prevent soil and water contamination will forestall any adverse impact on the faunal resources of the area. The measures to enhance natural vegetation in the area will benefit the area's fauna as well. The movement of construction machinery and equipment will be restricted to work areas only to avoid necessary disturbance of the wildlife. 	Contractor	Infrastructure Development Authority Punjab	Ambient Air and Noise Monitoring
Noise and Vibration	At the project site	Construction of campsite and buildings	<ul style="list-style-type: none"> Construction equipment and machinery will have exhaust mufflers (silencers) to minimize noise generation. Noise construction activities will be carried out only during normal working hours. It will be ensured that the generator, vehicles and other potentially noisy equipment used are in good condition. The use of pressure horns will not be allowed inside the hospital premises. Nighttime traffic and construction activities will be avoided. The Medical Superintendent 	Contractor	Infrastructure Development Authority Punjab	Noise Monitoring

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
			of the hospital will be taken in confidence if such work is unavoidable.			
Health and Safety of the workforce	At the project site	Construction of campsite and buildings	<ul style="list-style-type: none"> ▪ All occupational and health, and safety requirements for the workforce will be adhered to. ▪ Special safety measures will be adopted during the lifting and unloading of the infectious waste. ▪ Protected sheet/fencing will be fixed around the construction site. Unauthorized access to the construction area will not be allowed. ▪ To minimize the occupational health hazard, proper personal protective gear, i.e. masks, shall be provided to the workers who are engaged in dust generation activity. 	Contractor	Infrastructure Development Authority Punjab	Health and Safety Environment Report
Public Health, Safety and Nuisance	At the project site	Construction of campsite and buildings	<ul style="list-style-type: none"> ▪ The hospital staff will be educated regarding the safety hazards at the project site. ▪ Defensive driving practices will be inculcated in the project drivers through training. ▪ Vehicle speeds of 20 km/hr at the project site will be implemented. ▪ Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance caused by light pollution. 	Contractor	Infrastructure Development Authority Punjab	Public Health and Safety
Site Restoration	At the project site	Upon completion of construction activities	<ul style="list-style-type: none"> ▪ All equipment and machinery at the project site will be demolished. ▪ All temporary structures will be demolished, the land levelled and re-contoured to the original condition or better. All debris and any other material will be removed from the site. 	Contractor	Infrastructure Development Authority Punjab	Demobilization of contractor
Operational Phase						
Hospital Waste Generation	At the hospital	During Operation and maintenance period	<ul style="list-style-type: none"> ▪ The infection control protocol will be strictly implemented to minimize health risks for the staff and patients. 	Specialized Healthcare & Medical	Specialized Healthcare & Medical	Infectious solid waste

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
			<ul style="list-style-type: none"> ▪ The hospital waste will be properly managed. ▪ The infectious waste storage facility will be marked properly, and unauthorized personals will not be allowed there. ▪ While dealing with the waste, workers will wear personal protective equipment like a gas mask, gloves, safety shoes etc. ▪ Thick/puncture resistant plastic bags will be used to collect Hospital Waste and rigid/puncture-proof boxes to dispose of needles/other sharps. 	Education Department.	Education Department.	
Traffic Congestion	Defence Road	During Operation and maintenance period	<ul style="list-style-type: none"> ▪ Traffic management plan to be developed. ▪ Traffic control measures, including speed limit, are to be enforced. ▪ Mass awareness regarding traffic rules 	Specialized Healthcare & Medical Education Department.	Specialized Healthcare & Medical Education Department.	Traffic
Public Health and Safety hazards	At the hospital	During Operation and maintenance period	<ul style="list-style-type: none"> ▪ The infection control protocol will be strictly implemented to minimize health risks for the staff and patients. ▪ Proper management of hospital waste can minimize the risks both within and outside healthcare facilities. ▪ Strict compliance with the procedures specified in the Punjab Hospital Waste Management Rules, 2014 (and other similar standards), in close coordination with the infection control protocols mentioned above. ▪ Infectious Hospital waste will be incinerated on a daily basis; if not, the infectious hospital waste (yellow bag) will not be stored for more than 24 hours. ▪ The infectious waste storage facility will be marked properly, and unauthorized personals will not be allowed there. ▪ While dealing with the storage facility, workers will wear personal protective 	Infrastructure Development Authority Punjab	Specialized Healthcare & Medical Education Department.	Public Health and Safety Hazard

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
			equipment like a gas mask, gloves, safety shoes etc. <ul style="list-style-type: none"> ▪ Housekeeping around and inside the incinerator facility area will be ensured. ▪ Vaccination of the staff, particularly for Hepatitis A and B and tetanus. ▪ Thick/puncture resistant plastic bags to collect Hospital Waste and rigid/puncture-proof boxes to dispose of needles/other sharps will be used. 			

8.9 Solid Waste Management Plan

Construction Phase: A number of solid waste bins will be placed at the construction site for the collection of solid waste.

The civil work contractor will be responsible for the disposal of solid waste generated by the project.

Empty chemical drums, iron cuttings, etc., will be collected separately at the project site within an area marked as "Scrap Yard". After a suitable time frame, scrap will be sold to a recycling contractor.

The construction waste generated will be recycled to the extent possible. Open burning of solid waste will not be allowed.

Operational Phase: Two categories of solid waste will be generated during the operational phase of the proposed project.

- Municipal Solid Waste: The municipal solid waste generated by the hospital will be dumped at the hospital waste storage area from where the municipal committee will collect it.
- Infectious Waste: The infectious waste produced will be collected and stored in yellow bags for not more than 24 hours. The infectious wastes will be disposed of by using an incinerator or microwave shredder.

8.10 Hospital Waste Management Plan

The main categories of EPA Punjab Hospital Waste Management Rules 2014 include:

- **"Hospital waste"** includes both risk waste and non-risk waste.
- **"Infectious waste"** means waste contaminated by any type of pathogens such as bacteria, viruses, parasite or fungi and includes cultures from laboratory work, waste from surgeries and autopsies, waste from infected patients, discarded or disposable materials and equipment which have been in contact with such patients and infected animals from laboratories.
- **"Pathological waste"** includes tissues, organs, body parts, fetuses, blood and body fluids.
- **"Pharmaceutical waste"** includes expired or unused pharmaceutical products, spilled contaminated pharmaceutical products, surplus drugs, vaccines or sera, and discarded items used in handling pharmaceuticals such as bottles, boxes, gloves, masks, tubes, or vials;
- **"Radioactive waste"** includes liquid, solid and gaseous waste contaminated with radionuclides generated from in-vitro analysis of body tissue and fluid, in-vivo body organ imaging and tumour localization, and investigation and therapeutic procedures.
- **"Risk waste"** means infectious waste, pathological waste, sharps, pharmaceutical waste, genotoxic waste, chemical waste, and radioactive waste.
- "sharp" includes whether infected or not, needles, syringes, scalpels, infusion sets, saws and knives, blades, broken glass, and any other item that could cut or puncture; and (r) "waste management" includes waste segregation, waste collection, waste transportation, waste storage, waste disposal and waste minimization and reuse

- **Sharps:** Sharp waste. e.g., needles, infusion sets, scalpels, knives, blades, broken glass that may cause punctures and cuts. This includes both used and unused sharps.
- **Genotoxic Waste:** Waste containing substances with genotoxic properties. e.g., waste containing cytostatic drugs (often used in cancer therapy), genotoxic chemicals.
- **Chemical waste:** Waste containing chemical substances, e.g., laboratory reagents; film developer, disinfectants (disinfectants) that are expired or no longer needed solvents
- **Waste with high content of heavy metals:** Batteries, broken thermometers, blood-pressure gauges, etc.
- **Pressurized containers:** Gas cylinders, gas cartridges, aerosol cans.
- **General solid waste:** Waste generated from offices, kitchens, packaging material from stores.
- **Microorganisms:** Any biological entity, cellular or non-cellular capable of replication or of transferring genetic material.

Responsibility for waste management:

Every hospital shall be responsible for the proper management of the waste generated by it till its final disposal in accordance with the provisions of the Act and the rules 16 to 22. These constitute a grave risk if they are not properly treated or disposed of or are allowed to mix with other municipal waste. Where potentially hazardous substances are being disposed of, a chain of custody document should be kept with the environmental register as proof of final disposal.

Waste Management Plan (WMP):

A WMP shall be prepared by a WM Officer for approval by the WM Team and shall be based on internationally recognized environmental management standards such as the International Organization for Standardization 14000 series.

The WMP shall include:

- a plan of the hospital showing the waste disposal points for every ward and department, indicating whether each point is for risk waste or non-risk waste, and showing the sites of the central storage facility for risk waste and the central storage facility for non-risk waste.
- Details of the types, numbers and estimated costs of containers, waste bags and trolleys required annually.
- Timetables include the frequency of waste collection from each ward and department.
- Duties and responsibilities for each of the different categories of the hospital. Staff members who shall generate hospital waste and be involved in the management of the waste.
- An estimate of the number of staff members required for waste collection.
- Procedures for the management of waste require special treatment, such as autoclaving before final disposal.
- Contingency plans for storage or disposal of risk waste in the event of breakdowns of incinerators or of maintenance or collection arrangements.
- training courses and programmes on waste management; and
- Emergency procedures.

- Representatives of a local MC responsible for the collection and disposal of waste from the hospital shall be consulted in preparing and finalization of the WMP.
- The WMP shall be regularly monitored, reviewed, and revised and updated by the Waste Management Team as and when necessary.

Table 8.2 shows Hospital Solid Waste Management and Disposal plan

Table 8.2: Hospital Solid Waste Management and Disposal plan

Component	Actions/recommendations
Waste Minimization, Reuse, and Recycling	<p>Consider practices and procedures to minimize waste generation without sacrificing patient hygiene and safety considerations</p> <p>Use of efficient stock management practices and monitoring e.g.</p> <ul style="list-style-type: none"> • For chemical and pharmaceutical stocks, Small/frequent orders for products that spoil quickly and strict monitoring of expiry dates • Complete use of the old product before new stock is used • Maximization of safe equipment reuse practices, including Reuse of equipment following sterilization and disinfection (e.g., sharps containers)
Waste Segregation	<p>Waste should be identified and segregated at the point of generation.</p> <ul style="list-style-type: none"> • Non-hazardous waste, such as paper and cardboard, glass, aluminium and plastic, should be collected separately and recycled. Food waste should be segregated for composting. • Infectious and/or hazardous wastes should be identified and segregated according to their category using a colour-coded system • Other segregation considerations include the following: Avoid mixing general health care waste with hazardous health care waste to reduce disposal costs; Segregate waste containing mercury for special disposal. Aerosol cans and other gas containers should be segregated to avoid disposal via incineration and related explosion hazard; Segregate health care products containing PVC to avoid disposal via incineration or MW Shredders and subsequent harmful air emissions
On-site Handling, Collection, Transport and Storage	<ul style="list-style-type: none"> • Seal and replace waste bags and containers when they are approximately three-quarters full. Full bags and containers should be replaced immediately. • Identify/label waste bags/containers properly prior to removal. • Transport waste to storage areas on designated trolleys/carts, which should be cleaned/disinfected regularly; Waste storage areas should be located within the facility & sized to the quantities of waste generated, with the following design considerations: <ul style="list-style-type: none"> • Hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply. • Secured by locks with restricted access. • Designed for access and regular cleaning by authorized cleaning staff and vehicles. • Protected from the sun and inaccessible to animals/rodents. • Equipped with appropriate lighting and ventilation. • Segregated from food supplies and preparation areas. • Equipped with supplies of protective clothing, and spare bags/containers • Store mercury separately in sealed and impermeable containers in a secure location. • Establish a yellow room for the storage of infectious waste • Store cytotoxic waste separately from other waste in a secure location. • Store radioactive waste in containers to limit dispersion, and secure behind lead shields.

<p>Transport to Outside facilities for treatment</p>	<p>If the proponent does not have an onsite waste treatment facility now, therefore, during operation, solid waste segregation, collection, and storage shall be the responsibility of the hospital, whereas waste transportation to treatment facility and treatment shall be the work of a contracted biomedical waste handler. Therefore, the proponent shall:</p> <ul style="list-style-type: none"> • Appoint a waste handler who is licensed by NEMA and permitted by the local government to handle, transport, and treat biomedical wastes at approved treatment sites using recommended treatment procedures given by the legal framework and respective government agencies. • The contractor shall transport waste destined for off-site treatment facilities according to the guidelines for transport of hazardous wastes / biomedical wastes in EPA HWM Rules 2014. • Packaging for infectious waste should include an inner, watertight layer of metal or plastic with a leak-proof seal. Outer packaging should be of adequate strength and capacity for the specific type and volume of waste; • Packaging containers for sharps should be puncture-proof; • Waste should be labelled appropriately, noting the substance class, packaging symbol (e.g. infectious waste, radioactive waste), waste category, mass/volume, place of origin within the hospital, and final destination; • Transport vehicles should be dedicated to waste and the vehicle compartments carrying waste sealed.
<p>Specific Waste Management Procedures related to Radioactive Waste</p>	<ul style="list-style-type: none"> ▪ The containers should also clearly be labeled with the universal “radioactive symbol”, the type of radioisotope inside, as well as the date of the generation of the waste, so the duration of its half-life can be followed more easily.³ ▪ The collected radioactive waste is disposed as per the following:⁴ <ol style="list-style-type: none"> 1) Dilute and Disperse 2) Delay and Decay 3) Concentrate & Contain (Rarely used) <p>1) Dilute and Disperse</p> <ul style="list-style-type: none"> • Low Activity Solid Waste: <ul style="list-style-type: none"> ○ Must be disposed of as ordinary hospital waste if: <ul style="list-style-type: none"> ▪ The activity does not exceed 1.35 microcuries (50 KBq). ▪ The overall package concentration does not exceed 135 microcuries/m³ (5 MBq/m³). ○ Examples include vials, syringes, cotton swabs, and tissue papers. • Liquid Radioactive Waste: <ul style="list-style-type: none"> ○ Should be disposed of into the sanitary sewerage system with adequate water flushing if the activity is below microcurie levels. ○ The total discharge must not exceed prescribed limits. <p>2. Delay and Decay</p> <ul style="list-style-type: none"> • Medium Activity Radioactive Waste: <ul style="list-style-type: none"> ○ Must be stored if half-lives are less than a month. ○ The storage room should be properly ventilated with an exhaust system. ○ Lead shielding of appropriate thickness (10 HVL) must be used to prevent radiation leakage. ○ Waste should be stored for a minimum period of 10 half-lives to reduce activity to 0.1% of the initial level.

³ <https://celitron.com/en/blog/how-to-handle-radioactive-medical-waste-disposal-in-hospitals>

⁴ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3068798/>

	<ul style="list-style-type: none"> ○ The residual activity must be monitored before final disposal as low activity waste. <p>3. Concentrate and Contain</p> <ul style="list-style-type: none"> • High Activity and Long Half-life Waste: <ul style="list-style-type: none"> ○ Must be used when delay and decay methods are impractical. ○ Waste should be collected in suitably designed and labeled containers. ○ Must be buried in exclusive burial sites approved by the competent authority. ○ This method should be used rarely, as such waste is uncommon in hospital settings.
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8.11 Wastewater Management Plan

During the operational phase of Nawaz Sharif Institute of Cancer Treatment and Research Centre, various types wastewater will be generated:

- Blackwater (sewage) will be generated from the washrooms and kitchen of the hospital, which will contain a high concentration of faecal matter and urine, food residues, and toxic chemicals.
- Greywater (sullage) will be generated from washing, bathing, laboratory processes, laundry or technical processes such as cooling water or the rinsing of X-ray films.
- Stormwater will be generated from the hospital roofs, grounds, and paved surfaces.

The wastewater generated should be treated by taking into consideration the following wastewater management plan:

- Two separate collection systems for sewage and stormwater should be constructed where the wastewater will be collected.
- The medical laboratory waste should be pretreated by using acid-base neutralization, filtration or autoclaving options.
- The blackwater should be pretreated with lime milk (hydrated calcium oxide or calcium hydroxide).
- Blood should be pretreated by using a thermal method or disposed of directly to the septic tank if safety measures are used.
- After pretreatment, the heavy solids should be removed from the wastewater through primary treatment processes, i.e., sedimentation.
- After the primary treatment, the wastewater should be treated by using indigenous bacteria to remove the dissolved and suspended biological matter.
- Finally, the wastewater should be treated with chlorine to further reduce the remaining pathogens, suspended solids and other chemical contaminants.
- After the treatment, sludge will be produced, which should be treated in the anaerobic digester or used for composting.
- The treated water should be released in any water body or should be used for horticulture purposes.

8.12 HSE Management Plan

- Health Safety and Environment (HSE) induction/orientation will be provided to the workforce at the project site.
- Assembly points will be established for the gathering of the workforce regarding the daily HSE Toolbox Talk at the project site.
- HSE Toolbox Meeting will be held by HSE Manager on a weekly basis.
- Special education sessions will be conducted properly at the project site.
- The daily walkthrough will be conducted at the project site.
- All the Mandatory PPE's (Safety Helmet, Safety Jacket, Safety Shoes, Coverall, Full body Harness, Safety Goggles, Earplug, Earmuff, Dust mask/Special, Safety Gloves, Masks etc.).
- Proper and safe scaffolding will be provided at the site for safe work at height.
- All the construction machinery will be inspected properly at the site.
- All cranes and lifting gears will be inspected/checked on a regular basis.
- Inspection and Tagging system will be maintained at the project site.
- Safety signage will be provided at the project site.
- Fire posts will be established at the project site at an easy approach location.
- HSE Signboard will be installed at the project site for emergency response.
- Regular First Aid Center, along with all required medicines 24/7, will be available at the project site.

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

- **First Aid Boxes:** First aid boxes will be provided at the construction sites to cope up the emergency situations. Usually, a typical first aid box mainly contains antibiotics, basic medicines, cotton, bandages, sunny plast, healing balms, pyodine, spirit, painkiller, etc.
- **Dispensaries:** Medical facilities will be established by the contractor. A dedicated room will be established as a dispensary and first aid services at the construction site.
- **PPEs:** The site Engineer and HSE Manager will be responsible for providing PPEs to all workers.
- **Safety Signs:** Relevant safety signboards will be displayed on the worksites to make aware of / train workers about safety rules. Mainly safety signs include signs of speed limits, electric spark, etc.
- **TBTs:** Toolbox Talks (TBTs) will be delivered on a regular basis, and when a new team of workers start a new activity like shuttering, steel fixing, steel cutting, steel bending, scaffolding, concrete pouring, mechanical works, electrical works, etc. at sites to promote safety culture.
- **Barricading:** The contractor will put up barricade tape at all the active work sites. Hard barricading (scaffolding pipes) will be used to cover exposed areas where excavation is more than 10 feet.

- Training: Safety training will be delivered by the HSE Manager to achieve its objectives. Training will be conducted for capacity building of employees/workers/labour / sub-contractors to make them well effective to respond to any kind of emergency situation.

The breakup cost for the safety of workers is described in **Table 8.3**.

Table 8.3: Estimated Cost for the Implementation of Environmental Monitoring Plan for Establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore

Sr No	Item	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
Personal Protective Equipment (A)				
1	Dust Masks	16,320	10	163,200
2	Safety Shoes	360	2000	720,000
3	Gloves	8160	200	1,632,000
4	First Aid Box	2	3,000	6,000
5	Ear Plugs	720	50	36,000
6	Safety Helmets	360	1000	360,000
7	Safety Jackets (Hi Vis)	720	500	360,000
Others (B)				
8	Provision of Dust Bins	30	500	15,000
9	Warning Tape	50	500	25,000
10	Safety Cones	20	1000	20,000
11	Safety Sign Boards	40	1500	60,000
12	Raincoat	120	1000	120,000
Total (A + B)				3,517,200

- Time Required for Construction Period = 34 months
- Number of Labor Required during peak Construction = 120
- Personal Protective Equipment PPEs
- Dust Mask: 1 Dust Mask to be used in a week by each labourer
- Safety Shoes: 1 Safety shoe for 1 year for each labourer
- Gloves 2 pairs of gloves for each labourer for each month
- First Aid Box 1 first aid box for every 50 labourer
- Ear Plug 1 set of the earplug to be used for 6 months for each labourer
- Safety Helmet 1 safety helmet for each labourer for 12 months
- Safety Jackets 2 safety Jackets (Hi-Vis) for each labourer for 12 months
- Dust Bin: Rough estimate
- Water Sprinkling the whole construction period

- Rain Cost: 1 Raincoat for each labourer

8.13 Traffic Management and Construction Material Transportation Plan

According to the traffic impact assessment report:

- The construction material will be transported to the project site via Defence Road as per requirement and ease of access.
- 10 km/hr speed limited will be being maintained at the project site.
- All the light vehicles, cars, jeeps etc., are being parked in a designated area.
- Speed breakers will be followed properly.
- The experienced and license holders (drivers and operators) will be hired for transportation.
- All the heavy machinery will be checked properly and inspected on a regular basis.
- Speed limit signboards have been installed at the project site.
- All the headlights, backlights, indicators etc., of vehicles and machines, will be checked and maintained regularly.
- All the warning lights, reverse back alarms will be maintained properly.

8.14 Emergency Preparedness, Response and Site Evacuation Plan

- The contractor will always be ready for response in any kind of emergency at the project site.
- Special assembly points will be established at the project site (offices and site).
- The emergency siren will be installed at assembly points.
- Contact numbers of the emergency response team will be circulated at the project site.
- Close coordination will be carried out with 1122 in the case of any serious injury/accident.
- Close coordination will be carried out with all law enforcement agencies (police) in case of an aggressive mob of people in the shape of any kind of protest.
- An emergency response drill will be carried out once a month for the provision of awareness to the workforce at the project site.
- First Aid Box will be available at the project site around the clock.
- Experienced and qualified paramedic staff will be available at First Aid Post at the site under the command of the HSE Manager.
- All the new entrants will be oriented by HSE Manager regarding the required awareness towards the infectious and risky situation and control.
- The entire workforce will be provided with all mandatory PPEs for a risk-free environment.
- Special in-house training (TBT) will be conducted by the HSE Manager regarding awareness of any emergency condition and control.
- Proper water sprinkling will be carried out at the service road along with the project site for dust control to avoid any hazardous and risky situation which a cause of transport emergency can be.

8.15 Fire Fighting Plan

- The construction site will be equipped with fire extinguishers as well as communication equipment for contacting the appropriate emergency response teams.
- At all the project sites, emergency alarms will be installed. Persons will be nominated to ring the emergency alarm in case of an emergency situation or any emergency risk.
- All the workers will be trained and well communicated on how to respond to the emergency alarm and reach the assembly point immediately. Workers will be trained to respond to an emergency alarm, as discussed below:
- If the alarm rings for 20 seconds, only once, then it is a less severe emergency; if it rings for 20 seconds thrice after intervals, then it is medium to a severe high emergency, but it can be much severe, and If it rings for 60 seconds or more continuously, then the emergency situation is most difficult so, everyone should respond to it immediately, evacuate the workplace and move towards the assembly point.
- Proper evacuation routes will be designated, nominated, and well communicated to all. All the workers will be trained to follow the particular evacuation routes and reach the assembly point in case of an emergency situation.

8.16 Plantation Plan

The plantation plan recommends planting 3,000 mature plants having 4-5 feet height and 1.0 to 1.5 inches stem diameter at the Nawaz Sharif Institute of Cancer Treatment and Research Centre project.

The proponent of the project will ensure the provision of staff and budget for the implementation of the plantation plan.

The practice of plantation of mature plants will be an effective compensation for carbon sequestration against the expected damages to the environment during the operational phase. The plantation of recommended indigenous species will be carried out at a distance of 8 feet, having a distance of 8-10 feet among rows in case of multiple rows.

The plantation of recommended indigenous species will be carried out at a distance of 8 feet, having a distance of 8-10 feet among rows (in case of multiple rows).

The plantation plan consists of trees, shrubs and flowering plants, which are recommended for the Nawaz Sharif Institute of Cancer Treatment and Research Project.

Trees (20 ft. and above): A total of 10 trees comprising of shady, flowering, fruit trees have been recommended for plantation at Nawaz Sharif Institute of Cancer Treatment and Research, Lahore.

Table 8.4: Recommended outdoor Trees for Proposed Project

Sr.#	Botanical Name	Local Name	Description
1	<i>Azadirachta indica</i>	Neem	A deciduous, shady tree has medicinal importance
2	<i>Bombax ceiba</i>	Seemal	A large flowering tree having good timber
3	<i>Cassia fistula</i>	Amaltas	A tree has twice blossomed in a year with a beautiful yellow flower

4	<i>Eugenia jambolana</i>	Jaman	It is an evergreen fruit tree large size fruit tree with good quality timber wood
5	<i>Mangifera indica</i>	Aam	A fruit tree with a large shade
6	<i>Moringa oleifera</i>	Sohanjna	A medicinal plant in arid and semi-arid regions has a lot of nutritious value
7	<i>Psidium guajava</i>	Amrood	A fruit plant which can easily be grown in a semi-arid climate

Shrubs (under 20 ft.): A total of 6 evergreens, flowering, and ornamental shrubs having a variety of colours have been recommended for gardens and landscaping at Proposed Project.

Indoor Plants: A total of 8 indoor plants have positive psychological effects; indoor air purification purpose has been recommended in Proposed Project.

Table 8.5: Recommended indoor plants for Proposed Project

No.	Scientific Name	Common Name	Description
1	<i>Epipremnum aureum</i>	jade plant or money plant	An evergreen flowering vine
2	<i>Asparagus aethiopicus</i>	Asparagus Fern	An indoor ornamental plant
3	<i>Saintpaulia</i>	African violet	Indoor plant for decorative purposes
4	<i>Ficus elastica</i>	Rubber tree	An ornamental indoor plant
5	<i>Spathiphyllum</i>	Spath/ peace lilies	Evergreen herbaceous perennial plants with large leaves
6	<i>Aglaonema hybrids</i>	Chinese evergreen plant	An adaptable plant, and grow in low light and dry air
7	<i>Phoenix roebelenii</i>	Pygmy Date Palm	Medium-size, slow-growing shady plant
8	<i>Aphelandra squarrosa</i>	Zebra Plant	Exotic, emerald, green leaves with dramatic white veins

Plantation Plan Cost

A total number of 3,000 trees will be planted. The cost of plantation includes the cost of equipment, initial planting (including restocking during the first 2 years) and maintenance cost for the first four years of plantation. The total estimated cost of implementation of the plantation plan is Rs. 2,477,000. The Cost of raising one plant and its maintenance for 3 years is Rs. 825.

The tentative cost of equipment is given below in **Table 8.6**.

Table 8.6: Tentative Cost of Equipment

Sr.	Equipment	Numbers	Cost in PKR
1	Grub hoe (earth digging tool) and others	Lump-sum	100,000
Total cost of equipment			100,000

The cost break-up of plantation and maintenance for a period of four years is mentioned in **Table 8.7 to Table 8.11**.

Table 8.7: Estimated Cost of Unit Plantation (3,000 Plants) for 1st Year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
1	Clearance of Site (3,000 plants)	3,000	5/plant	15,000
2	Layout/ unit	3,000	2/plant	6,000
3	Digging of Pits	3,000	50/pit	150,000
4	Average cost per unit plant	3,000 plants	215/plant	645,000
5	Carriage/unit of plants from Nursery to Site including loading/unloading	3,000 plants	10/plant	30,000
6	Plantation of plants with ball of earth/unit	3,000	30/plant	90,000
7	Addition of Manure 1 cft. / pit	3,000 cft.	Lump Sum	50,000
8	Hand watering 100 times Approx. x3,000=300,000	300,000	1/watering	300,000
9	Weeding 4 times 3,000x4=12,000	12,000	5/plant	60,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	50,000
Total				1,396,000

Table 8.8: Estimated Unit Cost of Plantation of (600 Plants) & Maintenance for 2nd Year in case of 20% Mortality

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
3	Re-Digging of Pits	600	50/pit	30,000
4	Average cost per unit plant	600 plants	215/plant	129,000
5	Carriage/unit of plants from Nursery to Site including loading/unloading	600 plants	10/plant	6,000
6	Plantation of plants with ball of earth/unit	600	30/plant	18,000
7	Addition of Manure 1 cft. / pit	1,000 cft.	Lump Sum	25,000
8	Hand watering 100 times Approx. x3,000=300,000	300,000	1/watering	300,000
9	Weeding 4 times 3,000x4=12,000	12,000	5/plant	60,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	50,000
Total				618,000

Table 8.9: Estimated Cost of Plantation Unit (300 Plants) & Maintenance for 3rd Year

Sr. #	Activity	Quantity	Rate (PKR)	Amount (PKR)
3	Re-Digging of Pits	300	50/pit	15,000
4	Average cost per unit plant	300 plants	215/plant	64,500
5	Carriage/unit of plants from Nursery to Site including loading/unloading	300 plants	15/plant	4,500
6	Plantation of plants with ball of earth/unit	300	30/plant	9,000
7	Addition of Manure 1 cft. / pit	1,000 cft.	Lump Sum	25,000
8	Hand watering 50 times Approx. x3,000=150,000	150,000	1/watering	150,000
9	Weeding 3 times 3,000x3=9,000	9,000	5/plant	45,000
10	Miscellaneous/ Contingencies	Nil	Lump Sum	50,000
Total				363,000

Table 8.10: Total Cost of Plantation Plan for Four years

Activity	Amount (PKR)
Estimated Cost of Unit Plantation (2,000 Plants) for 1 st Year	1,396,000
Estimated Unit Cost of Plantation of (400 Plants) & Maintenance for 2 nd Year in case of 20% Mortality	618,000
Estimated Cost of Plantation Unit (200 Plants) & Maintenance for 3 rd Year	363,000
Total	2,377,000

Table 8.11: Final Cost per Tree Planted

Activity	Amount (PKR)
Cost for maintenance of cultivated plants for 4 years	2,377,000
Cost of equipment	100,000
Total cost	2,477,000
Cost for raising one plant and its maintenance for 3 years	825

8.17 Restoration and Rehabilitation Plan

Restoration of the project site and associated facilities, including access tracks, is of utmost importance. Improper disposal of the waste left at the end of the construction activities would lead to extensive disturbance to the environment.

Following measures will be adopted for site restoration and rehabilitation:

- All equipment and machinery at the project site will be de-mobilized.
- All waste at the project site will be disposed of according to the requirement of EIA.
- The Septic tank with soakage pit will be properly dismantled.
- All temporary concrete structures at the project site will be dismantled, and construction and demolition material will be handed over to the concerned contractor for reuse or disposal.
- All the unnecessary pits at the project site will be backfilled.

8.18 Environmental Monitoring

IDAP will make necessary arrangements to monitor the key environmental data during the construction phase and the management of Nawaz Sharif Institute of Cancer Treatment and Research during the operational phase of the project. These will include the quantity of water used, a record of waste produced, a record of waste disposal, and project-related vehicular traffic.

The Project coordinator, Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, will monitor project activities while working in the project area. He will keep a record of all non-conformances observed and report these along with actions for further action. He will also have to report any impacts anticipated along with his recommendations for further action.

8.19 Environmental Monitoring Plan

Environmental Monitoring is normally undertaken during both the construction and operational phases of the project to ensure the effectiveness of the proposed mitigation measures.

In order to respond to unanticipated environmental concerns at an early stage and to determine the accuracy of impact, predictions are also required. Specific monitoring programs are outlined below as well as responsibilities for the collection and analysis of data and the reporting requirements.

The various purposes of the environmental monitoring plan are:

- To evaluate the effectiveness of mitigation measures.
- To respond to the unanticipated environmental impacts when the project is under implementation.
- To make regulations and improve management and environmental controls based on the monitoring data. Environmental Protection and Climate Change Department, Lahore is entrusted with the overall responsibility of monitoring the environment in Lahore.

An Environmental Monitoring Plan for the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, has been provided in **Table 8.12**. The plan will be used as a management and monitoring tool for the implementation of the mitigation measures required by the EIA. The plan entails the required mitigation measures recommended in the EIA.

Table 8.12: Environmental Monitoring Plan for Establishment of Nawaz Sharif Institute of Cancer Treatment and Research Centre, Lahore

Environmental Component	Project Phase	Parameters	Locations	Frequency	Standards	Implementation	Supervision
Construction Phase							
Air Quality	Construction	SO ₂ , NO, NO ₂ , O ₃ , SPM, PM ₁₀ , PM _{2.5} , Pb and CO	At one location in Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, the Project site	PM ₁₀ , for continuous 8 hours, on a quarterly basis	WHO/USEPA guidelines, PEQS	Civil Work Contractor	M/s Infrastructure Development Authority Punjab
Roadside Plantation	Construction	Visual inspection of plant species survival rate and status of maintenance	At sites where the plantation was carried out	(1) One month after the plantation (2) One year after the plantation 1 month, 3 months, 6 months, and 12 months after planting	75 % survival rate	Civil Work Contractor	M/s Infrastructure Development Authority Punjab
Noise Levels	Construction	dB (A)	At a central location in Nawaz Sharif Institute of Cancer Treatment and Research, Lahore	Twice in 8 hours at a selected site on a quarterly basis.	Punjab EPA Ambient Noise standards	Civil Work Contractor	M/s Infrastructure Development Authority Punjab
Water Quality	Construction	pH, BOD, COD, TDS, TSS, DO, coliforms, hardness, nitrate, chloride, sulphate, hydrocarbon,	At two locations, i.e., start and end of the Project site	Quarterly	WHO and PEQS	Civil Work Contractor	M/s Infrastructure Development Authority Punjab
Operational Phase							
Plantation	Operation (First three years)	Visual inspection of plant species survival rate and status of maintenance	At sites where the plantation was carried out	2.5 years after the plantation	75% survival rate	Specialized Healthcare & Medical	Specialized Healthcare & Medical

Environmental Component	Project Phase	Parameters	Locations	Frequency	Standards	Implementation	Supervision
						Education Department	Education Department
Solid Waste Management	Operational phase	Infectious hospital waste	Solid Waste Management facility	Quarterly	PEQS	Specialized Healthcare & Medical Education Department	Specialized Healthcare & Medical Education Department

Key:

- dBA** = decibels (measured in the audible range)
- EPA** = Environmental Protection Authority
- PM10** = Particulate Matter smaller than about 10 micrometres
- ROW** = Right-of-Way
- PEQS** = Punjab Environmental Quality Standards
- SPM** = Suspended Particulate Matter
- TSS** = Total Suspended Solids
- USEPA** = United States Environmental Protection Agency
- WHO** = World Health Organization

Table 8.13: Estimated Cost for the Implementation of Environmental Monitoring Plan for Nawaz Sharif Institute of Cancer Treatment and Research, Lahore

Environmental Monitoring Activities	Units/ No. of Samples	Unit Cost specification	Cost (Rs)
Ambient air quality monitoring Quarterly basis for 34 months	9	@ 60,000 per sample for 24 hr monitoring	540,000
Ambient water quality monitoring Quarterly basis on one location for 34 months	9	@ 20,000 per sample	180,000
Noise levels, the quarterly basis for 34 months	9	@ 5,000 per sample	45,000
Environment , Health Safety Engineer	34 months	@ 50,000	1,800,000
Total			2,565,000

Source: Environmental Consultant Estimates, 2024

8.20 Training Schedule

Training programs are a necessary agenda that has to be implemented to implement the Environmental Management and Monitoring Plan effectively. The Environment, Health and Safety Officer will impart training to the contractor's staff. The key objective of the training program is to ensure that the requirement of EMP is clearly understood and followed throughout the project. The training shall cover the following areas:

- Environmental sensitivity of the project area.
- EMP communication and documentation requirement.
- Vegetation and community issues and their mitigation measures.
- Safe construction practices
- Use of personal protective equipment's (PPEs)
- Environmentally sound construction practices
- Vehicular safety.
- Site restoration requirement.
- Solid Waste Disposal

Infrastructure Development Authority, Punjab will be primarily responsible for providing training to all project personnel. Lump-sum fees of Rs. 1,000,000/= should be kept for the training management plan. Framework for the environmental and social training program is being provided in **Table 8.14**.

Table 8.14: Framework for Environmental & Social Training Program of Establishment of Nawaz Sharif Institute of Cancer Treatment and Research Centre, Lahore Project

Type of Training	Training Description	Period	Duration	Training By	Trainee
Occupational Health and Safety staff	Training should be provided to aware staff to conform to safety codes	Before Commencement of Project Activities	Full day	External Sources	EHS Manager
Environment and Social Laws, Regulations, procedure and guidelines of the government	The training should detail the laws and regulations concerning the environment, Labour laws and compliance with government regulation.	Before Commencement of Project Activities	Full day	External Sources	EHS Staff, Site Supervisors, Site Engineers.
Occupational Health and Safety for workers	Health, safety and hygiene. Proper usage of Personal Protective Equipment (PPE's), Precautions to be taken for working in confined areas.	Before Construction Activities	Full Day	EHS Manager	Workers
Solid Waste Management	Waste segregation, identification of infectious Waste, Use of PPEs and waste Handling	Before Commencement of Project Activities	Full Day	External Sources	Relevant workers and staff
Vehicular safety	Safe operation and maintenance of all vehicles, insurance in accordance with the applicable local and federal laws	Before Commencement of Project Activities	Full Day	EHS Manager	Relevant workers and staff
Vegetation and community issues and their mitigation measures	To analyze the community problems and how to cater to serious issues relevant to vegetation and agricultural land of the community	Before Commencement of Project Activities	Full Day	EHS Manager	Relevant workers and staff
Safe construction practices	To upgrade local craftsmen's skill in quality construction and develop skilful working human resources in hazard-resistant construction	Before Commencement of Project Activities	Full Day	EHS Manager	Relevant workers and staff
Health Safety and Environmental Auditing	Health Safety and Environmental Audits, Reporting Requirements	Before Commencement of Project Activities	Full Day	External Sources	Relevant Department
Implementation of environmental management and monitoring plan	Explanation of Environment Management and Monitoring Program	Quarterly. As soon as the project activities start	Full Day	External Sources	EHS Staff

8.21 Environmental Budget

The cost required to implement the mitigation measures effectively is important for the sustainability of the project both in the construction and operational phases of Project. The cost of Sewage Treatment Plant is already incorporated into the Project Cost.

The summary of the cost of monitoring the environment and mitigation cost is shown in **Table 8.15**.

Table 8.15: Summary of Environmental Budget

Activity	Basis	Cost (Rs)
Environmental Monitoring Cost	Ambient Air, Noise and Water Quality Monitoring	2,565,000
Plantation Plan	Implementation of plantation plan	2,477,000
Health and Safety of Workers	For 120 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi-Vis) and Provision of dustbins, warning tap, safety cones, safety signboards and water sprinkling	3,517,200
Cost of Environmental Training	For the whole construction period	1,000,000
Cost of Solar System	For usage of renewable energy to reduce carbon footprint of the building (1 MW)	341,600,000
Grand Total		351,159,200

8.22 Reporting/Communication and Documentation

An effective program for storing and communicating environmental information during the project is an essential requirement of an EMP. This activity will be done by an independent monitoring consultant. The key features of such a mechanism are:

- Precise recording and maintenance of all information generated during the monitoring in a predetermined format.
- Communicating the information to a central location
- Storing the raw information in a central database
- Processing the information to produce periodic reports

Data recording and maintenance: All forms will be numbered, and a tracking system will be developed for each. Whenever a form is released for use in the field, its number will be recorded. The monitors will be required to account for each form after completion. In this manner, it will be ensured that all forms are returned to the office, be they filled, unused or discarded.

Storage of information: A database for information collected during the project will be prepared. The database may include information on training programs, staff deployment, non-compliance, corrective actions, water resources, results of effects monitoring.

Meeting: For effective monitoring, management and documentation, of the environmental performance during the operation, environmental matters will be discussed during a daily meeting held on-site. Environmental concerns raised during the meetings will be mitigated after discussions with the proponent site representatives.

Reporting: Monitoring body will produce daily, weekly, monthly and another periodic report, as well as a final report of the project based on the information collected. The proponent site representative and the contractors will also prepare a weekly environmental report. Copies of the proponent will be provided to the proponent and contractor's higher management.

8.23 Change Management Plan

The EIA for Nawaz Sharif Institute of Cancer Treatment and Research Project recognizes that changes in the EMP may be required and therefore provides a Change Management Plan to manage such changes.

The overall responsibility for the preparation of change management statements will lay with the Project Coordinator, IDAP during the construction phase and Medical Superintendent, Nawaz Sharif Institute of Cancer Treatment and Research, during the operational phase of the project. However, if major changes are envisaged, then the environmental consultant will review the entire process and formulate the Change Management Plan to be implemented.

8.24 Quarterly Environmental Monitoring Report

The contractor will prepare a Quarterly Environmental Monitoring Report of project activities carried out during the specified period of the proposed project.

Project Coordinator, IDAP will submit the Quarterly Environmental Monitoring Report of the project to Environmental Protection and Climate Change Department, Lahore. A format of the Quarterly Environmental Monitoring Report has been provided in **Annexure 11**.

8.25 Post Project Monitoring

The Medical Superintendent, Nawaz Sharif Institute of Cancer Treatment and Research, or the representative shall prepare a brief post-project report describing the conduct of the actual operation, any changes from the operation for which approval was obtained, the degree to which the recommendations of the EIA were adhered to, any damages to the environment and the mitigation or compensation provided, and monitoring information of scientific or environmental interest that is not propriety in nature. This report should be submitted to the Environmental Protection and Climate Change Department, Lahore.

9 Conclusion and Recommendations

9.1 Introduction

This chapter presents the assessment of the possible environmental impacts of the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore. The study presents the purpose of the EIA as to the description of the site, the impact of the project during and after implementation, the mitigation measures, and residual impacts.

The EIA also includes the justification and detailed description of the project, with an evaluation of the potential impacts and effects on the environment, including economic and social consequences. This chapter describes the conclusion and recommendation of the EIA study of the project.

9.2 Conclusions

The major conclusions of the EIA are:

- The project is the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore. The main objective of the project is to establish a state-of-the-art cancer hospital in Valencia Town, Lahore, providing comprehensive treatment and recovery services to meet all the needs of cancer patients.
- The Nawaz Sharif Institute of Cancer Treatment and Research, Lahore, is located in Valencia Town, along the Pine Avenue Road which is further connected to Defence Road. The coordinates of the proposed project are **31°23'57.39"N and 74°14'53.17"E**.
- The proposed project will be established on an area of 333 Kanal and will be approximately a 915 bedded facility which is to be constructed in two phases. In Phase-I, 615 beds facility will be constructed which includes 280 Bedded Main Hospital Building (482,000Sft), 150 Bedded Cancer Care Clinic (118,000 Sft), 75 Bedded Hospice and Palliative Care (43,283 Sft), 110 Bedded Bone Marrow Transplant Center (197,140 Sft), Doctors Accommodation (50,000 Sft) along with external development and allied building works. In Phase-II, 300 bedded New Block of Hospital Building (158,000 Sft) will be constructed along with Parking Plaza (104,569 Sft).
- The estimated cost of the project is Rs 52,773 million and will be completed in 34 months.
- The potential impacts during the construction phase include loss of flora (shrubs and grass only), soil erosion and contamination, water contamination, deterioration of ambient air quality caused by the construction activities.
- The significant environmental management issues during the operational phase include air pollution, sewage disposal, solid waste and noise pollutions, and ash disposal.
- The project construction and operational activities can potentially affect the hospital staff, patients and the people living in the vicinity of the project site. These adverse impacts can be largely reduced by implementing the appropriate mitigation measures, which has been discussed in this report.
- The mitigation measures have been identified for impacts expected during the different phases of the project.

Based on the recommended mitigation measures in chapter 7, the impacts identified will be reduced, with residual impacts having insignificant levels.

9.3 Recommendations

- A plantation plan has been proposed in the EIA report, which will be developed and implemented by the Management of Nawaz Sharif Institute of Cancer Treatment and Research Centre, Lahore.
- The NSICT & RC should have a effective wastewater treatment plant and solid waste management system.

On the basis of the overall impact assessment, more specifically, the nature and magnitude of the residual environmental impacts identified during the present EIA, it is concluded that the establishment of Nawaz Sharif Institute of Cancer Treatment and Research, Lahore is likely to cause environmental impacts during its construction and operational phase. However, these impacts can be mitigated by the implementation of proposed mitigation measures. Infrastructure Development Authority, Punjab will ensure the effective implementation of mitigation measures during the construction phase and the Specialized Healthcare & Medical Education Department will ensure implementation of mitigation measures during the operational phase.

There are no remaining issues that warrant further investigation. This EIA is considered adequate for the environmental and social justification of the project.

Annexure-1: List of Names, Qualification and Roles of EIA Team Members

Name	Project Position	Qualification and Experience	Tasks Assigned
Mr Ali Abdullah	Environmental Consultant	M. Sc. Environmental Engineering, Newcastle University (2016) B. Sc. Civil Engineering, The University of Lahore, Lahore (2010-2014)	<ul style="list-style-type: none"> ▪ Overall management of the project (Supervision, site visits, guidance, inputs and suggestion, recommendation and discussion and report presentations). ▪ To review overall environmental issues and mitigation measures. ▪ To prepare a draft and final study reports.
Mr Saadat Ali	Environmental Consultant	Postgraduate Diploma in Sanitary Engineering, International Institute for Hydraulic and Environmental Engineering, the Delft, Netherlands, 1984 B. Sc. Civil Engineering, Engineering College, University of Peshawar, 1978	<ul style="list-style-type: none"> ▪ Carry out quality control and quality assurance of the Final EIA Report
Ms Amna Saeed	Research Associate to Environmental Consultant	B. Sc. Environmental Engineering, UET Lahore (2018-2022)	<ul style="list-style-type: none"> ▪ Preparation of draft report ▪ Field work for baseline data collection in the area under study ▪ Secondary data collection for desk review ▪ Field work for baseline data collection in the area under study ▪ Draft Environmental management plan for successful management of expected environmental impacts from the Project.

Annexure-2: Terms of Reference

An EIA will be carried out for all stages of the projects, i.e. preconstruction, construction and post-construction, with the following objectives:

- Establishing the environmental baseline in the study area and identifying any significant environmental issues.
- Assessing these impacts and providing for the requisite avoidance, mitigation and compensation measures.
- Integrating the identified environmental issues in project planning and design.
- Developing appropriate management plans for implementing, monitoring and reporting the environmental mitigation and enhancement measures suggested.
- Give presentation during a public hearing of the EIA of Nawaz Sharif Institute of Cancer Treatment and Research Project and respond to queries generated by Punjab EPA until issuance of the NOC.

Annexure-3: References

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Annexure-4: Glossary

Air pollution	Air is a composition of several gases, mostly nitrogen and oxygen and smaller amounts of water vapour, carbon dioxide, argon and other trace gases. Air pollution occurs when harmful chemicals and particles are emitted to the air – due to human activity or natural forces – at a concentration that interferes with human health or welfare or that harms the environment in other ways.
Ambient air quality	Ambient air quality refers to the quality of outdoor air in our surrounding environment. It is typically measured near ground level, away from direct sources of pollution.
Anatomical Waste	Anatomical waste is a subtype of pathological waste, materials that are recognizably human or animal body parts, such as an amputated limb.
Archaeology	The study of human history and prehistory through the excavation of sites and the analysis of artefacts and other physical remains.
Biodiversity	The variety of plant and animal life in the world or in a particular habitat, a high level of which is usually considered to be important and desirable.
Bye-law	A rule made by a local authority to govern activities within the area it controls. Examples include bye-laws covering waste disposal, traffic or public events or signs.
Carbon dioxide (CO₂)	A colourless gas that is naturally produced by animals and people in the exhaled air and the decay of plants.
Carbon monoxide	A highly poisonous, odourless, tasteless and colourless gas that is formed when carbon material burns without enough oxygen.
Climate	The pattern of weather in a particular region over a set period of time, usually 30 years.
Cytotoxic & Cytostatic Waste	Cytotoxic and cytostatic waste includes medicines in tablet, liquid, cream or aerosol form. Cytotoxic and cytostatic medicines are medicines that are either toxic, carcinogenic, mutagenic or toxic for reproduction.
Clinical Waste	Clinical waste is the term used for waste generated from healthcare and similar activities that may pose a risk of infection, e.g. bandages, swabs.
Conservation	Preserving or protecting animals and resources such as minerals, water and plants through planned action (such as breeding endangered species) or non-action (such as not letting taps run unnecessarily).
Deforestation	The reduction of trees in a wood or forest due to natural forces or human activity such as burning or logging.
Effluent	Liquid wastes such as sewage and liquid waste from industries.
Energy efficiency	Actions to save fuels, for example, better building design, changing production processes, developing better transport policies, using better road vehicles and using insulation and double glazing in homes.
EIA	An environmental impact assessment (EIA) is an analytical process that systematically examines the possible environmental consequences of the implementation of projects, programs and policies.

EMP	An environmental management plan (EMP) is a site-specific plan developed to ensure that all necessary measures are identified and implemented in order to protect the environment and comply with environmental legislation.
Fauna	The animals of a particular region, habitat, or geological period.
Flora	The plants of a particular region, habitat, or geological period.
Habitat	The area occupied by a community or species (a group of animals or plants), such as a forest floor, desert or seashore.
Initial Environmental Examination	Initial environmental examinations describe the environmental condition of a project, including potential impact, formulation of mitigation measures, and preparation of institutional requirements and environmental monitoring.
Landfill	A site that is specially designed to dispose of waste and operates with a license granted by the Environmental Protection Agency (EPA).
Medical Waste	Medical waste is any kind of waste that contains infectious material. E.g. anything that is soaked in blood, any waste produced in the patient's room.
Offensive/Hygiene Waste	Any waste that is not infectious and does not contain pharmaceutical or chemical substances, and is likely to cause offence to the senses is an offensive waste.
PEQS	Punjab Environmental Quality Standards (PEQS) are quality standards to regulate the air emissions and effluents of industry and other big polluters.
Pyrolytic Combustion	Pyrolysis is the thermal decomposition of materials at elevated temperatures in an inert atmosphere. Pyrolysis is considered as the first step in the combustion process, and extreme pyrolysis leaves mostly carbon as the residue, which is called carbonization.
Noise Pollution	Noises that disturb the environment and people's ability to enjoy it, for example, continually sounding house alarms, loud music, air conditioning or other electrical units and aircraft or motor engines.
Seismology	The branch of science is concerned with earthquakes and related phenomena.
Topography	The arrangement of the natural and artificial physical features of an area.

Annexure-5: List of People Met During EIA

S. No		Name of Person	Designation				
1	Stakeholders	Ms. Zill-e-Huma Faizi	Manager Environment and Public Health, Infrastructure Development Authority Punjab				
2		Dr. Yasir Qayyum Gill	UET, Lahore				
3		Dr. Asif Ali	Cardiologist Lahore				
4		Mr. Aslam	Lab Attendant, Diagnostic Centre, Lahore				
5		Mr. Zubair Rehman	Pakistan Nuclear Regulatory Authority, Lahore				
No.		Name	Age	Gender	Education	Designation/ Profession	Area
6	Public Consultation	Mr. Muhammad Hasan	35	Male	Bachelors	Property Dealer	Valencia Town
7		Mr. Mansoor Khan	21	Male	Matric	Shopkeeper	Valencia Town
8		Mr. Muhammad Salman	15	Male	Class 8 th	Shopkeeper	Valencia Town
9		Mr. Shahid Afridi	26	Male	F.Sc	Shopkeeper	Valencia Town
10		Mr. Khan	50	Male	N/A	Landowner	Lahore
11		Mr. Mumtaz Khan	55	Male	N/A	Landowner	Lahore
12		Mr. Muhammad Shah	23	Male	Class 8 th	Driver	Lahore
13		Mr. Muhammad Toheed	45	Male	N/A	Security Guard	Lahore
14		Mr. Muhammad Sabir	25	Male	N/A	Cook	Lahore
15		Mr. Qazi Asim	36	Male	Graduate	Business	Lahore
16		Mr. Muhammad Shehbaz	30	Male	Graduate	Private Job	Lahore
17		Ms. Rubina	22	Female	Bachelors	Student	Univesity of Lahore
18		Ms. Khalida	21	Female	Bachelors	Student	Univesity of Lahore

Annexure-6: Ambient Air & Noise Quality Monitoring Ground Water Quality Monitoring Reports



Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 24A/ 014105

Client Detail:	
Name of Contact Person:	-
Designation:	-
Contact Number:	-
Email:	-

GCEC Details:	
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Signatories:



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Environmental Consultants Pvt. Ltd.

Sr. No# 24A/ 014104

Monitoring & Test Report

- Ground Water
- Ambient Air Monitoring

**SITE FOR NAWAZ
SHARIF CANCER
HOSPITAL**

19th July. 2024

Job Reference No.: GCEC-PK-PU-162/2024

Green Crescent Environmental Consultant Pvt. Ltd.
has prepared this report in accordance with the instructions of
Client for their specific purpose. Any other individuals using the content presented in
the document shall do so at their own liability and shouldn't rely upon material provided in this report
as basis for making any legal decision.
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1 of 9

📍 Pakistan Office: House No. 368-B, Block Canal View
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Environmental Consultants Pvt. Ltd.

Sr. No# 24A/ 014112

Pictorial Evidence for Ground Water Sampling & Ambient Air Monitoring



Figure 1: Ground Water Sampling from Site for Nawaz Sharif Cancer Hospital

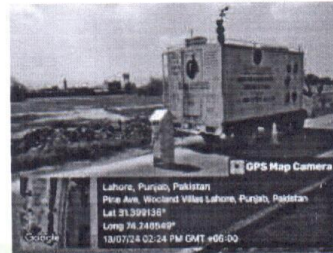


Figure 2: Ambient Air Monitoring of Road Side

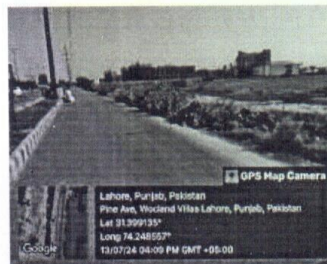


Figure 3: Noise Level Monitoring of Road Side

End of Report

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Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 24A/ 014111

Noise Level Monitoring Report

Job Reference Number	GCEC-PK-PU-162/2024
Monitoring Point	Road Side
Date of Intervention	13-July-2024 to 14-July-2024
Monitoring Coordinates	31°23'56.9"N 74°14'54.8"E

Sr. #	Time	Method/Technique	Unit	Results LAavg	PEQS (Commercial)
Night Time					
1.	23:00	Noise Meter	dB	52.6	55.0
2.	00:00	Noise Meter	dB	51.5	
3.	01:00	Noise Meter	dB	57.0	
4.	02:00	Noise Meter	dB	54.8	
5.	03:00	Noise Meter	dB	59.5	
6.	04:00	Noise Meter	dB	64.9	
7.	05:00	Noise Meter	dB	60.5	
8.	06:00	Noise Meter	dB	60.6	
Night Time Average			dB	57.67	55.0
Day Time					
9.	07:00	Noise Meter	dB	65.9	65.0
10.	08:00	Noise Meter	dB	69.8	
11.	09:00	Noise Meter	dB	67.9	
12.	10:00	Noise Meter	dB	68.8	
13.	11:00	Noise Meter	dB	67.6	
14.	12:00	Noise Meter	dB	65.8	
15.	13:00	Noise Meter	dB	65.9	
16.	14:00	Noise Meter	dB	67.3	
17.	15:00	Noise Meter	dB	65.6	
18.	16:00	Noise Meter	dB	69.5	
19.	17:00	Noise Meter	dB	67.8	
20.	18:00	Noise Meter	dB	67.3	
21.	19:00	Noise Meter	dB	60.0	
22.	20:00	Noise Meter	dB	69.1	
23.	21:00	Noise Meter	dB	62.4	
24.	22:00	Noise Meter	dB	61.7	
Day Time Average			dB	66.40	65.0

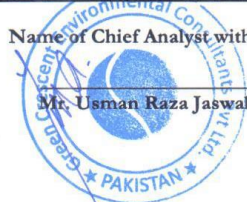
Monitoring Performed By:

Deputy Analyst

Muhammad Tahir

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal



8 of 9

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Ali Abdullah



Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 24A/ 014109

Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-PU-162/2024
Monitoring Point	Road Side
Date of Intervention	13-July-2024 to 14-July-2024
Monitoring Coordinates	31°23'56.9"N 74°14'54.8"E

Parameter	Unit	Monitoring Duration	LDL	Average Obtained Concentration	PEQS
Nitrogen Dioxide (NO ₂)	µg/m ³	24Hours	1.00	25.27	80.0
Nitrogen oxide (NO)	µg/m ³	24Hours	1.00	19.03	40.0
NO _x	µg/m ³	24Hours	1.00	44.30	120.0
Sulphur Dioxide (SO ₂)	µg/m ³	24 Hours	1.00	19.07	120.0
Carbon Monoxide (CO)	mg/m ³	08 Hours	0.01	1.84	5.0*
Ozone (O ₃)	µg/m ³	1 Hours	-	14.37	130.0**
Particulate Matter (PM ₁₀)	µg/m ³	24 Hours	1.00	119.62	150.0
Particulate Matter (PM _{2.5})	µg/m ³	24 Hours	1.00	23.34	35.0
Total Particulate Matter (TSP)	µg/m ³	24 Hours	1.00	177.96	500.0
Lead Air borne Particles	µg/m ³	24 Hours	-	0.21	1.5

Abbreviations:

LDL= Lowest Detection Limit

PEQS= Punjab Environmental Quality Standards

(*8 hours standard for CO

**1 hour standard for O₃)

µg/m³= Micrograms per Cubic Meter

mg/m³= Milligrams per Cubic Meter

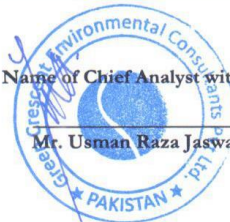
Monitoring Performed By:

Deputy Analyst

Muhammad Tahir

Name of Chief Analyst with Seal:

Mr. Usman Raza Jaswal



6 of 9

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Green Crescent
Environmental Consultants Pvt. Ltd.

Sr. No# 24A/ 014108

Ambient Air Quality Monitoring

Job Reference Number	GCEC-PK-PU-162/2024
Monitoring Point	Road Side
Date of Intervention	13-July-2024 to 14-July-2024
Monitoring Coordinates	31°23'56.9"N 74°14'54.8"E

Sr. #	Time	CO (mg/m ³)	NO (µg/m ³)	NO ₂ (µg/m ³)	NO _x (µg/m ³)	SO ₂ (µg/m ³)
1	09:45	2.02	18.46	23.94	42.39	20.13
2	10:45	2.10	19.70	25.19	44.89	18.12
3	11:45	2.12	18.04	24.17	42.20	19.08
4	12:45	2.06	18.58	27.45	46.03	18.24
5	13:45	2.02	18.39	25.76	44.15	18.81
6	14:45	2.05	19.17	24.82	43.99	17.76
7	15:45	2.01	19.35	25.15	44.49	18.49
8	16:45	2.00	17.90	26.73	44.63	18.71
9	17:45	2.03	19.47	25.49	44.96	19.99
10	18:45	2.08	17.94	26.85	44.79	17.71
11	19:45	2.01	18.22	25.56	43.77	17.55
12	20:45	2.09	19.70	23.92	43.62	19.77
13	21:45	2.98	18.99	22.47	41.46	19.46
14	22:45	2.04	19.81	22.92	42.73	18.13
15	23:45	1.98	19.20	24.88	44.08	20.51
16	00:45	2.19	17.96	26.29	44.25	19.57
17	01:45	1.96	18.90	24.83	43.73	18.99
18	02:45	1.05	19.71	23.30	43.01	17.26
19	03:45	1.10	18.93	25.91	44.84	19.05
20	04:45	1.04	20.45	25.36	45.81	19.75
21	05:45	1.08	20.64	26.04	46.69	20.37
22	06:45	1.02	20.09	27.57	47.66	18.81
23	07:45	1.08	18.52	25.30	43.82	20.16
24	08:45	2.18	18.61	26.55	45.16	21.28
Average Concentration		1.84	19.03	25.27	44.30	19.07

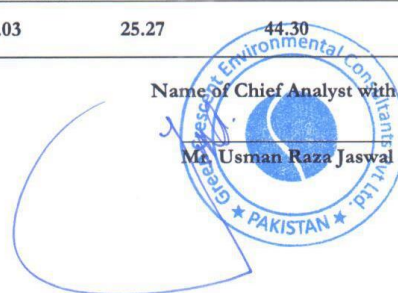
Monitoring Performed By:

Deputy Analyst

Muhammad Tahir

Name of Chief Analyst with Seal:

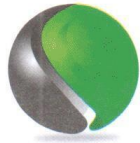
Mr. Usman Raza Jaswal



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Environmental Consultants Pvt. Ltd.

Sr. No# 24A/ 014106

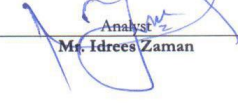
CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

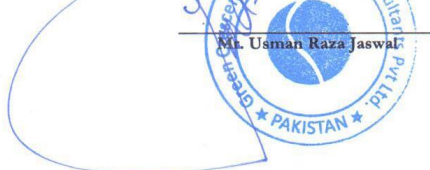
Sample Details			
Job Ref. No:	GCEC-PK-PU-162/2024	Project Name:	Site for Nawaz Sharif Cancer Hospital
Telephone No.	-	Client Name:	Infrastructure Development Authority Punjab
Sample Date:	13-07-2024	Sample Matrix:	Ground Water Sample
Sample Receipt Date:	15-07-2024	Sampled By:	GCEC
Grab/Composite:	Grab Sampling	Date of Completion of Analysis:	19-07-2024
Sample Identification			
01	Ground Water		

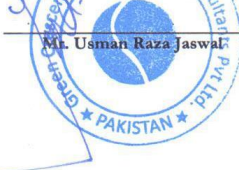
Parameters	Analysis Method	Unit	LOR	Result	PEQS
				01	
PHYSICAL & CHEMICAL ANALYSIS					
pH**	APHA-4500H+ B	-	0.01	7.25	6.5-8.5
Odor	In-house	-	-	Odorless	Non-Objectionable
Taste	In-house	-	-	Sweet	Non-Objectionable
Color	APHA-2120 B/C	Pt/Co	1.0	<1.0	≤15 TCU
Turbidity**	APHA-2130 B	NTU	0.1	<0.1	≤5 NTU
Total Hardness**	APHA-2340 B & C	mg/l	0.1	204.0	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	772.0	< 1000
Ammonia	APHA-4500-NH ₃ -B	mg/l	0.002	<0.002	-
Chloride**	APHA-4500Cl- B	mg/l	0.24	65.04	< 250
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	≤ 0.05
Fluoride (F)**	APHA-4500F- D	mg/l	0.01	<0.01	≤ 1.5
Nitrite	APHA-4500NO ₂ B	mg/l	0.01	<0.01	≤ 3 (P)
Nitrate**	APHA-4500NO ₃ C	mg/l	0.1	0.1	≤ 50
Phenolic Compound	APHA-5530'D	mg/l	0.01	<0.01	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.1	0.2-0.5
Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.028	≤ 0.2
Cadmium**	APHA-3111Cd B	mg/l	0.0028	<0.0028	0.01
Copper**	APHA-3111Cu B	mg/l	0.0045	<0.0045	2
Chromium**	APHA-3111Cr B	mg/l	0.0054	<0.0054	≤ 0.05 (P)
Mercury	APHA-3112Hg B	mg/l	0.0008	<0.0008	≤ 0.001
Antimony (Sb)**	APHA-3111Sb B	mg/l	-	ND	≤ 0.005 (P)
Nickel**	APHA-3111Ni C	mg/l	0.008	<0.008	≤ 0.02
Zinc**	APHA-3111Zn B	mg/l	0.0033	<0.0033	5.0
Arsenic	APHA-3111As B	mg/l	0.01	<0.01	≤ 0.05 (P)
Barium	APHA-3111Ba B	mg/l	0.031	<0.031	0.7
Manganese**	APHA-3111Mn B	mg/l	0.0016	<0.0016	≤ 0.5
Iron**	APHA-3111Fe B	mg/l	0.1	<0.1	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.1	0.3
Lead**	APHA-3111Pb B	mg/l	0.013	<0.013	≤ 0.05
Selenium	APHA-3111Se B	mg/l	-	ND	0.01 (P)
MICROBIOLOGICAL ANALYSIS					
Total Coliforms	APHA-9222 B	CFU/100ml		Absent	0/100ml
Faecal Coliforms (Ecoli)	APHA:9222 D	CFU/100ml		Absent	0/100ml

Abbreviations: ND: Not Detected LOR: Limit of Reporting PEQS: Punjab Environmental Quality Standards

Note: *Uncertainty of all the parameters and laboratory conditions at the time of analysis will be provided as per client's requirement. The lab environmental conditions are maintained at 25±5°C and humidity at 50±20%. Disclaimer: The results are solely of the sample provided. **All the starred parameters are PNAC accredited.

Sample Analyzed By: 
Analyst
Mr. Idrees Zaman

Name of Chief Analyst with Seal: 
Mr. Usman Raza Jaswal



3 of 9

Pakistan Office: House No. 368-B, Block Canal View
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Ali Abdullah

Annexure-7: Quarterly Environmental Monitoring Report

Chapter No.	Description
	Executive Summary
Chapter 1.0	Project Summary (One page)
Chapter 2.0	Construction Summary
Chapter 3.0	Project's Progress Up to date.
Chapter 4.0	Environmental Monitoring
Chapter 5.0	External Environmental Monitoring
Chapter 6.0	Internal Environmental Monitoring
Chapter 7.0	Communicable Disease Testing
Chapter 8.0	Environmental Audit
Chapter 9.0	Monthly Progress
Chapter 10	Safeguard Plans and their Implementation Status
	HSE Management Plan
	Fire Fighting Plan
	Hospital/Solid Waste Management
	Fatal Incidents
	Workmen Compensation
	Borrow Area Management Plan
	Site Restoration Plan.
	Emergency Preparedness, Response and Site Evacuation Plan
	Traffic Management & Construction Material transportation
	Implementation of Social Safeguard Policies
	Local Employment
Annex	Pictorial Presentation of Environmental Monitoring Plan

Annexure-8: Land Documents of Nawaz Sharif Cancer Hospital

EXTRA ORDINARY ISSUE

REGISTERED No. L-7532



The Punjab Gazette

PUBLISHED BY AUTHORITY

LAHORE THURSDAY JUNE 20, 2024

OFFICE OF THE COMMISSIONER, LAHORE DIVISION, LAHORE.

Notification under section 17(4) & 6 of the Land Acquisition Act, 1894.

No. SR/ACQ/361/L/24/122

Dated. 15-06-2024

Whereas, it appears to the Commissioner, Lahore Division, Lahore that land (hereinafter referred as said land) specified in the Notification under section 4 of the Land Acquisition Act 1894 Issued by the Collector, Lahore District, Lahore vide No. LAC/896-2024 dated. 09-03-2024 read with Addendum bearing No. LAC/896-2024/693 dated. 18-03-2024 duly published in the Punjab Gazette Extra Ordinary Issue on 11-03-2024 & 20-03-2024 respectively (as described in the specification below) is required to be taken by the Government of the Punjab, Specialized Healthcare & Medical Education Department, Lahore for public purpose namely "**Establishment of Cancer Hospital at Lahore**", at public expenses.

2. And whereas, the Commissioner, Lahore Division, Lahore is satisfied that the said land is urgently required and provisions of sub section (1) of section 17 of the Land Acquisition Act, 1894 are applicable to the aforesaid land.

3. Now, therefore, in exercise of powers under section (4) of section 17 of the said act, the Commissioner, Lahore Division, Lahore, is further pleased to direct that provisions of section 5 and 5-A of the Act 1894 shall not be applicable in the case of the said land and the Land Acquisition Collector, District Lahore should take action accordingly.

4. This declaration is also made under section 6 of the Land Acquisition Act. 1894 for all whom it may concern and under provisions of section 7 of said Act, the Land Acquisition Collector, District Lahore, is hereby directed to take order for the acquisition of land.

The plan of the aforesaid land may be inspected in the office of the Collector, Lahore District, Lahore and the Section Officer (General), Government of the Punjab, Specialized Healthcare & Medical Education Department, Lahore.

Price Rs. 10.00 Per Page

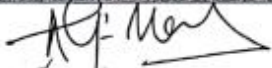
(4771)

Land upon which any religious place or worship, shrine, Graveyard or any immovable property attached to any institution and the boundaries of which are contiguous with the site of the same shall be excluded from the said land. Similarly Waqf, Evacuee and State Properties shall also be excluded.


Specification.

Ameerpura, Tehsil Raiwind, District Lahore.


Sr No	Khasra No.	Area		Sr No.	Khasra No.	Area	
		K	M			K	M
01.	1497	03	00	28.	1538 Min	03	08
02.	1498	08	00	29.	1539	08	00
03.	1501	08	00	30.	1540	08	00
04.	1502	08	00	31.	1541	08	00
05.	1503	08	00	32.	1542	08	00
06.	1504	08	00	33.	1543	08	00
07.	1507	08	00	34.	1544	08	00
08.	1508	08	00	35.	1545	08	00
09.	1518 Min	05	02	36.	1546	08	00
10.	1519 Min	06	18	37.	1547	08	00
11.	1521 Min	00	12	38.	1548	08	00
12.	1522	08	00	39.	1553	08	00
13.	1523	08	00	40.	1554	08	00
14.	1524 Min	01	13	41.	1555	08	00
15.	1525 Min	02	16	42.	1556	08	00
16.	1526	08	00	43.	1576	08	00
17.	1527	08	00	44.	1577	08	00
18.	1528 Min	02	11	45.	1578	08	00
19.	1529 Min	01	12	46.	1579	09	02
20.	1530 Min	06	05	47.	1585 Min	07	07
21.	1531 Min	01	06	48.	1586	08	00
22.	1532	08	00	49.	1587	08	00
23.	1533 Min	01	08	50.	1588	08	00
24.	1534 Min	01	16	51.	1589 Min	03	16
25.	1535 Min	02	04	52.	1590 Min	04	06
26.	1536 Min	02	12	53.	1591 Min	04	16
27.	1537 Min	03	00	54.	1592 Min	04	15
Total Area: 336 Kanal 05 Marla							


Secretary,
Government of the Punjab,
Specialized Healthcare & Medical
Education Department,
Lahore.


Commissioner,
Lahore Division, Lahore.


Addl. Deputy Commissioner (Rev.),
Lahore.


Collector,
Lahore District, Lahore.


Land Acquisition Collector,
Lahore.