Environmental and Social Impact Assessment

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Pakistan: Sustainable and Green Infrastructure Project
— *Procurement of Equipment for Establishment of Cancer Hospital in Islamabad*

Prepared by Ministry of National Health Services, Regulations and Coordination, Government of Pakistan for the Asian Development Bank (ADB) and Asian Infrastructure Investment Bank (AIIB).

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CURRENCY EQUIVALENTS

(as of 28 August 2025)

Currency Unit	–	Pakistan rupee/s (PRe/PRs)
PRe1.00	=	$0.0035
$1.00	=	PRs283.35

NOTE

In this report, "$" refers to United States dollars.

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Ministry of National Health
Services Regulations & Coordination
GOVERNMENT OF PAKISTAN

ENVIRONMENTAL & SOCIAL IMPACT ASSESSMENT OF 200-BEDDED CANCER HOSPITAL AT PIMS, SECTOR G-8/3, ISLAMABAD

SEPTEMBER 2025

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EXECUTIVE SUMMARY

1. Project Background and Rationale. The Government of Pakistan, through the Ministry of National Health Services, Regulations and Coordination (MoNHSRC), is establishing a 200-bedded state-of-the-art Cancer Hospital within the Pakistan Institute of Medical Sciences (PIMS), Islamabad. Pakistan faces nearly 180,000 new cancer cases annually, with breast cancer being the most prevalent. Current oncology facilities are overburdened, and many patients are forced to wait long periods or seek expensive treatment abroad. Islamabad, despite being the federal capital, lacks a dedicated cancer hospital. This project seeks to fill the gap by offering comprehensive oncology services, including diagnostics, chemotherapy, radiotherapy, surgical oncology, intensive care, palliative care, and research facilities. Approximately 70% of the civil structure has already been completed, and financial support from the Asian Development Bank (ADB) and Asian Infrastructure Investment Bank (AIIB) will facilitate procurement of advanced medical equipment.

2. **Project Features.** The hospital has been designed with 200 indoor beds and a full spectrum of oncology services. Diagnostic facilities include MRI, CT, PET-CT, angiography, and advanced laboratories. Treatment facilities comprise Linear Accelerators (LINACs), brachytherapy, a cyclotron, and specialized operating theatres. To ensure radiation safety, a reinforced concrete radiation bunker has been designed in compliance with PNRA and IAEA standards. Biomedical waste management will be addressed through a dual-chamber high-temperature incinerator (100 kg/hour) with advanced air pollution control devices and scrubbers, meeting national and international emission standards. Ancillary services include pharmacy, physiotherapy, counseling, cafeteria, parking, staff residences, and training and research facilities.

3. **Policy and Legal Compliance.** The project is bound by the Pakistan Environmental Protection Act (1997), National Environmental Quality Standards (2000), and the Hospital Waste Management Rules (2005). The PNRA Ordinance (2001) governs radiation equipment use and safety. At the international level, the project must comply with ADB's Safeguard Policy Statement (2009) and AIIB's Environmental and Social Framework (2024). Both institutions have classified the project as Category B for social and environment, reflecting that its impacts are site-specific, reversible, and can be effectively mitigated through the Environmental and Social Management Plan (ESMP).

4. **Baseline Environmental and Social Conditions.** The hospital site, covering thirty-eight kanals, is located within the urbanized PIMS complex in Sector G-8/3, Islamabad. The area is surrounded by hospitals, residences, commercial areas, and Fatima Jinnah Park. Baseline monitoring shows that air quality and noise levels are within permissible limits, though traffic peaks can cause temporary exceedances. Water is supplied by the Capital Development Authority and meets NEQS standards, while the soil is stable but falls in Seismic Zone II, requiring earthquake-resistant construction. The site is classified as a modified habitat with limited vegetation, and a landscaping plan will introduce approximately three thousand native trees and shrubs. Sensitive receptors include PIMS patients, staff, nearby residents, and commuters along Ibn-e-Sina Road.

5. **Key Environmental and Social Impacts.** During construction, potential impacts include dust emissions, noise, waste generation, occupational health and safety risks, and traffic congestion, which could disrupt hospital services. In the operational phase, key risks relate to biomedical waste generation, incinerator emissions, wastewater discharge, and radiation exposure from diagnostic and treatment equipment. Other concerns include increased traffic flow and potential community health and safety issues. However, the project's benefits outweigh the risks: it will provide advanced cancer treatment, reduce the need for

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overseas care, generate employment, improve training and research, and introduce landscaping for environmental enhancement.

6. **Mitigation Measures and Environmental and Social Management Plan (ESMP).** Mitigation measures follow the hierarchy of avoid, minimize, mitigate, and compensate. During construction, dust suppression, noise control, traffic management, and use of PPE will be enforced. During operation, biomedical waste will be segregated and incinerated using advanced pollution control systems, and ash will be disposed of by licensed contractors. Scrubber wastewater will be treated before discharge. Radiation safety will be ensured through reinforced bunkers, PNRA licensing, staff dosimetry, and continuous monitoring. Occupational health and safety will be strengthened through PPE, vaccination, training, and health checks. Community safety will be managed through traffic controls, disclosure of monitoring reports, and a grievance redress mechanism. Implementation will be overseen by a dedicated hospital Environmental and Social Manager, supported by a Radiation Safety Officer and Waste Management Officer, with compliance monitoring by Pak-EPA and financing institutions.

7. **Stakeholder Consultations.** Stakeholder engagement included consultations with local residents, PIMS staff, regulatory authorities, and civil society organizations. Communities expressed support for the hospital while raising concerns about construction disturbances, biomedical waste safety, affordability, and the need for trained professionals. The project has addressed these concerns through strong ESMP commitments on waste and radiation safety, traffic management, affordability under MoNHSRC, and training programs for oncology staff.

8. **Grievance Redress Mechanism (GRM).** A multi-tiered grievance mechanism will be established for patients, staff, workers, and surrounding communities. It will be accessible, confidential, and inclusive, with sensitivity to gender-based violence and SEA/SH concerns. The GRM will be aligned with ADB and AIIB accountability mechanisms, allowing affected people to escalate issues beyond the project level if necessary.

9. **Conclusion and Recommendations.** The ESIA concludes that the 200-bedded Cancer Hospital at PIMS is environmentally and socially feasible, with impacts being localized, temporary, and manageable through effective mitigation measures and monitoring. The hospital will play a transformative role in enhancing Pakistan’s capacity for affordable, specialized cancer treatment while strengthening research and training. Strict adherence to the ESMP, regular monitoring, transparent disclosure, and continuous stakeholder engagement are strongly recommended to ensure sustainable and socially responsible project implementation.

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1. Introduction

10. The Government of Pakistan, through the Ministry of National Health Services, Regulations & Coordination (MoNHSRC), is constructing a 200-bedded state-of-the-art Cancer Hospital within the premises of the Pakistan Institute of Medical Sciences (PIMS) in Islamabad, as shown in Figure 1.1. The hospital aims to provide comprehensive oncology services, including diagnostic imaging, radiotherapy, chemotherapy, surgical oncology, palliative care, and research facilities. This Environmental and Social Impact Assessment is developed to support the environmental and social due diligence provisions for activities to be covered under the Bond proceeds guaranteed by the AIIB and ADB Bank for the development of 200-Bedded Cancer Hospital at PIMS (the Project). The Ministry of National Health Services, Regulations & Coordination (MoNHSRC) is the Implementing Agency, responsible for overall planning, execution, and coordination. The infrastructure component is being executed by the Capital Development Authority (CDA), while procurement and installation of medical equipment will be managed by the MoNHSRC. The project is financed through Public Sector Development Programme (PSDP) allocations, with additional financing from ADB and AIIB via Panda Bonds, for the procurement and installation of specialized medical equipment.

1.1 Background

11. 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. Such statistics underscore the need for robust healthcare infrastructure to manage and treat cancer effectively[1].

12. Pakistan faces an alarming rise in cancer cases, with breast cancer being the most common among women. The country has the highest incidence of breast cancer in Asia, with one in nine women at risk during their lifetime and one of the highest breast cancer mortality rates globally. Lips and mouth cancer ranks as the second most common cancer overall and the most frequent among males, accounting for 15.9% of cases when both genders are considered. This prevalence is strongly associated with cultural practices such as the use of smokeless tobacco products (e.g., gutkha, paan), which contain over 30 toxic substances linked to cancer.[2]

13. The existing healthcare infrastructure is insufficient to manage this growing burden. Many cancer treatment facilities in Pakistan are overburdened, resulting in long delays for diagnosis and treatment: — a critical factor that adversely affects survival rates. Moreover, a large number of hospitals lack advanced diagnostic and treatment technologies, limiting their ability to provide comprehensive cancer care.

[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.

[2] World Health Organization. (2023). Smokeless tobacco and cancer risk. WHO Report. Retrieved from https://www.who.int/publications

Hussain, M., Qadir, A., & Iqbal, H. (2023). Oral cancer burden and associated cultural practices in South Asia. *Journal of Oral Oncology, 15*(3), 112–118.

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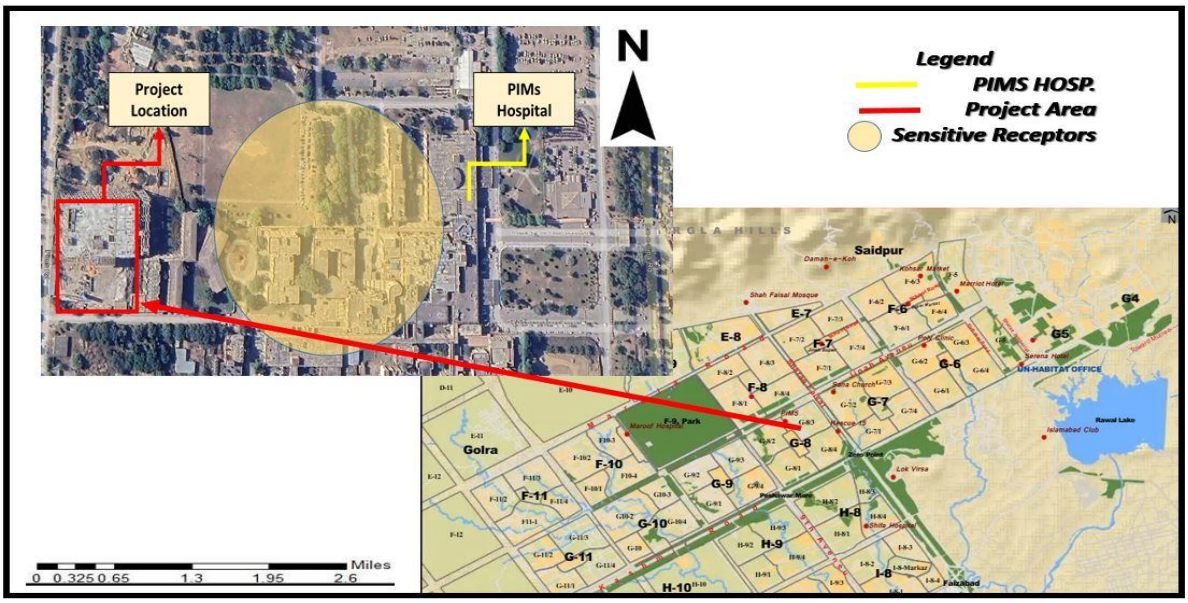
14. The project addresses the growing cancer burden in Pakistan, where access to specialized oncology care remains limited, forcing many patients to seek costly treatment abroad. Once operational, the facility will enhance the country's capacity for early detection, advanced treatment, and long-term management of cancer, with a strong emphasis on patient safety, affordability, and sustainability.

Figure 1.1: Project Area within PIMs Hospital Periphery



1.2 Scope of Works

15. The ESIA study covers the full project life cycle from construction to operation and includes:

- Identification and assessment of potential environmental and social impacts from hospital construction activities, currently, around 70% of the construction works (grey structure) have been completed (site preparation, civil works, mechanical/electrical installations, and ancillary infrastructure development), equipment installation, and hospital operation.
- Evaluation of project compliance with Pakistan EPA regulations, NEQs, PNRA licensing requirements, ADB SPS, AIIB ESF requirements and international best practice standards Development of mitigation measures and preparation of an Environmental and Social Management Plan (ESMP).
- Assessment of cumulative and indirect impacts on the PIMS complex, surrounding residential and commercial areas, and off-site facilities such as waste treatment and utility services.
- Stakeholder engagement, disclosure, and grievance redress planning in accordance with ADB, AIIB, and national requirements.

1.3 Requirement for Environmental Assessment

16. In accordance with Section 12 of the Pakistan Environmental Protection Act (PEPA), 1997, all development interventions require an Initial Environmental Examination (IEE). As per Pak-EPA (Review of IEE/EIA Regulations, 2000), the proposed project falls under Category I (Urban Development) of Schedule I, which specifies that: "A proponent of a project falling in any category specified in Schedule I shall file an IEE with the Federal Agency and the provision

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of Section 12 shall apply to such project." Accordingly, an IEE is being prepared for the construction phase, following a scoping session with the Director, Pak-EPA, where it was agreed that an IEE would be the appropriate instrument for Phase I (hospital construction).

17. From the Asian Development Bank (ADB) Safeguard Policy Statement (SPS, 2009) perspective, the project is expected to be Category B or potentially Category A (Environment), as it involves activities with potentially significant adverse environmental impacts (e.g., hospital construction activities (site preparation, civil works, mechanical/electrical installations, and ancillary infrastructure development) biomedical waste incineration, radiation facilities). These impacts are mostly site-specific but may require complex mitigation measures.

18. Under the Asian Infrastructure Investment Bank (AIIB) Environmental and Social Framework (ESF, 2024) and Environmental and Social Policy (ESP), the project was initially considered to have potential for Category A classification due to its high environmental and social risks. However, following a rapid needs assessment, during which a hospital environmental and social checklist was prepared, and subsequent consultations with the AIIB team, it was determined that the project should fall under Category B. This classification reflects that the main risks are associated with the operation of specialized equipment and healthcare waste management, which are considered site-specific, reversible, and manageable through appropriate environmental and social management measures.

1.4 Methodology of ESIA Study

- **Literature Review**: Review of project documents, engineering designs, and relevant national and international best practices, ADB and AIIB E&S requirements.
- **Baseline Data Collection**: Field surveys for air quality, noise levels, water quality, soil characteristics, and socio-economic conditions along with biodiversity survey was also carried out.
- **Impact Identification & Prediction**: Using checklists, impact matrices, and professional judgment to evaluate direct, indirect, and cumulative impacts.
- **Mitigation & Management Measures**: Development of specific actions to avoid, minimize, or mitigate impacts in line with the mitigation hierarchy.
- **Stakeholder Engagement**: Public consultations with community members, hospital staff, and other stakeholders.
- **ESMP Preparation**: Formulation of monitoring plans, reporting requirements, and institutional arrangements for environmental and social management.
- **Estimation of budget** to ensure the effective implementation of all the mitigation measures/ actions proposed in the ESMP.

1.5 Structure of the Report

19. The ESIA report is structured into the following chapters:

- **Chapter 1** = Introduction: Project overview, scope, category, methodology, proponent, and report structure.
- **Chapter 2** = Policy and Legal Framework: Applicable national and international environmental laws, policies, and safeguard requirements.
- **Chapter 3** = Project Description: Detailed description of location, rationale, components, specialized equipment, implementation schedule, resource requirements, and cost.
- **Chapter 4** =Description of Environment: Physical, biological, and socio-economic environment of the project area.
- **Chapter 5** = Impact Assessment: Identification, prediction, and evaluation of potential environmental and social impacts.

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- **Chapter 6** = Mitigation Measures: Strategies to avoid, minimize, or offset impacts.
- **Chapter 7** = Environmental and Social Management Plan (ESMP): Mitigation, monitoring, reporting, and institutional arrangements.
- **Chapter 8** = Public Consultation and Disclosure: Stakeholder engagement outcomes and information disclosure plan.
- **Chapter 9** = Grievance Redressal Mechanism (GRM)
- **Chapter 10** = Conclusion and Recommendations.

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2. Policy & Legal Framework

2.1 General

20. This chapter outlines the applicable national and international environmental and social policies, laws, regulations, and standards relevant to the 200-bedded Cancer Hospital Project at PIMS, Islamabad. The project is located within the Islamabad Capital Territory (ICT) and thus falls under the Pakistan Environmental Protection Agency (Pakistan EPA). Since the project is seeking potential co-financing from the Asian Development Bank (ADB) and the Asian Infrastructure Investment Bank (AIIB), it must comply with their respective safeguard policies in addition to Pakistan's environmental and social regulations.

2.2 National / Bank Policies and Legal Framework

21. Key national legal instruments applicable to the project include:

Table 2.1: Environmental Guideline and Regulations

Legislation/Guideline	Description	Relevance
Pakistan Environmental Protection Act (PEPA), 1997	Principal environmental legislation in Pakistan, empowering the Pakistan EPA to enforce NEQS, review EIAs, and regulate environmental compliance.	Requires an IEE for hospital construction and compliance with NEQS for emissions, wastewater, noise, and radiation safety. The project will comply with the requirements of this Act, during implementation.
National Environment Policy, 2005	Provides strategic direction for sustainable development and environmental protection in Pakistan.	Guides overall sustainability of hospital design and operation, ensuring energy efficiency, waste minimization, and pollution control.
Hospital Waste Management Rules, 2005	Issued under PEPA to ensure safe handling, segregation, transportation, and disposal of hospital waste. These rules classify waste into categories (infectious, pathological, pharmaceutical, chemical, radioactive, general) and prescribe specific treatment/disposal methods, such as incineration, autoclaving, or secure landfill. Hospitals must appoint a Waste Management Officer, prepare a Waste Management Plan, train staff, and maintain waste records for inspection by the relevant EPA.	Critical for managing infectious, pharmaceutical, chemical, and radioactive waste generated by cancer treatment facilities.
ICT Building Bylaws and Fire Safety Codes	Apply to hospital construction, electrical safety, and emergency preparedness.	Ensures hospital complies with structural integrity, fire exits, and emergency response plans during construction and operation.
Regulatory Clearances, Federal EPA	The following environmental approvals are required: IEE Approval Certificate – Precondition for commencing construction/operation. Quarterly compliance report submission During Construction	IEE approval is being prepared for construction; compliance reporting will be required throughout construction and operation.
Fire Safety and Emergency Access.	Standards that require provision of fire detection, suppression systems (hydrants, alarms,	Ensures that the hospital building incorporates

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	sprinklers), fire exits, and dedicated emergency access routes for firefighting and ambulance vehicles.	firefighting systems, safe evacuation routes, and dedicated emergency access for ambulances and fire services to protect patients and staff.
Parking and Traffic Management.	ICT regulations require adequate parking facilities and traffic flow management within and around major developments.	Ensures that the hospital provides sufficient parking for patients, staff, and visitors and that hospital traffic does not disrupt Ibn-e-Sina Road or surrounding areas
Floor Area Ratio (FAR).	Defines the permissible ratio of a building's total floor area to the size of the plot of land on which it is built.	Ensures that the hospital building height, size, and density comply with Islamabad Master Plan requirements, preventing overcrowding and ensuring safety.
ICT Zoning Regulations.	Islamabad Capital Territory zoning rules that specify permissible land uses, building setbacks, and development restrictions.	Ensures that the hospital site use is compliant with zoning laws (institutional/healthcare category), preventing land use conflicts and ensuring legal approval.
Guidelines for Environmental Assessment, Pakistan EPA	The EPA Guidelines for Environmental Assessment provide step-by-step methodology for scoping, baseline data collection, impact assessment, and mitigation planning. These align with international ESIA procedures.	Applied in preparing the Environmental Assessment for the hospital, ensuring alignment with national procedures.
National Environmental Quality Standards (NEQS) 2000	Relevant NEQS parameters for this project include: Ambient air quality limits for $PM_{2.5}$, PM_{10}, SO_2, NOx, CO. Effluent discharge standards for hospital wastewater (pH, BOD, COD, TSS, heavy metals). Emission limits for incinerators (PM, SO_2, NOx, CO, dioxins, furans). Occupational noise limits. Occupational exposure limits for ionizing radiation.	Sets limits for hospital wastewater discharge, incinerator emissions, ambient air, and radiation exposure.
ADB's Safeguard Policy Statement (SPS), 2009	The Asian Development Bank's Safeguard Policy Statement (SPS), 2009 establishes the environmental and social safeguard requirements for all ADB-financed projects. It is built on three core pillars: (i) Environmental Safeguards, (ii) Involuntary Resettlement Safeguards, and (iii) Indigenous Peoples Safeguards. The environmental safeguard component requires that projects avoid, minimize, mitigate, and/or compensate for adverse environmental impacts, adopt pollution prevention measures, and promote occupational and community health and safety. For the proposed 200-bedded Cancer Hospital, the SPS will apply particularly to the management of biomedical waste, control of air and water	Applied because ADB is financing medical equipment. Requires ESIA, EMP, and safeguards for biomedical waste, radiation safety, and air emissions.

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	emissions, and the safe operation of radiation-emitting medical equipment. Given the hospital's waste generation profile, radiation use, and potential air emissions from its incinerator, the project is likely to be classified as Category B or A for environment, necessitating a comprehensive ESIA, an Environmental Management Plan (EMP), and regular monitoring and disclosure in line with SPS requirements.	
ADB's Access to Information Policy (AIP), 2018	The ADB Access to Information Policy (AIP), 2018 mandates proactive and timely disclosure of project-related information to stakeholders and the general public. This policy ensures that environmental and social assessment documents including the ESIA, EMP, and monitoring reports are made publicly available well before project approval, in formats and languages understandable to affected communities. For the Cancer Hospital project, this means that the ESIA and key safeguard documents must be translated into Urdu, uploaded to ADB's website, and shared with local communities through public consultations and notice boards at PIMS. The AIP also establishes transparency as a key principle, thereby fostering public trust and enabling informed participation in project planning and monitoring.	Requires ESIA disclosure in Urdu, public consultations, and availability of documents for stakeholders.
ADB's Accountability Mechanism Policy, 2012	The ADB Accountability Mechanism Policy (2012) provides a structured process for people adversely affected by ADB-assisted projects to voice their concerns and seek resolution. It has two main functions: the Problem-Solving Function, which helps find solutions to project-related issues, and the Compliance Review Function, which investigates allegations of non-compliance with ADB's operational policies and procedures, including the SPS. For the Cancer Hospital, this mechanism ensures that if community members, hospital staff, or other stakeholders believe that the project is causing or will cause harm due to non-compliance with safeguards such as inadequate waste management, radiation safety breaches, or excessive air emissions they can submit a complaint either locally through the project's Grievance Redress Mechanism (GRM) or directly to ADB's Accountability Mechanism. This process reinforces project accountability, transparency, and responsiveness to stakeholder concerns.	Ensures stakeholders can raise concerns about hospital operations (e.g., waste handling, radiation safety).
AIIB Environmental and Social Framework (ESF), 2024	The Asian Infrastructure Investment Bank's (AIIB) Environmental and Social Standard 1 (ESS 1) Environmental and Social Assessment and Management require borrowers to identify, assess, and manage environmental and social risks and impacts associated with their projects throughout the entire project life cycle. ESS 1 emphasizes the application of a mitigation	AIIB is financing equipment; project classified Category B. Requires ESIA covering E&S risks associated with medical equipment (e.g., biomedical waste, radiation) and hospital building. The measures provided in the

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	hierarchy, avoid impacts where possible, minimize and mitigate those that cannot be avoided, and, as a last resort, compensate or offset residual impacts. For the 200-bedded Cancer Hospital, compliance with ESS 1 entails conducting a comprehensive ESIA that covers potential impacts from construction, operation, and decommissioning phases, including those related to air emissions from the incinerator, wastewater discharge, handling of hazardous and radioactive materials, occupational health and safety, and community health and safety. The standard also requires the preparation and implementation of an Environmental and Social Management Plan (ESMP) with clear monitoring indicators, as well as proactive stakeholder engagement and disclosure. Importantly, ESS 1 mandates that the project maintain compliance with both national laws (Pakistan EPA regulations, NEQS, PNRA licensing) and international good practice standards, with the more stringent provisions prevailing in cases of difference. ESS 2: Involuntary Resettlement focuses on avoiding or minimizing physical and economic displacement, and where unavoidable, ensuring compensation and livelihood restoration for affected persons. ESS 3: Indigenous Peoples require respect for the rights, culture, and dignity of Indigenous Peoples and equitable access to project benefits.	ESIA shall be implemented to ensure the compliance with ESF requirements. While the Cancer Hospital is being constructed within the PIMS premises and no large-scale resettlement is anticipated, this standard remains relevant to manage any temporary impacts such as restricted access, traffic diversions, or economic disruption for small vendors and service providers during construction. A due diligence review will confirm the absence of permanent resettlement impacts and outline measures to mitigate short-term disturbances. The Proejct will also ensure that vulnerable groups—such as women, low-income patients, and migrants from rural areas—are not excluded from hospital services. The project must therefore promote inclusivity, non-discrimination in healthcare access, and culturally sensitive service delivery. There are no Indigenous Peoples in Islamabad as defined under the ESS3.
Environmental Quality and Emission Standards	National Environmental Quality Standards (NEQS), 2000 Under PEPA 1997, the NEQS were formulated to define pollutant thresholds for various environmental media. These standards are legally enforceable and cover: • **Air emissions:** 16 parameters including SO_2, NOx, particulate matter, and volatile organic compounds for industries and power generation facilities. • **Water effluents**: 32 parameters for municipal and industrial discharges into inland waters, treatment plants, and marine environments. • **Vehicular emissions**: Including two gaseous parameters and limits on	NEQS apply during both construction and operational phases of the Cancer Hospital. Compliance is mandatory for construction machinery emissions, hospital wastewater discharge, operation of backup generators, incinerator emissions, and noise from equipment/traffic. Regular monitoring will ensure that hospital activities do not exceed permissible limits

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	vehicle noise. • **Noise pollution:** Specific decibel limits for vehicles and equipment. These NEQS are applicable during both construction and operational phases of the 200 Bedded cancer hospital Project. Compliance is mandatory for all generators, construction machinery, wastewater discharges, and transport vehicles associated with the project.	and safeguard community health.
Employment of Children Act, 1991	This act prohibits the employment of children in hazardous occupations or environments. Exceptions are made for family-run operations and government-recognized schools.	Relevant to ensure no child labor in construction or hospital operations (e.g., waste handling, incinerator).
Factories Act, 1934	This act addresses the health, safety, and welfare of workers, including the handling of toxic and hazardous materials. It has been partly superseded by the Pakistan Environmental Protection Act, 1997, for matters related to environmental degradation.	Applies to hospital staff and construction workers dealing with hazardous waste, chemicals, and radiation.
Islamabad Fire Fighting and Life Safety Regulations, 2010	These regulations mandate fire safety measures for buildings in the Islamabad Capital Territory, including inspections and penalties for non-compliance. Authorities are empowered to seal unsafe buildings and impose fines.	Ensures firefighting equipment, alarms, evacuation routes in hospital design.
Pakistan Penal Code, 1860	Sections of this code address environmental concerns such as air and water pollution, noise (considered a public nuisance under Section 268), and food adulteration. While many of these concerns are now covered under PEPA 1997, the Penal Code remains relevant for certain offenses. Sections of this code address environmental concerns such as air and water pollution, noise (considered a public nuisance under Section 268), and food adulteration. While many of these concerns are now covered under PEPA 1997, the Penal Code remains relevant for certain offenses.	Can be applied if hospital operations cause nuisance (noise, smoke, improper waste disposal).
Environmental Protection Agency Guidelines	Pak-EPA has issued guidelines to ensure standardized procedures in environmental assessments. These include guidance on report preparation, public consultation, and sensitive areas. Compliance with these guidelines is mandated by the 2000 EIA/IEE Review Regulations.	-
Antiquities Act, 1975	Protects archaeological and cultural heritage sites from damage.	Ensures that construction activities do not disturb any heritage sites in Islamabad However, the procedures for handling chance finds has been prepared and made part of the ESIA, to handle any such situation during project implementation.

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Pakistan Climate Change Act, 2017.	Establishes framework for climate adaptation and low-carbon development.	Relevant for hospital design in terms of energy efficiency, climate-resilient infrastructure, and carbon reduction (e.g., incinerator emissions, energy use).
Pakistan Nuclear Regulatory Authority (PNRA) Ordinance, 2001	Governs licensing, safety, and radiation protection for devices such as LINAC, cyclotron, PET-CT. Radiation Protection Regulations – Define shielding, controlled areas, monitoring, and personnel dosimetry requirements.	The Cancer Hospital will install radiation-based diagnostic and treatment equipment. PNRA licensing and approval are mandatory for their operation. The hospital must ensure shielded bunkers, radiation protection programs, staff dosimetry, and regular monitoring to safeguard patients, staff, and the community.
Minimum Wages Ordinance, 1961	Mandates minimum wage payments to all workers in industrial/commercial sectors, determined and updated by governments.	
Protection Against Harassment of Women at the Workplace Act, 2010 (Amended 2022)	Provides a legal framework to prevent and address all forms of harassment, including sexual harassment in formal and informal workplaces.	

22. For the project, where differences exist between local and international standards, the more stringent requirement will apply. Continuous environmental monitoring, occupational health and safety protocols, and public consultation are mandatory. The Hospital Waste Management Rules, 2005, combined with AIIB/ADB's IFC EHS and World Bank Group General EHS Guidelines for Healthcare Facilities, will set the benchmark for waste management practices.

2.3 International Conventions/Agreements

23. As a member of several international organizations, Pakistan is a signatory to various environmental and social obligations. Therefore, the subproject will follow the covenants of such international obligations related to the environment and social, listed below:

- Stockholm Convention on Persistent Organic Pollutants, 2004.
- The Rio Declaration, 1992
- United Nations Framework Convention on Climate Change (UNFCCC), 1992;
- Kyoto Protocol, 1992;
- Convention on the Rights of the Child, 1989
- Convention on the Elimination of all Forms of Discrimination against Women, 1979.
- International Covenant on Civil and Political Rights, 1966
- International Covenant on Economic, Social and Cultural Rights, 1956.

Similarly, Pakistan has ratified 08 fundamental and 26 technical ILO conventions of which the following may relevant to the subproject.

- C138 - Minimum Age Convention, 1973 (No. 138);
- C111 - Discrimination (Employment and Occupation) Convention, 1958 (No. 111);
- C029 - Forced Labor Convention, 1930 (No. 29); and
- C001 - Hours of Work (Industry) Convention, 1919 (No. 1).

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Institutional Set-up

The Pakistan Environmental Protection Council (PEPC) is the apex environmental authority, supported by the Pakistan Environmental Protection Agency (Pak-EPA) and provincial EPAs. These bodies oversee environmental assessments and approvals, particularly for projects located in their respective jurisdictions. The 200 Bedded cancer hospital Project, being located in Islamabad, falls under the jurisdiction of the Pak-EPA.

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3. Project Description

3.1 Project Brief

24. The proposed 200-Bedded Cancer Hospital is being established within the premises of the Pakistan Institute of Medical Sciences (PIMS), Islamabad Capital Territory (ICT), Pakistan. The hospital site covers an area of 38 kanals owned and possessed by the MoNHSRC, the land is free from all encumbrances, resettlement and/or land acquisition related issues. Furthermore, there are no legacy issues with the project site which is cordoned off by the PIMS hospital boundary wall, the site is accessible through PIMS's internal road network, which connects to major arterial roads of Islamabad, providing ease of access for patients and staff. The Ministry of National Health Services, Regulations & Coordination (MoNHSRC) is the Executing and Sponsoring Ministry of the project.

25. The idea for establishing a dedicated cancer hospital at PIMS emerged in 2018, when the rising number of oncology patients exposed the inadequacy of existing facilities. At that time, only 8 oncology beds were available at PIMS, and even today the hospital can accommodate only 18 oncology in-patients, which is insufficient given the rapidly increasing burden of cancer in Islamabad and referrals from across Pakistan. To address this urgent need, the Capital Development Authority (CDA) allocated land within the PIMS premises for the project, enabling the Federal Government to move forward with the development of a 200-bedded, state-of-the-art cancer hospital aimed at significantly expanding diagnostic, treatment, and research capacity for oncology care.

Project Rationale and Need

26. The idea for the Cancer Hospital was generated in response to the growing cancer burden in Pakistan, where the country records one of the highest incidences of breast and oral cancers in Asia. Existing oncology services in Pakistan remain limited, forcing many patients to either wait months for treatment or seek costly care abroad. Islamabad, despite being the federal capital, does not yet have a dedicated state-of-the-art cancer treatment facility. Establishing this hospital within PIMS a tertiary care institute addresses this urgent gap by providing affordable, specialized, and comprehensive oncology services to patients from across Pakistan.

Salient Features of the Project

- The hospital has been designed as a state-of-the-art, 200-bedded facility, equipped with both diagnostic and treatment technologies. The salient features include:
- **Diagnostic facilities:** MRI, CT, PET-CT, mammography, pathology, and molecular labs.
- **Radiotherapy facilities:** Linear Accelerators (LINAC), brachytherapy units, and a radiation bunker for shielding.
- **Chemotherapy and Surgical Oncology:** Day-care chemotherapy wards, major and minor operating theatres.
- **In-patient care:** General wards, semi-private and private rooms, and intensive care units.
- **Supportive care:** Palliative care units, pharmacy, physiotherapy, and counseling services.
- **Ancillary services:** Waste management facilities including an incinerator, backup power supply, parking, cafeteria, and staff residences.
- **Research and Training:** Clinical research center, training rooms for oncology staff, and telemedicine facilities.

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Construction Status and Basis of Progress

27. As of August 2025, approximately 70% of the hospital's construction works have been completed, as verified through project management consultant progress reports and physical site inspections. The grey structure, including most RCC works, internal partitions, and core infrastructure, is substantially complete. The percentage completion was derived from measurable quantities of works completed against the total scope.

Completed Works (as of August 2025)

- Building structure (RCC framework): 100% completed.
- Brick masonry works: 95% completed.
- Internal plaster works: 95% completed.
- Electrical conduits: 95% completed.
- Point wiring: 95% completed.
- External plaster: 98% completed.
- Plumbing and sewerage works: 80% completed.
- Façade work In progress at site, nearing completion.

Pending Works

- HVAC system installation.
- Lift installation.
- Generator set installation.
- External development works (landscaping, parking, approach roads, utility linkages, etc.).
- Construction and fit-out of the radiation bunker.
- Procurement, installation, and commissioning of specialized medical equipment.

28. The structural phase (RCC framework) has been fully completed, followed by 95–98% progress in masonry, plastering, and electrical conducting works, which form the bulk of the grey structure activities. Plumbing and sewerage networks are advanced (80%), while façade works are ongoing and expected to be finalized in the coming months.

29. The next phase of work focuses on specialized installations, including HVAC systems, elevators, generators, PA systems, and radiation bunker construction, which are essential for hospital operations. This will be followed by internal finishing, fit-out of medical areas, and external development works, culminating in the procurement and commissioning of high-tech medical equipment.

Components of the Hospital Building

The hospital design includes the following major components:

- Outpatient Department (OPD) – consultation rooms, waiting areas
- In-patient Wards – 200 beds across general, semi-private, and private wards
- Diagnostic Imaging Wing – MRI, CT, PET-CT, X-ray, and mammography suites
- Radiotherapy Wing – 2 LINAC bunkers, brachytherapy suite
- Operating Theatres & ICU – 4 OTs, recovery rooms,
- Chemotherapy Day-Care Unit – 40 stations
- Laboratories & Research Wing – pathology, molecular labs, clinical research
- Support Services – pharmacy, palliative care, physiotherapy (6,000 sq. ft.).
- Utilities & Ancillary Areas – waste storage, incinerator, HVAC plant rooms, parking

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Main Features of the Hospital

- A dedicated cancer treatment facility integrated into PIMS.
- 200 beds, catering to in-patient and day-care treatment.
- Comprehensive oncology services including surgery, chemotherapy, radiotherapy, and palliative care.
- Cutting-edge medical technology including PET-CT, LINACs, and cyclotron facilities.
- Dedicated waste management system (in line with Hospital Waste Management Rules, 2005).
- Patient-centric design with separate male/female wards, accessibility features, and waiting lounges.
- Teaching and research hub for oncology training and clinical research.
  Emergency access and fire safety systems designed as per ICT Building Bylaws and Fire Safety Codes.

Figure 3.1: View of 70% Grey Structure Building Completed-Grey Structure

Area of Influence includes:

30. The Area of Influence (AoI) of the proposed 200-bedded Cancer Hospital has been defined to capture both direct and indirect environmental and social impacts arising from project construction and operation.

Core/Primary Impact Zone (COI):

31. This includes the hospital footprint itself (38 kanals) and the immediate surroundings within a 100–200-meter buffer. Impacts in this zone are mainly related to construction noise, dust, traffic movement, and hospital operations (waste disposal, emissions, radiation safety).

Secondary Impact Zone (AoI – Surrounding Areas)

32. Defined as the area within a 500–1000 meter radius of the project boundary, covering adjacent PIMS medical facilities, staff residences, and nearby commercial and residential neighborhoods. This zone may experience traffic congestion, increased patient inflow, temporary access restrictions, or noise/air quality changes during construction and operation.

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Extended/Indirect AoI (Off-site Facilities):

33. This includes off-site facilities linked to the project such as biomedical waste disposal sites, medical gas suppliers, water supply, and utility connections. The distance varies depending on the facility location (e.g., 10–15 km for authorized biomedical waste disposal sites).

34. For the ESIA assessment, a tiered approach was adopted:

- 100–200 m radius → direct physical affects (dust, noise, vibration, safety).
- 500–1000 m radius → Community-level social and environmental affects (traffic, access, neighborhood disturbance).

  Beyond 1 km (up to 10–15 km for off-site facilities) → Associated facility impacts (waste disposal, utility support, supply chains).3.2 Project Rationale and Objectives

3.2 Objectives of the Project

- Establish integrated services: diagnostic imaging, radiotherapy, chemotherapy, surgical oncology, intensive care, and palliative care.
- Offer specialized care for adult, pediatric, and female oncology patients.
- Reduce the need for overseas treatment by introducing advanced technologies locally.
- Ensure patient and staff safety through radiation shielding, infection control, and waste management systems.

3.3 Project Components and Layout

35. The proposed 200-bedded Cancer Hospital will be a Basement + Ground + 3 Floors structure. The detailed layout plan of each floor is attached as **Annex-A**.

36. The hospital site is located within the premises of the Pakistan Institute of Medical Sciences (PIMS) and is fully integrated into the existing PIMS road network. Internal roads of PIMS provide direct access to the hospital plot, which are further connected to major city arteries such as Ibn-e-Sina Road, Fazl-e-Haq Road, and Jinnah Avenue. This ensures convenient access for patients, staff, emergency vehicles, and supply deliveries.

37. Dedicated entry and exit points will be developed for the Cancer Hospital within the PIMS boundary to regulate traffic flow. The internal road network allows for ambulance access to the emergency block, delivery of medical supplies, and safe movement of waste collection vehicles to designated disposal points. Adequate parking areas and circulation roads are included in the site design to minimize congestion and ensure smooth mobility within the hospital complex.

Building Components

Table 3.1: Detail of Building Components

Lower Ground	Library, conference rooms, auditorium, administrative offices, pharmacy, pathology collection, electro-medical maintenance, cyclotron bunker.
Ground Floor	Reception, waiting areas, OPD with chemotherapy suites, emergency, radiology department.
First Floor	Medical wards, oncology wards, laboratory/blood bank, private wards, postgraduate teaching facilities, administration.
Second Floor	Medical ICU, gynecology wards, pediatric wards, oncology wards.

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Third Floor	Surgical ICU, surgical wards, operation theatres, interventional radiology, post-operative care.
Roof	Mechanical equipment rooms, overhead water tanks, and maintenance access.

3.3.1 Project Covered Area

38. The total covered area of all the floor is 204308 sqft, floor wise breakup is given in table below:

Table 3.2: Detail of Floor Covered Area

Floors	Area (Sft.)
Lower Ground (Basement)	40300.00
Ground Floor	40300.00
First Floor	40300.00
Second Floor	40300.00
Third floor	40300.00
Mounty & OHWT	3458.00
Total (Approx.)	**204308.00**

3.3.2 Specialized Safety Infrastructure – RCC Radiation Bunker

39. In house high-energy radiation equipment (e.g., LINAC, cyclotron), a reinforced concrete bunker will be constructed with 12"–36" RCC shielding in compliance with PNRA, IAEA, and WHO radiation safety standards as shown in Master Plan **Figure 3.2.**

Safety Features

- Lead-lined doors, controlled access, radiation monitors.
- Independent ventilation, fire suppression, and emergency shut-down systems.

3.4 Procurement and Installation of Medical Equipment

40. Procurement will be carried out in accordance with both the Asian Development Bank (ADB) Procurement Policy (2017, as amended) and the Asian Infrastructure Investment Bank (AIIB) Procurement Policy (2016, as amended). International competitive bidding will be adopted to ensure fairness, transparency, and value for money.

41. All medical equipment, particularly radiation-based devices such as Linear Accelerators (LINACs), PET-CT, and cyclotron, must comply with Pakistan Nuclear Regulatory Authority (PNRA) licensing requirements prior to installation and operation.

42. By following both ADB and AIIB procurement frameworks, the project ensures that procurement processes meet the highest international standards, aligning with principles of economy, efficiency, transparency, integrity, and equal opportunity while satisfying the safeguard and fiduciary requirements of both co-financiers.

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Key Equipment:

3.4.1 Radiology and Imaging Equipment

MRI (1.5 Tesla)

- **Function**: Non-invasive imaging using magnetic resonance for tumor detection, staging, and follow-up.
- **Environmental & Safety Considerations**: Requires a magnetically shielded room; noise suppression; non-ionizing radiation but strong magnetic fields necessitate safety zoning and ferromagnetic exclusion.
- **Installation Needs**: Vibration-free floor, RF shielding, controlled temperature & humidity.

PET-CT Scanner

- **Function**: Combines metabolic imaging with anatomical CT for oncology diagnosis and treatment planning.
- **Environmental & Safety Considerations**: Uses short-lived radioactive tracers; strict PNRA controls on handling, transport, and storage; lead shielding in the scanning room.
- **Installation Needs**: Radiation shielding to PNRA standards and as per world bank group general EHS guidelines, secure radiopharmaceutical storage, and ventilation control.

CT Scan (640-slice)

- **Function**: High-resolution imaging for tumor detection and intervention guidance.
- **Environmental & Safety Considerations**: X-ray radiation; shielding required; meets NEQS for occupational exposure limits.

Angiography Machine

- **Function:** Real-time imaging of blood vessels, often used for interventional oncology procedures.
- **Installation Needs:** Lead-lined walls, high-power electrical supply, dust-free environment.

Digital X-ray & Mobile X-ray Units

- **Function**: Routine imaging in wards, ICUs, and operating theatres.
- **Environmental & Safety Considerations**: Shielding as per PNRA; mobile units require portable lead screens in sensitive areas.

DEXA Scan

- **Function**: Measures bone density; useful in cancer patients with metastases or osteoporosis from treatment.
- **Environmental Impact**: Minimal radiation dose, localized shielding.

Fluoroscopy Unit

- **Function**: Real-time imaging for diagnostic and interventional procedures.
- **Safety**: PNRA-compliant dose control and shielding.

3.4.2 Radiotherapy & Nuclear Medicine Equipment

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Linear Accelerator (LINAC)

- **Function**: Delivers high-energy X-rays or electrons for targeted tumor destruction.
- **Environmental & Safety Considerations**: Requires a reinforced concrete bunker (12"–36" RCC walls) with controlled access, interlocks, and continuous radiation monitoring. PNRA licensing is mandatory.
- **Installation Needs**: Heavy equipment anchorage, independent HVAC, uninterrupted power supply with stabilizers.

Cyclotron

- **Function**: Produces radioisotopes (e.g., FDG) for PET imaging.
- **Environmental & Safety Considerations**: Significant radiation shielding; secure isotope transfer lines; exhaust ventilation with filters.
- **Installation Needs**: RCC shielding bunker, remote operation capability, PNRA-approved design.

Brachytherapy System

- **Function**: Places radioactive sources inside or near the tumor.
- **Safety**: Lead-lined treatment rooms, strict source handling protocols, patient isolation as per IAEA safety codes.

3.4.3 Diagnostic Laboratory Equipment

Automatic Chemistry Analyzer

- **Function**: Processes biochemical tests for cancer markers and general health monitoring.
- **Safety**: Requires proper chemical waste disposal; minimal environmental impact.

Blood Gas Analyzer

- **Function**: Measures oxygen, CO_2, and pH in critical patients.
- **Environmental Considerations**: Calibration solutions disposed of as per Hospital Waste Management Rules (2005).

Hematology Analyzer & Coagulometer

- **Function**: Analyzes blood cells and clotting profiles; crucial for cancer patients undergoing chemo/radiotherapy.

3.4.4 Critical Care Equipment

- **Anesthesia Machines with Ventilators** – Life support in surgeries; require medical-grade gas pipelines and power redundancy.
- **ICU Ventilators** – Continuous respiratory support; require HEPA filtration for infection control.
- **Dialysis Machines** – For patients with chemotherapy-induced renal failure; require treated water systems.
- **Cardiac Monitors** – Continuous ECG, BP, and oxygen monitoring; integrated with hospital IT systems for central observation.

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3.4.5 Waste Management Equipment

High-Temperature Medical Waste Incinerator (50–1000 kg/hr)

- **Function**: Safe disposal of infectious and hazardous medical waste.
- **Environmental & Safety Considerations**: Equipped with Air Pollution Control Devices (fabric filters, scrubbers, activated carbon injection) to meet **NEQS** and **ADB/AIIB air emission guidelines** for particulate matter, SO_2, NOx, CO, and dioxins/furans.
- **Installation Needs**: Stack height designed for dispersion modeling compliance, dedicated waste handling area; operator training in emissions control.

3.4.6 Installation and Commissioning Protocol

- **Pre-Installation**: Completion of site-specific civil works (shielding, vibration control, utility connections) before delivery.
- **Installation**: Supervised by OEM-certified engineers to ensure proper alignment, calibration, and functional integrity.
- **Commissioning & Testing**: Includes Site Acceptance Tests (SAT), radiation leakage tests (for PNRA licensing), performance verification, and safety interlock checks.

Training: All operators, biomedical engineers, and safety officers will receive formal training on use, maintenance, and emergency procedures.

Associated Facility

43. The infrastructure component (hospital building) is being executed by the CDA, while procurement and installation of medical equipment will be managed by the MoNHSRC. The project is financed through Public Sector Development Programme (PSDP) allocations, with additional financing from ADB and AIIB via Panda Bonds, specifically for the procurement and installation of specialized medical equipment. The hospital building, which is already under construction, is considered an associated facility for the specialized medical equipment component in accordance with the ESF criteria[3][1].Under AIIB's ESF Policy, the application of ESP and ESSs are also applicable to associated facilities.

[1] *(a) directly and materially related to the Project; (b) carried out, or planned to be carried out, contemporaneously with the Project; and (c) necessary for the Project to be viable and would not be carried out if the Project did not exist.*

3.4.7 Energy Consumption

Table 3.3: Detail of Energy Consumption by Equipment's

Equipment	Typical Power Rating	Estimated Energy Consumption	Notes / Relevance
MRI (1.5 Tesla)	50–100 kW	150–250 kWh per scan (depending on duration & sequences)	Requires dedicated chiller & uninterrupted power.
PET-CT Scanner	30–50 kW	100–200 kWh per study	Radioisotope cooling adds to power demand.

[3] *(a) directly and materially related to the Project; (b) carried out, or planned to be carried out, contemporaneously with the Project; and (c) necessary for the Project to be viable and would not be carried out if the Project did not exist.*

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CT Scan (640-slice)	20–40 kW	50–100 kWh per scan	Frequent use in oncology patients increases load.
Angiography Machine	60–80 kW	120–200 kWh per procedure	Requires clean power supply and cooling.
Digital X-ray Units (incl. Mobile)	5–15 kW	10–20 kWh per study	Low per-use, but high frequency increases total load.
DEXA Scan	2–5 kW	5–10 kWh per scan	Minimal demand.
Fluoroscopy Unit	15–25 kW	50–100 kWh per procedure	Continuous radiation during procedures = higher use.
Linear Accelerator (LINAC)	80–150 kW	200–400 kWh per treatment session	One of the largest consumers; consumers requires 24/7 cooling & backup.
Cyclotron	300–500 kW	3,000–5,000 kWh per day (depending on isotope production cycles)	Highest load equipment; bunker with cooling & ventilation.
Brachytherapy System	10–20 kW	10–20 kWh per treatment	Much lower than LINAC but needs strict radiation shielding.
Chemistry / Hematology / Gas Analyzers	2–10 kW each	10–30 kWh per day (continuous operation)	Medium demand spread across labs.
ICU Ventilators, Dialysis, Anesthesia Machines, Monitors	1–3 kW each	5–10 kWh per unit per day	Small individually but many units together add up.
High-Temperature Medical Waste Incinerator (50–1000 kg/hr)	50–100 kW (burner + APCD)	1,000–2,000 kWh per day (depending on cycles)	Needs diesel + electricity, continuous emission monitoring.

3.5 Project Implementation Schedule

44. The project commenced in April 2023 and is scheduled for completion by 30 June 2026. As of August 2025, approximately 70% of civil works have been completed.

Phase 1: Site Preparation and Utility Relocation

45. Since the grey structure of the hospital is already approximately 70% completed, the initial site preparation activities have largely been carried out. At present, this phase mainly involves the completion of any residual site organization works, management of construction support facilities (temporary offices, storage, and worker amenities), and the relocation or protection of remaining utilities to ensure uninterrupted supply of electricity, water, and medical gases to other operational PIMS facilities during the ongoing construction and equipment installation period.

46. Basic environmental safeguard measures (such as dust suppression, noise control, and waste handling) were applied during the earlier stages of site development and continue to be enforced. The detailed description of environmental and social safeguards applicable to each phase is presented in the Environmental Management section of this ESIA.

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Figure 3.2: Master Plan of the Project highlighting the Bunker portion.

Phase 2: Construction of Structural and Radiation Bunker Facilities

47. While the hospital's main structure is largely complete, this phase will finalize remaining RCC works, internal partitions, and specialized construction such as the reinforced concrete radiation bunker for high-energy medical equipment (LINAC, cyclotron). The bunker will be built according to PNRA and IAEA shielding standards with controlled access, radiation monitoring provisions, and independent ventilation systems. Structural finishing, waterproofing, and fire safety measures will also be integrated at this stage.

Phase 3: Installation of Building Services

48. Once the core structure and bunker are complete, critical building systems will be installed, including HVAC, centralized medical gas supply, fire detection and suppression systems, electrical distribution networks, elevators, and IT/data cabling. All installations will adhere to international hospital facility standards and NEQS requirements for energy efficiency, indoor air quality, and occupational safety. This phase will also involve integration of infection control systems, such as HEPA filtration for oncology wards.

Phase 4: Delivery and Installation of Medical Equipment

49. Procurement of medical equipment will follow ADB procurement guidelines and will include advanced diagnostic, radiotherapy, surgical, laboratory, and waste management systems. Equipment will be delivered in a phased manner to minimize site congestion. Installation will be supervised by OEM-certified engineers, with calibration conducted according to manufacturer specifications. Radiation-emitting devices will undergo inspection and licensing by PNRA prior to clinical use.

Phase 5: Commissioning, Regulatory Approvals, and Operational Readiness

50. In the final phase, all systems and equipment will be tested for performance, safety, and compliance. The hospital will secure necessary regulatory approvals from PNRA, Pakistan EPA, and relevant municipal authorities. Staff training programs will be implemented to ensure operational efficiency and compliance with radiation safety, waste management, and emergency preparedness protocols. Upon completion, the hospital will be ready to provide

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integrated oncology services to patients, with the official target completion date set for 30 June 2026.

3.6 Project Cost

51. The 200-Bedded Cancer Hospital has a total estimated cost of Rs. 7,476.017 million, including Rs. 3,406.1 million for infrastructure funded under the PSDP and executed by the CDA. For 2025–26, Rs. 900 million has been allocated through the PSDP, while the Ministry of Finance is exploring additional financing from AIIB and ADB through Panda Bonds to ensure timely completion by June 2026 and maintain affordability for low-income patients.

3.7 Construction Phase Resources

3.7.1 Workforce

52. The construction works are currently in progress, with approximately 88 personnel engaged at the site:

- **Direct Workers (67):** Skilled and unskilled labor employed on-site, including masons, carpenters, welders, electricians, plumbers, machine operators, and helpers.
- **Indirect Workers (21):** Personnel engaged through subcontractors or in supporting activities such as transport, security, catering, materials supply, and quality control. List of Direct & Indirect are shown in Table 3.4-3.5

53. The workforce level is expected to vary depending on construction intensity, particularly during finishing works, radiation bunker development, and installation of building services.

Table 3.4: List on Indirect Labor

Contactor		
Sr. No	**Designation**	**Status**
1	MD Company	1
2	Project Manager	1
3	Construction Manager	1
4	Planning Engineer	1
5	Coordination Engineer (Civil)	0
6	Coordination Engineer (Electrical)	0
7	Mechanical Engineer	1
8	Quantity Surveyor	1
9	Admin Officer	1
10	Accountant	1
11	Surveyor	1
12	Surveyor Helper	1
13	Supervisor	3
14	Storekeeper	1
15	Safety officer (HSE)	1
16	Laboratory Technician	1
17	Lab Helper	0
18	Store Helper	0
19	Watchman	2
20	Driver	1
21	Tower crane operator	0
22	Ass. Storekeeper	1
23	Technician	1
	TOTAL	**21**

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Table 3.5: List on Direct Labor (Skilled & Unskilled)

Direct Labor (Skilled & Unskilled)		
Sr.	**Designation**	**Status**
1	Mason Forman	2
2	Mason	6
3	Mason helper	6
4	Labor	12
5	Scaffolder	4
6	Scaffold helper	6
7	Electrician	9
8	Staff Cook	02
9	Office boy	01
10	Labor cook	02
11	Staff cook helper	01
12	G. Forman	01
13	Sweeper	01
14	Plumber	07
15	Carpenters	02
Total		**67**

54. All workers will be employed in compliance with Pakistan's Labor Laws, ILO Core Labor Standards, ADB's Safeguard Policy Statement (2009) requirements on labor and working conditions and AIIB's ESF requirements

3.7.2 Construction Materials and Sources

55. The following key materials are being used for the hospital construction, sourced primarily from Islamabad/Rawalpindi markets and certified suppliers to ensure compliance with national quality standards:

Table 3.6: List of Construction Material and Sources

Material	Estimated Use in Hospital Construction	Likely Source
Cement	RCC structure, plastering, finishing	Local suppliers (Maple Leaf, Lucky, DG Khan)
Steel Reinforcement Bars	Structural RCC, radiation bunker walls	Steel mills / authorized dealers in Islamabad & Rawalpindi
Bricks & Concrete Blocks	Internal partitions, walls	Local kilns and block manufacturers
Sand & Crush Aggregate	RCC works, flooring, mortar	Margalla quarries and local suppliers
Glass & Aluminum	Windows, facades, partitions	Local fabricators in Islamabad
Ceramics & Tiles	Flooring, walls in wards, labs, and OTs	Imported and local brands (market supply)
Wood & Joinery	Doors, cabinetry, furniture	Local timber markets and workshops
Electrical & Plumbing Materials	Wiring, fixtures, pipelines	Authorized distributors in Rawalpindi/Islamabad
HVAC Equipment & Ducting	Air conditioning, ventilation	Local suppliers / imported units via authorized dealers
Paints & Finishes	Internal/external finishing	Local manufacturers (ICI, Berger, Nippon)

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3.7.3 Machinery and Equipment

56. The following equipment and machinery to be deployed on site during the construction phase of the cancer hospital building.

Table 3.7: Equipment and Quantity on Site During Construction

S.No	Description of Equipment	Quantity
1	Batching Plant	1 No.
2	Hoist (Lift Machine)	2 Nos.
5	Vibrator/Compactor	4 Nos.
6	Steel Cutting /Bending Machine	1 Nos.
7	Concrete Mixer (Single Bag)	1 Nos.
8	Loader (Tractor)	1 No.
9	Auto Level	1 Nos.
10	Total Station	1 No.
11	Tractor & Trolley	1 No.
12	Generator (100 KVA)	1 Nos.

57. All machinery will be maintained to NEQS air emission and noise level standards (maximum permissible noise: 85 dB(A).

3.7.4 Construction Camp Site

58. The construction camp is established within the project boundary, ensuring convenient access and close supervision. The camp has been designed to accommodate the current workforce and provide essential facilities, including:

- **Worker Accommodation and Offices:** Temporary prefabricated structures for worker rest areas, site offices, and storage.
- **Sanitation Facilities:** Septic tank–based sewage management system sized for the workforce, with periodic desludging through authorized service providers in compliance with NEQS standards.
- **Solid Waste Collection:** Waste segregation at source (recyclables, general waste, organic) with designated bins located outside the active work zone. Waste is collected and transferred through the PIMS waste contractor.
- **Power Supply:** The camp is connected to the Islamabad Electric Supply Company (IESCO) distribution network to ensure reliable electricity. In addition, a backup diesel generator is available to provide uninterrupted power during load shedding or outages.
- **Water Supply:** Sourced through PIMS internal water supply network, with storage tanks installed to ensure reliability.
- **Safety Facilities:** Provision of personal protective equipment (PPE) including helmets, safety shoes, gloves, and reflective vests for all workers.
- **Access and Mobility:** Internal camp roads and pathways to facilitate safe movement of personnel and materials.

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Figure 3.3: Labor Camp, Waste collection bins and Labor wearing PPEs while working

3.7.5 Operation Phase Resources

a) Utilities

59. **Electricity:** Supplied from the Islamabad Electric Supply Company (IESCO) grid with two backup diesel generators (for critical areas like ICUs, OTs, and radiotherapy). Generators will meet Pakistan EPA NEQS for NOx, SO_2, PM, and CO emissions, and IFC EHS Guidelines for fuel storage and spill prevention. In construction phase, as the building in within PIMs hospital premises so IESCO supply is available for the Construction phase.

60. **Water Supply:** Potable water sourced from the Capital Development Authority (CDA) municipal network, supplemented by storage tanks to ensure an uninterrupted supply. Estimated daily demand: 100–120 liters per patient and staff member (including personal use, laundry, and hygiene), in line with WHO Hospital Water Use Guidelines. For the construction phase, water requirements are being met through water bozers (tankers) arranged by the contractor. These are used for activities such as concrete curing, dust suppression, and general site needs.

61. **Medical Gases:** Centralized piped system supplying oxygen, nitrogen, nitrous oxide, and medical air, meeting ISO 7396-1 standards for medical gas pipeline systems. Backup cylinder banks will be installed for redundancy.

62. **Wastewater Disposal:** On-site pre-treatment of effluent to meet NEQS for Hospital Effluent before discharge into municipal sewers.

b) Biomedical Waste Management

- Hospital waste will be segregated at source into infectious, non-infectious, and sharps, as per Hospital Waste Management Rules, 2005.
- A high-temperature medical waste incinerator (100 kg/hour capacity), equipped with advanced Air Pollution Control Devices (APCDs), will be installed within the hospital premises to ensure environmentally safe disposal of hazardous biomedical waste. The incinerator is designed in compliance with the World Bank Group/IFC Environmental, Health and Safety (EHS) Guidelines for Healthcare Facilities (2007), WHO recommendations, and relevant ADB/AIIB safeguard requirements, particularly for controlling emissions of dioxins, furans, and particulate matter.

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Detail of the Incinerator:

63. To manage infectious and hazardous waste generated from hospital operations, a hospital-grade incinerator will be installed within the premises. The incinerator is designed to handle 100 kg/hour of biomedical waste, including contaminated plastics, textiles, rubber, paper, and pathological waste such as human tissue.

64. The system consists of a dual-chamber design with a primary pyrolytic combustion ch amber (operating above 800°C) and a secondary post-combustion chamber (operating abov e 1,100°C with >1 second retention time) to ensure complete destruction of harmful pollutant s and smokeless emissions. A wet scrubber-based flue gas treatment system will further redu ce particulate matter, acid gases, and dioxins/furans to meet both national (Pak-EPA/NEQS) and international (ADB/AIIB/WHO) requirements.

65. The incinerator is fueled primarily by natural gas, with LPG standby arrangements to ensure uninterrupted operation during fluctuations in gas supply. It is designed for 12-hour daily operation, with automated PLC-based control systems, temperature monitoring, and emergency shutdown features for safe handling.

66. Incinerator ash will be collected in sealed containers and handed over to a licensed third-party waste management contractor for final disposal in compliance with Pak-EPA guidelines. Scrubber wastewater will undergo on-site treatment before discharge to ensure compliance with NEQS effluent standards.

67. All waste-handling staff will be equipped with PPE and trained in standard operating procedures (SOPs), as required under the World Bank Group EHS Guidelines for Health Care Facilities. This system ensures that hazardous hospital waste is managed in an environmentally responsible manner, minimizing risks to public health, surrounding communities, and the broader environment.

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4. Description of Existing Environment

4.1 General

68. This chapter provides a detailed description of the physical, biological, and socio-economic environment, serving as the baseline against which project impacts are predicted, and mitigation measures are designed. The information presented here has been compiled from literature, field surveys, baseline monitoring, and stakeholder consultations, with particular emphasis on the requirements of Pakistan EPA, National Environmental Quality Standards (NEQS), and safeguard policies of the ADB and AIIB.

Status of Project Area

69. The proposed 200-bedded Cancer Hospital is located within the premises of the Pakistan Institute of Medical Sciences (PIMS), Sector G-8/3, Islamabad. The total site area is 38 kanals. The location is part of the established PIMS hospital complex, which currently accommodates multiple medical facilities including the Children's Hospital, Mother and Child Health Center, and various specialty wards.

Ongoing Activities in the Project Area

70. **Construction Status:** As of August 2025, approximately 70% of the grey structure is completed, including RCC framework, partitions, and core infrastructure.

71. **Hospital Operations:** PIMS is fully operational and provides tertiary healthcare services. Patient inflow, staff movements, and emergency operations are ongoing adjacent to the project site.

72. **Traffic & Access:** The site is accessed through the internal road network of PIMS, which connects to Ibn-e-Sina Road. The roads are actively used by ambulances, hospital staff, and patients.

73. **Utility Connections**: Electricity is supplied by IESCO, water from the CDA municipal network, and solid waste management is handled by PIMS contractors.

74. **Vegetation:** Several shade trees are present within the project boundary, However, no tree cutting or removal is being carried out as part of the construction works. Landscaping and plantation will be enhanced in the operational phase to improve the hospital's green footprint.

75. **Environmental Safeguards Implemented:** Dust suppression, controlled access, and site fencing are already in place as part of construction management.

4.2 Environmental Setting

76. Islamabad lies at the northern edge of the Potohar Plateau, at an average elevation of approximately 540 meters above mean sea level. The city was deliberately selected and developed as the federal capital in the 1960s due to its favorable location, natural beauty, and relatively stable climate. It is bounded to the north by the Margalla Hills, an offshoot of the Himalayan foothills, while the south merges into the gradually descending plains of the plateau.[4]

[4] Source: CDA Master Plan, 1960; Pakistan Meteorological Department, 2023; Geological Survey of Pakistan, 2022)

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77. **Topography** in the project area is relatively gentle and flat, particularly within the PIMS complex, where land was leveled during earlier institutional development. Unlike the surrounding plateau, which is characterized by rolling uplands, ravines, and active gullies caused by water erosion, the hospital site itself does not face significant topographic constraints.

78. **Geology and soils** of the area reflect the wider Potohar region, which consists of sedimentary formations including sandstone, shale, conglomerates, and silty sandy clays. The Margalla Hills to the north are composed of Jurassic to Triassic limestone, while alluvial deposits dominate the plains. Soils in the project area are generally loamy to clayey, with adequate load-bearing capacity for construction. However, the wider region is susceptible to soil erosion, a factor that necessitates the use of proper stormwater drainage and landscaping in new infrastructure developments.

79. The **climate** of Islamabad is classified as humid subtropical, with four distinct seasons. Summers are hot, with average daytime temperatures between 35–40°C in June, while winters are cool to cold, with minimum temperatures falling to 3–4°C in January. The monsoon brings the bulk of the rainfall between July and September, contributing to an annual average of around 1,145 mm. The surrounding hills and vegetation moderate the climate, but urban expansion has introduced localized heat island effects.[5] For the hospital site, baseline monitoring confirmed that air quality parameters such as SO_2, NO_2, CO, PM_{10} are within permissible limits as shown in annex attached (**Environmental Monitoring report)**.

80. **Groundwater** in Islamabad is a critical resource, with the water table in the project vicinity found at approximately 160 feet below ground level. In addition to groundwater extraction, the city is dependent on Rawal Lake and Simly Dam, which provide piped municipal water supply. The hospital is connected to this municipal network, which reduces dependency on direct groundwater abstraction. Surface hydrology is influenced by seasonal streams (nullahs) that drain into the Korang River system. No streams pass directly through the project site, limiting risks of surface water contamination. Within the project area groundwater sampling was also taken place, the result shows the parameters of water samples tested meet the permissible limits of National Environmental Quality Standards (NEQS) also shown in annex attached (**Environmental Monitoring report**).

81. Baseline **noise level** monitoring showed that day- and night-time readings at the project site were within NEQS limits for residential/institutional zones, though peaks occur due to traffic movements and construction equipment. Since the hospital lies in a mixed-use institutional and residential area, construction and operation activities must continue to follow NEQS and IFC EHS guidelines to protect nearby sensitive receptors.

82. **Seismologically**, Islamabad falls within Seismic Zone II of Pakistan's seismic zoning map, which corresponds to a high hazard area with the potential for moderate to severe damage. The city lies near active tectonic features such as the Hazara Fault Zone and the Soan Syncline. The devastating 2005 Kashmir earthquake (magnitude 7.6) caused severe structural damage and loss of life in parts of Islamabad, highlighting the necessity for earthquake-resistant hospital infrastructure. Accordingly, the Cancer Hospital is being constructed with reinforced concrete designs and structural safety measures in compliance with CDA building codes, PNRA guidelines for radiation facilities, and international seismic safety standards.

[5] Pakistan Meteorological Department (2023). Climatological Normals of Islamabad (1991–2020). Government of Pakistan.
Khan, B., Saleem, M., & Hameed, S. (2013). Urban heat island intensity in Islamabad and its linkages to land use change. Journal of Environmental Studies, 22(2), 45–56.

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83. **Sensitive Receptors.** Sensitive receptors within and around the project site include patients, attendants, and staff of PIMS hospital, who are directly adjacent to ongoing construction activities; nearby residential communities in G-8/3, which may be exposed to noise, dust, and traffic during construction; and educational institutions in the wider G-8 sector that could experience indirect traffic congestion and air quality effects. Commercial establishments along Ibn-e-Sina Road are also considered sensitive due to possible access disruptions. In addition, the F-9 Capital Park (Fatima Jinnah Park), located less than 1 km from the project site, represents a significant ecological and social receptor, being one of Islamabad's largest urban green spaces.

4.3 Ecological Resources

4.3.1 Flora

84. Islamabad lies in the Dry Subtropical Scrub Forest Zone, though the project site and its surroundings within the PIMS complex are already highly urbanized, dominated by residential, commercial, and institutional developments. The hospital site is best categorized as a modified habitat under the AIIB ESF, as natural conditions have been extensively altered and existing vegetation is limited to ornamental trees, shrubs, and grassy lawns. No rare, endangered, or protected flora species are present, and no tree cutting or removal is required for the project.

85. On the contrary, the project incorporates a landscaping plan with approximately 3,000 native and drought-tolerant trees and shrubs (e.g., Phulai, Amaltas, Kachnar, and Shisham), which will enhance the ecological setting, provide shade, reduce localized heat island effects, and improve the site's aesthetic and environmental quality. Since no natural or critical habitats are present and no loss of trees is involved, the project is expected to have no adverse impacts on vegetation and instead will contribute positively by increasing green cover.

Figure 4.1: Existing Flora Species within Project Area

Table 4.1: Proposed Plantation Mix (Total ≈ 3,000 Plants)

Category	Quantity	Notes (Spacing / Purpose)
Shade/Native Trees	300	6–7 m spacing along periphery, parking, and courtyards; species below
Shrubs/Hedges	700	Perimeter hedging, parking islands, building edges (0.8–1.5 m spacing)
Ornamental/Flowering Trees	80	Avenues/entrances; accent species
Palms (limited)	20	Entry accents only (avoid overuse)
Climbers/Vines	100	Pergolas/trellises/screens

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Groundcovers/Grasses/Perennials	1800	Lawns, bioswales, rain-garden edges, medians
Total	≈3,000	

86. **Rationale:** Assuming 40–50% of the 38 kanals becomes non-green (buildings, drives, services), the net plantable area (lawns, setbacks, pockets) supports 250–350 trees at 6–7 m spacing plus understory shrubs/groundcovers. This mix is practical for hospital O&M and meets visual/functional needs (shade, dust/noise buffering, patient wellbeing).

Recommended Species (Prioritize Native/Non-invasive)

- **Shade/Native Trees**: Acacia modesta (Phulai), Ziziphus nummularia / mauritiana (Ber), Cassia fistula (Amaltas), Bauhinia variegata (Kachnar), Dalbergia sissoo (Shisham*), Melia azedarach (Dharek), Syzygium cumini (Jaman), Albizia lebbeck (Sirin), Pongamia (Millettia) pinnata.
- **Ornamental Trees (limited):** Jacaranda mimosifolia, Tabebuia spp., Platanus orientalis (Chinar) (only where space allows).
- **Shrubs/Hedges**: Dodonaea viscosa, Nerium oleander/Kaner*, Thevetia peruviana*, Carissa carandas, Callistemon (Bottlebrush), Hibiscus rosa-sinensis, Bougainvillea (trellised).
- **Groundcovers/Perennials/Grasses**: Cynodon dactylon (Bermuda), Pennisetum spp., Lippia/Phyla nodiflora, Vinca, Dianella, Daylily.
- **Climbers:** Bougainvillea, Thunbergia, Petrea volubilis, Quisqualis indica.

87. **Avoid/Limit:** Eucalyptus spp., Conocarpus, and highly water-demanding or allergenic species near air intakes/wards.

Implementation & Maintenance Commitments

- **Planting Windows:** Monsoon (Jul–Sep) and late winter (Feb–Mar).
- **Survival Rate:** ≥ **80%** after 24 months; replace failures annually.
- **Irrigation:** Drip/soaker for trees/shrubs; sprinklers for lawns; harvest roof runoff to **raingardens/bioswales**.
- **Soils & Mulch:** 12–18" topsoil in beds; organic mulch 75–100 mm to reduce evapotranspiration.
- **Protection:** Tree guards in parking/perimeter zones; root barriers near utilities.

4.3.2 Fauna

88. Faunal presence within the immediate project site is negligible due to its urbanized setting within the PIMS complex. However, the wider Islamabad area supports species typical of the Potohar scrub forest. Common mammals include the golden jackal (*Canis aureus*, LC – Least Concern), Indian crested porcupine (*Hystrix indica*, LC), Indian hare (*Lepus nigricollis*, LC), and wild boar (*Sus scrofa*, LC). Reptilian species observed regionally include the oriental garden lizard (*Calotes versicolor*, LC) and the spiny-tailed lizard (*Uromastyx hardwickii*, VU – Vulnerable). Avifauna are abundant and adapted to both rural and urban habitats, with species such as the house crow (*Corvus splendens*, LC), house sparrow (*Passer domesticus*, VU – Vulnerable), common mynah (*Acridotheres tristis*, LC), and common quail (*Coturnix*, LC).

4.4 Social Environment

89. The hospital lies in Sector G-8/3, at the heart of Islamabad. Politically and administratively, Islamabad is a Federal Territory, directly governed by the federal government through the Islamabad Capital Territory Administration, with planning and municipal services

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overseen by the Capital Development Authority (CDA). Environmental compliance is regulated by the Pakistan Environmental Protection Agency (Pak-EPA).

90. The demographic characteristics of the surrounding sectors reflect Islamabad's mixed population. G-8 and G-9 host middle- and working-class residents, F-8 is more upscale and institutional, while H-8 houses educational institutions. To the south lies the Blue Area, Islamabad's commercial hub with banks, offices, shopping centers, and public services. The project location is therefore central and easily accessible to diverse socio-economic groups. The population density around the site is higher compared to peripheral sectors, resulting in strong demand for affordable and specialized health services.

4.5 Economic Conditions

91. Islamabad's economy is dominated by the service sector, with government employment, education, commerce, and healthcare as key drivers. The Blue Area serves as the city's commercial hub, while nearby Rawalpindi complements it with trade, logistics, and manufacturing. Livelihoods in Islamabad range from public sector jobs, private services, trade, and small businesses to informal labor, with average household monthly incomes typically ranging between PKR 60,000–150,000, reflecting a mix of lower-income, middle-class, and affluent professional groups. The construction and eventual operation of the Cancer Hospital will contribute significantly to the local economy by generating jobs, supporting medical research, and reducing the financial outflow associated with cancer patients traveling abroad for treatment. For low-income families, the provision of affordable oncology care in the capital city will greatly reduce economic hardship associated with cancer management.

4.6 Transportation

92. The project site is connected by a well-developed transport network. The hospital is directly accessible via Ibn-e-Sina Road, which links to Jinnah Avenue and 9th Avenue, providing connectivity to the Blue Area and surrounding residential sectors. The Srinagar Highway ensures regional linkages, including to the new Islamabad International Airport and Rawalpindi city. The Metro Bus service further improves accessibility, offering affordable public transport for patients, attendants, and staff. Internal road networks within PIMS connect the hospital seamlessly with other health facilities, laboratories, and service areas.

4.7 Educational Facilities

93. The site is in close proximity to major educational institutions, especially in H-8 Sector, which houses universities such as the Allama Iqbal Open University (AIOU) and the National University of Modern Languages (NUML), as well as technical colleges and training centers. These institutions provide a skilled human resource base that can contribute to hospital operations, research, and continuous professional development for healthcare professionals.

4.8 Health Facilities

94. The proposed Cancer Hospital will be integrated into the PIMS complex, which is Islamabad's largest tertiary care facility, catering to patients from across Pakistan. Within surrounding sectors, several public and private health facilities, clinics, and diagnostic centers also operate, including Polyclinic Hospital in G-6, Shifa International Hospital in H-8, and numerous smaller clinics. Despite this network, there remains a critical gap in specialized oncology care in Islamabad, which this Cancer Hospital is designed to address. It will not only provide advanced diagnostics and treatment locally but also reduce dependency on overseas treatment, thereby enhancing the overall healthcare capacity of the country.

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4.9 Demographic profile

95. Islamabad Capital Territory (ICT) presents relatively favorable socio-economic indicators compared to other regions of Pakistan, which directly influence the project's social baseline and anticipated benefits.

96. **Population**: The total population of ICT is approximately 2.36 million (Census 2023), with an annual growth rate of 4.91%, one of the highest in the country due to migration and urbanization.

97. **Literacy Rate**: Islamabad has the highest literacy rate in Pakistan at 83% (PBS 2023), with male literacy at 87% and female literacy at 79%.

98. **Employment:** The labor force participation rate is about 54%, dominated by the service sector, including government employment, commerce, education, healthcare, and small-scale trade. Informal labor, domestic work, and daily wage activities also support livelihoods in surrounding urban and peri-urban communities.

99. **Average Income**: Household incomes are relatively higher than the national average, with most families earning between PKR 60,000–150,000 per month (HIES 2020–21), though pockets of low-income and vulnerable groups remain, particularly among informal workers and migrants.

100. **Health Indicators**: Islamabad has better health outcomes than the national average, with life expectancy around 67 years, improved maternal and child health, and easier access to tertiary care facilities such as PIMS. However, cancer remains a growing burden, with limited specialized oncology services.

101. **Vulnerability Indicators**: Despite higher incomes, the majority of health spending in Pakistan is out-of-pocket (over 60% of total health expenditure, WHO 2022), which disproportionately impacts low-income families. Limited oncology capacity in the public sector forces many patients to either forego treatment or incur catastrophic medical expenses.

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5. Potential Environmental Impacts and Mitigation Measures

102. This chapter identifies the potential environmental and social risks and impacts envisaged due to the implementation of the proposed Project. The appropriate mitigation and remedial measures of each environmental and social impact are proposed in this chapter keeping in view the mitigation hierarchy.

5.1 Project Location Impact Assessment and Mitigation

103. The Project is expected to have a significant positive impact by enhancing access to specialized cancer diagnosis and treatment services. However, like any major healthcare infrastructure project, the location and development activities may also pose environmental and social challenges that must be addressed through appropriate planning and mitigation measures. Since the grey structure of the hospital building (Associated Facility) is completed, and the leftover work includes installation of HVAC system, lift facility, and generator set. Other activities include construction and fit-out of radiation bunkers, external development works (landscaping, parking, utility linkages and approach road). Followed by these activities, the installation and operation of equipment/instruments (Table 5.4 and Table 5.5) and installation of incinerator facility may also generate E&S impacts. The associated activities, i.e. installation of incinerator facility is also expected to generate E&S impacts. However, given mitigation options will avoid or reduce these impacts, either by Project's leftover works, installation and operation of equipment or installation and operation of incinerator facility.

104. The impact assessment, most of the risks and impacts are anticipated at the implementation/operational phase, range from medium to high significance and are temporary site-specific, reversible. Further, adopting simple mitigation measures, in accordance with the mitigation hierarchy, these potential impacts will either be avoided altogether, or their likelihood of occurrence and severity will be reduced, thus making the proposed Project environmentally responsible and socially acceptable.

5.2. Screening of Potential Impacts and their Significance

105. The establishment and operation of the proposed Project can bring significant benefits to public health, especially in underserved regions. However, it may also result in E&S impacts that need to be identified early and managed effectively. This screening outlines the key potential impacts and evaluates their significance to guide appropriate mitigation and monitoring strategies. Table 5.1 and Table 5.2 below show the positive and negative impacts with their significance.

Table 5.1: Potential Positive Impacts with Significance

Sr. No.	Impact	Significance	Description
1	Improved access to cancer care	High	Enhances early detection, diagnosis, and treatment outcomes.
2	Local employment opportunities	Medium to High	Job creation during construction and operation phases.
3	Capacity building in healthcare	High	Trains healthcare professionals in oncology services.
4	Strengthening of health systems	High	Reduces pressure on existing tertiary hospitals.

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Table 5.2: Potential Negative Impacts with Significance

Sr. No.	Potential Impact	Significance	Remarks
1	Dust, noise, and vibration during construction	Medium	Localized and short-term but can affect nearby communities/populations.
2	Biomedical and hazardous waste generation	High	Involves infectious, cytotoxic, and radioactive waste; requires strict control.
3	Risk of radiation exposure (radiotherapy)	High	Critical risk if shielding, monitoring, or protocols fail.
4	Wastewater discharge (chemotherapy & lab waste)	Medium to High	Requires treatment before release to prevent contamination.
5	Energy and water consumption	Medium	Continuous utility demand: sustainable resource use is necessary.

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5.3 E&S Impacts and Mitigation Measures for Project's Leftover Works of Hospital Building

Table 5.3: Potential E&S Impacts and Mitigation Measures for leftover Project Activities

Sr. No.	Activities	E&S Impacts	Mitigation Measures/Options	Responsibilities	
				Implementation	Supervision
1	Installation HVAC system	Noise Pollution: Operation of condensers, fans and compressors may generate noise pollution and affect the surrounding environment including nearby (residential and hospital areas)	▪ Installation of silencer, sound barriers will reduce the impact. ▪ Schedule the noisy activities during daytime. ▪ Install temporary acoustic barriers like plywood with sound insulation or portable noise curtains. ▪ Use vibration-dampening mats or pads under heavy equipment. ▪ Seal gaps and duct penetrations during installation to reduce sound leakages. ▪ Provide hearing protection like earplugs, earmuffs to workers. ▪ Rotate workers to limit time in high-noise areas. ▪ Display noise hazard signs around noisy equipment. ▪ Ensure compliance with NEQS and the effective implementation of the GRM.	CC/SC	PMU (PD/ES)
		Air quality impacts: During the construction phase dust emissions may deteriorate local air quality, posing health risks to workers and affecting the surrounding environment. In addition, improperly installed ventilation or mechanical systems may circulate pollutants and allergens further compromising indoor air quality and human health..	▪ Use wet cutting techniques or vacuum-attached power tools to reduce airborne dust. ▪ Install temporary dust barriers or containment zones like plastic sheeting around work areas. ▪ Use sticky mats at entry/exit points to prevent tracking dust into clean areas. ▪ Keep windows open or increase natural ventilation if possible. ▪ Avoid installing HVAC systems during poor outdoor air quality conditions (smog days). ▪ Isolate HVAC work zones from critical areas using containment systems. ▪ Monitor air quality near sensitive areas during installation. ▪ Ensure compliance with NEQS and the effective implementation of the GRM.	CC/SC	PMU (PD/ES)

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		Occupational Health and Safety Risks: The installation of HVAC will involve work at height handling refrigerants and electrical work, all of which may pose safety risks to workers. Secondly, the technicians can be exposed to harmful refrigerants or chemicals during installation and maintenance as well.	▪ Availability and provision of relevant PPEs may be ensured. ▪ Conduct a site-specific risk assessment. ▪ Provision of proper safety signage and equipment. ▪ Ensure that the site will be restricted for the entry of irrelevant people. ▪ ▪ Prepare a Job Safety Analysis or Method Statement. ▪ Identify high-risk tasks like working at height, electrical work, confined spaces and heavy lifting. ▪ Use certified ladders, scaffolding, or aerial lifts with fall protection. ▪ Implement fall arrest systems. For example, harness, anchor points, lifelines etc. ▪ Train workers on fall prevention procedures. ▪ Avoid working at height during bad weather while working outdoor. ▪ Ensure effective implementation of GRM to timely address the issues.	CC/SC	PMU (PD/ES)
		Waste generation: The waste may involve ductwork, packaging, concrete, bricks, wood, glass, plastics and metals and plumbing fixtures insulation materials and wiring etc.	▪ To minimize the waste, the purchase of excess materials and packaging and their arrival at the site shall be prevented and it will be controlled. ▪ Construction and Demolition waste materials will be reused as far as possible in an effective way to save money while protecting natural resources. ▪ Scrap wood will be chipped on site and used as mulch or groundcover. ▪ Brick, concrete and masonry will be recycled on site as fill material. ▪ Packaging materials will be returned to suppliers for reuse. ▪ The generated waste will be collected properly, segregated, and disposed off in a CDA designated place accordingly.	CC/SC	PMU (PD/ES)

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			▪ Monitor the waste management mechanism by the Resident engineer and HSE Engineer on site. ▪ Follow the waste management protocols.		
		Energy consumption and emissions: HVAC systems are known for the largest energy consumers. Secondly, these systems contribute to carbon emissions and climate change.	▪ Use of energy-efficient systems like inverter technology may be ensured. ▪ Conduct a professional load calculation. ▪ Avoid oversizing or under sizing systems. ▪ Optimize duct design to reduce resistance and pressure drops. ▪ Use zoning systems to cool/heat only occupied areas	CC/SC	PMU (PD/ES)
2	Installation of elevator/lift	Noise and vibration: The construction/installation involve drilling, welding and cutting during shaft preparation and machinery installation, that is likely to produce noise pollution and vibration. Sounds of motors, pulleys and doors maydisturb the workers and nearby areas if not well-insulated.	▪ Use sound-dampening materials and insulated elevator shafts. This should be ensured by Construction Contractor CC) and the Supervision Consultant (SC). ▪ Maintain equipment to reduce operational noise. ▪ Schedule noisy activities during working hours and avoid these activities at nights.	CC/SC	PMU (PD/ES)
		Air quality and dust: Dust from shaft construction, wall cutting, and drilling mayaffect indoor air quality of the area.	▪ Use dust suppressants like water spray, vacuum extractors may be ensured by the CC. ▪ Ensure seal off work areas with temporary barriers ensure proper ventilation system. ▪ Seal off the installation area with plastic sheeting, dust-proof panels, or temporary enclosures. ▪ Use zippered doors and sticky mats at access points to control spread of dust. ▪ Maintain negative pressure in the installation zone using fans or air scrubbers.	CC/SC	PMU (PD/ES)
		Waste Generation: Installation may involve steel, glass, cables, motors, electronics, and produces packaging and installation waste.	▪ The SC and CC should ensure Procurement of eco-certified materials. ▪ Ensure and encourage recycle scrap materials and packaging. ▪ Choose modular systems to reduce waste.	CC/SC	PMU (PD/ES)
		Energy consumption: Elevator may require significant electricity for operation and standby modes,	▪ Use energy-efficient elevators like regenerative drives and a standardized energy star ratings for elevators may be considered.	CC/SC	PMU (PD/ES)

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		contributing to increased building energy use and GHG emissions.	▪ Installation of LED lighting and motion sensors inside the elevator cabin will help in release of GHG emissions. ▪ Use energy-efficient tools and machinery (electric rather than diesel-powered lifts). ▪ Switch off idle equipment and tools when not in use.		
		Use of chemicals: There may be risk of leakage/spillage of hazardous fluids commonly used in elevator components.	▪ Training of workers in safe handling and storage of chemicals used in elevators and provision of spill kits and secondary containment systems will avoid/reduce the impact on workers. ▪ Encourage the use of environmentally friendly and biodegradable fluids. ▪ Store chemicals in designated, well-ventilated areas, away from ignition sources. ▪ Use clearly labelled, sealed containers with secondary containment like spill trays. ▪ Provide spill kits near chemical use/storage areas. ▪ Train workers in spill response procedures. ▪ Place absorbent mats or trays under chemical handling areas. ▪ Ensure availability of fire extinguishers, eyewash stations, and first aid kits.	CC/SC	PMU (PD/ES)
		Fire/electrical safety & OHS risk: Faulty installation or equipment may pose risks to building and overall safety. Similarly, workers face risks while working at heights and electrical systems.	▪ Use certified electrical components and ensure compliance with Pakistan's Fire and Building codes, as mandatory component. ▪ Installation of emergency communication systems and fire-resistant elevator components will reduce the chance of risk and safety. ▪ Secure installation areas from unauthorized people. ▪ Implement strict HSE protocols including use of PPEs, lockout/tagout, fall protection and the Emergency response Plan. ▪ Provide training and supervision to the workers engaged in the installation of elevator.	CC/SC	PMU (PD/ES)
3	Installation of generator set	Noise and vibration: The installation of generator set may cause noise pollution from drilling and associated equipment use. Furthermore, during operation,, this may also generate	▪ Schedule noisy work during daylight hours. ▪ Use sound-insulated elevator shafts and vibration dampeners. ▪ Install the equipment in an area that is farer than the sensitivity of patients and other activities.	CC/SC	PMU (PD/ES)

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		noise potentially disturbing both workers and patients and contributing to overall noise pollution within the hospital environment	▪ Maintain equipment regularly to reduce operational noise. ▪ Ensure compliance with NEQS and the effective implementation of the GRM.		
		Material use and waste generation: Installation also involves the use of metals, electronics, cables and other materials that generate packaging and construction waste.	▪ Procurement may be carried out keeping in view the reputation of the supplier and make sure the selection of environmentally responsible suppliers. ▪ Reuse or recycle leftover materials and packaging. ▪ Implement waste segregation and disposal procedures on-site and disposal of waste may be made by an authorized contractor. ▪ Store chemicals in designated, well-ventilated areas, away from ignition sources. ▪ Use clearly labelled, sealed containers with secondary containment like spill trays. ▪ Provide spill kits near chemical use/storage areas. ▪ Train workers in spill response procedures. ▪ Place absorbent mats or trays under chemical handling areas.	CC/SC	PMU (PD/ES)
		Use of chemicals and lubricants: Potential for leakage of oils, lubricants or hydraulic fluids that can pollute indoor spaces or water systems.	▪ Selection of eco-friendly and low-toxicity lubricants may be ensured followed by a regular training of workers in spill response shall help in reducing the impact of chemicals and lubricants.	CC/SC	PMU (PD/ES)
4	Construction and fit-out of radiation bunker	Use of material: Radiation bunkers are specialized shielded rooms designed to house equipment such as linear accelerators for cancer treatment. Their construction involves heavy materials like lead, high-density concrete, and steel. This reflects an increasing demand of material use.	▪ This should be ensured by the design and supervision team should minimize over-ordering and encourage material reuse where feasible. Moreover, the design structures should be made in such a way that becomes beneficial for longer use. ▪ Use of certified and sustainably sourced materials in the construction and fit-out of radiation bunker.	CC/SC	PMU (PD/ES)
		Noise and air pollution: concrete pouring and cutting activities may lead to noise and dust pollution, affecting the workers, as well as the surrounding environment if not	▪ Use dust suppression techniques (e.g., water spraying, barriers) and limit noisy work to daylight hours.	CC/SC	PMU (PD/ES)

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		managed properly. Diesel-powered machinery and dust can temporarily degrade air quality of the premises and the surrounding area.	▪ Installation of acoustic screens or noise barriers if required based on the exceeding levels of noise as per NEQs. ▪ Use low-emission equipment and machinery and maintain equipment to minimize exhaust emissions. ▪ Monitor air quality near sensitive areas during construction.		
		Radiation Shielding Materials: Lead and other shielding materials pose potential environmental and health risks if spilled or improperly stored.	▪ Store shielding materials securely. ▪ Use PPE when handling lead. ▪ Follow proper SOPs and protocols for handling, cutting and disposing of shielding materials.	CC/SC	PMU (PD/ES)
		OHS Issues: Workers face risks from handling heavy materials, working in confined spaces, and potential exposure to radiation during equipment calibration or testing. Furthermore, restricted access, temporary barriers, or unsafe walkways may impact patients and staff movement.	▪ Conduct a site-specific risk assessment and develop a Safe Work Method Statement for each task. ▪ Include hazard identification, control measures and emergency procedure. ▪ Implement strict safety protocols and PPE use and provide radiation safety training and supervision. ▪ Schedule and monitor commissioning with radiation protection experts present on site. ▪ Ensure alternate access routes and signage. ▪ Use safe pedestrian walkways and barrier systems. ▪ Avoid blocking emergency access routes. ▪ Use mechanical lifting aids like cranes, forklifts and hoists for lead bricks, shielding doors, etc. ▪ Provide manual handling training and enforce team lifting protocols. ▪ Store lead and hazardous materials securely to avoid tipping or exposure. ▪ Use PPE when handling hazardous substances (gloves, aprons, respirators).	CC/SC	PMU (PD/ES)
5	Installation and procurement of equipment/instruments	Installation of complex and sensitive equipment has both short-term environmental and social impacts, as well as long-term operational implications. Installation of this equipment has several environmental and social impacts, primarily related to energy use, construction activity,	The equipment-wise impacts during installation and operations have been assessed and mitigation options are incorporated to avoid or reduce the possible impacts.	Vendor/supplier/SC	PMU (PD/ES)

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		radiation safety and hospital operations. However, the long-term benefits include improved cancer care, reduced mortality, and enhanced healthcare access are significant.			

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5.3. Potential E&S Impacts During Equipment Installation and Operation

106. The identified impacts range from medium to high significance. Construction related impacts such as dust, noise, and vibration are generally medium due to their localized and short-term nature. In contrast, biomedical waste generation and radiation exposure carry high significance because of their potential severe health and environmental risks. Wastewater discharge falls between medium to high, depending on treatment effectiveness, while continuous energy and water consumption remains a medium-level impact requiring sustainable management The potential E&S impacts of equipment installation and equipment operation and their mitigation measures are given under Table 5.4 and Table 5.5 below.

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Table 5.4: Potential E&S Impacts During Equipment Installation

Sr. No.	Environmental Component	Impact	Source	Mitigation	Responsibilities	
					Implementation	Supervision
	Procurement of medical equipment	Lack of environmental and social consideration that could lead to downstream impacts such as improper medical waste management, increase in greenhouse gas emission, and occupational health and safety risks during equipment distribution and operation Lack of proper handling of medical equipment, leading to health and safety risks to primary supplier workers and the community	Lack of environmental and social consideration	• Integrate environmental considerations into the bidding document • Adequacy of medical waste management capacity shall be verified prior to equipment distribution • Include awareness on facility OHS procedures at healthcare facilities as per the national regulation as part of the human resource readiness criteria • Include worker's code of conduct that prohibits misconduct related to SEA/SH as part of the bidding document and contract. • Ensure primary supply workers are trained for safe handling and transportation of medical equipment and/or hazardous waste	CC/vendor/SC	PMU/PD
1	Air and Noise Pollution	Dust generation and elevated noise levels from drilling, cutting, and equipment transport.	Use of heavy tools, concrete cutting for radiotherapy bunkers,	Use dust suppression measures (e.g., wetting surfaces).	CC/vendor/SC	PMU/PD

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			and HVACs system installation.	Maintain equipment to reduce emissions and noise. Schedule noisy activities during daytime. Ensure the provision of PPE to workers and provide training on their proper use. Ensure the compliance with NEQS.		
2	Waste Generation	Generation of construction and packaging waste, including plastics, metal parts, and crates.	Equipment crates, installation materials, protective wrappings, and possible leftover construction debris.	Segregate and dispose of waste according to HWMP.	CC/vendor/SC	PMU/PD
				Avoid accumulation by using scheduled waste removal.	CC/vendor/SC	PMU/PD
				Recycle packaging materials where possible.	CC/vendor/SC	PMU/PD
3	Potential Radiation Safety Concerns	Improper handling or premature activation of radiotherapy equipment may expose workers to radiation.	Installation of linear accelerators or imaging systems (CT simulators).	Ensure all radiation-emitting devices remain in a deactivated state until commissioned.	CC/vendor/SC	PMU/PD
				Install equipment only after shielding infrastructure is certified from PNRA.	CC/vendor/SC	PMU/PD
				Supervise installation by licensed medical physicists.	CC/vendor/SC	PMU/PD
4	Risk of Hazardous Material Handling	Improper handling or spillage of chemicals (e.g., refrigerants, cleaning agents, or calibration fluids).	Installation of cooling systems, sterilization units, or maintenance materials.	Ensure only trained personnel handle hazardous materials.	CC/vendor/SC	PMU/PD
				Use appropriate spill kits and PPE.	CC/vendor/SC	PMU/PD
				Store materials securely in designated areas of the hospital.	CC/vendor/SC	PMU/PD
5	Indoor Air Quality Risks	VOCs (Volatile Organic Compounds) from		Ensure good ventilation during and after installation	CC/vendor/SC	PMU/PD

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		adhesives, coatings, or equipment off-gassing may affect indoor air. Potential accidents or injuries during handling heavy, sensitive equipment.	Poor lifting techniques, inadequate PPE, or restricted workspaces.	Allow off-gassing to occur before hospital commissioning.	CC/vendor/SC	PMU/PD
				Select low-VOC products where feasible.	CC/vendor/SC	PMU/PD
				Conduct risk assessments and safety briefings.	CC/vendor/SC	PMU/PD
				Use proper lifting equipment and trained technicians.	CC/vendor/SC	PMU/PD
				Enforce OHS protocols strictly.	CC/vendor/SC	PMU/PD
6	Soil and Water Contamination	Minor risk of contamination from accidental discharge of construction or cleaning fluids.	Minor risk of contamination from accidental discharge of construction Of radiation bunkers.	Prevent running off into nearby drains Indoor quality monitoring may be conducted during the installation works.	CC/vendor/SC	PMU/PD
				Ensure proper disposal of liquid waste via approved channels.	CC/vendor/SC	PMU/PD
				Store chemicals properly and monitor use.	CC/vendor/SC	PMU/PD

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Table 5.5: Environmental Releases from Medical Equipment During Operation

Sr. No.	Medical equipment	Environmental Impacts	Mitigation Measures	Responsibilities	
				Implementation	Supervision
1	Radiology and Imaging Equipment	Chemical Residues or Oils: Some imaging equipment (MRI or CT scanners) may contain small amounts of lubricants, hydraulic fluids, or cleaning agents that, if spilled, may cause exposure and contamination if not managed promptly. Electronic Waste (e-waste): If installation involves replacing older equipment, the removed devices must be disposed of responsibly. Radiation Sources: Most radiology equipment remains inert until powered and commissioned posing no radiation risk. However, in systems that use sealed radioactive sources (like some nuclear medicine equipment) radiation may penetrate adjacent spaces, expose staff and patients. Daily imaging generates cumulative exposure risks. If imaging protocols are not optimized, patients may receive doses above diagnostic reference levels., t Waste: Installation often involves large quantities of packaging materials. Imaging generates solid waste (PPE, cassettes, parts) and electronic waste at the end of equipment life. Improper disposal can contaminate soil and water or result in unsafe informal recycling practices. Health and Safety Staff may face musculoskeletal strain from lifting patients, and repetitive tasks may lead	▪ Implement proper waste segregation and disposal plans ▪ Use certified contractors for chemical handling and old equipment removal. ▪ Ensure compliance with the PNRA standards and regulations. ▪ Maintain spill kits and train personnel in emergency response procedures. ▪ Use energy-efficient equipment and packaging wherever possible. ▪ Ensure certified e-waste recycling to prevent release of hazardous materials like lead, mercury, and other heavy metals and compliance with HWMP. ▪ Proper handling and spill containment procedures should be followed while installing. ▪ Plastic, foam, wood, and cardboard must be properly disposed of or recycled to prevent environmental harm. ▪ Optimize imaging protocols (adult/pediatric) and periodically review. ▪ Develop and implement an Emergency Response Plan. ▪ Display radiation hazard signage and patient information materials. ▪ Rotations and breaks shall be scheduled to reduce fatigue. ▪ Backup power systems shall be maintained to ensure safe operation during outages. ▪ Incident drills shall be conducted regularly, and lessons learned shall be integrated into revised procedures.	Technical staff	MoNHSRC

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		to ergonomic injuries. Power failure, equipment malfunction, or accidental exposure incidents may cause patient harm or staff dose if not promptly managed.	Ensure compliance with WBG EHS Guidelines – Occupational Health and Safety and Health -Care Facilities guidelines. ▪		
2	Positron Emission Tomography-Computed Tomography (PET CT)	Electronic and Packaging Waste: Large volumes of packaging materials (wood, plastic, foam, cardboard) are generated during transport and unboxing. ▪ Potential e-waste may be produced if old systems are removed or if components arrive damaged. During installation, leaks or spills of refrigerants (e.g., R 134a or R-410a) can occur if the cooling system is connected or charged. Handling and dispensing PET tracers (e.g., 18F-FDG) can cause surface contamination, needle/spill incidents, or staff exposure if procedures are wea Some refrigerants have high global warming potential (GWP), so any leaks should be avoided and managed with appropriate safety measures. Mis-segregation of contaminated consumables (syringes, vials, absorbents) or premature disposal may lead to avoidable low-level contamination Minor use of industrial cleaners, adhesives, or lubricants may be involved in equipment setup or shielding installations. This may lead to cause inflammation of eyes of workers as well as skin diseases if exposed without taking precautionary measures. If room modifications are needed (e.g., installing lead shielding, HVAC upgrades), there could be construction dust, debris, or	▪ Follow a waste management plan for packaging and e-waste. ▪ Use licensed contractors for refrigerant handling and HVAC work. ▪ Store and dispose of chemical agents in compliance with Pak EPA PNRA and World Bank Group General EHS guidelines and Health Care facilities . ▪ Ensure all radioactive materials are only handled post-installation by trained licensed personnel. ▪ Conduct a pre-installation risk assessment including environmental and safety checks. ▪ Ensure compliance with HWMP. ▪ Backup power systems shall be maintained to ensure safe operation during outages. ▪ Incident drills shall be conducted regularly, and lessons learned shall be integrated into revised procedures.	Technical staff	MoNHSRC

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		VOCs (volatile organic compounds) released. This phase might also involve noise and emissions from tools or machinery. Power failure, equipment malfunction, or accidental exposure incidents may cause patient harm or staff dose if not promptly managed.			
3	CT scan	Packaging Waste ▪ CT systems are delivered in large, protective packaging that includes Wooden crates, plastic film and foam cardboard and metal fasteners. The packaging waste, if not properly disposed of, this packaging waste can contribute to landfill overflow or plastic pollution Cooling System Fluids ▪ Most modern CT scanners use air cooling or chilled water systems, but some may include small amounts ofrefrigerants (such as R134a). ▪ During connection or charging of cooling systems, refrigerant leaks are possible if not properly managed. Chemical Use ▪ Minor use of cleaning agents, adhesives, and lubricants may occur during equipment setup. Spills or improper disposal can result in localized environmental contamination. Contrast media may	▪ Use low-VOC materials ▪ Ensure proper ventilation and dust control ▪ Ensure that PNRA guidelines may be followed. ▪ Ensure follow the HWMP. ▪ Unused or expired contrast media shall be collected and disposed of through licensed medical waste contractors, not via drains ▪ Staff shall be trained in safe patient handling and use lifting aids where possible. Workstations shall be ergonomically designed, with adjustable monitors and seating to reduce repetitive strain. ▪ Rotations and breaks shall be scheduled to reduce fatigue. ▪ An emergency preparedness plan shall be developed, covering equipment shutdown, patient evacuation, and radiation incident reporting. ▪ Backup power systems shall be maintained to ensure safe operation during outages. ▪ Incident drills shall be conducted regularly, and lessons learned shall be integrated into revised procedures.	Technical staff	MoNHSRC

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		also contribute to chemical waste if poorly managed. ▪ Electronic and Biomedical Waste Improper disposal can lead to soil and water contamination due to toxic components. ▪ Health and Safety: CT scans deliver higher doses of X-rays than conventional radiography, and repeated scans may increase patient risks. Staff can also be exposed if safety practices are neglected. Staff may face musculoskeletal strain from lifting patients, and repetitive tasks may lead to ergonomic injuries. Power failure, equipment malfunction, or accidental exposure incidents could cause patient harm or staff dose if not promptly managed.	▪ Ensure compliance with PNRA , WBG EHS Guidelines – Occupational Health and Safety and Health -Care Facilities guidelines.		
4	Angiography Machine	▪ Angiography machines use X-ray radiation, but do not emit radiation during installation or when powered off. ▪ Environmental radiation exposure is not a concern during setup, as radiation is only produced during procedures involve prolonged fluoroscopic imaging, exposing patients to relatively high radiation doses, and staff may be exposed if shielding practices are not followed ▪ Some angiography systems are connected to external cooling systems (e.g., water chillers or air-	▪ Follow the guidelines of PNRA for room shielding and equipment testing before use. ▪ Use certified e-waste recyclers. ▪ Maintain documentation for proper disposal, especially for compliance with local environmental regulations.(PNRA). ▪ Ensure installation and maintenance are done by a certified .HVAC personnel. ▪ Use systems with low GWP (Global Warming Potential) refrigerants tore and handle all chemicals in accordance with MSDS (Material Safety Data Sheets). ▪ Train installation teams in spill response and waste disposal.	Technical staff	MoNHSRC

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		cooled systems). These may use refrigerants (e.g., R 410A), which are potent greenhouse gases if leaked. ▪ Chemical Use (Minimal) Limited use of cleaning agents, adhesives, or lubricants may be required during setup. ▪ Improper handling or spills could contaminate workspaces or water systems. Contrast media may also contribute to chemical waste if poorly managed. ▪ Waste Generation Angiography produces waste including syringes, catheters, and blood-stained disposables, which may cause infection or chemical exposure risks if mixed with general waste. Over time, upgrades, part replacements, and eventual decommissioning generate e-waste. These components often contain **heavy metals (lead, cadmium, mercury)**, **plastic polymers**, and **refrigerants/coolants**. If disposed of with general waste, they can leach toxins into soil and water, emit harmful gases if incinerated, and contribute to long-term pollution. ▪ Health and Safety: Staff may suffer musculoskeletal strain from standing long hours in protective gear and repetitive manual handling of patients or heavy equipment. Angiography suites are high energy consumers, requiring cooling systems and reliable backup power; power interruptions may	▪ Shielded rooms should be built to ensure radiation does not escape into the environment during operation. ▪ Lead aprons and thyroidshields ▪ Lead gloves and goggles ▪ Mobile lead barriers for portable radiography ▪ Provide personal dosimeters (TLD badges) to all radiation workers. ▪ Set up regular calibration and testing of equipment to ensure safe output levels. ▪ The hospital shall **maintain an e-waste inventory log**, recording the type, serial number, and disposal pathway of each major component. ▪ Licensed vendors or recycling companies shall be engaged for safe recovery and recycling of e-waste ▪ Ensure compliance with HWMP. ▪ Conduct mandatory radiation safety training for all staff handling or working near radiation equipment. ▪ Ensure compliance with WBG EHS Guidelines – Occupational Health and Safety and Health -Care Facilities guidelines. ▪ Backup power systems shall be maintained to ensure safe operation during outages. ▪ Incident drills shall be conducted		

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		compromise patient safety. Angiography suites are high energy consumers, requiring cooling systems and reliable backup power; power interruptions may compromise patient safety	regularly, and lessons learned shall be integrated into revised procedures. ▪		
5	Linear Accelerator	Radiation Emissions – High Potential if Uncontrolled ▪ LINACs produce high energy ionizing radiation, typically in the megavolt range (e.g., 6 18 MV). ▪ No radiation is emitted during installation, but once operational, stray radiation (including neutrons at higher energies >10 MV) could pose a risk if shielding is inadequate. ▪ LINAC systems generate substantial heat and often require external cooling (e.g., chilled water or refrigerant-based systems). ▪ Risk of refrigerant leakage (e.g., R-134a, R 410A), which are potent greenhouse gases. Waste Generation: Treatment produces contaminated dressings, immobilization devices, and sharps, which, if mixed with general waste, may cause infection or chemical risks. LINACs contain large volumes of electronics, cooling systems, and high-voltage components. Replacement and decommissioning generate e-waste with heavy metals and refrigerants, which can harm soil, water, and air if improperly discarded. Health and Safety: Inadequate shielding, malfunctioning interlocks, or procedural	▪ Construct shielded treatment rooms (bunkers) using lead, concrete, or specialized shielding materials. ▪ Perform radiation safety surveys and leakage tests before commissioning. ▪ Follow sustainable construction practices (e.g., low-carbon concrete). ▪ Implement dust suppression and noise control measures. ▪ Use modular construction techniques to minimize waste. ▪ Follow radioactive waste handling protocols set by national regulatory bodies. (PNRA). ▪ Thick concrete walls and ceilings be ensured. ▪ Dedicated electrical and ventilation systems. ▪ Ensure compliance with HWMP. ▪ Ensure compliance with WBG EHS Guidelines – Occupational Health and Safety and Health -Care Facilities guidelines. ▪ An emergency preparedness plan shall cover radiation incidents, equipment failures, and evacuation procedures. ▪ Backup generators and UPS systems shall be maintained to ensure continuity of critical treatments. ▪ Staff shall participate in periodic drills and report incidents to PNRA as required.	Technical staff	MoNHSRC

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		lapses may expose staff to scatter or leakage radiation. Improper handling of biomedical and e-waste may cause infectious risks. Repetitive tasks and awkward postures may lead to musculoskeletal injuries. Power failure, fire, or equipment malfunction could cause incomplete treatments or staff exposure if not managed promptly.	Rotational schedules and rest breaks shall be introduced to reduce fatigue.		
6	Cyclotron	Radiation Emissions (Significant potential if uncontrolled) ▪ Cyclotrons accelerate charged particles (e.g., protons) to high energies and direct them onto targets to produce radioisotopes. This process generates prompt radiation, including Gamma rays, Neutrons (especially problematic due to their high penetration and Target processing and cleaning procedures may generate radioactive liquid waste, particularly when dissolving targets to extract isotopes. Waste Generation ▪ Liquid waste from targets, synthesis units, and patient prep areas may contain short-lived isotopes and may contaminate sewers if not managed properly. Solid waste, including vials, syringes, and gloves, may also hold residual radioactivity. Cyclotron operations produce diverse wastes: radioactive emitters and activated components from use and maintenance, contaminated syringes and dressings from radiopharmaceutical handling, and cooling	▪ Install heavily shielded rooms (typically thick concrete walls with borated polyethylene or lead lining for neutron and gamma protection). ▪ Perform radiation mapping and safety interlock testing before use. ▪ Follow strict PNRA and international radiation protection standards (e.g., IAEA, NCRP, AERB). ▪ Tore waste in shielded decay tanks until radioactivity falls below regulatory thresholds. ▪ Never discharge radioactive liquids into municipal wastewater systems without regulatory clearance. ▪ Maintain detailed waste logs. However, POPs test may be performed out of e-waste to know the concentration. ▪ Label and store activated components in shielded containers. ▪ Engage licensed radioactive waste disposal services for final handling. ▪ Follow long-term decay and clearance protocols during decommissioning.	Technical staff	MoNHSRC

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		system effluents that risk leaks or thermal pollution. Improper disposal of electronics and parts can also release heavy metals, plastics, and refrigerants, threatening health and the environment. Health and Safety Cyclotron staff may face risks from radiation, chemicals, and physical strain, especially without proper protective gear and training. They may also face dangers from target ruptures, spills, or power failures, which could release radioactivity or stop isotope production, putting both workers and the public at risk. ▪	▪ Regularly inspect leaks and manage cooling tower discharge according to environmental standards. ▪ Consider closed-loop cooling systems or coolant recycling options. ▪ Choose low-GWP refrigerants if applicable. ▪ Ensure compliance with HWMP and WBG EHS Guidelines – Occupational Health and Safety and Health -Care Facilities guidelines. ▪		
7	Brachytherapy System	Radiation Emissions – Controlled but Critical ▪ During normal operation, radiation is confined to the patient and the treatment area through: ➢ Shielded rooms (brachytherapy suites or after loading bunkers) ➢ Remote after loading systems, which minimize staff and environmental exposure ▪ Environmental risk arises primarily from: Source leakage or damage, loss or misplacement of radioactive seeds, improper handling of used sources or applicators Radioactive Waste (Primary environmental concern) ▪ Spent or decayed sources (e.g., Ir-192 after 3–4 months) are classified as low- or intermediate-level radioactive waste. If not properly managed, they can pose	▪ Use remote after loading equipment to automatically insert and retract sources. ▪ Operate only in shielded rooms with monitored access. ▪ Store in shielded, secure containers. ▪ Return to manufacturer or licensed radioactive waste handler by regulatory guidance. ▪ Maintain detailed waste inventory and transfer records. ▪ Follow biohazard and radiation safety procedures in patient care areas. Use radiation-resistant absorbent materials and dispose of them as per radioactive biomedical waste protocols. ▪ Have a detailed radiation incident response plan. ▪ Train staff in emergency procedures and contamination control. ▪ Monitor and counsel patients receiving permanent implants regarding excretion	Technical staff	MoNHSRC

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		environmental and public health risks. Air or Gas Emissions (Negligible) ▪ Brachytherapy systems do not emit radioactive gases or aerosols. There is no air activation or gaseous waste like in cyclotron or nuclear medicine facilities. Emergency or Accidental Releases ▪ Rare, but incidents such as: Source loss, misplacement, or rupture, spillage of radioactive seeds ▪ Improper disposal of implanted seeds from patients (e.g., via urine/feces in low-dose permanent implants) Waste Generation Brachytherapy procedures generate contaminated dressings, gloves, applicators, and other patient-contact items that may spread infection if mixed with general waste. The computerized after loaders and monitoring devices used in these systems eventually become obsolete, creating e-waste that contains harmful heavy metals and plastics. Health and Safety Radiation oncologists, physicists, and technologists may face exposure risks during source handling, applicator placement, and emergencies. Long procedures may cause ergonomic strain, while source misplacement, afterloader malfunctions, or accidental releases could lead to serious radiation accidents if not addressed quickly.	safety protocols (especially in prostate seed implants). ▪ All infectious consumables shall be collected, treated, and disposed of through licensed biomedical waste facilities. ▪ All obsolete electronic parts shall be inventoried and stored as hazardous e-waste. Licensed e-waste recyclers shall be engaged for dismantling and recycling. ▪ Ensure compliance with WBG EHS Guidelines – Occupational Health and Safety and Health -Care Facilities guidelines and HWMP.		

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8	Automatic Chemistry Analyzer	Chemical Waste ▪ Automatic chemistry analyzers use a wide range of liquid reagents, buffers, diluents, and calibrators, many of which are toxic, corrosive, or hazardous to aquatic life. Wastewater may contain: Heavy metals (e.g., arsenic, mercury, lead from some reagents), acids or bases (e.g., hydrochloric acid, sodium hydroxide), organic solvents (e.g., ethanol, methanol) and detergents and surfactants if released untreated, wastewater may contaminate municipal sewers Biological Waste ▪ Used samples (e.g., blood, plasma, serum, urine) and sample cups/tubes may carry infectious or biohazardous agents. If not properly handled, this can lead to: Contamination of drains, exposure to lab personnel, environmental contamination if waste is disposed in general garbage Plastic Waste ▪ Chemistry analysers generate significant single-use plastic waste including	▪ Treat biological waste as biohazardous under clinical waste regulations. ▪ Dispose via autoclaving, incineration, or through a licensed biomedical waste contractor. ▪ Train staff on biosafety and spill management. ▪ Choose analyzers that support reusable components or offer eco-friendly consumables. ▪ Set up segregation and recycling of non-contaminated plastic where permitted. ▪ Work with suppliers that have taken-back or recycling programs for consumables. ▪ Recycle packaging responsibly. ▪ Dispose of old analyzers via certified e-waste recyclers. ▪ Choose energy-efficient models. ▪ Regularly maintain water systems to reduce waste. ▪ Monitor resource usage to identify areas for efficiency improvement. ▪ Obsolete analyzers and electronic parts shall be inventoried and categorized as hazardous e-waste. • Certified e-waste recyclers shall be contracted for dismantling and material recovery. ▪ All staff shall undergo biosafety and chemical safety training. PPE (gloves, lab coats, eye protection, masks) shall be mandatory during analyzer operation. Fume hoods and local exhaust ventilation shall be used for volatile chemicals. Ergonomic workstations and staff rotation shall be implemented to reduce repetitive	Technical staff	MoNHSRC

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		Sample cups, pipette tips, tubes and reagent cartridges, disposable cuvettes ▪ E-Waste ▪ Electronic parts, monitors, sensors, and printer units eventually become obsolete, generating e-waste with heavy metals and plastics. Informal disposal can cause soil, water, and air pollution. ▪ Power and Water Consumption ▪ High-throughput chemistry analyzers may use significant electricity and deionized water during continuous operation. Health and Safety Lab technicians may be exposed to biohazards (infectious samples), chemical hazards (toxic reagents), and ergonomic strain from repetitive tasks. Poor ventilation or lack of PPE can worsen risks. Spills, equipment malfunction, or power failures can release hazardous reagents, contaminate work areas, or interrupt diagnostic services.	strain. ▪ Train staff in emergency procedures and contamination control. ▪ Ensure compliance with WBG EHS Guidelines – Occupational Health and Safety and Health -Care Facilities guidelines and HWMP. ▪ ▪		

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Potential E&S Impacts and Mitigation Measures for Installation and operation of Incinerator Facility

Table 5.6: E&S Impacts for Installation of Incinerator Facility

Sr. No.	Environmental components	E&S Impacts	Mitigation measures	Responsibilities	
				Implementation	Supervision
Installation					
1	Air quality/Particulate matter	Civil works during installation of incinerator may cause decline in air quality due to emissions of particulate matter (PM), dioxins, furans, carbon monoxide (CO), sulfur oxides (SOx), and nitrogen oxides (NOx). These emissions may harm air quality, contribute to climate change, and affect community and workers health.	▪ Vehicle speeds in the construction area will be limited to minimize dust in the area. ▪ Discourage idling of vehicles i.e. vehicle and equipment will be turned off when not in direct use to reduce exhaust emissions. ▪ Regular maintenance of construction plants and equipment. ▪ The management will sensitize the employees on sound environmental management ▪ Provide personal protective equipment such as nose masks, goggles to the workers on site. ▪ The CC will water the site with exposed soil surfaces twice each day during dry weather. ▪ The incinerator stack shall be designed to appropriate height to ensure pollutant dispersion. ▪ The incinerator shall be sited at a safe distance from patient wards, residential areas. ▪ Ensure compliance with NEQS and WBG Geneal EHS guidelines.	CC	SC/PMU
2	Noise Pollution	Noise from heavy machinery, generators, and construction tools may affect the workers and also disturb hospital operations and nearby residents	▪ Limit noisy activities to daytime working hours ▪ Use noise barriers or acoustic panels where feasible ▪ Maintain equipment regularly to reduce	CC	SC/PMU

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			noise ▪ Provide hearing protection to workers ▪ Sensitize drivers of construction machinery on effects of noise ▪ Billboards will be suitably erected on the start of the project to psychologically prepare the people in the vicinity. ▪ Ensure compliance with NEQS and WBG Geneal EHS guidelines.		
3	Soil and ground water contamination	Risk of oil/fuel leakage from equipment contaminating soil or groundwater. Improper storage of construction materials near drains or water sources	▪ Use impermeable sheeting under fuel storage areas ▪ Provide spill containment kits on-site ▪ Store chemicals/materials away from stormwater drains and in sealed containers ▪ Establish a wastewater management system for equipment washdown and concrete works.	CC	SC/PMU
4	OHS issues	Anticipated impacts may include Accidents, injuries, exposure to dust, noise, and hazardous materials.	▪ Establish and implement HSE plan during working activities ▪ Provision of PPEs like helmets, gloves, safety boots, masks, etc. during work ▪ Conduct safety training and toolbox talks	CC	SC/PMU
5	Labor camp management	Likely E&S impacts can be the poor living conditions within labor camp, water contamination and disease outbreaks. Moreover, the non-compliance with labor laws including child labor and daily wages of the workers, financial exploitation, workers' dissatisfaction, potential strikes, malnutrition, decreased workers' productivity and risk of harassment and abuse can arise.	▪ Provision of adequate space, ventilation, and sanitation as per IFC/ILO standards. ▪ Ensure employment contracts, labor registry and adherence to labor laws. ▪ Ensure compliance with national minimum wage laws. Refer to the (latest Federal government notifications) ▪ Conduct wage audits and maintain transparent payroll records. ▪ Inclusion of wage clauses in labor contracts and regular inspections of food hygiene. ▪ Maintain a gender-sensitive accommodations, grievance Redressal and zero-tolerance policy on gender	CC	SC/PMU

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			issues		
6	Gender Based Violence (GBV)	Normalization of abusive behavior; underreporting of incidents Harassment, exploitation, or abuse within the workforce or toward the community Unsafe living conditions for female workers; lack of privacy Offense or discomfort to community norms; increased social tension	▪ Conduct regular GBV awareness and sensitization training for all workers, staff, and contractors ▪ Enforce a signed Code of Conduct with zero tolerance for GBV ▪ Display Code of Conduct in local language(s) at camps and work sites ▪ Provide separate, secure, and well-lit accommodations and WASH facilities for women also appoint a female camp supervisor ▪ Conduct cultural sensitivity training for workers also engage with local leaders, women's groups, and CSOs to build trust		
Operation					
	Air Emission	If operated below recommended temperatures or without air pollution control devices, incinerators release pollutants such as dioxins, furans, heavy metals, and particulate matter. These emissions may harm air quality, contribute to climate change, and affect community and workers health.	▪ Incinerator shall be designed for high-temperature combustion. ▪ Secondary combustion chambers and proper residence times shall be maintained to minimize incomplete combustion. ▪ Continuous monitoring of stack emissions shall be conducted. ▪ Ensure compliance with NEQS and WBG EHS guidelines for Health Care Facilities.	Technical staff	MoNHSRC
	Noise	Incinerator operation generates noise from combustion blowers, fans, pumps, and loading/unloading of waste. Prolonged exposure to elevated noise levels may cause discomfort, stress, and reduced well-being among hospital staff and patients, particularly in wards located near the incinerator building. At community level, if the incinerator is improperly sited or lacks acoustic	▪ The incinerator shall be installed in a dedicated structure away from patient care areas and sensitive receptors to reduce noise exposure. Acoustic enclosures and sound-dampening materials shall be used around blowers, fans, and motors to minimize operational noise. ▪ Regular maintenance of moving parts and bearings shall be carried out to prevent excessive vibration and noise.	Technical staff	MoNHSRC

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		controls, noise emissions during waste loading or ash handling may disturb nearby residents. Continuous exposure to high noise levels also increases occupational risks for waste management staff, potentially leading to hearing loss and fatigue.	▪ Waste loading and ash removal shall be scheduled during daytime to avoid nighttime disturbance. ▪ Staff working near the incinerator shall be provided with hearing protection (earplugs/earmuffs) when noise levels exceed permissible occupational limits. ▪ Noise levels shall be monitored periodically, ensuring compliance with NEQS and WBG EHS guidelines for Health Care Facilities.		
	Residues & Ash Disposal	Incineration produces bottom ash and fly ash, which contain heavy metals and toxic compounds. If disposed of with general waste, these residues may contaminate soil and groundwater. Improper temporary storage or transportation of ash may lead to dust dispersion during handling or leakage into hospital premises and surrounding areas. Uncontrolled disposal of ash in open dumps or municipal landfills can result in long-term soil and groundwater contamination. Fly ash in particular is highly toxic and requires special treatment.	▪ Ash shall be collected separately, tested for hazardous constituents, and disposed of in lined, engineered landfills. ▪ Workers handling ash shall wear PPE (respirators, gloves, protective clothing). ▪ Records of ash generation and disposal shall be maintained. ▪ Ash shall be stored in closed, secure containers in a designated hazardous waste storage area. ▪ Containers shall be resistant to corrosion and labeled as “Hazardous – Incinerator Ash.” ▪ Transport of ash shall be done by licensed hazardous waste contractors in sealed vehicles. ▪ Ensure compliance with NEQS and WBG EHS guidelines for Health Care Facilities.	Technical staff	MoNHSRC
	Biomedical Waste Handling	Poor segregation of biomedical waste before incineration may result in inappropriate materials (e.g., pressurized containers, radioactive waste, mercury-containing items) being burned, releasing toxic emissions.	▪ Develop and implement waste segregation protocols at the point of generation in hospital. ▪ Staff shall be trained in safe segregation and loading of incinerators. ▪ Ensure compliance with WBG EHS guidelines for Health Care Facilities and HWMP.	Technical staff	MoNHSRC

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	Occupational Health & Safety	Workers may be exposed to high temperatures, sharps, pathogens, and toxic emissions during waste loading, ash removal, and maintenance. Without PPE and training, risks of burns, respiratory illness, and needle-stick injuries increase. Manual handling of heavy waste bags can lead to musculoskeletal injuries, while inadequate ventilation increases the risk of respiratory diseases.	▪ All workers shall receive training in safe biomedical waste handling and incinerator operation. ▪ PPE including heat-resistant gloves, respirators, and protective clothing shall be mandatory. ▪ Mechanical loading systems shall be used where possible to reduce manual handling of waste. ▪ Routine health checks and immunization (e.g., hepatitis B, tetanus) shall be provided to waste handlers. ▪ Mechanical loading systems shall be used where feasible to minimize manual handling of infectious and hazardous waste. ▪ An incident reporting and investigation system shall be implemented to document, analyze, and prevent repeat accidents. ▪ Ensure compliance with WBG EHS guidelines for Health Care Facilities.	Technical staff	MoNHSRC
	Resource Conservation	Incinerators are energy-intensive and contribute to greenhouse gas emissions (CO_2, NOx). Inefficient systems increase fuel consumption and operational costs.	▪ Energy-efficient burners and heat recovery systems shall be used where feasible. ▪ Waste minimization and segregation shall be practiced to reduce incineration load. ▪ Regular preventive maintenance shall be conducted to optimize combustion efficiency. ▪ Ensure compliance with WBG EHS guidelines for Health Care Facilities and HWMP.	Technical staff	MoNHSRC
	Emergency Preparedness	Fire hazards, equipment malfunction, or power failures during incinerator operation can pose risks to staff and hospital safety.	▪ Emergency response procedures shall be developed for fire, power failure, and equipment malfunction scenarios. ▪ Fire extinguishers, spill kits, and first-aid	Technical staff	MoNHSRC

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			facilities shall be maintained near the incinerator. ▪ All incidents shall be reported and reviewed to prevent recurrence. ▪ Ensure compliance with WBG EHS guidelines for Health Care Facilities.		

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6. Environmental and Social Management Plan (ESMP)

107. This section outlines key risks, mitigation measures, responsibilities, and monitoring mechanisms, aligned with international best practices. This ESMP provides a structured framework for construction and operation of the cancer hospital safely, sustainably, and in alignment with community and regulatory expectations.

6.1 Scope of Environmental and Social Management Plan (ESMP)

108. Applicable to all departments and operational activities of the proposed project including:

- Support Services (Staff, Visitors, Community)
- Diagnostic Imaging (CT, MRI, PET-CT)
- Radiotherapy (LINAC, Brachytherapy)
- Chemotherapy
- Laboratories (Pathology, Biochemistry)
- Pharmacy
- General Services (Waste, Water, Energy)

109. The purpose of this Environmental and Social Management Plan is to:

- Identify potential environmental and social risks associated with the project.
- Define measures to avoid, reduce, mitigate, or compensate for adverse impacts.
- Establish procedures for the environmental and social risks management, assess regulatory requirements and ensure compliance.
- Specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social issues related to the activities.
- Identify the staffing requirements, as well as the training and capacity building needed to successfully implement the provisions of the ESMP.
- Address mechanisms for public consultation and disclosure of project documents as well as redress of possible grievances.
- Establish the budget requirements for implementation of the ESMP.

6.2 Institutional Arrangements

110. Following functionaries will be involved in the implementation of ESMP:

PMU

- Provide support to Bank missions, oversight, and quality control to field staff working on environmental and social risk management.
- Review, and provide quality assurance and approval to E & S reports during implementation. Keep documentation of all progress.
- Oversee overall implementation and monitoring of environmental and social mitigation and management activities, compile progress reports from project, and report to the Bank on a quarterly basis
- Train field staff and contractors who will be responsible for implementing the ESIA.
- Ensure that all bidding and contract document include all relevant E&S requirements.
- Maintain the close liaison with the Bank Team, Government Departments (where applicable), contractor and supervision consultant for smooth and effective implementation of E&S

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aspects.

Contractor/Vendor

- Environmental Engineer (EE) of contractor will prepare and submit site specific ESMP (SSESMP) before commencement and procurement of installation of equipment.
- EE of Contractor will provide training to the staff and labor on quarterly basis related to environment and social issues, communicable diseases, community privacy and ESMP implementation issues.
- Contractor will conduct environmental monitoring (analytical tests for indoor and outdoor air quality, noise levels).
- EE of Contractor will be responsible for supervising daily activities as per ESMP requirement.
- EE of contractor will be responsible for the implementation of ESMP and to take effective measures against corrective actions plan
- EE will ensure proper provision and usage of Personal Protective Equipment (PPEs) to the workers and train them for fire extinguishers, emergency exit plan etc.

Supervision Consultant

- ES of SC will ensure the approval of SSESMP from the funding agency.
- ES of SC will ensure implementation of ESMP while installation of equipment
- ES of CSC will notify the donor agency of any kind of accident within 48 hours. Subsequent report on the incident and mitigation measure adopted must be submitted to bank within 30 days.
- SC will be responsible to prepare corrective action plan if required.
- CSC will conduct internal audits of the site after 6 months to evaluate the compliance of ESMP on the site.
- Preparing and submitting monthly and quarterly environmental compliance reports to the implementing body and donor agency

6.3 Environmental and Social Monitoring and Reporting Plan

111. The proposed monitoring plan for the operations of the hospital should be in accordance with best practices for hospital operations and regulatory compliances. This compliance may include biomedical waste, radiation, and effluent discharge and sustainability goals in particular. Table 6.1 below illustrates the mechanism for environmental monitoring.

Table 6.1: Environmental and Social Monitoring Plan

Sr. No.	Environmental Parameters	Key Indicators	Frequency	Responsibility/supervision
1	Waste Segregation including radio active waste	Visual inspection, checklist to be prepared for monitoring of daily operational activities, Safety signages	Daily	PIMS/Infection Control Team/ Dedicated Radiation Safety Officer
2	Patient Satisfaction	Surveys to be made by hospital administration/quality assurance team and maintain feedback forms	Quarterly	PIMS/Quality Assurance
3	Radiation Safety	Required to note down Dosimeter readings and area surveys may be conducted	Monthly	PIMS/Radiation HSE

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4	Occupational Incidentsand Community Health and Safety	▪ Incident reports mechanism should be in place ▪ Regular audits may be made, Awareness ▪ Sfatey signages ▪ GRM records	Immediate	PIMS/Hospital HSE
5	Water & Energy Consumption	Utility meter logs and record of bills to be maintained, Trainings records Awareness on conservation	Monthly/ as and when required	PIMS/Administration
6	Air & Water Quality an dNoise levels	Lab testing to be carried out by EPA certified laboratory	Quarterly	PIMS/Hospital HSE/ Operation & Maintenance
7	Biomedical Waste Disposal	Disposal logs may be maintained	Weekly	PIMS/WMP Implementor
8	Community Complaints	Feedback forms may be developed and maintained and keep helpline records	Daily/ongoing	PIMS/Administration
	Gender and Social Inclusion	GRM records Awareness sessions Audit Safety signages Separate areas	Monthly/ as and when required	PIMS/Administration
	Patient & Family Welfare	Counseling records GRM records Awareness session Family accommodation and support	Monthly/ as and when required	PIMS/Administration

6.4 Other Mandatory Requirements

6.4.1 Reporting Mechanism

112. CC of the Project will prepare monthly environmental performance reports. The monthly will be submitted to SC for review and followed by the review of implementing body and approval of donor agency.

Table 6.2: Reporting Mechanism

Frequency of report	Preparation of report	Reviewed by	Approved by
Monthly	CC	PMU	Implementing body/donor agency
Quarterly	SC	PMU	Implementing body/donor agency
Annual	SC	PMU	Implementing body/donor agency

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6.4.2 Training and Capacity Building

113. It is proposed that the training schedule outlined under Table 6.3 below may be undertaken during operations of the proposed project:

Table 6.3: Training & Capacity Building

Sr. No.	Training items	Target Staff	Frequency	Responsibility
1	Patient Rights & Communication	Frontline staff of the hospital	Bi-annually	PMU/Third party
2	Biomedical & Hazardous Waste Handling	Nurses, Lab Technicians and Housekeeping	Bi-annually	PMU/Third party
3	Spill Response and Chemical Safety	Laboratory and Pharmacy staff of the hospital	Bi-annually	PMU/Third party
4	Radiation Protection and Safety	Radiology Department and Oncology staff	Quarterly	PMU
5	Infection Control and PPE Usage	Clinical staff	Quarterly	PMU

Sr. No.	Training items	Target Staff	Frequency	Responsibility
1	Patient Rights & Communication	Frontline staff of the hospital	Bi-annually	PMU/Third party
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3	Spill Response and Chemical Safety	Laboratory and Pharmacy staff of the hospital	Bi-annually	PMU/Third party
4	Radiation Protection and Safety	Radiology Department and Oncology staff	Quarterly	PMU
5	Infection Control and PPE Usage	Clinical staff	Quarterly	PMU

6.4.3 Need of Regulatory Compliance

114. There is a need of the following regulatory compliances:

- Waste Management Plan as per HWM Rule 2005
- Biomedical Waste Management Rules
- Laboratory accreditation requirements
- Regulatory requirements of Atomic Energy, Pakistan
- EHS standards of WHO, World Bank and other applicable national guidelines

6.4.4 Grievance Redress Mechanism (GRM)

115. GRM is a framework that ensures that patients, families, staff, and communities/populations can voice concerns, complaints and suggestions. They want to get them addressed promptly, fairly and transparently. For the proposed project, a GRM has been proposed (Chapter 8). Following mechanism under GRM may be undertaken:

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116. **Internal (Staff & Patients):**

- Suggestion boxes, online forms, grievance hotline
- Response within 7 working days

117. **External (Community):**

- Dedicated community liaison officer
- Complaint registers at the entrance
- Public engagement sessions (bi-annually)

6.4.5 Review/Update of ESMP

118. This ESMP may be reviewed after the Project's commissioning of first year. Considering the sensitivity and efficient implementation of safeguard measures, feedback from staff, patients, and local community may be incorporated in the revised ESMP. Furthermore, third party sustainability audit may be undertaken after a year of commissioning, that will help the effectiveness of implementation measures/options.

6.4.6 ESMP Budget for Implementation

119. Budget tailored for the implementation of ESMP is tabulated under Table 6.4 below:

Table 6.4: ESMP Budget

Sr. No.	Component	Activities/Details	Estimated Cost (PKR/year)
1	**Waste Management**		
	Biomedical waste disposal	Contract with licensed EPA approved waste handler/contractor	1,400,000/-
	Cytotoxic waste handling	Specialized bags, containers and separate disposal	500,000/-
	Radioactive waste management	Decay storage, shielding and return logistics	600,000/-
	Waste bins and segregation tools	Color-coded bins, trolleys and labelling	300,000/-
2	**Environmental Monitoring**	-	
	Air/water quality		1,000,000/-
	Noise level		200,000/-
	Effluent pre-treatment maintenance and pump maintenance, chemical dosing		500,000/-
3	**Training and Capacity Building**	-	
	Infection control, PPE, waste training		500,000/-
	Radiation safety training and Annual refresher for radiology/oncology staff		200,000/-
	Spill response and chemical safety and lab/pharmacy staff		300,000/-
	Fire drills and emergency preparedness and fire wardens, evacuation planning		300,000/-
4	**Community Engagement & Grievance Handling**	-	

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7. Public Consultation and Information Disclosure

120. Public participation and community consultation is considered an integral part of ESIA process. Stakeholders are individuals and groups that may be affected by a project or can affect the outcome of a project. The stakeholder engagement in the project cycle ensures that feedback from community and institutional stakeholders can be used to adjust and improve the project planning, particularly installation of equipment and implementation from an Environmental and Social (E&S) point of view. This section documents the outcomes of public consultation carried out for the proposed project with different stakeholders in accordance with the Pak-EPA Guidelines for Public Consultation, AIIB ESF and ADB guidelines.

7.1 Objectives of Stakeholder Consultation

121. The overall objective of conducting consultations is to inform all stakeholders about the project, record and take into account their opinions, suggestions and concerns and establish confidence amongst the project stakeholders that the project is developed in a responsible way. This is achieved by informing the stakeholders in a timely manner about the proposed project and its potential consequences on the environment and by encouraging their feedback. Specific objectives are listed below:

- Share Project information with the stakeholders regarding the project and the expected impacts on the physical, biological and socioeconomic environment in the Project area.
- Provide an opportunity for those otherwise unrepresented to present their views and values, therefore allowing more sensitive consideration of mitigation measures and trade- offs. Particularly, understanding stakeholder concerns regarding various aspects of the project and likely impacts of construction-related as well as the installation and operational of hospital equipment.
- Provide those involved with planning the proposal with an opportunity to ensure that the benefits of the proposal are maximized and that no major impacts have been overlooked.
- Provide opportunity for the public to influence project design in a positive manner
- Obtain local and traditional knowledge (corrective and creative), before decision-making.
- Increase public confidence in the proponent, reviewers and decision-makers and ensuring better transparency and accountability in decision making.
- Reduce the possibility of conflict through the early identification of contentious issues, and working through these to find acceptable solutions.
- Creating a sense of ownership of the Project among stakeholders.

7.2 Stakeholder Identification

122. Stakeholder identification was carried out during the scoping phase of the ESIA to ensure stakeholders are consulted during the course of the consultation process. The list was further updated during the reconnaissance visit over the entire length of the alignment.

123. The focus of attention has been the community living around the 200-Bedded Cancer Hospital at PIMS, Islamabad Project, as well as staff, patients and visitors who may be affected by the project. The viewpoint of the stakeholders has been considered, and their concerns and suggestions for possible improvements have been included. The stakeholders involved in the process were the Proponent of 200-Bedded Cancer Hospital at PIMS, Islamabad, Doctors, and the community living around the project location. For the purpose of this ESIA, stakeholder was categorized Direct and indirect stakeholders.

124. **Direct Stakeholders**: Individuals, groups, or institutions directly affected by or involved in the project activities or outcomes.

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125. **Indirect Stakeholders:** Individuals or groups who are not directly involved but may be influenced by or influence the project at a broader level.

- **Direct Stakeholders**: Hospital staff and management (e.g., PIMS and Cancer Hospital team), Construction workers and laborers, Patients and caregivers, Local residents adjacent to PIMS , Contractors and subcontractors, Local businesses supplying goods/services to the hospital
- **Indirect Stakeholders**: Representatives of Pak-EPA, representatives of Bahria University Islamabad Campus and representatives from CDA.

7.3 The Consultation Process

126. The consultations were undertaken at two stages of the ESIA: scoping and during baseline assessment of the biophysical and socioeconomic environment of the Project Area. All stakeholder consultations were recorded through one-to-one meetings, Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs) to ensure the views and concerns are recorded.

127. In addition to the national guidelines for public consultation, the ESIA also adhered to AIIB's policies on conducting meaningful consultation as discussed in Environmental and Social Standard 1. The meaningful consultation is elaborated as those which:

- Start early in the preparation stage of the Project and is carried out on an ongoing basis throughout the implementation and life cycle of the Project.
- Ensure that all parties have a voice in consultation, including national and subnational government, the private sector, nongovernmental organizations and people affected by the Project.
- Provide timely disclosure of relevant and adequate information that is understandable and readily accessible to the people affected by the Project and other stakeholders.
- Undertaken in an atmosphere free of intimidation or coercion and is gender inclusive, accessible, responsive and tailored to the needs of vulnerable groups.
- Enable the consideration of relevant views of people affected by the Project and other stakeholders in decision-making.

128. In the process, stakeholder consultations were carried out with people of different backgrounds in the project area e.g. business owners, employed persons, and pensioned persons. FGDs were conducted with the in the surrounding areas, shop owners, taxi drivers standing nearby their Taxi Stand. Institutional consultation was also held with government departments and local service providers. Details of non-institutional and institutional consultations held are given in **Table7.1.**

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Table 7.1: Details of Stakeholder Consultation

No.	Stakeholder type	Date	Venue	No. of Participants	Profession	Concerns/feedback
1	Non-Institutional	August 19, 2025	PIMS Hospital-North side	5	Local resident (Accountant)	▪ Expressed concern about possible traffic congestion along Ibn-e-Sina Road due to construction activities. ▪ Suggested proper traffic management and scheduling of heavy vehicle movement during off-peak hours. ▪ Welcomed the project as it will provide easier access to cancer treatment for residents without traveling far.
2	Non-Institutional	August 19, 2025	PIMS Hospital-South side	10	Local resident (student)	▪ Concerning about the infrastructure facilities like water, electricity and access to the hospital if not planned adequately.
3	Non-Institutional	August 19, 2025	PIMS Hospital-Main Gate	4	Local resident (student)	▪ Concerned about poor people may be facilitated while rich can have treatment everywhere in the country or abroad.
4	Non-Institutional	August 18, 2025	PIMS Hospital-Main Gate	7	Local resident (Business)	▪ Suggested to maintain the facility for longer. It should not be like other hospitals of the country.
5	Non-Institutional	August 18, 2025	Bus Stand, Ibn-e Sina Road	4	Local resident (working abroad)	▪ Concerned about the environmental risks of

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						radioactive and chemical waste. ▪ Concerns if there is a lack of free or subsidized services for low-income patients.
6	Non-Institutional	August 18, 2025	Bus Stand, Ibn-e Sina Road	5	Local resident (Lecturer in college)	▪ Welcome the hospital as a valuable healthcare service in the region. ▪ Expect better access to cancer screening and treatment, especially for underserved populations. ▪ Hope for job creation (medical and non-medical).
7	Non-Institutional	August 18, 2025	Bus Stand, Ibn-e Sina Road	12	Local resident (Business)	▪ Showed concerns about noise, dust, and construction disturbance, especially if nearby side of G-8 sector. ▪ Waste management, especially concerns about hazardous medical and radioactive waste.
13	Institutional	August 18, 2025	E&ES Department, Bahria University office		Assistant professor	▪ Supported the project as a much-needed healthcare initiative. ▪ Suggested incorporating renewable energy options (solar panels) to reduce pressure on the grid.

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						▪ Emphasized use of green building design features.
14	Institutional	18 August, 2025	Pak-EPA office	2	Director-Pak-EPA	▪ Emphasized the need for advanced diagnostic and treatment facilities (e.g., radiotherapy, chemotherapy, bone marrow transplant). ▪ Suggested that the hospital should be integrated with the existing PIMS infrastructure but also have independent utilities (power backup, waste management, water supply).
15	Institutional	17 August, 2025	Radiology Department, PIMS	2	Head of Radiology Department, PIMS office	▪ Supported the Project considering the load on Oncology department of PIMS hospital
16	Institutional	17 August 2025	Ms. Sana Fatima, Senior Staff Nurse	1	PIMS Hospital	▪ Highlighted the overcrowding in current oncology wards and long waiting lists for cancer patients. ▪ Suggested adequate space for patient attendants and waiting areas. ▪ Stressed the need for staff training programs on advanced cancer care equipment

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17	Institutional	17 August 2025	Arooj Iftikhar Staff Nurse	1	PIMS Hospital	▪ Supported the Project, considering the load on the Oncology department of PIMS hospital
18	Institutional	17 August 2025	Ambreen Nawaz-Nurse	1	PIMS Hospital	▪ Suggested adequate space for patient attendants and waiting areas. ▪ Stressed the need for staff training programs on advanced cancer care ▪ equipment.
19	Institutional	17 August 2025	Sana Raheem-Nurse	1	PIMS Hospital	▪ Suggested to have partnership with medical colleges and training institutes of the country.
20	Institutional	17 August 2025	Kinza Akhter-Nurse	1	PIMS Hospital	▪ Suggested to ensure privacy and dignity in patient care areas.
21	Institutional	17 August 2025	Javed Khan-Patient attendant	1	PIMS Hospital	▪ Shared that patients from remote regions (AJK, Gilgit-Baltistan, KP) travel to PIMS for cancer treatment but face delays due to capacity limitations. ▪ Welcomed the project as a relief for poor patients. ▪ Suggested that medicines and diagnostic tests should remain affordable and subsidized.

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22	Institutional	17 August 2025	Dr. Tasbih Ur Rehman-Medical Officer	1	PIMS Hospital	▪ Suggested to ensure privacy and dignity in patient care areas.
23	Institutional	16 August 2025	Farhat Siddiqui-Head Nurse MCH	1	PIMS Hospital	▪ Make sure of the availability of qualified oncologists and nurses for the hospitals. If inappropriately handled, it will be of no use. This will become like other government hospitals in the form of lacking the real facilities for the specific treatment.
24	Institutional	16 August 2025	Dr. Shahid-Post graduate Trainee	1	PIMS Hospital	▪ Concerned about waste management, especially concerns about hazardous medical and radioactive waste.
25	Institutional	16 August 2025	Dr. Abdul Rehman-House Officer	1	PIMS Hospital	▪ If this is a support for access to affordable cancer treatment, especially for the poor. ▪ Highlighted that there is potential for awareness campaigns, screenings, and early detection programs.
26	Institutional	16 August 2025	Dr. Abdullah-Consultant Cardiology	1	PIMS Hospital	▪ Suggested adequate space for patient attendants and waiting areas. ▪ Stressed the need for staff training programs on advanced cancer care equipment.

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27	Institutional	16 August 2025	Dr. Abdul wakil Khan-Post graduate Trainee	1	PIMS Hospital	▪ Opportunity for training, research, and collaboration with the new hospital. ▪ Chance to reduce patient burden on existing health facilities.
28	Institutional	16 August 2025	Dr. Asim-House Officer	1	PIMS Hospital	▪ Showed concerns if there will be availability of qualified oncologists and nurses. ▪ Also suggested for the need of interdisciplinary care like surgery, radiotherapy, palliative care. ▪ Concerns about adequate infection control, especially in an immuno-compromised patient environment
29	Institutional	16 August 2025	Dr. Zubair-Medical Officer	1	PIMS Hospital	▪ It will be a hope for comprehensive care. This includes radiation, chemo, surgery, psychosocial support etc. under one roof.
30	Institutional	16 August 2025	Ms Asmat-Head nurse Cardiac Surgey	1	PIMS Hospital	▪ Incorporate support groups and survivorship programs.

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7.4 Key Concerns Raised by Non-Institutional Stakeholders

The main issues and concerns emerging from these consultations are summarized below:

Noise

- The Project construction and later operation will cause noise issue for all those coming to PIMS, since it is the main hospital of Islamabad.
- Noise pollution may be an issue during unloading and installation of equipment.

Focus Group Discussions (FGDs)

A number of FGDs were conducted with the people in the Project area (details are given in Table 7.2). FGDs conducted were primarily related to the project and its activities, people's current livelihood engagement and expected environmental and social implications of the project. Project activity wise generic environmental and social issues were discussed with different people / groups as well as activity specific environmental concern were noted. The summary of discussions is given in **Table 7.2.**

Table 7.2: Focus Group Discussion

No	Location	No of Participants	Profession	Feedback
1	PIMS Parking Area	10	-	The project is good in terms of cancer treatment in Islamabad. However, it should be executed at earliest possible
2	PIMS Entrance Gate	8	Shopkeeper, auto-mechanic, electrician, driver, student	It is a good initiative especially for poor people, as it helps the needy for an expensive treatment.
3	Project site (Entrance Gate)	6	-	Overall supporting the project and do not have any issue.
4	Ibn-e sina Road towards G-11 Chowk	5	-	Do not have any issue as long as it is not disturbing business.
5	Bus Stand, Ibn-e-Sina Road	9	Housewife Businessman Businessman Govt. job holder Housewife	Supporting the project, as it helps the poor and provides free treatment of a chronic and expensive disease.
6	PIMS Emergency Area	4	Student Electrical Engineer Student Student	Supporting. Beneficial for poor community of the country.

7.5 Institutional Consultation

129. A series of consultation meetings were held with local officials from various departments to understand their views on various aspects of the project. Departments who have specific interest / stake in proposed project from environmental and social dimensions are as follows:

- Pak-EPA, Islamabad
- Bahria University, Islamabad
- Islamabad Electric Supply Company (IESCO)

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- Sui Northern Gas Pipeline Ltd (SNGPL)

Table 7.3: Institutional Consultation Record

No.	Name	Department	Concerns
1	Mr. Khalid Mehmood Chaddar	Director (EIA/Mont.)	• Make sure the compliance in implementation/operation phases
2	Mr. Imtiaz Sindhi	Inspector (Inspection team Pak-EPA)	• Enhance the treatment of cancer in Islamabad residents and people coming all over the country.
3	Mr. Sher Afzal Khan	Deputy Director (E&S), IESCO Islamabad	• Support the project, but compliance to section 11 of PEPA 1997 (Prohibition of certain discharges or emissions) may be required during implementation and operation phases.
4	Mr. Umair Ullah Jamil	Head of Department (E&ES department Bahria University)	• The ESIA may be shared with the department once it is approved.

7.6 Future Consultations

130. Draft ESIA report will be disclosed once again before the stakeholders and general public to ensure that their concerns and remedial measures have been incorporated in the report. ESIA report will be accessible to interested parties on request, and the version of final report will be available in PMU of the Project.

131. It will be essential to continue this consultation process to ensure that the community remains supportive and that they are fully informed of progress, particularly before and during the construction period. It will be essential that the community is given information on the grievance redress mechanism (GRM) and that regular meetings with the community are held in the future. Once the project has been approved and a construction program has been defined, the first of a number of community meetings must be held to provide details of the construction program and to give information on the GRM. A website should be set up, including all this information, however, many of the community may not have access to the internet, therefore face to face meetings and hard copy handouts must be provided to the whole community.

132. A project-specific grievance redress mechanism (GRM) will be established to receive, evaluate, and facilitate the resolution of people's concerns, complaints, and grievances about the social and environmental performance at the level of the project. The GRM will aim to provide a time-bound and transparent mechanism to voice and resolve social and environmental concerns linked to the project.

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8. Grievance Redressal Mechanism (GRM)

8.1 Introduction

133. ADB and AIIB requires the EA to establish a Grievance Redress Mechanism (GRM) with the objective to receive and facilitate resolution of affected peoples' concerns and grievances about the EAs social and environmental performance at project level. The GRM is a formal process to ensure that any concern, complaint, or dispute arising from the construction or operation of the 200-Bedded Cancer Hospital is addressed promptly and transparently. The GRM will act as a bridge between project authorities, workers, and communities, allowing issues to be resolved at the earliest possible stage. It is designed in compliance with:

- Pakistan Environmental Protection Act (1997),
- Hospital Waste Management Rules (2005) (for medical facility operations),
- ADB Safeguard Policy Statement (SPS, 2009), and
- AIIB Environmental and Social Framework (2022).

134. The GRM will cover issues such as labor rights, construction-related disturbances, hospital operations, and community concerns, ensuring that the voices of all stakeholders—including vulnerable groups are heard.

8.2 Objectives

135. The key objectives of the GRM are to:

- Ensure that workers, patients, and community members have a simple and transparent way to raise grievances without fear of retaliation.
- Encourage settlement at the site level to minimize delays, costs, and disruptions.
- Build trust between the project authorities and local stakeholders by demonstrating responsiveness.
- Align with the grievance requirements of ADB and AIIB, which emphasize transparency, accessibility, and fairness.
- Keep a record of all grievances, their resolution status, and lessons learned for future improvement.

8.3 Scope of the GRM

136. Both the Asian Development Bank (ADB) and the Asian Infrastructure Investment Bank (AIIB) have strict requirements for grievance redress under their Environmental and Social Safeguard Policies:

137. **ADB Requirements**: Under ADB's SPS 2009, a functional GRM is mandatory for Category A and B projects that must be accessible, inclusive, responsive and culturally appropriate. This should also enable early conflict resolution and prevent escalation of disputes.

138. **AIIB Requirements**: Referring to AIIB's ESF 2016, a GRM must be established as part of the ESMP that should handle both project-related grievances and labor grievances. Furthermore, there should be a provision for sensitive issues such as GBV.

139. The GRM will address grievances across different project phases:

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Construction Phase:

- Dust, noise, and vibration from construction works.
- Traffic congestion and blocked access routes.
- Safety hazards (falling debris, unsafe scaffolding, machinery accidents).
- Conditions of labor camps (food, housing, sanitation).
- Local community disturbance from transport/deliveries.

Labor Concerns:

- Non-payment or delayed payment of wages.
- Absence of employment contracts or appointment letters.
- Violation of minimum wage laws.
- Poor living and working conditions.
- Lack of protective equipment and occupational safety.

Operational Phase:

- Patient access and affordability.
- Malfunction or delays in diagnostic/treatment equipment.
- Staff behavior or negligence.
- Safety concerns in specialized units (e.g., radiotherapy bunker, ICU).

Community Concerns:

- Parking and traffic management around the hospital.
- Security and public safety.
- Noise, light, or congestion issues affecting surrounding neighborhoods.

8.4 Structure of the GRM

140. The GRM will follow a **three-tier structure**:

Tier 1: Site-Level Resolution

- A GRM Focal Person (Environmental & Social Officer) will be based at the site.
- A complaint desk/window will operate during working hours where community members, patients, or workers can directly lodge grievances.
- Complaint boxes will be installed at strategic points (main gate, outpatient entrance, labor camp).
- Complaints may also be filed via phone, email, WhatsApp, or written form.

141. The Focal Person will:

  - Acknowledge receipt of complaints **within 3 working days**.
  - Investigate and coordinate with contractors/hospital staff.
  - Provide resolution within **10 working days**.

Typical Tier 1 Issues:

- Labor wages and camp conditions.
- Minor construction nuisances (dust, noise).
- Traffic or parking disturbances.

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- Immediate service-related complaints.
- Noise and vibration
- Water and sanitation, solid waste
- Community complaints
- Labor issues

Tier 2: Project-Level Grievance Redress Committee (GRC)

142. If complaints remain unresolved, they will be referred to the GRC, which meets every two weeks (or earlier if urgent).

Composition:

- Representative of MoNHSRC (Chairperson).
- CDA representative (for land, construction, and approvals).
- Hospital administration (PIMS).
- Contractor's representative.
- Community representative (including at least one woman).
- EPA observer (for environmental/social compliance).

143. Resolution Timeline: Maximum 15 working days.

Typical Tier 2 Issues:

- Repeated labor rights violations.
- Long-term community access issues.
- Hospital operational problems affecting service quality.

Tier 3: National and International Mechanisms

144. If grievances are not resolved at the GRC level, stakeholders may escalate to:

- Pakistan EPA – For environmental and social safeguard issues under PEPA 1997.
- Labor Department, ICT – For wage, contract, or worker safety violations.
- ADB Accountability Mechanism – Independent review of safeguard compliance.
- AIIB Project-Affected People's Mechanism (PPM) – Independent recourse system for unresolved concerns.

145. This ensures that all complainants have access to fair, independent, and higher-level remedies.

8.5 Accessibility and Inclusiveness

146. The GRM will be designed to be easily accessible to all stakeholders:

- Complaint forms available in Urdu and English.
- Awareness sessions conducted for workers, hospital staff, and communities.
- Anonymous complaints accepted without prejudice.
- Dedicated female focal persons for gender-related issues.
- Information display boards at the site showing GRM procedures, contact details, and timelines.
- Multiple channels: complaint boxes, verbal complaints, phone numbers, WhatsApp, and written submissions.

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8.6 Institutional Arrangements

- The GRM Focal Person will be appointed before the next phase of construction begins.
- The Grievance Redress Committee (GRC) will be constituted before commissioning of the hospital.
- A Grievance Log Register will be maintained at site level, recording:
    - Complaint ID, date, nature of complaint, responsible party, resolution timeline, and status.
- Communities will play a role through representation in the GRC.

8.7 Record Keeping and Reporting

- All grievances will be formally logged and tracked until closure.
- Monthly grievance summaries will be submitted to MoNHSRC.
- Reporting to ADB, AIIB, and Pakistan EPA will be based on the conditions outlined in the Environmental Approval and safeguard monitoring reports.
- The log will also be shared during safeguard monitoring missions.

8.8 Training and Awareness

- All workers will undergo orientation sessions on how to use the GRM.
- GRC members will receive specialized training on grievance resolution, mediation, and documentation.
- Community awareness campaigns will be carried out to ensure local residents know about their rights and the GRM process.

8.9 Immediate Remedial Measures

For urgent cases (e.g., accidents, safety hazards, wage disputes):

- The GRM focal person will initiate immediate action in coordination with the contractor or hospital administration.
- Temporary remedies (such as providing medical aid, clearing blocked access, or providing food/water to laborers) will be taken before escalation to the GRC.

- The GRC cannot impede a DP's access to the legal system, thus, a DP can approach the courts at any time in accordance with the applicable legal provisions as well as ADB's Accountability Mechanism.

8.10 Monitoring and Evaluation

147. The effectiveness of the GRM will be tracked through:

- Quarterly monitoring reports submitted to ADB, AIIB, and EPA.
- Independent third-party evaluations during mid-term and completion stages.
- Feedback loops to improve procedures, reduce repeat grievances, and strengthen accountability.
- The project consultants and management will be responsible for monthly progress report including the GRM monitoring and progress.
- External Monitoring will be carried out on bi-annual basis

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9. Conclusion & Recommendations

148. The installation and operation of advanced oncology equipment at the 200-bedded Cancer Hospital, PIMS, represents a critical step in addressing the rising cancer burden in Pakistan. Based on the assessment, the proposed interventions are not expected to cause significant adverse environmental or social impacts, provided that mitigation measures, safety standards, and regulatory compliance are strictly observed.

149. With appropriate planning, the project will enhance diagnostic and treatment capacity, ensure patient and worker safety, and contribute to sustainable healthcare delivery. Radiotherapy equipment (e.g., linear accelerators) will be housed in shielded bunkers to prevent radiation leakage, while chemotherapy preparation areas will include specialized ventilation and containment systems. Waste management—including radioactive, biomedical, and hazardous waste—will follow the Hospital Waste Management Rules (2005), PNRA licensing, Pak-EPA regulations, and ADB/AIIB safeguard standards.

150. To achieve safe and effective implementation, the following recommendations are made:

- **Regulatory Compliance:** Ensure full adherence to IAEA, WHO, PNRA, and Pak-EPA standards before commissioning.
- **Qualified Personnel:** Employ licensed medical physicists, oncologists, biomedical engineers, and trained waste handlers; conduct continuous training on radiation safety, biomedical protocols, and emergency response.
- **Infrastructure Readiness**: Complete construction of radiation bunkers, drug preparation clean rooms, UPS-backed power supply, and HVAC systems before installation.
- **Occupational & Patient Safety:** Enforce radiation monitoring, PPE use, closed-system chemotherapy transfer, and infection control.
- **Emergency Preparedness:** Develop and drill emergency response plans for radiation leaks, equipment failures, or hazardous spills.
- **Quality Assurance:** Commission and calibrate equipment prior to use; maintain a QA program with daily, weekly, and monthly checks.
- **Monitoring & Reporting:** Regularly review emissions, waste handling, incident reports, and patient outcomes; submit compliance reports to Pak-EPA and financing institutions as per approval conditions.
- In conclusion, the project offers a vital advancement in oncology care for Pakistan. With proper safeguards, it will deliver high-quality treatment services, strengthen the health system, and minimize environmental and social risks.

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Annexures

Annexure-1 Waste Management Plan (WMP)

Waste Management Plan (WMP)

The proposed 200-bedded Cancer Hospital will generate various categories of waste during construction and operational phases, including biomedical, radioactive, hazardous, domestic, and general solid waste. Effective waste management is critical to safeguard human health, protect the environment, and ensure compliance with Pakistan's Hospital Waste Management Rules (2005), Pakistan Environmental Protection Act (1997), National Environmental Quality Standards (NEQS 2000), as well as international best practices under the ADB Safeguard Policy Statement (2009) and the AIIB Environmental and Social Framework.

WASTE GENERATION SOURCES

a) Construction Phase

- Excavated soil, concrete, and packaging materials.
- Waste from labor camps (domestic refuse, food waste).
- Small quantities of hazardous waste (oil, lubricants, solvents).

b) Installation Phase

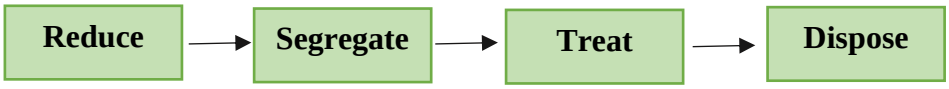
- Packaging waste from medical equipment: wooden crates, plastic wrapping, Styrofoam, and cardboard.
- Metal scrap, cables, wiring off-cuts, and insulation materials from installation.
- Calibration fluids, coolants, and solvents used during testing and commissioning of diagnostic and radiotherapy equipment.
- Small volumes of low-level radioactive waste during commissioning of nuclear medicine equipment (e.g., PET-CT, cyclotron), managed under PNRA licensing.
- Wastewater generated from cleaning, flushing, and equipment setup.
- General solid waste (food waste, plastic bottles, wrappers) from contractor and supplier teams.

C) Operational Phase

- **Biomedical Infectious Waste:** syringes, IV sets, blood bags, contaminated dressings, human tissue, cytotoxic drugs.
- **Radioactive Waste:** from diagnostic and therapeutic equipment (PET-CT, cyclotron, LINAC, brachytherapy).
- **Hazardous Waste:** chemicals, solvents, laboratory reagents, expired drugs.
- **General Solid Waste:** packaging materials, food waste, paper, plastics.
- **Liquid Waste:** wastewater from laboratories, patient wards, and incinerator flue gas scrubbers.

Waste Management Strategy

The WMP follows the Waste Management Hierarchy: Reduce → Segregate → Treat → Dispose.



WASTE SEGREGATION AND COLLECTION

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Color-coded bins and bags will be placed across the hospital, following Hospital Waste Management Rules (2005), Segregation will occur at the point of generation by hospital staff and housekeeping teams trained in biomedical waste handling.

Color Codes for Waste Segregation

- Yellow > infectious/pathological waste.
- Red > sharps.
- Blue > pharmaceutical/chemical waste.
- Black – general non-infectious waste.
- Radioactive waste will be managed under PNRA licensing requirements, using lead-shielded containers and decay-in-storage protocols.

Types of Containers

- **Bins:** Rigid, puncture-proof, washable bins with foot-operated lids to minimize contact.
- **Sharps:** Puncture-proof, tamper-resistant, leak-proof plastic/metal safety boxes (capacity: 5–10 liters).
- **Infectious/Pathological Waste:** Double-layered, leak-proof, yellow plastic bags placed in covered bins.
- **Chemical/Pharmaceutical Waste:** High-density polyethylene (HDPE) containers resistant to corrosion and chemical attack.
- **Radioactive Waste:** Lead-shielded, labeled containers (PNRA-approved).

Collection Timetable and Frequency

- **Infectious and Sharps Waste:** Collected twice daily (morning and evening) to minimize infection risk.
- **Pharmaceutical and Chemical Waste:** Collected once daily or immediately when containers reach 75% capacity.
- **General Waste:** Collected once daily during routine housekeeping rounds.
- **Radioactive Waste:** Collected and stored under PNRA guidelines, with frequency determined by isotope half-life (e.g., daily for short-lived isotopes, weekly/monthly for long-lived isotopes).
- **Central Storage Transfer:** All waste transferred to a designated central storage area within hospital premises for treatment/disposal, not exceeding 24 hours storage for infectious waste.

TRANSPORTATION AND STORAGE

Waste will be transported in sealed trolleys along designated routes, avoiding patient areas.Temporary storage rooms will be ventilated, secured, and disinfected daily.Maximum storage time for infectious waste 48 hours.

TREATMENT AND DISPOSAL

Infectious waste: Treated in a dual-chamber hospital-grade incinerator (capacity: 100 kg/hr) located within the hospital premises. The incinerator includes:

- Primary chamber at >800°C.
- Secondary chamber at >1,100°C with 1-second retention time.
- Wet scrubber and pollution control devices for emission control.
- Compliance with NEQs ADB/AIIB EHS Guidelines, and WHO standards for dioxins, furans, PM, SO_2, NO_x.

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Ash disposal: Ash generated from the incinerator will be collected in sealed, labeled containers and transported by an authorized contractor to a designated hazardous/risk landfill site, as required under the Hospital Waste Management Rules (2005) and PEPA, 1997. Disposal at ordinary municipal sites is not permitted by law, and only officially approved hazardous waste landfills will be used to ensure compliance with national regulations and safeguard environmental and public health.

Liquid effluent: Wastewater from laboratories and the incinerator scrubber will undergo on-site pre-treatment to meet NEQS standards before discharge into the municipal sewer system.

Radioactive waste: Managed under PNRA regulations, stored until decayed to background levels, and then disposed of as non-radioactive waste.

General solid waste: Handed over to Islamabad Municipal Corporation/PIMS contractor for safe disposal.

ROLES AND RESPONSIBILITIES

- Hospital Waste Management Officer (WMO), Appointed as per Rules 2005 to supervise segregation, collection, treatment, and record keeping.
- Environmental and Social Officer, Ensures compliance with ADB, AIIB, and EPA reporting requirements.
- Incinerator Operators, Certified staff trained in safe handling, emergency response, and emission monitoring.
- Contracted Waste Disposal Services, Handle final transport/disposal of treated waste and non-hazardous solid waste.

OCCUPATIONAL HEALTH AND SAFETY

All staff engaged in waste handling will be provided with PPE (gloves, masks, aprons, goggles, boots). Regular training programs on safe waste handling, spill response, and emergency procedures. Health monitoring and immunization (e.g., Hepatitis B, Tetanus) for all waste management workers.

MONITORING AND COMPLIANCE

- Air emissions from the incinerator will be monitored quarterly for PM, SO_2, NO_x, CO, dioxins, and furans in line with NEQS and IFC EHS guidelines.
- Wastewater will be tested for BOD, COD, heavy metals, and pathogens before discharge.
- Solid waste audits will be conducted monthly to track generation rates and disposal compliance.
- Annual waste management reports will be submitted to the Pakistan EPA, ADB, and AIIB.

The Waste Management Plan ensures that all categories of waste generated by the Cancer Hospital are managed in a safe, efficient, and regulation-compliant manner. By adhering to Pak-EPA legislation, Hospital Waste Management Rules (2005), NEQS (2000), PNRA licensing requirements, and ADB/AIIB safeguard requirements, World Bank Group EHs guidelines for Health Care Facilities, the hospital will protect patients, staff, and the wider community, while minimizing environmental and public health risks.

All hospital staff, including medical, paramedical, and housekeeping personnel, will undergo regular training sessions on biomedical waste segregation, use of PPE, radiation safety, and emergency response protocols. Specialized training will be provided to incinerator operators and waste handlers on emission control, ash handling, and spill response.

An Emergency Response Plan (ERP) will be developed covering fire safety, chemical spills, radiation exposure, and incinerator malfunctions. Mock drills will be conducted biannually with

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participation from hospital staff, local emergency services, and the waste management team to ensure preparedness.

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Annexure-2 Emergency Response Procedures (ERP)/ SOPs for E-Waste Management

Emergency Response Procedures (ERP)

To ensure prompt, coordinated, and effective response to emergencies that may arise during hospital operation, including fire, chemical/radiation spills, medical waste mishandling, or natural disasters.

Key Components:

Emergency Control Organization

- Emergency Response Committee chaired by Hospital Director.
- Waste Management Officer, Safety Officer, and Security Officer as core members.
- Coordination with CDA Fire Service, Rescue 1122, and PNRA (for radiation incidents).

Types of Emergencies & Response Procedures

- Fire Safety: Immediate evacuation, activation of fire alarms, firefighting using hydrants/extinguishers, and coordination with CDA Fire Department.
- Chemical/Radiation Spills: Isolate area, use spill kits and PPE, notify PNRA (for radioactive materials), and implement containment and cleanup procedures.
- Incinerator Malfunction: Shut down system, activate emergency cooling, notify engineering staff, and initiate backup waste storage protocols.
- Natural Disasters (earthquake, flood): Safe evacuation, triage zones for patients, coordination with ICT emergency services.

Training & Drills:

- Fire and evacuation drill every 6 months.
- Spill response and waste handling drills every quarter.
- Annual hospital-wide mock disaster simulation.

Emergency Equipment:

- Fire hydrants, extinguishers, alarms, PPE kits, radiation survey meters, spill kits.

SOPs for E-Waste Management

To manage electronic waste (e-waste) from medical equipment, IT systems, and electrical devices in compliance with Pak-EPA regulations and ADB/AIIB EHS guidelines.

Scope

Includes obsolete diagnostic machines, computers, monitors, batteries, cables, printers, UPS, and electronic components.

Standard Operating Procedures (SOPs):

Segregation & Collection:

- E-waste stored separately from biomedical and general waste.

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- Dedicated containers (labeled, non-corrosive, closed storage).

Inventory & Record-Keeping:

- Maintain logbooks of all e-waste items (type, quantity, date of disposal).
- Asset management system for tracking obsolete equipment.

Temporary Storage:

- Secure, ventilated room within hospital premises.
- Storage not exceeding 6 months.

Transportation & Disposal:

- Disposal only through licensed third-party vendors authorized by Pak-EPA.
- Priority given to recycling and material recovery.
- Hazardous e-waste components (batteries, circuit boards) sent to approved risk landfill or recycling facilities.

Health & Safety:

- Workers handling e-waste provided with gloves, masks, and protective clothing.
- Training on safe dismantling and handling of heavy metals (lead, mercury, cadmium).

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Annexure-3 Public Consultation / Questionnaire Form

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STAKEHOLDER CONSULTATION QUESTIONNAIRE FORM

(FOR ESIA STUDY OF 200-BEDDED CANCER HOSPITAL AT PIMS, ISLAMABAD)

General Information

1. Name (optional): _____
2. Gender: ☐ Male ☐ Female ☐ Other
3. Age Group: ☐ <20 ☐ 21–40 ☐ 41–60 ☐ >60
4. Occupation: _____
5. Community/Area of Residence: _____

Awareness and Perceptions

1. Are you aware of the proposed 200-Bedded Cancer Hospital project?
   ☐ Yes ☐ No
2. How did you hear about the project?
   ☐ Local Government ☐ PIMS Staff ☐ Media ☐ Community Meetings ☐ Other _____
3. What is your perception of the need for this hospital in Islamabad?
   ☐ Very necessary ☐ Necessary ☐ Neutral ☐ Not necessary

Potential Positive Impacts

1. What benefits do you expect from the hospital? (Tick all that apply)
   ☐ Improved access to cancer care
   ☐ Reduced need to travel outside Islamabad for treatment
   ☐ Employment opportunities (construction/operation phase)
   ☐ Research and training facilities
   ☐ Community development (roads, services, utilities)
   ☐ Others (please specify): _____
2. In your opinion, which group will benefit most?
   ☐ Local community ☐ Cancer patients from across Pakistan
   ☐ Health professionals ☐ Students/Researchers ☐ Other _____

Potential Concerns and Risks

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1. Do you foresee any negative impacts from the hospital's construction or operation?

   ☐ Yes ☐ No

   If Yes, please specify:

   - Noise/dust during construction
   - Traffic congestion
   - Waste disposal/Incinerator emissions
   - Land use and greenery impact
   - Radiation or safety concerns
   - Other: _____

2. Do you think the hospital may affect community safety or health in any way?

   ☐ Yes ☐ No (If Yes, explain: _____)

3. Are you concerned about the hospital's waste management (medical waste, hazardous waste, general waste)?

   ☐ Yes ☐ No

   If Yes, what specific concerns? _____

Social and Economic Aspects

1. Do you expect the project to create job opportunities for local residents?

   ☐ Yes ☐ No

   If Yes, what type of jobs? ☐ Skilled ☐ Unskilled ☐ Both

2. Do you think the project will affect local businesses or markets?

   ☐ Positively ☐ Negatively ☐ No effect

3. What do you think about the affordability of cancer treatment in such a hospital?

   ☐ Should be subsidized ☐ Affordable rates ☐ Private market rates

Community Engagement & Grievances

1. What is the best way for the hospital project to share information with you?

   ☐ Community meetings ☐ Local leaders ☐ Media ☐ Pamphlets ☐ Social media

2. If you face a problem due to the project, how would you prefer to file a complaint?

   ☐ Complaint box at hospital ☐ Community representative ☐ Phone hotline

   ☐ Direct to hospital management ☐ Other _____

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Suggestions & Recommendations

1. What are your key recommendations for ensuring that the project is beneficial for the community?
2. Any concerns or expectations related to:

Construction phase: _____

Operation phase: _____

3. Additional Comments: _____

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Annexure-4 Environmental Monitoring Reports

Green Crescent
Environmental Consultants Pvt. Ltd.

Monitoring & Test Report

- Ground Water
- Waste Water
- Ambient Air
- Meteorological Data
- Noise Monitoring

200-Bedded Cancer Hospital, PIMS, Islamabad

12th August. 2025

Job Reference No.: GCEC-PIMS-251/2025

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Client Detail:	
Name of Contact Person / Project:	- 200-Bedded Cancer Hospital, PIMS, Islamabad
Designation:	- Authorized Person
Contact Number:	- 03325575174
Email:	-
Address:	- PIMS, Ibn-e-Sina Road, Sector G-8/3, Islamabad

GCEC Details:	
Director:	Mr. Mian Khurram Usman
Telephone:	+92 42 35962885
Fax:	+92 42 35962884
Email:	manager.operations@gcee.ae
Address	House No. 368-B Block B, Canal View, Lahore

Signatories:

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CHEMICAL ANALYSIS TEST REPORT (GROUND WATER)

Sample Details			
Job Ref. No:	GCEC-PIMS-252/2025	**Client Detail:**	200-Bedded Cancer Hospital, PIMS
Telephone No. :	03320987058	**Sample Matrix:**	Ground Water Sample
Sample Date:	12 August. 2025	**Sampled By:**	GCEC
Sample Receipt Date:	13 August. 2025	**Date of Completion of Analysis:**	15 August. 2025
Grab/Composite:	Grab Sampling	**Address:** PIMS, Ibn-e-Sina Road, Sector G-8/3, Islamabad	
Sample Identification			
01	Ground Water		

Parameters	Analysis Method	Unit	LOR	Result 01	NEQS
PHYSICAL & CHEMICAL ANALYSIS					
pH**	APHA-4500H+ B	-	0.01	7.59	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	-	ND	<5 NTU
Total Hardness**	APHA-2340 B&C	mg/l	0.1	287.0	< 500 mg/l
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	397.0	< 1000
Ammonia	APHA-4500-NH_3-B	mg/l	0.002	36.18	-
Chloride**	APHA-4500 B	mg/l	0.24	<0.01	< 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-4500NO2 B	mg/l	0.01	<0.1	≤ 3 (P)
Nitrate**	APHA-4500NO3 C	mg/l	0.1	0.3	≤ 50
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.1	-
Residual Chlorine	APHA-4500Cl G	mg/l	0.1	<0.025	0.2-0.5
Aluminum (Al)	APHA-3111Al B	mg/l	0.028	<0.0019	≤ 0.2
Cadmium**	APHA-3111 B	mg/l	0.0028	<0.0042	0.01
Copper**	APHA-3111 B	mg/l	0.0045	<0.0051	2
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0005	≤ 0.05 (P)
Mercury	APHA-3112Hg B	mg/l	0.0008	ND	≤ 0.001
Antimony (Sb)**	APHA-3111 B	mg/l	-	<0.008	≤ 0.005 (P)
Nickel**	APHA-3111 C	mg/l	0.008	<0.0023	≤ 0.02
Zinc**	APHA-3111 B	mg/l	0.0033	<0.01	5.0
Arsenic	APHA-3111As B	mg/l	0.01	<0.011	≤ 0.05 (P)
Barium	APHA-3111Ba B	mg/l	0.031	<0.0016	0.7
Manganese**	APHA-3111 B	mg/l	0.0016	<0.1	≤ 0.5
Iron**	APHA-3111 B	mg/l	0.1	<0.1	-
Boron	APHA-4500-B (C)	mg/l	0.1	<0.013	0.3
Lead**	APHA-3111 B	mg/l	0.009	ND	≤ 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 **NEQS:** National 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±5C° and humidity at 50±20%.*

Disclaimer: *The results are solely of the sample provided. ** All starred parameters are PNAC accredited.*

Sample Analyzed By:
Analyst
Mr. Idrees Zaman

Name & Signature with Seal:
Raza Jaswal

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CHEMICAL ANALYSIS TEST REPORT (WASTE WATER)

Sample Details			
Job Ref. No:	GCEC-PIMS-252/2025	**Client Name:**	200-Bedded Cancer Hospital, PIMS
Telephone No.	03320987058	**Sample Matrix:**	Waste Water Sample
Sample Date:	12 August. 2025	**Sampled By:**	GCEC
Sample Receipt Date:	13 August. 2025	**Date of Completion of Analysis**	15 AugustJuly. 2025
Grab/Composite:	Grab Sampling	**Address:** PIMS, Ibn-e-Sina Road, Sector G-8/3, Islamabad	
Sample Identification			
01	Waste Water		

Parameters	Analysis Method	Unit	LOR	Result 01	NEQS
PHYSICAL & CHEMICAL ANALYSIS					
Temperature	APHA-2550 B	℃	-	24.4	-
pH**	APHA-4500-H+ B	pH unit	0.01	7.25	6-9
Total Dissolved Solid (TDS)**	APHA-2540 C	mg/l	1.0	2844.0	3500
Oil and Grease**	USEPA-1664	mg/l	0.2	<0.2	10
Biological Oxygen Demand	APHA-5210 B	mg/l	1.0	271.0	250
Chemical Oxygen Demand**	APHA-5220 D	mg/l	1.0	445.0	400
Total Suspended Solid**	APHA-2540 C	mg/l	1.0	162.0	400
Phenolic Compound	APHA-5530 D	mg/l	0.01	<0.01	0.3
Chloride (Cl)**	APHA-4500 B	mg/l	0.24	971.11	1000
Fluoride (F)**	APHA-4500F- D	mg/l	0.01	<0.01	10
Cyanide (CN)	APHA-4500CN E	mg/l	0.01	<0.01	1.0
Detergent	APHA-5540 C	mg/l	-	ND	20
Sulphate**	APHA-4500-SO_4^{-2} C	mg/l	0.41	391.00	1000
Sulphide	APHA-4500-S^{-2} F	mg/l	0.4	<0.4	1.0
Ammonia	APHA-4500-NH_3-B,C	mg/l	0.002	1.0	40
Silver	APHA-3500Ag B	mg/l	0.0032	<0.0022	1.0
Cadmium**	APHA-3111 B	mg/l	0.0028	<0.0024	0.1
Chromium**	APHA-3111 B	mg/l	0.0054	<0.0042	1.0
Copper**	APHA-3111 B	mg/l	0.0045	0.0041	1.0
Lead**	APHA-3111 B	mg/l	0.013	<0.013	0.5
Mercury	APHA-3112Hg B	mg/l	0.0008	<0.0005	0.01
Nickel**	APHA-3111 C	mg/l	0.008	0.0102	1.0
Zinc**	APHA-3111 B	mg/l	0.0033	0.0211	5.0
Arsenic	APHA-3111As B	mg/l	0.01	<0.01	1.0
Barium	APHA-3500Ba B	mg/l	0.031	<0.021	1.5
Manganese**	APHA-3111 B	mg/l	0.0016	<0.0012	1.5
Iron**	APHA-3111 B	mg/l	0.1	1.22	8.0
Boron	APHA-4500B C	mg/l	0.1	<0.1	6.0
Total Chlorine	APHA-4500 Cl B	mg/l	0.1	<0.1	1.0
Selenium	APHA-3111 Se B	mg/l	-	ND	0.5
Pesticides	APHA-6630 B	mg/l	-	ND	0.15
Total Toxic Metals	-	mg/l	-	0.016	2

Abbreviations:
ND: Not Detected **LOR:** Limit of Reporting **NEQS:** National 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±5C° and humidity at 50±20%. **All the starred parameters are PNAC accredited.*

Disclaimer: *The results are solely of the sample provided.*

Sample Analyzed By:
Analyst
Mr. Idrees Zaman

Name of Chief Au... Official Seal:
Mr. Usman ... Jaswal

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Ambient Air Monitoring Location

200-Bedded Cancer Hospital, PIMS, Islamabad

Zaraj Housing Society, Sector-A, Islamabad

Pakistan Institute Of Medical Sciences

Pakistan Office: House No. 368-B , Block Canal View Housing Society, Lahore. Pakistan.
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Ambient Air Quality Monitoring

Job Reference Number	GCEC-PIMS-252/2025
Monitoring Point	Center of Site
Date of Intervention	13 August. 2025
Monitoring Coordinates	N 33°45'12.47" and E 73°12'33.78"

Sr. #	Time	CO (mg/m^3)	NO ($\mu g/m^3$)	NO2 ($\mu g/m^3$)	NOx ($\mu g/m^3$)	SO2 ($\mu g/m^3$)	$PM_{2.5}$
1.	12:50	2.74	17.17	23.85	39.92	15.98	41.1
2.	13:50	2.59	20.69	22.25	41.84	17.46	42.3
3.	14:50	2.97	15.78	16.09	30.77	20.27	43.1
4.	15:50	3.10	16.98	14.83	30.71	22.31	44.5
5.	16:50	3.17	19.22	21.92	40.14	21.84	48.4
6.	17:50	3.69	15.44	23.91	38.25	18.47	51.5
7.	18:50	2.99	17.65	24.16	40.71	16.25	48.5
8.	19:50	2.59	20.64	26.74	46.28	15.97	47.8
9.	20:50	2.41	16.34	26.90	42.24	20.45	45.4
10.	21:50	2.58	15.17	28.25	42.32	18.46	45.7
11.	22:50	3.02	17.37	19.11	35.38	18.96	44.1
12.	23:50	2.98	13.67	23.22	35.79	18.32	41.0
13.	00:50	3.88	14.33	22.47	35.70	22.17	37.4
14.	01:50	3.79	16.48	22.65	38.03	21.41	35.7
15.	02:50	3.11	14.67	23.71	37.28	19.26	34.5
16.	03:50	2.64	16.28	14.21	29.39	15.51	34.7
17.	04:50	2.72	18.16	14.92	31.98	17.68	33.1
18.	05:50	2.27	13.47	13.38	25.75	22.84	35.5
19.	06:50	2.82	16.08	13.80	28.78	18.74	39.8
20.	07:50	3.19	14.21	16.79	29.90	20.91	45.2
21.	08:50	2.61	15.79	22.19	36.88	18.68	514
22.	09:50	3.73	12.79	19.60	31.29	23.55	50.8
23.	10:50	3.81	15.13	19.15	33.18	19.17	49.9
24.	11:50	3.89	13.76	15.15	27.81	24.19	48.5
Average Conc.		**3.05**	**16.14**	**20.39**	**35.44**	**19.54**	**62.6**

Monitoring Performed By:
Deputy Analyst
Muhammad Tahir

Name of Chief Analyst & Official Seal:
Mr. Usman Raza Jaswal

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Ambient Air Quality Monitoring

Job Reference Number	GCEC-PIMS-252/2025
Monitoring Point	Center of Site
Date of Intervention	13 August. 2025
Monitoring Coordinates	N 33°45′12.47" and E 73°12′33.78"

Parameter	Unit	Monitoring Duration	LDL	Average Obtained	NEQS
Nitrogen Dioxide (NO_2)	µg/m³	24 Hours	1.00	22.89	80.0
Nitrogen Oxide (NO)	µg/m³	24 Hours	1.00	18.04	40.0
NO_X	µg/m³	24 Hours	1.00	38.33	120.0
Sulphur Dioxide (SO_2)	µg/m³	24 Hours	1.00	18.44	120.0
Carbon Monoxide (CO)	mg/m³	24 Hours	0.01	1.95	5.0*
Ozone (O_3)	µg/m³	24 Hours	-	33.29	130.0**
Particulate Matter ($PM_{2.5}$)	µg/m³	24 Hours	1.00	62.60	35.0
Particulate Matter (PM_{10})	µg/m³	24 Hours	1.00	180.46	150.0
Suspended Particulate Matter (SPM)	µg/m³	24 Hours	1.00	164.93	500.0
Lead Airborne Particles	µg/m³	24 Hours	-	0.20	1.5

Abbreviations:
µg/m³= Micrograms per Cubic Meter
mg/m³= Milligrams per Cubic Meter
LDL= Lowest Detection Limit
PEQS= Punjab Environmental Quality Standards
*08 hour standard for CO
**01 hour standard for O_3

Monitoring Performed By:
Deputy Analyst
Muhammad Tahir

Name of Chief [illegible] with Seal:
Mr Usman Faiz [illegible]

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Meteorological Data

Job Reference Number	GCEC-PIMS-252/2025
Monitoring Point	Center of Site
Date of Intervention	13 August. 2025
Monitoring Coordinates	N 33°45'12.47" and E 73°12'33.78"

Time	Ambient Temperature 0C	Wind Direction	Wind Velocity m/s	Humidity %	Pressure (mm of Hg)
12:50	18	SW	1.9	65.1	743.2
13:50	19	SW	2.0	61.3	748.4
14:50	20	SW	2.3	61.1	745.0
15:50	20	SW	2.6	69.3	744.0
16:50	19	W	2.4	66.1	746.6
17:50	18	W	2.2	69.3	749.2
18:50	19	W	2.0	71.1	747.0
19:50	16	W	2.9	85.3	760.9
20:50	16	W	3.3	84.1	748.7
21:50	13	W	2.7	90.1	757.9
22:50	13	NW	2.6	90.3	750.8
23:50	13	NW	2.8	90.1	750.0
00:50	13	NW	2.9	87.1	766.1
01:50	12	NW	3.0	89.3	743.5
02:50	12	NW	3.6	91.1	753.2
03:50	10	NW	3.8	99.3	755.9
04:50	11	NW	3.5	97.1	753.2
05:50	10	NW	3.3	95.1	742.9
06:50	9	SW	3.3	96.1	759.5
07:50	11	SW	3.2	93.1	755.9
08:50	12	SW	2.8	89.1	746.3
09:50	14	SW	2.5	83.1	756.5
10:50	16	SW	2.1	72.1	754.9
11:50	18	SW	2.3	62.1	756.0

Monitoring Performed By:
Deputy Analyst
Muhammad Tahir

Name of Chief [illegible]:
Mr. Usman Raza Jaswal

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Noise Level Monitoring Report

Job Reference Number	GCEC-PIMS-252/2025
Monitoring Point	Center of Site
Date of Intervention	13 August. 2025
Monitoring Coordinates	N 33°45'12.47" and E 73°12'33.78"

Sr. #	Time	Method/Technique	Unit	Results LAavg	PEQS (Commercial)
Night Time					
1.	23:00	Noise Meter	dB	45.7	
2.	00:00	Noise Meter	dB	44.8	
3.	01:00	Noise Meter	dB	46.2	
4.	02:00	Noise Meter	dB	45.5	
5.	03:00	Noise Meter	dB	42.1	55.0
6.	04:00	Noise Meter	dB	45.6	
7.	05:00	Noise Meter	dB	42.7	
8.	06:00	Noise Meter	dB	43.6	
Night Time Average			**dB**	**44.53**	**55.0**
Day Time					
9.	07:00	Noise Meter	dB	45.7	
10.	08:00	Noise Meter	dB	44.2	
11.	09:00	Noise Meter	dB	50.5	
12.	10:00	Noise Meter	dB	51.3	
13.	11:00	Noise Meter	dB	53.6	
14.	12:00	Noise Meter	dB	53.5	
15.	13:00	Noise Meter	dB	56.4	
16.	14:00	Noise Meter	dB	57.0	
17.	15:00	Noise Meter	dB	54.1	65.0
18.	16:00	Noise Meter	dB	52.7	
19.	17:00	Noise Meter	dB	50.6	
20.	18:00	Noise Meter	dB	52.0	
21.	19:00	Noise Meter	dB	51.4	
22.	20:00	Noise Meter	dB	53.2	
23.	21:00	Noise Meter	dB	55.5	
24.	22:00	Noise Meter	dB	45.9	
Day Time Average			**dB**	**51.73**	**65.0**

Monitoring Performed By:
Deputy Analyst
Muhammad Tahir

Name of Chief Scientist with Seal
Mr. Aiman Raza Jaswal

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