



SPECIALIZED HEALTH CARE & MEDICAL EDUCATION DEPARTMENT, GOVT OF THE PUNJAB

ENVIRONMENTAL IMPACT ASSESSMENT OF RECONSTRUCTION OF LADY WILLINGDON HOSPITAL, LAHORE, PUNJAB



**EIA Report
NOVEMBER 2023**



Infrastructure Development Authority Punjab

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Report Disclaimer

Infrastructure Development Authority of Punjab has prepared an Environmental Impact Assessment of “Reconstruction of Lady Willingdon Hospital” Lahore, Punjab.

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Executive Summary

Title and Location of the Project

This report presents the findings of "Environmental Impact Assessment (EIA) of the Reconstruction of Lady Willingdon Hospital Lahore Punjab.

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

The Reconstruction of Lady Willingdon Hospital Lahore site is located at Ravi Road, Walled City Lahore, Punjab Pakistan. The coordinates of the proposed project are 31.5875° N, 74.3069° E.

Name of Proponent

Dr. Saeed Ahmad Khan Medical Superintendent Teaching and Maternity Lady Willingdon Hospital Lahore is the proponent of the "Reconstruction of Lady Willingdone Hospital Lahore" project while the Specialized Healthcare & Medical Education Department, Government of The Punjab, Lahore is sponsoring agency of the project.

Name of the organization preparing the report:

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

IDAP has prepared an Environmental Impact Assessment of Reconstruction of Lady Willingdon Hospital Lahore.

A brief outline of the proposal (type, process, technology and land requirement)

Project objective:

The project is geared towards the construction of Reconstruction of Lady Willingdon Hospital Lahore to provide infrastructure for the speedy provision of general healthcare facilities. The project will help to reduce and manage an enormous load of patient influx on the existing facilities. The Lady Willingdon Hospital has seen multiple expansions and changes in its design over time. Currently, it functions as a teaching maternity hospital with around 250 beds including OPD. A recent survey by the C&W department assessed the structural condition of the old buildings, revealing concerns about safety in the indoor block, old nursing hostel, doctors' flats, and hostels.

Given this assessment, constructing a new maternity hospital on the premises is imperative. This involves demolishing unsafe hostel structures to ensure continued safe and effective healthcare, aligning with the hospital's mission for maternal health. The technical parameters of design will cater to construction of a Ground plus three floors building including one basement with a total area of 250,000 SF and a bed count of 230 at the location existing OPD and hostel buildings (after demolition) and other allied facilities are also included in the plan to ensure prompt delivery of respective services round the clock without interruption.

The project cost is estimated to be Rs 8927.72 million and will be completed in a period of three years.

Environmental Baseline Conditions

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

Physical Environment

Topography: Lahore city is situated at an average elevation of 210 meters above mean sea level. The alluvial subsoils are of late Pleistocene and were formed by the flood plains of river Ravi. These consist of clay, silt and sand. River Ravi flows on the Northern side of Lahore.

The project site is an old building bounded by Ravi Road to the West, Fort Road Walled City on the South, Badshahi Mosque on the East and River Ravi, Azadi Chowk & Minar-E-Pakistan on the North.

Surface Water: River Ravi is a surface water body in the North of Lahore.

Ground Water: Lahore is entirely dependent on Ground Water. Groundwater is rapidly depleting because of unprecedented groundwater abstraction in comparison to the natural recharge, which is decreasing both in quantity and quality with passage of time. The quality of shallow water has deteriorated over the years and therefore, the deep aquifer is under the threat of pollution from the top shallow groundwater. The ground water analyses have been conducted by sampling for laboratory testing and details are provided in this report.

Land Use: The land for project site is the old constructed hospital & hostel building constructed in 1930. A recent survey by the C&W department assessed the structural condition of the old buildings, revealing concerns about safety in the indoor block, old nursing hostel, doctors' flats, and hostels. The "Demolition Plan" has been prepared and provided in report in hand.

Climate: Lahore features a five-season semi-arid climate closely bordering a humid subtropical climate, with five seasons: foggy winter (30 Nov – 15 Feb) with few western disturbances causing rain; pleasant spring (16 Feb – 15 March); summer (15 April – 30 June) with dust, rain storms and heat wave periods; rainy monsoon (1 July – 16 September); and dry autumn (16 September – 14 November). However, in some cases, it can be classified as being humid subtropical rather than semi-arid, since it has well defined seasons and an ample amount of rain. It occasionally has very prolonged and dense monsoons, typical of a humid subtropical climate.

Air Quality: Major anthropogenic source of air pollution in Lahore is vehicular emissions, industrial pollution and the burning of waste materials. The ambient air quality monitoring was carried out for 24h from October 07, 2023, 11:00 AM to October 08, 2023 10:00 AM, were observed at the project site.

The time-averaged (24h) concentrations of SO₂, NO_x, CO, PM 2.5 and PM₁₀ were found to be 50.72 µg/m³, 42.05 µg/m³, 3.0 µg/m³, 28.0 µg/m³ and 92.10 µg/m³ respectively. The ambient air quality for all the parameters monitored was within the PEQS limits.

Noise and Vibration: The noise level data for daytime was 63.34 dB(A) and 54.16 dB(A) at night time. Overall, the noise level lies within the PEQS values at the project site.

Ecological Environment

Flora

The project area is fully urbanized area. The terrain of the project site is an old building and lawn with mature trees. However, some old buildings i.e., indoor block, old nursing hostel, doctors' flats, and hostels are included in demolition plan and the new building will be constructed after demolition. The "Demolition Plan" has been prepared and provided in report in hand. There are (116) Nos. trees found at the site out of them (88) trees will be re-located while (28) trees will be retained according to the Master Plan of the project.

Fauna

Fauna and flora are an essential part of the environment and depend on each other in many ways, Lahore Zoo is the main preserver of Lahore's fauna. Although Lahore has expanded in area, alongside modern additions to the city are the ancient monuments, old gardens, graveyards, traditional bungalows with attached gardens, large expanses of lawn and old roadside trees. These green areas and old endemic trees of Lahore are home to many resident birds as well as providing to seasonal migrants. The grounds of different habitats such as Lahore Zoo and the Lawrence Gardens, Mayo and Jinnah Gardens, GOR, Jallo Park, Kinnaird College, Government College University, Aitchison College and many others are home to various bird species. Resident species include Indian grey hornbill, yellow-footed green pigeon, parakeets, bulbuls, doves, spotted owlet, Old World babblers, Old World flycatchers, mynas, woodpeckers, crows, black kites, ashy prinia, redstarts, warblers, red-wattled lapwing, kingfishers, and the Indian white-eye. Three types of migratory birds are regular visitors to Punjab's provincial metropolis. These are winter visitors, summer visitors and transit migrants.

Protected Areas/National Sanctuaries

In Punjab, there are several areas of land devoted to the preservation of biodiversity through the dedication of national parks game reserves and wildlife sanctuaries. There are no protected areas within the immediate vicinity of the proposed project site.

Socio-Economic and Cultural Environment

Lahore is the provincial capital of Punjab with area of 1,772 sq. Km, 12 million Population, 04 Tehsils, 44 Union Councils, 05 Municipal Committees, 85 health care spots in hospital profile and 73% literacy rate. The culture of Lahori People is a manifestation of the lifestyle, festivals, literature, music, language, politics, cuisine and socio-economic conditions of its people. It is characterized by the blending of South Asian, Middle Eastern, Central Asian and Western influences. Lahore's culture is unique. It is sometimes referred as the cultural capital or the heart of Pakistan, the city was a seat of the Mughal Empire and the Sikh Empire as well as the capital of Punjab in Mahmud Ghaznavi's 11th century empire and in the British Empire.

Public and Stakeholder Consultations

During the public and Stakeholder consultation, meetings were held with the Reconstruction of Lady Willingdon Hospital Project, Design & Technical team of Infrastructure Development Authority (IDAP), Medical Superintendent, Lady Willingdon Hospital Lahore and community living around the project site. Their point of concern and suggestions regarding the project was solicited.

The impact of project activities on the project site's physical, biological, and socio-economic environment was highlighted. Stakeholders concerns regarding various aspects, the existing environment, and impacts of the project were noted, and mitigation measures are proposed in the EIA report.

Much of the public consultation process has revolved around concerns for the mitigation of construction stage and operational stage impacts like air, water and noise pollution. The information obtained from the community was used to identify concerns and issues that have been subsequently mentioned and addressed in the EIA report.

The major impacts

Physical Environment

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

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

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

These emissions can deteriorate the ambient air quality in the immediate vicinity of the project site. Furthermore, construction activities such as excavation, land levelling and Batching Plant may also cause fugitive dust emissions.

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

The quality of water may deteriorate in the area. For example, during the deep excavation, the aquifer may be hit, and water quality will be depleted. In addition, because of the preparation of construction material on-site, leachate may be produced and percolated through the soil. It may then reach the water table and contaminate the water that the local people may consume.

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

Ecological Environment

Impacts: The project site demolition, preparation and construction activities may necessitate the removal of the natural vegetation and loss of plant cover. The terrain of the project site is flat and level ground.

The covered project area is an old constructed building small and inhibits no wildlife, while smoke, chemicals, dust particles, and noise generated by heavy machinery during the construction period are scary factors for biota. Rodents and insects would lose their abode due to tree cutting/replacement.

Socio-Economic Environment

Impacts: The project site is located in Walled City on Ravi road in densely populated area nearby the historical buildings Badshahi Mosque & Badshahi Qala (Lahore Fort), which may pose some safety hazards to the residents during the project's construction phase.

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

There are two sites of the archaeological or historically significant Badshahi Mosque & Badshahi Qala (Lahore Fort), nearby the project site. However, the project activities will remain limited to the boundary wall of Lady Willingdon hospital and will not directly affect the said buildings however, in case an artefact of such significance is found during the construction activities, the Archaeology Department, the Government of Punjab will be informed.

Recommendations for mitigation measures

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

The Contractor's Camp will be placed at a safe location so that the environmental and social impacts can be reduced in construction phase.

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

Water quality analysis will be carried out at the project site during the construction phase. The management of the Reconstruction of TMLW Hospital Project will maintain the area's existing plantation cover and aesthetic beauty. Endeavours will be made to enhance the environment through a plantation of trees.

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

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

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

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

The green sheet will be installed around the construction activities area to prevent the buildings from dust in the vicinity of Reconstruction of TMLW Hospital project site.

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

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

Environmental Management Plan

The Environmental Mitigation & Management Plan (EMMP) aims to minimize the potential environmental impacts due to the project. The EMP reflects the commitment of TMLW Project to safeguard the environment as well as the surrounding population.

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

Proposed Environmental Mitigation and Monitoring Cost

The total estimated Environmental Mitigation and Monitoring Cost is Rs. 14.366 million.

Conclusion and Recommendations

Based on the overall impact assessment, more specifically, the nature and magnitude of the residual environmental impacts identified during the present EIA, it is concluded that the establishment of Reconstruction of TMLW Hospital Project, Lahore Project likely to cause environmental impacts during its constructional and operational phase. However, these impacts can be mitigated, providing that the proposed project activities are carried out, as mentioned in the report, and the mitigation measures included in this report are completely and effectively implemented.

The project will positively contribute to providing quality healthcare facilities across Punjab.

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

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List of Abbreviations

AI:	Artificial Intelligence
COVID-19:	Corona Virus Infectious Disease 2019
EIA:	Environmental Impact Assessment
EMP:	Environmental Management Plan
EPA:	Environmental Protection Agency
HCWM:	Health Care Waste Management
GPD:	Gallons per Day
HSE:	Health, Safety and Environment
IDAP:	Infrastructure Development Authority Punjab
TMLW:	Teaching and Maternity Lady Willingdon
NCS:	National Conservation Strategy
NEQS:	National Environment Quality Standards
PEQS:	Punjab Environment Quality Standards
NOC:	No Objection Certificate
PLC:	Programmable Logic Controller
PEPA:	Pakistan Environmental Protection Act 1997
PEPC:	Pakistan Environmental Protection Council
PPE:	Personal Protective Equipment
ToR:	Terms of Reference
HWM:	Hospital Waste Management
BMW:	Bio-Medical Waste

List of Units

%:	Percent (age)
°C:	Degree centigrade
cm:	Centimeter
dB (A):	Decibel
ft ² :	Square foot
ft ³ :	Cubic foot
Km:	Kilo meter
Km/h:	Kilometer/hour
m:	Meter
m ² :	Square meter
m ³ :	Cubic meter
MT:	Metric Ton
Rft:	Running Feet

1 Introduction

1.1 Project Background and Overview

Pakistan is one of the developing countries suffering from high maternal and infant mortality rates. Besides other reasons, one of the major reasons causing this is the lack of access of women and children to advance healthcare services.

Lahore is the second largest city in Pakistan after Karachi and 26th largest in the world, with a population of over 11 million (2017). It is situated in the north-east of the country with River Ravi flowing north-west of the city. It is the capital of the province of Punjab, where it is the largest city. Lahore reached the height of its splendor under the Mughal Empire between the late 16th and early 18th century and served as its capital city for many years. Lahore's modern cityscape consists of the historic Walled City of Lahore in the northern part of the city, which contains several World Heritage Sites and national heritage sites.

Lahore is a high profile city in healthcare facilities with twenty-eight Teaching and Specialized public hospitals, Military hospital, Railway hospital, Semi Govt. and a number of private hospitals. These hospitals are providing high quality medical services at cheaper rate to the people of Pakistan. Lahore is found to be the highest recipient of migrants in Punjab. This rapid increase of population has led to increased demand for the healthcare facilities. Existing government hospitals are insufficient to cater for this population.

The Government of Punjab is making strenuous efforts for a better and effective health care system. The major challenge for Specialized healthcare & Medical education department is to boost the confidence of the public in the healthcare system. The reality is that most of the institutions at tertiary level are not able to provide healthcare services up to the desired level, owing to multiple factors including large patient influx, scarcity of resources, human resource deficiency and non-functional equipment.

The Government of the Punjab is firmly committed to enhancing health care services at the doorstep of the community through an integrated approach.

Lady Willingdon Hospital, situated in Lahore, Punjab, Pakistan, stands as a prominent teaching hospital affiliated with King Edward Medical College. Established in 1930 as the Teka Devi Health Centre, this institution has evolved into one of Pakistan's largest maternity hospitals. Its inception was inspired by the travels of final year M.B.B.S. students to Madras (Chennai) in 1925, prompting the establishment of a maternity hospital. Commencing with a modest 56 beds in October 1930, the hospital's official inauguration took place on March 11, 1933, under the auspices of Her Excellency the Countess of Willingdon, the First Lady of the 22nd Viceroy of India.

Since 1933, it has served as a renowned teaching facility, attracting aspiring doctors for undergraduate, postgraduate, and post-fellowship training. Its training programs are duly recognized by HEC, PMDC, CPSP, and RCOG (UK). Lt. Col. S. N. Hayes, who laid the foundation stone in 1933, became the inaugural Medical Superintendent, having also been a former Principal of King Edward Medical College. Affiliation with the college occurred the same year, further cementing its role in medical education and care.

The Lady Willingdon Hospital has seen multiple expansions and changes in its design over time. Currently, it functions as a teaching maternity hospital with around 250 beds. A recent survey by the C&W department assessed the structural condition of the old buildings, revealing concerns about safety in the indoor block, old nursing hostel, doctors' flats, and hostels.

Given this assessment, constructing a new maternity hospital on the premises is imperative. This involves demolishing unsafe hostel structures to ensure continued safe and effective healthcare, aligning with the hospital's mission for maternal health.

Moreover, Lahore's rapid population growth has led to a significant gap in healthcare facilities. The city's population-to-hospital bed ratio is below recommended levels, and the emergency area needs improvement. With Lahore's expanding urban area and a population of 11.7 million, the current bed capacity in public hospitals falls short. A new maternity hospital is thus vital to provide accessible and advanced maternity services.

This visionary project will not only raise healthcare standards for women and infants but also establish the hospital as a center of excellence, fostering progress in research, healthcare delivery, and community well-being.

1.2 Brief description of nature, size and location of the project

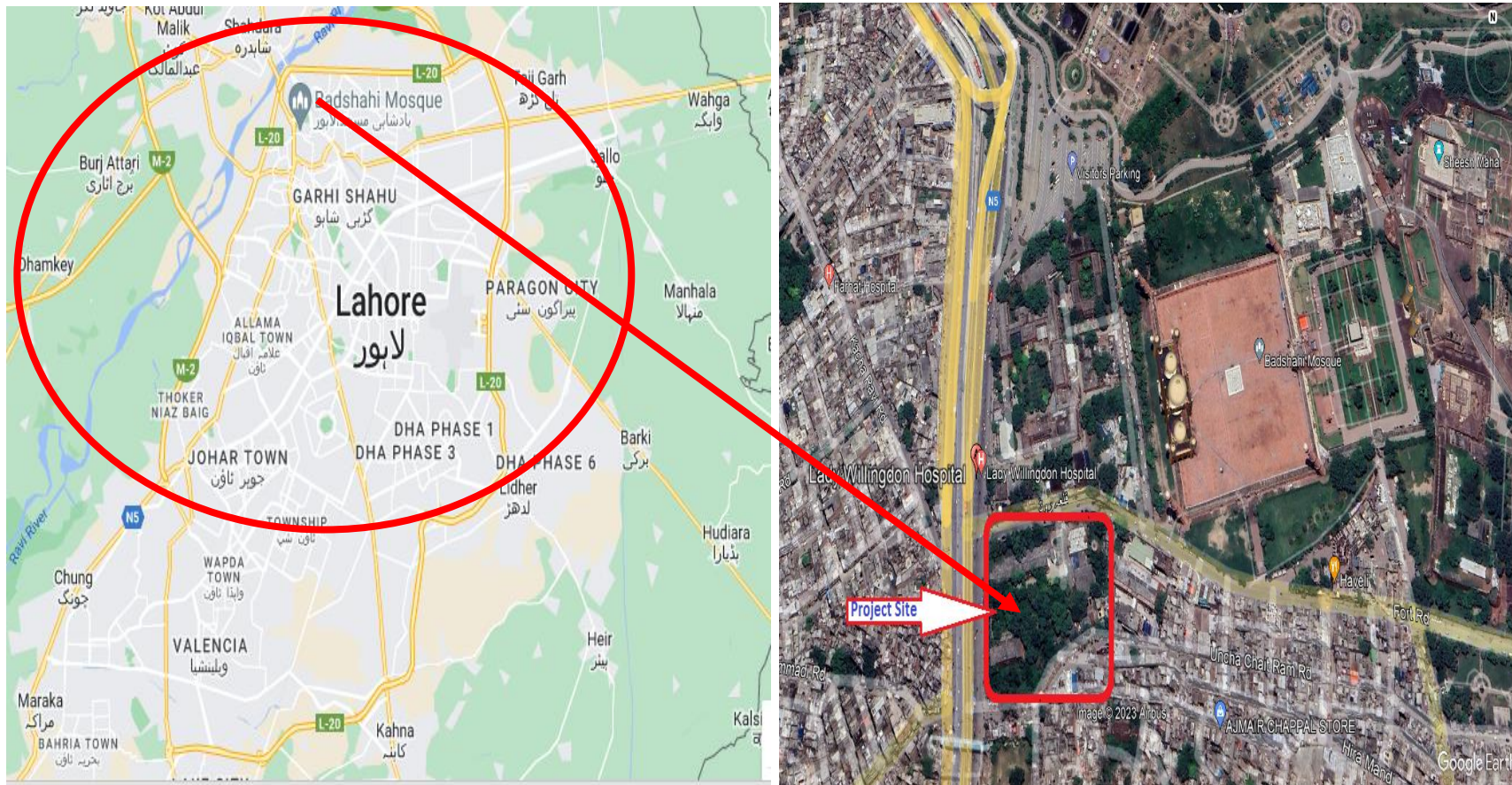
Nature: The project is the re construction of Lady Willingdon Hospital Lahore, Lahore.

Size: The Lady Willingdon Hospital Lahore Project has been proposed at Government owned land. The total covered area of the hospital including ground floor covered area 50,695 sft, basement 54,948 sft first floor covered area 49,745 sq. ft., second floor covered area 45,499 sft, third floor covered area 46,813 sft and roof plan covered area 2,300 sft is 250,000 sft.

Location: The Reconstruction of Lady Willingdon Hospital Lahore Site is located at Ravi road on facing and Fort Road on left side, Walled City, Lahore, Punjab, Pakistan. The coordinates of the proposed project are 31°34'59.99" N 74°17'60.00" E.

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

Figure 1.1: Key Location Map of Reconstruction of TMLW Hospital, Lahore



1.3 Identification of project and proponent

Specialized Healthcare & Medical Education Department, Government of The Punjab is the proponent of the project.

Lahore delivers quality healthcare services to the community through an efficient and effective service delivery system that is accessible, equitable, culturally acceptable, affordable, and sustainable. Lahore Punjab aims to improve the health and quality of life of all, through access to essential health services.

1.4 Details of consultant

M/s Infrastructure Development Authority Punjab (IDAP) is an autonomous body established under the Infrastructure Development Authority of the Punjab Act 2016 for planning, designing, construction and maintenance of public sector infrastructure in the province, has prepared Environmental Impact Assessment (EIA) of "Reconstruction of TMLW Hospital Lahore. Details attached as **Annexure-1**.

Contact Persons

The Proponent and Environmental Consultant are the following:

Proponent	Environmental Consultant
Dr. Saeed Ahmad Khan Medical Superintendent TMLW Hospital, Lahore. Phone: +92-423759001-4 Email: ms.lwh.lhr@punjab.gov.pk	Engr. Muhammad Umer Umair MSc. Chemical Engineering H # 19, Street # A Block "X" Cycle Stop Near Punjab Hospital, New Multan Colony, Multan Cell: 0333-6055094 Email: umerumair21@gmail.com

1.5 Environmental Impact Assessment

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

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

1.6 Purpose of Report

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

The EIA is the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of a development project prior to major decisions being taken and commitments made. Furthermore, the report will enable the proponent to obtain environmental approval for the establishment of the 60 Bedded Spoke Hospital Sheikh Zayed Hospital project from the Punjab Environmental Protection Department, Government of Punjab.

1.7 Screening

The project is to establish Reconstruction of Lady Willingdon Hospital Lahore.

EIA is mandatory according to section 12 of the Punjab Environmental Protection (Amended) 2012. According to Punjab Environmental Protection (Review of Initial Environmental Examination and Environmental Impact Assessment) Regulations, 2022, the proposed projects fall under Category H - 3 (Hospital beds more than 50 beds) of Schedule II.

1.8 Scoping

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

Spatial and Temporal Boundaries of Environmental Assessment: The project site is located along the Fort road (Walled City) at Lahore. The project site is located at Govt. owned land is an old building and no new land acquisition is involved. The project site occupies a total plot area of 45 Kanals (250,000 sq. ft.). According to the Master Plan, the total covered area is 250,000 sq. ft. consisted on basement plan, ground floor plan, first floor plan, second floor plan and mumty floor plan. The reconstruction will be executed after demolition of indoor block, old nursing hostel, doctors' flats, and hostels. The Reconstruction of Lady Willingdon Hospital Lahore project will be completed in 25 months and the impacts of the construction phase will be short term. Similarly, the magnitude of impacts will moderate in nature due to the limited covered area of the project.

The spatial and temporal boundary during the operational phase of the project will be same and long term as it was before the project execution.

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

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

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

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

- Traffic Management Plan and car parking arrangements for the Hospital
- Wastewater Treatment Plant
- Concerns of the residents (Project Affected Persons, if any)

1.9 Scope of EIA

The project requires the Environmental Impact Assessment to identify the environmental impacts of construction and operational phases of the proposed project of Reconstruction of Lady Willingdon Hospital Lahore Punjab. The scope of EIA of Reconstruction of Lady Willingdon Hospital Lahore Punjab is as follows:

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

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

1.10 Approach and Methodology

1.10.1 Approach for EIA

The approach for conducting Environmental Impact Assessment of Reconstruction of Lady Willingdon Hospital Lahore Project is to follow the requirement of Punjab Environmental Protection Act 1997 (amended 2012) and Pakistan Environmental Protection Agency (Review of IEE/EIA) Regulations, 600.

1.10.2 Kick-off Meeting with the Proponent

The kick-off meeting was held between the IDAP team and proponent of Reconstruction of Lady Willingdon Hospital Lahore Project.

During this meeting, the list of activities for the study relevant to the environmental impact assessment of the project was discussed.

1.10.3 Collection of Secondary Data

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

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

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

1.10.4 Collection of Primary Data and Field Visit

The project site and adjoining areas of Reconstruction of Lady Willingdon Hospital Project, were visited to obtain detailed knowledge of the area's environmental conditions. During the field visits, the existing environmental conditions were studied.

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

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

1.10.5 Consideration of Alternatives

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

1.10.6 Public Consultation

Public consultations were held with the visitors and doctors and of community living in the vicinity of Reconstruction of Lady Willingdon Hospital Lahore Project. Different aspects of the proposed project were highlighted to the community regarding their impacts on the project area's physical, biological, and socio-economic environment and their concerns and suggestions were solicited.

Meetings were held with the Proponent, District Health Authority Lahore, Design team of the project, Technical & Mechanical team of the project Doctors working in TMLW hospital, and community living around the project site. Their point of concern and suggestions regarding the project was solicited.

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

1.10.7 Review of Legislative Requirements

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

1.10.8 Identification and Evaluation of Impacts

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

The potential impacts were identified with methodical consideration of likely or possible significant impacts on the environment for the Reconstruction of TMLW Hospital Lahore. The aim of this task was to assess the associated risks with these impacts.

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

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

evaluation of the significant impacts has formed the basis for the development of the Environmental Management Plan.

1.10.9 Identification of Mitigation Measures

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

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

1.10.10 Development of Environmental Management Plan (EMP)

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

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

1.11 Organization of the EIA Report

This report has been structured in the following manner:

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

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

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

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

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

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

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

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

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

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

Table 1.1: Summary of Methodologies and Activities to Conduct EIA

Project screening	• Determine the Legal requirements of EIA is necessary
Scoping	• Decide the potential main issues to be addressed
Baseline Data Collection	• Collecting relevant data on the state of environment
Impact Prediction	• Forecasting the likely changes in the environment as a result of the development
Impact Assessment	• Evaluation of the significance of the identified impacts
Mitigation	• Measures taken to reduce or remedy adverse impacts, or enhance positive impacts
Environmental Management and Monitoring Plan	• Environmental Management and Monitoring Plan (EMMP) develops for effective implementation of the recommended mitigation measures and to monitor the environmental parameters against likely environmental impacts
EIA Report Submission to EPA for approval	• EPA reviews all the nitty gritty of the report to make sure the compliance with environmental guidelines.
Correspondance with EIA for Final Approval	• EPA reviews the Draft report submitted and communicate comments to address discrepancies, if any.
Public Hearing	• For the purpose of dissemination of information of the Project with stakeholders, a public hearing is held with its 30 days prior advertisement in local/national news papers.
Project Approval/Rejection by EPA	• EPA issues Environmental Approval for the Project development after client/consultant addresses the comments from EPA on Draft report and Public Hearing.

2 Legislative Institutional Framework

2.1 Introduction

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

The compliance status of the Reconstruction of Lady Willingdon Hospital Lahore Project was reviewed with reference to the legislation and existing legal framework on the environment at Pakistan and the International level as described henceforth.

2.2 National Environmental Policy 2005

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

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

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

2.3 Laws and Regulations

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

2.3.1 Punjab Environmental Protection Act, 1997 (Amended 2012)

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

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

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

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

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

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

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

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

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

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

- Categories of projects requiring IEE and EIA are issued through two schedules attached to the Regulations.
- A fee, depending on the cost of the project, has been imposed for review of EIA and IEE.

- The submittal is to be accompanied by an application in prescribed format included as schedule V of the Regulations.
- The EPA Punjab is bound to conduct preliminary scrutiny and reply within 10 days of submittal of the report a) confirming completeness, b) asking for additional information, or c) requiring additional studies.
- The EPA Punjab is required to make every effort to complete the review process for IEE within 30 days and of the EIA within 45 days of the issue of the confirmation of completeness.
- EPA Punjab accords their approval subject to following conditions:
 - Before commencing construction of the project, the proponent is required to submit an undertaking accepting the conditions.
 - Before commencing operation of the project, the proponent is required to obtain from EPA Punjab a written confirmation of compliance with approval conditions and requirements of the IEE/ EIA.
- An EMP is required to be submitted with the request for obtaining confirmation of compliance.
- The EPA Punjab are required to issue a confirmation of compliance within 15 days of receipt of the request and complete documentation.
- The IEE/EIA approval will be valid for three years from the date of the accord.
- A monitoring report is required to be submitted to the EPA Punjab after completion of construction, followed by annual monitoring reports during operations.

2.3.3 Hazardous Substance Rules, 2005

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

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

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

2.4 Hospital waste management rules, 2005

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

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

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

2.5 Punjab Hospital Waste Management Rules 2014

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

A summary of the key features of these rules are.

- The hospital superintendent shall form a waste management team comprising different professionals of the hospital
- The responsibilities of the waste management team shall be defined
- Every hospital's waste management team should hold a review at least once a month
- Hospital engineer shall be appointed, and responsibilities should be defined regard hospital waste management
- The waste management officer shall make the waste management plan for approval by the waste management team
- Proper procedures shall be followed to collect, store, transport and dispose of the hospital waste
- The rules also discuss the accidents and spillage and waste minimization and reuse strategies

2.6 Punjab Environmental Quality Standards (PEQS)

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

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

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

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

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

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

- The combustion efficiency, computed should be at least 99.0 %
- The minimum temperature of the primary chamber shall be 800°C.
- The gas residence time in the secondary chamber shall be at least 1 second at the temperature of around 160°C with at least 3% oxygen in the stack emission.

Table 2.1: Emission Standards

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

2.6.2 PEQS for Liquid Effluent

The Punjab Environmental Quality Standards (PEQS) for the discharge of effluent from industry are presented in Table 2.3.

Table 2.2: PEQS for Liquid Effluent Discharge

Parameters	Into Inland Waters	Into Sewage Treatment
Temperature	≤3°C	≤3°C
pH Value	6-9	6-9
Biological Oxygen Demand (BOD) ₅ at 20°C	80	250
Chemical Oxygen Demand (COC)	150	400

Parameters	Into Inland Waters	Into Sewage Treatment
Total Suspended Solids (TSS)	60	400
Total Dissolved Solids (TDS)	3500	3500
Grease & Oil	10	10
Phenolic Compounds (as phenol)	0.1	0.3
Chlorides (as Cl')	1000	1000
Fluoride (as F')	10	10
Cyanide (CN') total	1.0	1.0
An-ionic Detergents (as MBAs)	2.0	20
Sulphate (SO'')	600	1000
Sulphide (S ²⁻)	1.0	1.0
Ammonia (NH ³)	40	40
Pesticides	0.15	0.15
Cadmium (Cd)	0.1	0.1
Chromium (trivalent & hexavalent)	1.0	1.0
Copper (Cu)	1.0	1.0
Lead (Ni)	0.5	0.5
Mercury (Hg)	0.01	0.01
Selenium (Se)	0.5	0.5
Nickel (Ni)	1.0	1.0
Silver (Ag)	1.0	1.0
Total Toxic Metals	2.0	2.0
Zinc (Zn)	5.0	5.0
Arsenic (As)	1.0	1.0
Barium (Ba)	1.5	1.5
Iron (Fe)	8.0	8.0
Manganese (Mn)	1.5	1.5
Boron (B)	6.0	6.0
Chlorine (Cl ₂)	1.0	1.0

Source: PEQS, Punjab Environmental Protection Department

2.6.3 PEQS for Gaseous Emission

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

Table 2.3: PEQS for Gaseous Emission

Parameter	Source of Emission	Standard
Smoke	Smoke opacity not to exceed	40% or 2 Ringlemann Scale or equivalent smoke number
Particulate Matter	Boilers & Furnaces:	
	Oil Fired	300
	Coal-Fired	500
	Cement Kilns	300
	Grinding, crushing, clinker coolers and related processes, metallurgical processes, converters, blast furnaces and cupolas	500
Hydrogen Chloride	Any	400
Chlorine	Any	150
Hydrogen Fluoride	Any	150
Hydrogen Sulphide	Any	10
Sulphur Oxides	Sulfuric Acid/sulphonic Acid Plants	5000
	Other Plants except power plants operating on oil and coal	1700
Carbon Monoxide	Any	800
Lead	Any	50
Mercury	Any	10
Cadmium	Any	20
Arsenic	Any	20
Copper	Any	50
Antimony	Any	20
Zinc	Any	60
Oxides of Nitrogen	Nitric Acid Manufacturing Unit	3000
	Other plants except for power plants operation on oil or coal:	
	Gas-fired	400
	Oil fired	600
	Coal-fired	160

Source: PEQS, Punjab Environmental Protection Department

2.6.4 PEQS for Vehicular Emission

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

Table 2.4: PEQS for Vehicular Emission

Parameters	Standards (Maximum permissible limits)	Measuring Method
Smoke	40% or 2 on the Ringelmann Scale During acceleration mode	To be compared with engine Ringelmann chart at a distance of 6 meters or more

Parameters	Standards (Maximum permissible limits)	Measuring Method
Carbon Monoxide	6%	Under idling conditions: non-dispersive infrared detection through the gas analyzer.
Noise	85 dB (A)	A sound meter at 7.5 meters from the source

Source: PEQS, Punjab Environmental Protection Agency

2.6.5 PEQS for Drinking Water, 2010

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

Table 2.5: PEQS for Drinking Water Quality

Parameter	Standard values	WHO guidelines
Biological		
All water intended for drinking (E. Coli or Thermo-tolerant Coliform bacteria)	Must not be detectable in any 100 ml sample.	Must not be detectable in any 100 ml sample.
Treated water entering the distribution system (E. Coli or Thermo-tolerant Coliform and Total Coliform bacteria)	Must not be detectable in any 100 ml sample.	Must not be detectable in any 100 ml sample.
Treated water in the distribution system (E. Coli or Thermo-tolerant Coliform and Total Coliform bacteria)	Must not be detectable in any 100 ml sample. In the case of large supplies, where sufficient samples are examined, it must not be present in 95% of the samples taken throughout any 12-month period.	Must not be detectable in any 100 ml sample. In the case of large supplies, where sufficient samples are examined, it must not be present in 95% of the samples taken throughout any 12-month period.
Physical		
Color	≤ 15 TCU	≤ 15 TCU
Taste	Non-acceptable	Non-acceptable
Odour	Non-acceptable	Non-acceptable
Turbidity	< 5 NTU	< 5 NTU
Total hardness	< 500 mg/L	---
TDS	<1000	<1000
pH	6.5- 8.5	6.5- 8.5
Chemical		
Essential Organic	mg/Litre	mg/Litre
Aluminium	≤ 0.2	0.2
Antimony	≤ 0.005	0.02
Arsenic	≤ 0.05	0.01
Barium	0.7	0.7

Parameter	Standard values	WHO guidelines
Boron	0.3	0.3
Cadmium	0.01	0.003
Chloride	≤ 250	250
Chromium	≤ 0.05	0.05
Copper	2	2
Toxic Inorganic		mg/Litre
Cyanide	≤ 0.05	0.07
Flouride	≤ 1.5	1.5
Lead	≤ 0.05	0.01
Mangnese	≤ 0.5	0.5
Mercury	≤ 0.001	0.001
Nickel	≤ 0.02	0.02
Nitrate	≤ 50	50
Nitrite	≤ 3	3
Zinc	5	3
Pesticides mg/L		PSQCA No.4639-604. page No 4 Table No. 3serial No. 20-58
Phenolic Compounds		<0.002
Polynuclear aromatic hydrocarbons		0.01
Radioactive		
Alpha emitters bq/L	0.1	0.1
Beta emitters	1	1

Source: PEQS, Punjab Environmental Protection Department

2.6.6 PEQS for Ambient Air and Noise

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

Table 2.6: PEQS for Ambient Air

Pollutants	Time Weighted Average	Concentration in Ambient Air (ug/m ³)
Sulfur Dioxide (SO ₂)	Annual Average* 24 hrs**	80 120
Oxides of Nitrogen as (NO)	Annual Average* 24 hrs**	40 40
Oxides of Nitrogen as (NO ₂)	Annual Average* 24 hrs**	40 80
Ozone (O ₃)	1 hour	130
Suspended Particulate Matter (SPM)	Annual Average* 24 hrs**	360 500

Pollutants	Time Weighted Average	Concentration in Ambient Air (ug/m ³)
Respirable Particulate Matter (PM ₁₀)	Annual Average*	120
	24 hrs**	150
Respirable Particulate Matter (PM _{2.5})	Annual Average*	15
	24 hrs**	35
	1 hr	15
Lead (Pb)	Annual Average*	1
	24 hrs**	1.5
Carbon monoxide (CO)	8 hrs	5 mg/m ³
	1 hr	10 mg/m ³

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

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

Source: PEQS, Punjab Environmental Protection Agency

Table 2.7: PEQS for Noise

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

Source: PEQS, Punjab Environmental Protection Department

2.7 Institutional Set-Up

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

The EPAs have been empowered to receive and review the environmental assessment reports (IEEs and EIAs) of the proposed projects and provide their approval (or otherwise).

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

2.8 Environmental Protection Agency's Environmental Guidelines

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

2.9 The Implication of Legislations to the project

The implication of the above-mentioned legislation to the pre-construction, construction, and operational phase of Reconstruction of Lady Willingdon Hospital Lahore Project would be as follows:

- Primary and Secondary Healthcare Department (P&SHD), being the proponent of the project, will ensure that construction and operational phases of the project be carried out in accordance with the EIA report and Environmental Management Plan is effectively implemented.
- The project will be subjected to four basic provisions relating to pollution control under the Punjab Environmental Protection Act, 1997 (Amended 2012), as contained in section 11, 13, 14 and 15 as follows:
 - Section 11 prohibits discharge or emission of any effluent or waste or air pollutant or noise in excess of the PEQS or the established ambient standards for air, water or land.
 - Section 13 prohibits hazardous wastes.
 - Section 14 prohibits the handling of hazardous substances except under a license or in accordance with the provision of any local law or international agreement.
 - Section 15 prohibits the operation of motor vehicles for each air pollutant or noise is being emitted in excess of the PEQS or the established ambient standard.
- Reconstruction of Lady Willingdon Hospital Lahore Project will follow the Punjab Hospital Waste Management Rules, 2014

3 Description of the Project

3.1 Introduction

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

3.2 Type and Category of the Project

The proposed project is the Establishment of Reconstruction of TMLW Hospital Lahore, which falls under Schedule II of Pakistan Environmental Protection Agency (Review of IEE and EIA) Regulation under the category of Urban development.

3.3 Objectives of Project

The Project Objectives are as follows:

The project has been initiated by the commitment of the government of Punjab to provide infrastructure for the speedy provision of general healthcare facilities.

- The project will help reduce and manage an enormous load of patient influx on the existing facilities.
- To make available medical procedures and examination at subsidized costs to the low socio-economic population.
- To achieve optimum health indicators by providing outpatient services by specialists and consultants to the citizens.
- This project will assist the Government of the Punjab in achieving the goal of providing health facilities in accordance with the declared policy of Government of Punjab.
- To ensure excellence in operative and post-operative patient care by providing infection free, safe, and aesthetically pleasing environment.
- The project will accommodate the existing facility's patient load by adding state-of-the-art facilities for the public.
- The Hospital may better cater for patient load through efficient use of space & equipment while meeting medical standards of hygiene & technology.
- The project will encourage medical and healthcare human resources advancements by promoting medical research, training, and education.

3.4 Location and Site Layout of the Project

The Lady Willingdon Hospital Lahore is located at Ravi road on the West and Fort Road on facing, Texali Gate road on the South and Punjab Dental Hospital adjacent to the East.

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

The project site is an old hospital building in two parts one is laid out on the North side of Fort road (Topographic map by Google) while the other one is laid out on the South of Fort road. The project influence is involved only on the southern part of the Lady Willingdon hospital.

- **East:** Punjab Dental Hospital
- **West:** Ravi Road

- **North:** Fort Road (facing of project site)
- **South:** Texali Gate Road

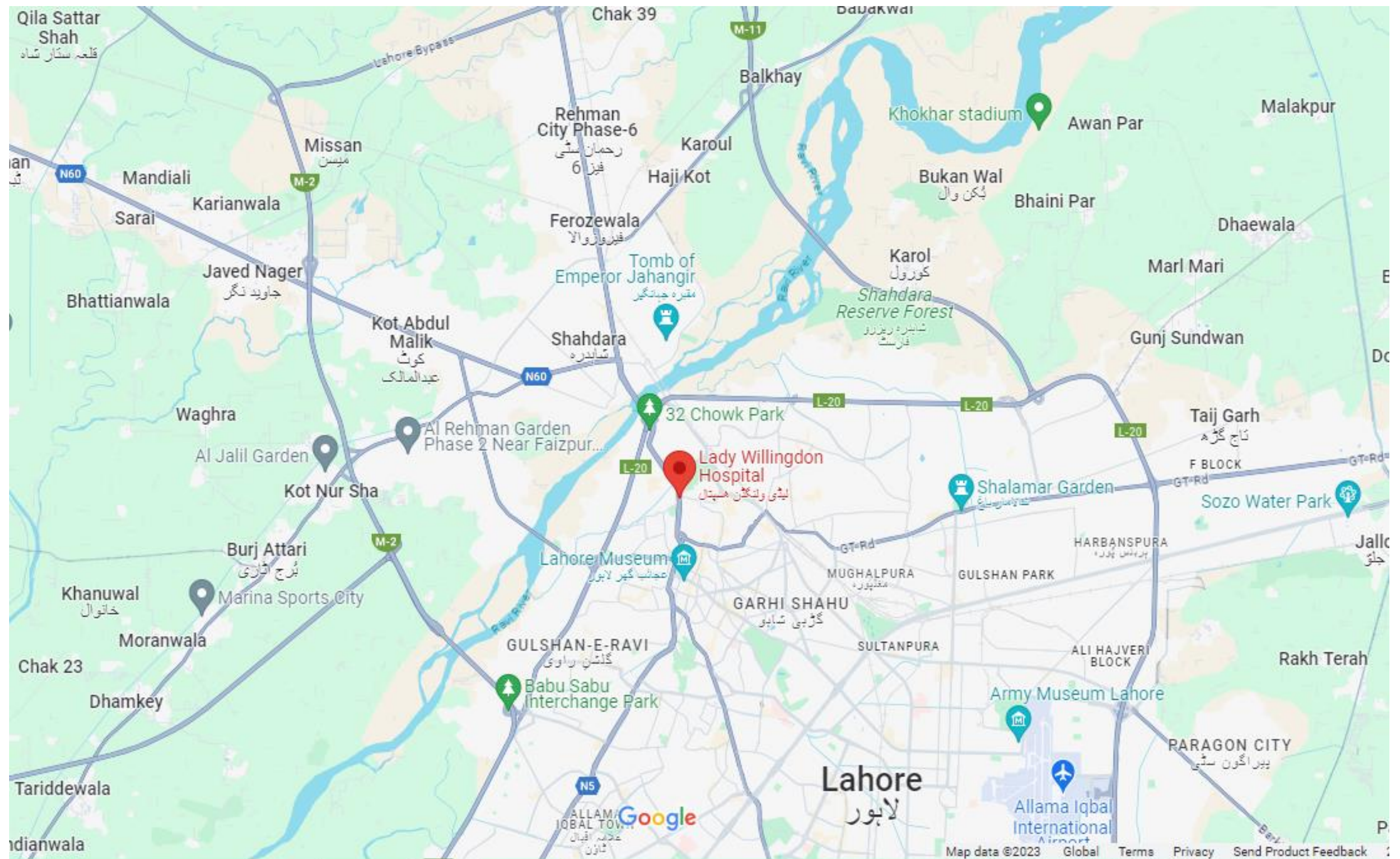
Road access

The Reconstruction of Lady Willingdon Hospital Lahore project site is accessible through Ravi road, Fort road and Texali Gate road. The accessibility of the project is shown in **Figure 3.2**.

Figure 3.1 : Location of Reconstruction of Lady Willingdon Hospital Lahore Project Site



Figure 3.2 : Accessibility Map of Reconstruction of Lady Willingdon Hospital Lahore Project Site



3.5 Description of the Project

The Reconstruction of Lady Willingdon Hospital Lahore will comprise a bed strength of 230 beds with a total covered area of 250,000 sq. ft. The Project has been proposed at Government owned land which is an old building and the new construction will be executed after demolition. The total covered area of the hospital including ground floor covered area 50,695 sft, basement 54,948 sft, first floor covered area 49,745 sq. ft., second floor covered area 45,499 sft, third floor covered area 46,813 sft and roof plan covered area 2,300 sft is 250,000 sft.

The project has been initiated by the commitment of the government of Punjab to provide infrastructure for the speedy provision of general healthcare facilities. The project will help reduce and manage an enormous load of patient influx on the existing facilities. The project will accommodate the existing facility's patient load by adding state-of-the-art facilities for the public. The Hospital may better cater for patient load through efficient use of space & equipment while meeting medical standards of hygiene & technology. The project will encourage medical and healthcare human resources advancements by promoting medical research, training, and education.

3.6 TECHNICAL PARAMETERS

The technical parameters of design will cater to construction of a Ground plus three floors building including one basement with a total area of 250,000 SF and a bed count of 230 at the location existing OPD and hostel buildings (after demolition). Floor-wise area breakup and floor-wise program breakup & bed count is provided in tables below.

Table 3.1: Blocks and No. of Beds TMLW Hospital, LAHORE

LEVELS	PROGRAM	NO. OF BEDS
Ground Floor	Emergency With 2 Minor OT, O.P.D, Radiology and Pharmacy	30
Basement Floor	CSSD / Laundry, Workshops, Store and Cars Parking	00
First Floor	Radiology, Labs, Surgical Department (06 OTs), ICU, HDU and Inpatient Wards	30
Second Floor	Kitchen With Café, Inpatient Wards, and Doctor Offices	90
Third Floor	Private Rooms, Inpatient Wards and Administration	80
Roof Plan	Machine Room and allied Services	00
	Total no. of Beds	230

The hospital will have a total bed strength of 230 beds including emergency with 02 minor Operation Theaters (OT, O.P.D), radiology and pharmacy 30 beds on Ground floor, radiology, labs, surgical department (06 OTs), ICU, HDU and inpatient wards 30

beds on First floor, Inpatient wards 90 beds on Second floor and Private rooms & Inpatient wards 80 beds on Third floor.

Hospital Building (Cup Building)

The cup building will be comprised on three floors and one basement. Emergency Ward (Triage, OT & Resuscitation Bay), Labor Room, Surgical ICU, Surgical Ward Guinea Ward, Medical Ward and OPD are the main features of Master Plan.

Miscellaneous Utility

- Guard Room (02 No. s)
- Wastewater Treatment Plant
- Yellow Room
- Filtration Plant
- Gas Station
- WAPDA Metering Room
- Pump Station
- Oxygen Tank
- Tube Well
- Substation
- Car Parking
- Bike Parking
- Green Lawn

Support services

Support services like radiology, SSD, pharmacy, laboratory, machine room and laundry are also included in the plan to ensure prompt delivery of respective services round the clock without interruption.

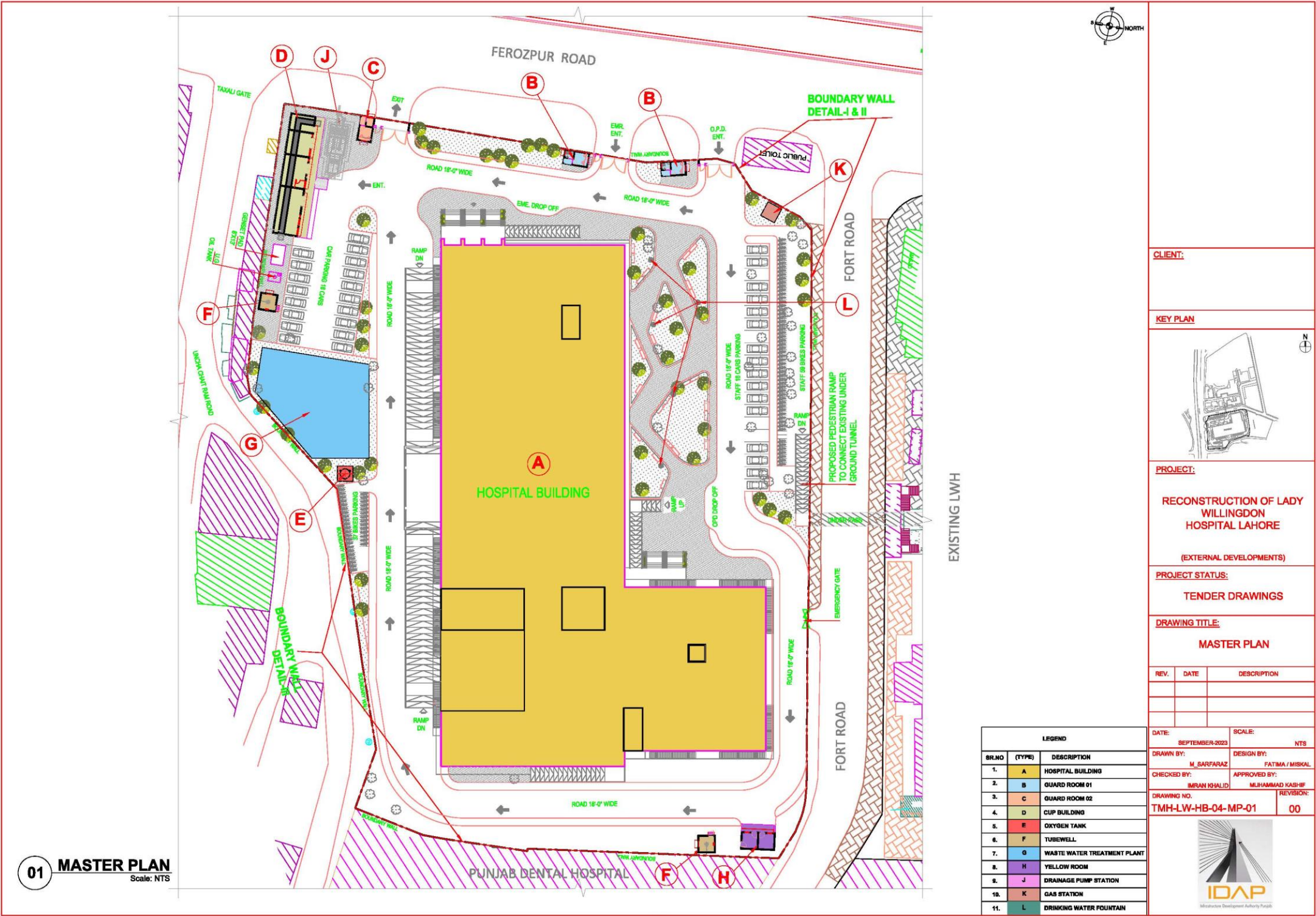
Allied Facilities

The hospital will include the following facilities to provide necessary services:

Central Sterile Services Department (CSSD) / Laundry, Workshops, Store and Cars Parking, Kitchen with café, Doctors' offices, Guard room (02 No.s), Oxygen Tank, Tube Well, Wastewater Treatment Plant, Yellow Room, Drainage Pump Station Gas Station and Drinking Water fountain.

The Layout Plan of the proposed Reconstruction of TMLW Project Lahore is shown in **Figure 3.3**

Figure 3.3: Masterplan of Reconstruction of Lady Willingdon Hospital Lahore Project



3.7 Land use on the site

The Reconstruction of Lady Willingdon Hospital Lahore will comprise a bed strength of 230 beds with a total covered area 250,000 sq. ft. approximately for hospital building & allied facilities. The project comprises the following objects:

3.8 Cost and Magnitude of Project

The project shall be funded by Government of the Punjab, Specialized Healthcare & Medical Education Department. The project executing agency Infrastructure Development Authority Punjab (IDAP) will be responsible for construction phase which will be comprised on 25 months approximately. The Specialized Healthcare & Medical Education Department will be responsible for implementing phase.

This visionary project will not only raise healthcare standards for women and infants but also establish the hospital as a center of excellence, fostering progress in research, healthcare delivery, and community well-being. The project cost is estimated to be Rs. 8,927.72 million.

Table 3.2. Project Cost Estimates

S. No	Description	Cost (Millions)
A	Capital Component	7,638.47
B	Revenue Component	1,289.25
	Total PC-I Cost A+B	8,927.72

3.9 Land Acquisition

As the project is proposed on government-owned land, there is no issue of land acquisition or resettlement of the community due to the project.

3.10 Vegetation Features of the Site

The project site has two types of features (a) old constructed building (b) lawns with 116 total number of trees 88 out of them will be Re-located while rest of 28 will be retained.

3.11 Current Land Use of the Project Site

The project site is an old constructed building and lawns with 116 trees.

3.12 Status of the Project

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

3.13 Government Approvals

Presently, the only approval required is from Environmental Protection Agency, Government of Punjab, to start construction of the Reconstruction of Lady Willingdon Hospital Lahore. The approvals required from the concerned departments e. g. WASA,

WAPDA and Sui Northern Gas Pipelines Limited (SNGPL) will be obtained on the behalf of proponent before/during commencement of the construction or when will be required.

Schedule of Implementation

The construction of the project will be completed in a period of 25 months approximately.

Table 3.3: Time Schedule for Reconstruction of Lady Willingdon Hospital Lahore Project.

Activity/Month	2	4	6	8	10	12	14	16	18	20	22	24	25
Construction works Commencement Date													
Mobilization of Contractor													
Sub/Super Structural Works													
Architectural Finishing and MEP Works													
Testing and Commissioning													
Snag list													
Handing/Taking over													

3.14 Occupancy of Reconstruction of TMLWH Project

The occupancy of the Reconstruction of Lady Willingdon Hospital Lahore Project., will be 230 beds.

Table 3.4. Occupancy of Reconstruction of TMLWH Project

No.	Description	
1.	Hospital Beds	230
2	Hospital Staff	80
	Total	310

3.14.1 Water Demand

The estimated domestic water demand of the Reconstruction of Lady Willingdon Hospital Lahore per day is 12,400 Gallons per day.

Table 3.5. Daily Water Requirements

No	Occupancy	Recommended Daily Water Requirement	Daily Water Consumption	Daily Water Requirement
	Number	Gal/Day/Person	Gal/day	Gal/day
1	310	40	GPD	GPD
Total Water Requirement				12,400 GPD

3.14.2 Water Drainage System

The drainage system of the Reconstruction of TMLW Hospital will relate to the drainage network of Lahore Municipal Corporation.

3.14.3 Waste Water Treatment Plant

Sewerage Treatment Plant will be constructed to manage the wastewater generated during the operational phase of the Reconstruction of TMLW Hospital. A wastewater treatment plant plan has been proposed at the Reconstruction of TMLW Hospital; having capacity of the wastewater treatment plant is 500m³ per day. The wastewater will be treated daily by using an aeration process.

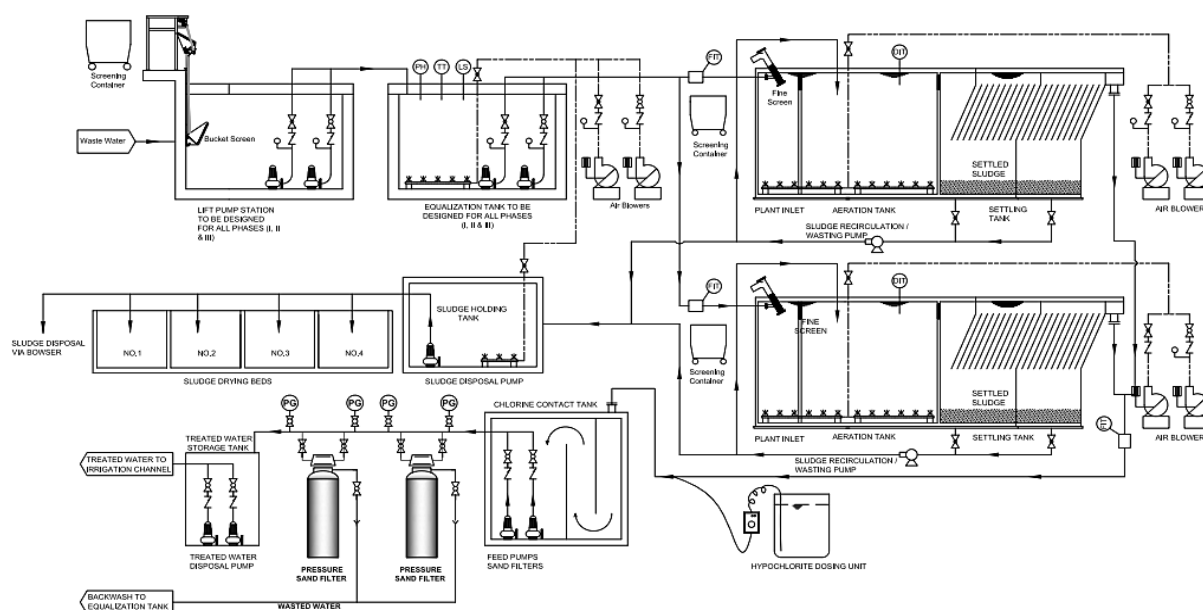
The various components of the sewage treatment plant are:

- Screen Chamber and Pump Pit
- Equalization Tank
- Aeration Tank 1
- Aeration Tank 2
- Secondary Clarifier 1
- Secondary Clarifier 2
- Disinfection Tank
- Sludge Holding Tank

- Chlorination and Sand Filter Room
- Treated Water tank
- Operator Room
- Air Blower Room
- Four sludge drying beds

The process flow diagram of a conventional Activated Sludge Process is shown in **Figure-3.4**.

Figure-3.4: Process Flow Diagram of Wastewater Treatment Plant



3.14.4 Solid Waste Management

According to an estimate, the project will produce approximately 155 kg of solid waste per day during the operational phase, with an average of 0.5 kg/day per person.

For the proper management of the infectious waste, a yellow room will be constructed. The temperature of the yellow room will be maintained at 4°C for not more than 24 hours.

The solid waste management of the Reconstruction of TMLW Project will comply with all the clauses of the Punjab Hospital Waste Management Rules, 2014.

3.15 Restoration and rehabilitation plans

The proposed project will be comprised of the following components to be considered in the design:

3.15.1 Traffic Plan and Transportation

A proper traffic management plan will be prepared after conducting traffic assessment study to ensure safety, which will be then implemented by Hospital Management. The traffic plan should include the following:

- The traffic at the main gate will be controlled with the help of security guards. Traffic cones will be placed to direct the traffic in the desired direction, and speed breakers will control the speed of traffic.
- The main roads will be one-way roads. To control the speed of traffic, road blockers will be placed at a distance of about 500 meters. At some places, speed breakers will be constructed.
- At least two security guards will be deputed to allow smooth flow of the traffic and to check traffic violators, i.e., over speeding, adopting the wrong route and not wearing a helmet etc.
- Signboards will be displayed at different locations on the roads to direct the traffic in their desired direction.

In order to ensure that the traffic plan is strictly adhered to by the community, the following measures will be undertaken:

- Route cards both in Urdu and English will be prepared and distributed with the information leaflets among residents, parents, drivers etc.
- Fast-moving Lanes will be marked by placing separators.
- To smoothly regulate traffic, one-way signboards will be placed during closing hours from 13:30 – 14:30 and 16:00 – 17:30 hours at all critical points such as schools, Masjids etc
- Availability of traffic sergeant will be coordinated with traffic police

3.15.2 Hospital Waste Management Plan (HWMP)

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

The HWMP shall include:

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

10. The WMP shall be regularly monitored, reviewed, and revised and updated by the Waste Management Team as and when necessary.

Table 3.6 shows Hospital Solid Waste Management and Disposal plan

Table 3.6: Hospital Solid Waste Management and Disposal plan

Component	Actions/recommendations
Waste Minimization, Reuse, and Recycling	Consider practices and procedures to minimize waste generation without sacrificing patient hygiene and safety considerations. Use of efficient stock management practices and monitoring e.g. • For chemical and pharmaceutical stocks, Small/frequent orders for products that spoil quickly and strict monitoring of expiry dates. • Complete use of the old product before new stock is used. • Maximization of safe equipment reuse practices, including Reuse of equipment following sterilization and disinfection (e.g., sharps containers).
Waste Segregation	Waste should be identified and segregated at the point of generation. • Non-hazardous waste, such as paper and cardboard, glass, aluminum and plastic, should be collected separately and recycled. Food waste should be segregated for composting. • Infectious and/or hazardous wastes should be identified and segregated according to their category using a colour-coded system. • Other segregation considerations include the following: Avoid mixing general health care waste with hazardous health care waste to reduce disposal costs; Segregate waste containing mercury for special disposal. Aerosol cans and other gas containers should be segregated to avoid disposal via incineration and related explosion hazard; Segregate health care products containing PVC to avoid disposal via incineration or MW Shredders and subsequent harmful air emissions.
On-site Handling, Collection, Transport and Storage	• Seal and replace waste bags and containers when they are approximately three-quarters full. Full bags and containers should be replaced immediately. • Identify/label waste bags/containers properly prior to removal. • Transport waste to storage areas on designated trolleys/carts, which should be cleaned/disinfected regularly; Waste storage areas should be located within the facility & sized to the quantities of waste generated, with the following design considerations: • Hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply. • Secured by locks with restricted access. • They are designed for access and regular cleaning by authorized cleaning staff and vehicles. • Protected from the sun and inaccessible to animals/rodents. • Equipped with appropriate lighting and ventilation. • Segregated from food supplies and preparation areas. • Equipped with supplies of protective clothing, and spare bags/containers • Store mercury separately in sealed and impermeable containers in a secure location. • Store cytotoxic waste separately from other waste in a secure location. • Store radioactive waste in containers to limit dispersion, and secure behind lead shields.
Transport to Outside facilities for treatment	If the proponent does not have an onsite waste treatment facility now, therefore, during operation, solid waste segregation, collection, and storage shall be the responsibility of the hospital, whereas waste transportation to treatment facility and treatment shall be the work of a contracted biomedical waste handler. Therefore, the proponent shall:

	• Appoint a waste handler who is licensed by NEMA and permitted by the local government to handle, transport and treat biomedical wastes at approved treatment sites using recommended treatment procedures given by the legal framework and respective government agencies. • The contractor shall transport waste destined for off-site treatment facilities according to the guidelines for transport of hazardous wastes / biomedical wastes in EPA HWM Rules 2014. • Packaging for infectious waste should include an inner, watertight layer of metal or plastic with a leak-proof seal. Outer packaging should be of adequate strength and capacity for the specific type and volume of waste. • Packaging containers for sharps should be puncture-proof. • Waste should be labelled appropriately, noting the substance class, packaging symbol (e.g., infectious waste, radioactive waste), waste category, mass/volume, place of origin within the hospital, and final destination. • Transport vehicles should be dedicated to waste and the vehicle compartments carrying waste sealed.
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3.16 Project Phases

The construction of the Project will be implemented in three phases, i.e., Pre-construction/ Design, Construction, and Operation.

3.16.1 Pre-construction/Design Phase

Suitability of a site: The geotechnical and soil investigation of the project site will be carried out for determining the suitability of a site to support the structures and other development works.

Geotechnical/Soil Investigation: An extensive soil investigation of the project site will be carried out. The topographical survey will be undertaken by the surveying consultant to demarcate the area and measure the ground elevation.

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

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

3.16.2 Construction Phase

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

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

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

Construction Activities: The construction/demolition activities will be carried out using the conventional methodology and sequence of work. The activities will include demolition, relocation of existing trees, excavation, masonry work, carpentry, wiring,

pipng and plumbing, flooring, painting and installation of fixtures. Other activities will include the laying of cables, water supply, sewerage and storm drainage systems, junction boxes and providing connections to the individual buildings. Supervision of this whole activity will be carried out by the Reconstruction of TMLW Project management and the consultant.

Staffing: Construction crews will have the responsibility of the civil contractor and its petty contractor. It is estimated that approximately 165 personnel will be working at the site at a given time during the peak construction period.

These will essentially include masons, carpenters, electricians, painters, plumbers, and general labourers. For unskilled employment, preference will be given to residents of the project area. **Table 3.7** details the staffing requirement during the construction phase of the project.

Table 3.7: Staff for the Construction Phase of the Project

No.	Description	For construction
1	Technical staff	35
2	Skilled workers (technicians, plumbers, labour)	60
3	Unskilled labour/ helper	70
Total		165

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

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

Construction Machinery:

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

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

- Tower Crane

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

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

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

The concrete mixing plant combines various ingredients to form concrete. Some of these inputs include sand, water, aggregate, fly ash, potash, and cement. The plant has a variety of parts and accessories, including mixers, cement batches, aggregate batches, conveyors, radial stackers, aggregate bins, cement bins, heaters, chillers, cement silos, batch plant controls, and dust collectors (to minimize environmental pollution). The centre of the concrete batching plant is the mixer. It is used to mix stiff consistency concrete, semi-stiff consistency concrete, lightweight aggregate concrete and so on.

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

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

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

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

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

Traffic Load for Construction Materials Supplies: It is estimated that, on average, 5-08 truckloads per day during the peak construction period will be supplying different types of construction materials to the project site during the peak construction period.

Other Supplies Water: During the construction phase, a maximum of about 5,000 gallons per day of water will be required for construction activities and human consumption. The water supply will be arranged through existing tube well in hospital and in case of insufficient quantity it will be fulfilled by water tankers from designated sites approved by the engineer.

Fuels: For the construction equipment and vehicle, diesel will be required. The peak consumption of diesel would be 1000 litres per day during the peak construction period.

3.16.3 Operational Phase

The Designated Personal from the management of TMLW Hospital Lahore will be responsible for the operation and maintenance of the project during the operational phase of the project.

3.16.4 Current pictorial presentation of the project site is as under:

Figure 3.5: Pictorial Presentation of Project Site





4 Project Alternatives

4.1 Background

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

4.2 Management Option

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

4.2.1 No Project Option

The 'no-action alternative', which serves as a baseline for comparative analysis, is included where the environmental impact of taking the proposed action is high compared to the impact of not taking the proposed action. The no-project alternative option in respect to the proposed project implies that the status quo is maintained. This option is the most suitable alternative from an extreme environmental perspective as it ensures non-interference with the existing conditions. Under the no-project option, the proponent's proposal would not receive the necessary approval from authorities. The proposed construction would not be implemented. This option would, however, involve several losses both to the proponent and the community.

The No-Project Alternative option is the least preferred from the socio-economic and partly environmental perspective due to factors such as the economic status of the people would remain unchanged; The local skills would remain under-utilized (in terms of labor provision); Increased poverty and crime in the area due to lack of job opportunities; and the health sector would continue to suffer due to lack of enough and high-quality health services in the area and the existing building will remain threat to the concerned people/staff due to its age factor as well as the patient influx will be continuously increased while the health facilities will not be rationalized.

4.3 Site Alternatives

The project site has access from Ravi Road, Fort Road and N-5 and is not a new establishment while it is re construction of existing building after demolition instead. Relocation of the proposed Reconstruction of TMLW Project is also one of the alternatives in ensuring the environmental status of the area is not affected. But it is quite clear that as per the current situation, the proposed Reconstruction of TMLW Project cannot be relocated because the proponent currently owns the proposed site of development; hence getting an alternative site could be a very expensive venture. Hence this is not an economically viable alternative and will be away from the approach of the people and vulnerable patients.

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

4.3.1 Build as Proposed

The existing TMLW Hospital in Lahore city being a one of the largest maternity hospital in Pakistan caters to the second largest populated city of Pakistan as well. A recent survey by the C&W department assessed the structural condition of the old buildings,

revealing concerns about safety in the indoor block, old nursing hostel, doctors' flats, and hostels.

Given this assessment, constructing a new maternity hospital on the premises is imperative. This involves demolishing unsafe hostel structures to ensure continued safe and effective healthcare, aligning with the hospital's mission for maternal health. The implementation phase of project will lessen the burden on the existing hospital.

Moreover, Lahore's rapid population growth has led to a significant gap in healthcare facilities. The city's population-to-hospital bed ratio is below recommended levels, and the emergency area needs improvement. With Lahore's expanding urban area and a population of 11.7 million, the current bed capacity in public hospitals falls short. A new maternity hospital is thus vital to provide accessible and advanced maternity services.

This visionary project will not only raise healthcare standards for women and infants but also establish the hospital as a center of excellence, fostering progress in research, healthcare delivery, and community well-being.

Therefore, building as proposed is the best option. However, the negative impacts due to the project construction and operation can be minimized, controlled, or eliminated if the proposed mitigation measures, as suggested in the EIA report, are effectively implemented.

4.4 Economic Alternative

The proposed project will harness the substantive role by enhancing the bed capacity and will improve access of communities to quality Health Care. The immediate benefits of the proposed project are the provision of routine maternal medical and surgical services to the catchment population. The land use will be changed from old constructed building into a Reconstruction of Lady Willingdon Hospital Lahore building which will return more benefits during the operational phase as compared to the current land use of the project site.

The Reconstruction of Lady Willingdon Hospital project will provide aesthetically pleasing state-of-art health institution in the city and will ensure excellence in operative and post-operative patient care to minimize mortality figures in the region. The net present value of future benefits exceeds the initial investment cost for the proposed project, which is an indication of the economic feasibility of a project, considering all the mitigation measures suggested as part of this EIA report are implemented during construction as well as operational phase of the project.

4.5 Environmental Alternative

The proposed project site is an old building which will be reconstructed. There may be potential environmental and human health impacts of the proposed project during the Demolition/construction phase of the project. However, the proposed project has been planned to mitigate the impacts and introduce the concept of green building and to contribute towards sustainable development. All the sustainable features required for a green building have been incorporated into the building design at design stage. Following green features is part of the proposed project.

- Energy Efficiency and Renewable Energy.
- Environmentally Preferable Building Materials and Specifications.

- Waste Reduction.
- Waste Management aligned with HWM rules 2014
- Toxics Reduction.
- Indoor Air Quality.
- Smart Growth and Sustainable Development.

Considering the environmental protection measures to be taken during the construction and operational phase of the project and the sustainable features of the proposed project, it can be implied that the proposed project will enhance the environment of the project area during the operational phase of the project.

4.6 Conclusion

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

5 Description of the Existing Environment

5.1 Introduction

This chapter describes the existing environmental and socio-economic conditions of the project area. The proposed project is in Lahore. A generic overview of the environmental conditions of this entire area is presented in consolidated form. The project site is a land area of approximately 50,700 sq. ft. consisted on an old constructed building.

5.2 LAHORE.

Lahore district is the most populated area of Punjab having a population of approximately 11 million with a growth rate of 4%. It is the second-most populous city of Pakistan. Migration to Lahore is one of the reasons for Lahore's higher population growth rate than other cities in Pakistan. Lahore is found to be the highest recipient of migrants in Punjab. This rapid increase of population has led to increased demand for the healthcare facilities. Existing government hospitals are insufficient to cater for this population.

Heath Profile

Hospitals in Lahore District

Teaching Hospitals (Specialized Health)	19
THQ Hospitals	01
Indus THQ Hospital	05
RHCs	05
BHUs	38
Rural Dispensaries	21
MCH Centers	50
Total	139

The map of the District Lahore is given in **Figure 5.1**.

Figure 5.1: Map of District LAHORE.



Source: [https://Lahore.punjab.gov.pk/district profile](https://Lahore.punjab.gov.pk/district%20profile)

5.3 Baseline Physical Environment

5.3.1 The Topography

Lahore is bounded on the north and west by the Sheikhpura District, on the east by Wagah, and on the south by Kasur District. The Ravi River flows on the northern side of Lahore. Lahore city covers a total land area of 1772 km² and is still growing.

5.3.2 Geology and Soil Texture

Lahore city is situated at an average elevation of 210 meters above mean sea level. The alluvial subsoils are of late Pleistocene and were formed by the flood plains of river Ravi. These consist of clay, silt and sand. The thickness of clay increases with distance from the river bed. The city lies on the alluvial plain called Bari Doab. Doab is a local word for area between rivers. Bari Doab is a part of the Indo-Gangatic alluvial plain formed by the Indus river and its tributaries. It is bounded by Ravi and Chenab rivers in the northwest and west and by Sutlej river in the southeast. Northeastern boundaries of Doab lie near the foothills of the Himalayan Ranges.

5.3.3 Seismicity

The project site falls in Lahore., Punjab Plain, where the seismicity level is low to moderate. The project region has been subjected to severe shaking in the past due to earthquakes in the Himalayas. The known main active fault of the Himalayas is the Main Boundary Thrust (MBT), which passes at about 180 km from Lahore towards the northeast along the Himalayan front. Earthquakes of magnitude greater than 8 have been recorded along this fault during the past century. The epicenters of low to moderate magnitude earthquakes recorded in the Punjab plain are associated with the subsurface fractures in the basement rocks, which are concealed by thick alluvial deposits.

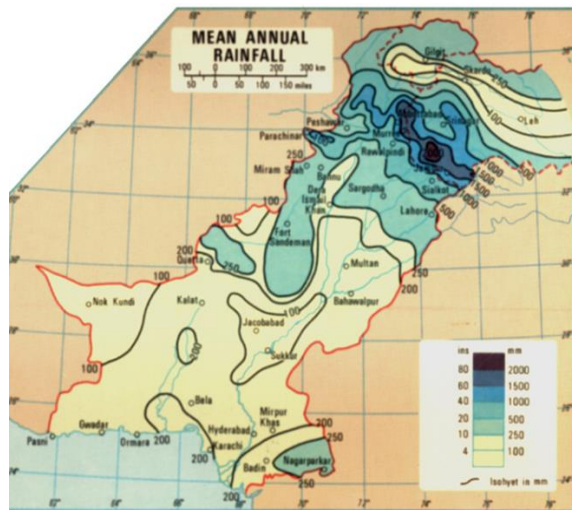
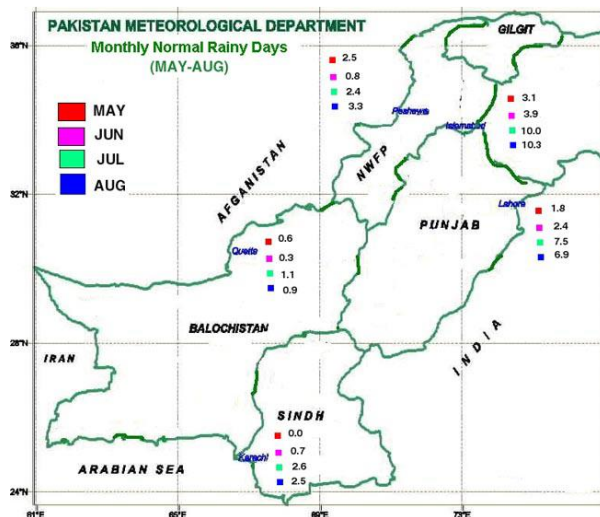
Probabilistic seismic hazard assessment recently carried out for Reconstruction of Lady Willingdon Hospital Project area as part of the revision of Seismic Provisions of the Building Code of Pakistan, shows that the Project area falls in Zone 2A.

5.3.4 Climate

The mean maximum annual temperatures in the city of Lahore falls under 25-30 degree Centigrade temperature. Generally, the climate of the area is dry and severe during summer season and moderately cold in winter. June is the hottest month of the year with maximum daily temperature of 40.4o C and extra maximum temperature of 48oC. January is the coldest month with a minimum temperature of 5.9oC.

The Figure-5.2 exhibits rainy days in the country. It is evident that wet days during monsoon are increasing when moved towards north. In case of Lahore, the rainy days are relatively more than in southern region; as such surface water infiltration into the soil is higher than in the southern part of the country.

Figure-5.2: Rainfall Pattern in The Country



Lahore mainly receives its rainfall during the monsoon season from June till September, and in winter season from December till February. The highest-ever annual rainfall in Lahore was recorded in 1955 when 1,317.5 millimeters (51.87 in) of rainfall was recorded. Lahore received below normal rains in 2009, and normal rains in 2007 and 2010.

5.4 Lab Reports of Environmental Analysis

5.4.1 Surface Water

No rivers exist in the vicinity; however, storm water drains cross the route for disposal into the Ravi River. Water from River Ravi, flowing on the northwestern side of the city of Lahore, is being used for other purposes other than drinking purposes. River Ravi receives almost all the municipal/ industrial wastes from the city of Lahore. The potential value as a recreational water body and breeding place for fish is threatened by the municipal and industrial pollution.

5.4.2 Ground Water

Ground water quality is fresh (defined as acceptable in terms of its salinity). Raw water abstracted from the deep tube wells is believed to be essentially bacteria free. The water quality in the upper 50 meters' zone of subsoil is generally brackish.

For city's drinking purposes water is abstracted from groundwater aquifer by means of tube wells located throughout the city. The quality of water is generally adequate for direct consumption. About 83% of city population is consuming groundwater for drinking purposes.

Groundwater is available at a depth ranging between 15 to 23m below the natural surface level. Deep groundwater from a depth of about 210m in the vicinity of the Project Area is being extracted for meeting the domestic and commercial water demands in nearby areas. The quality of water from these shallow sources is not so good and is mostly contaminated. Therefore, situation necessitates expansion of distribution network to those areas which are without a piped water supply. Tube wells in some areas are used for the irrigation purpose as well. A ground water sample was taken October 07 2023. The report is provided as **Annexure – 7**.

Table 5.1: Ground Water (source: Tube well installed in TMLWH) Analysis Report

Sr.#	Parameter	Method	Unit	PEQS Limit	Results
1.	Taste	APHA 2120 B	Object/Un object	Not objectionable	Acceptable
2.	Odour	APHA 2120 B	Object/Un object	Not objectionable	Acceptable
3.	Colour	APHA 2120 B	TCU	15	0.79
4.	Turbidity	APHA 2130 B	NTU	5	1.0
5.	pH	APHA 4500 - H ⁺ B	pH Unit	6 - 9	7.28
6.	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	1000	169
7.	Fluoride	APHA 4500-F-D	mg/L	1.5	0.2
8.	Nitrite, NO ₂ ⁻	APHA 4500-NO ₂ - B	mg/L	3	0.02
9.	Nitrate, NO ₃ ⁻	APHA 4500-NO ₃ - E	mg/L	50	0.5
10.	Residual Chlorine	APHA 4500 Cl 2	mg/L	0.2-0.5	0.33
11.	Cyanide	APHA 4500 CN ⁻ D	mg/L	0.05	0.01
12.	Total Hardness (as CaCO ₃)	APHA 2340 C	mg/L	500	59.73
13.	Chloride	APHA 4500 Cl B	mg/L	250	11.007
14.	Aluminium (Al)	APHA 3111 D	mg/L	0.2	BDL
15.	Antimony (Sb)	APHA 3114 C	mg/L	0.020	0.002
16.	Arsenic (As)	APHA 3114 C	mg/L	0.050	0.012
17.	Barium (Ba)	APHA 3111 B	mg/L	0.7	0.021
18.	Boron (B)	APHA 4500- B C	mg/L	0.3	0.08
19.	Cadmium (Cd)	APHA 3500-Cd D	mg/L	0.01	BDL
20.	Chromium (Cr)	APHA 3500-Cr B	mg/L	0.05	0.011
21.	Copper (Cu)	APHA 3500-Cu C	mg/L	2.0	0.5974
22.	Lead (Pb)	APHA-Pb B	mg/L	0.05	BDL
23.	Mercury (Hg)	APHA 3112	mg/L	0.001	BDL
24.	Nickel (Ni)	APHA 3111 B	mg/L	0.02	BDL
25.	Zinc (Zn)	APHA 3500-Zn B	mg/L	3	0.03
26.	Total Coliform	APHA 9222 B	Number/100 ml	0/100ml	0
27.	E. coli	APHA 9222 C	Number/100 ml	0/100ml	0

28.	Thermo Coliform	APHA 9222 B	Number/100 ml	0/100ml	0
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Table 5.2: Drinking Water (source: Water Filtration Plant installed in TMLWH) Analysis Report

Sr.#	Parameter	Method	Unit	PEQS Limit	Results
1.	Taste	APHA 2120 B	Object/Un object	Not objectionable	Acceptable
2.	Odour	APHA 2120 B	Object/Un object	Not objectionable	Acceptable
3.	Colour	APHA 2120 B	TCU	15	0.79
4.	Turbidity	APHA 2130 B	NTU	5	BDL
5.	pH	APHA 4500 - H ⁺ B	pH Unit	6 - 9	7.46
6.	Total Dissolved Solids (TDS)	APHA 2540 C	mg/L	1000	180
7.	Fluoride	APHA 4500-F-D	mg/L	1.5	0.19
8.	Nitrite, NO ₂ ⁻	APHA 4500-NO ₂ - B	mg/L	3	0.32
9.	Nitrate, NO ₃ ⁻	APHA 4500-NO ₃ - E	mg/L	50	2.0
10.	Residual Chlorine	APHA 4500 Cl 2	mg/L	0.2-0.5	0.33
11.	Cyanide	APHA 4500 CN ⁻ D	mg/L	0.05	0.01
12.	Total Hardness (as CaCO ₃)	APHA 2340 C	mg/L	500	59.73
13.	Chloride	APHA 4500 Cl B	mg/L	250	133.21
14.	Aluminium (Al)	APHA 3111 D	mg/L	0.2	BDL
15.	Antimony (Sb)	APHA 3114 C	mg/L	0.020	0.002
16.	Arsenic (As)	APHA 3114 C	mg/L	0.050	0.012
17.	Barium (Ba)	APHA 3111 B	mg/L	0.7	0.021
18.	Boron (B)	APHA 4500- B C	mg/L	0.3	0.014
19.	Cadmium (Cd)	APHA 3500-Cd D	mg/L	0.01	BDL
20.	Chromium (Cr)	APHA 3500-Cr B	mg/L	0.05	0.011
21.	Copper (Cu)	APHA 3500-Cu C	mg/L	2.0	BDL
22.	Lead (Pb)	APHA-Pb B	mg/L	0.05	BDL
23.	Mercury (Hg)	APHA 3112	mg/L	0.001	BDL
24.	Nickel (Ni)	APHA 3111 B	mg/L	0.02	BDL

25.	Zinc (Zn)	APHA 3500-Zn B	mg/L	3	0.05
26.	Total Coliform	APHA 9222 B	Number/100 ml	0/100ml	0
27.	E. coli	APHA 9222 C	Number/100 ml	0/100ml	0
28.	Thermo Coliform	APHA 9222 B	Number/100 ml	0/100ml	0

5.4.3 Waste Water

A waste water sample was collected for laboratory analyses as a baseline record and the results are as under and the report is provided as **Annexure – 7**.

Table 5.2: Waste Water Analysis Report

Sr. No.	Parameters	Method	Parameter	Result	P
1	Temperature	APHA 2550 B	C°	25.5	≤3°
2	pH	APHA 4500-H+ B	---	7.61	6-9
3	Chemical Oxygen Demand (COD)	APHA 5220 D	mg/l	139	150
4	Biochemical Oxygen Demand (BOD ₅)	APHA 5210 D	mg/l	70	80
5	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	805	3
6	Total Suspended Solids (TSS)	APHA 2540 D	mg/l	41.33	200
7	Oil & Grease	APHA 5520 B	mg/l	4.5	10
8	Chromium (Hexa & Trivalent)	APHA 3500-Cr B	mg/l	BDL	1.0
9	Sulphate (SO ₄ ²⁻)	APHA 4500-SO ₄ ²⁻ C	mg/l	273.5082	600
10	Iron (Fe ²⁺)	APHA 3111 B	mg/l	1.154	8
11	Chlorine (Cl ₂) Free	APHA 4500-Cl ₂ G	mg/l	0.38	1.0
12	Fluoride (F ⁻)	APHA 4500-F ⁻ D	mg/l	BDL	10
13	Chloride	APHA 4500-Cl ⁻ B	mg/l	88.05	1
14	Ammonia (NH ₃)	APHA 4500-NH ₃ C	mg/l	23.2	40
15	Cadmium	APHA 3500-Cd D	mg/l	BDL	0.1
16	Lead	APHA-Pb B	mg/l	0.02	0.5
17	Arsenic	APHA 3114 C	mg/l	0.05	1.0
18	Phenolic Compounds	APHA 5530 D	mg/l	0.01	0.1
19	Copper	APHA 3500-Cu C	mg/l	0.6285	1.0
20	Barium	APHA 3111 B	mg/l	0.33	1.5
21	Silver	APHA 3111 B	mg/l	BDL	1.0
22	Zinc	APHA 3500-Zn B	mg/l	0.22	5.0
23	Nickel	APHA 3111 B	mg/l	BDL	1.0
24	Boron	APHA 4500-B C	mg/l	0.15	6.0
25	Mercury	APHA 3112 B	mg/l	BDL	0.01
26	Sulphide (S ²⁻)	APHA 4500-S ₂ F	mg/l	0.37	1.0
27	Total Toxic Metals	---	mg/l	0.54	2.0
28	Cyanide	APHA 4500-CN- D	mg/l	0.007	1.0

5.4.4 Ambient Air Quality and Noise Level Monitoring

The ambient air quality and noise monitoring was conducted for Punjab Environmental Quality Standards (PEQS) for Sulphur dioxide (SO₂), Oxide of Nitrogen (as NO), Oxide of Nitrogen (as NO₂), Ozone (O₃), Respirable Particulate Matter (as PM₁₀), Respirable Particulate Matter (as PM_{2.5}) and Carbon Monoxide (CO) during 24 hours at the project site. The monitoring was carried out on 07th October 2023 for 24 hours at the project site by Punjab EPA certified laboratory SEAL, Lahore.

The noise level monitoring was conducted for 24 hours at the project site of Reconstruction of TMLW Hospital Project, Lahore.

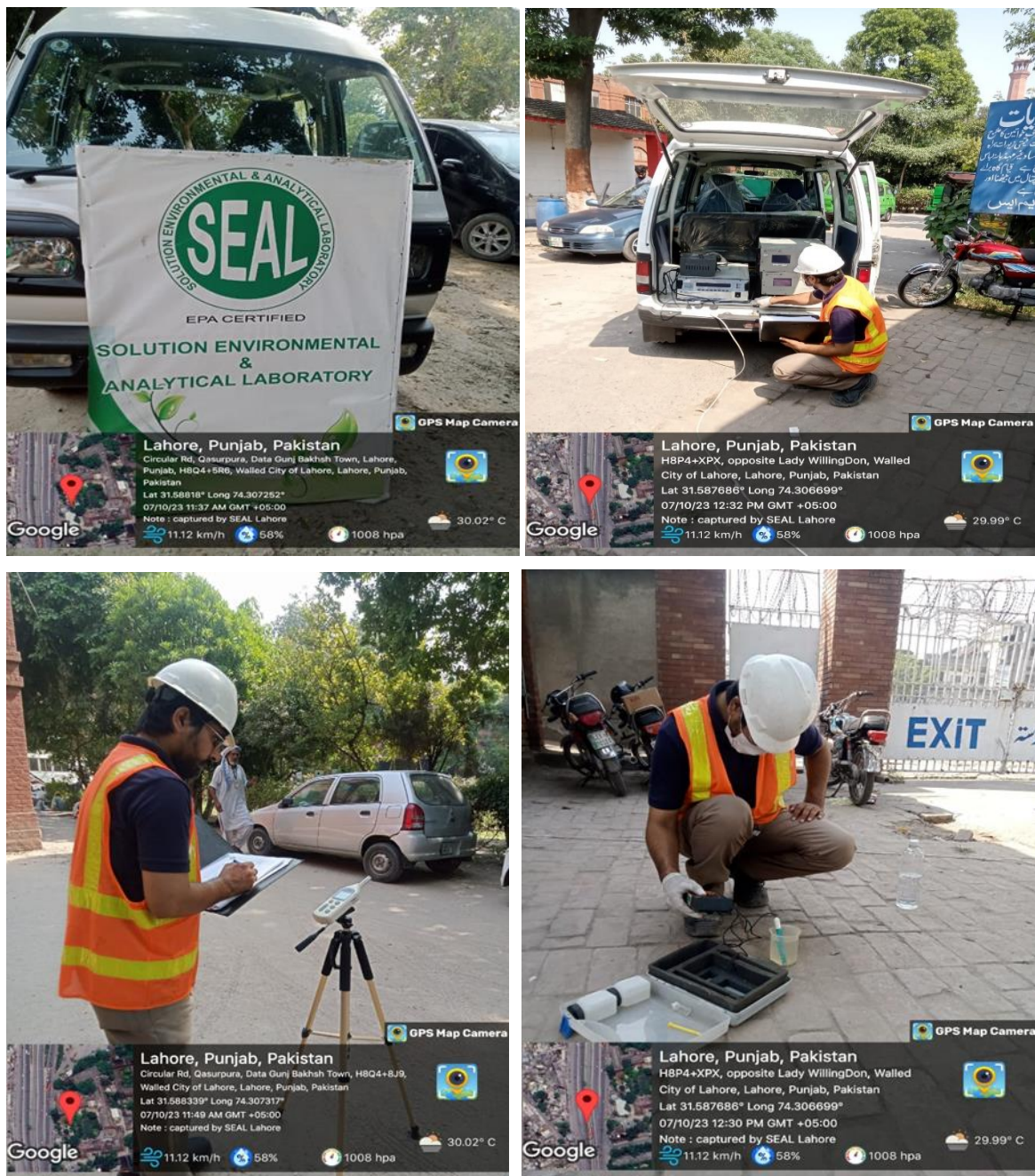
The time-averaged (24h) concentrations of SO₂, NO_x, CO, PM_{2.5} and PM₁₀ were found to be 50.72 µg/m³, 42.05 µg/m³, 3.0 µg/m³, 28.0 µg/m³ and 92.1 µg/m³ respectively. The laboratory report detailing the ambient air and noise level monitoring report is attached in **Annexure-7**.

The SO₂, NO, NO₂, O₃, PM_{2.5}, PM₁₀, CO concentrations meets the PEQS limits. A summary of ambient air quality and noise levels results are given in Table 5.2 below:

Table 5.2: Summary of Ambient Air Quality and Noise Results at the Project Site

Parameter	Averaging Time		PE QS	Unit	Average Concentration at the Project Site
Sulphur dioxide (SO ₂)	24 h		120	µg/m ³	50.72
Nitrogen dioxide (NO _x)	24 h		80	µg/m ³	42.05
Particulate Matter (PM ₁₀)	24 h		150	µg/m ³	92.1
Particulate Matter (PM _{2.5})	24 h		35	µg/m ³	28.0
Carbon monoxide (CO)	8 h		10	mg/m ³	3.0
Noise	Day-time (12:30 pm – 06:30 pm and 05:30am-11:30 am)	12 h	75	dB(A)	63.34
	Night-time (06:30pm– 05:30 am)	12 h	65		54.16

Figure 5.3: Photographical Evidence of Ground Water, Waste Water, Air Quality and Noise Monitoring at the Project Site





5.5 Baseline Ecological Environment

The project area is clear land and has no forest area. The terrain of LAHORE. is quite flat and level. It has mostly agricultural flat fields.

5.5.1 Flora

The diversity and distribution of plant species within the Lahore District depends upon the availability of water and the underlying geology. The project area is fully urbanized area. The terrain of the project site is an old building and lawn with mature trees. However, some old buildings i.e., indoor block, old nursing hostel, doctors' flats, and hostels are included in demolition plan and the new building will be constructed after demolition. The "Demolition Plan" has been prepared and provided in report in hand. There are (116) Nos. trees found at the site out of them (88) trees will be re-located while (28) trees will be retained according to the Master Plan of the project. Every effort has been made at design stage of the project to avoid cutting of trees even the relocation as well.

The tree relocation & retained plan is shown in demolition plan in Figure-5.4.

Figure-5.4 Tree Re-Location/Retained Plan

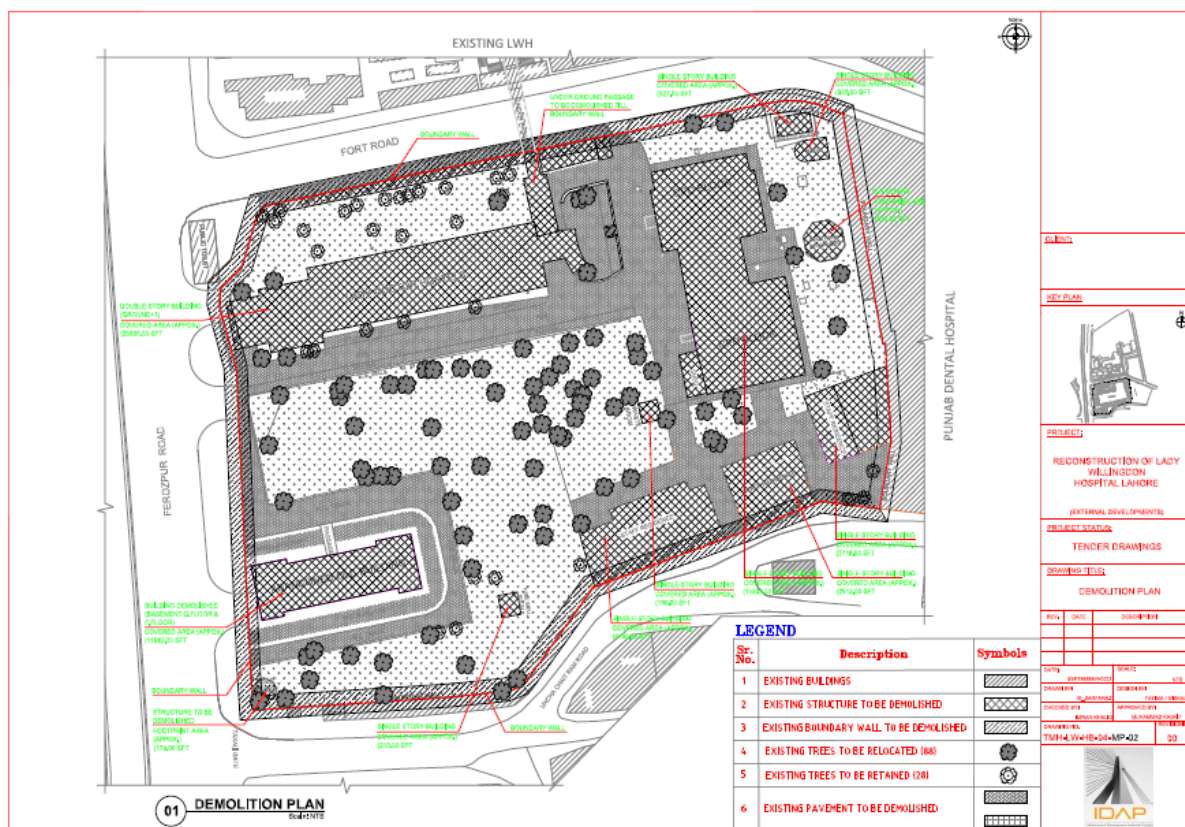


Table 5.3: List of trees

TREE DETAIL OF LADY WILLINGDON HOSPITAL						
SR	NORTHING	EASTING	GIRTH	TREE TYPE	LOCAL NAME	
1	11,466,124.74	1,424,956.35	16"	Moringa	Sohanjna	سونجنا

2	11,466,122.46	1,424,951.45	20"	Melia Azedarach	Boken	بوکین
3	11,466,071.79	1,424,956.62	12"	Moringa	Sohanjna	سوپنجا
4	11,466,047.50	1,424,878.83	39"	Mangifera Indica	Mango	آم
5	11,466,037.24	1,424,829.36	43"	Mangifera Indica	Mango	آم
6	11,466,031.36	1,424,803.11	45"	Mangifera Indica	Mango	آم
7	11,466,012.90	1,424,747.86	43"	Azadirachta Indica	Neem	نیم
8	11,466,015.95	1,424,766.98	47"	Azadirachta Indica	Neem	نیم
9	11,466,015.07	1,424,762.49	24"	Jaman	Jaman	جمن
10	11,466,012.19	1,424,730.35	83"	Crateva Religiosa	Bama	باما
11	11,466,022.84	1,424,990.12	24"	Tally	Tally	ٹیلی
12	11,466,013.54	1,424,991.70	28"	Tally	Tally	ٹیلی
13	11,466,003.26	1,425,001.88	35"	Melia Azedarach	Boken	بوکین
14	11,465,985.57	1,424,986.44	71"	Azadirachta Indica	Neem	نیم
15	11,465,978.28	1,424,975.42	43"	Platanus Orientalis	Boade	بوڈ
16	11,465,970.55	1,424,948.18	14"	Mulberry	Shahtoot	شابٹوت
17	11,465,981.03	1,424,951.92	12"	Melia Azedarach	Boken	بوکین
18	11,465,986.45	1,424,953.39	24"	Mulberry	Shahtoot	شابٹوت
19	11,465,998.44	1,424,959.60	10"	Mulberry	Shahtoot	شابٹوت
20	11,466,026.63	1,424,961.23	35"	Crateva Religiosa	Burma	برما
21	11,466,022.83	1,424,944.47	39"	Crateva Religiosa	Burma	برما
22	11,466,018.94	1,424,912.06	63"	Azadirachta Indica	Neem	نیم
23	11,465,999.14	1,424,930.32	43"	Sukhchin	Sukhchin	سخچن
24	11,466,007.68	1,424,938.10	12"	Azadirachta Indica	Neem	نیم
25	11,465,990.76	1,424,947.27	12"	Melia Azedarach	Boken	بوکین
26	11,465,992.64	1,424,919.43	39"	Sukhchin	Sukhchin	سخچن
27	11,465,980.57	1,424,921.99	18"	Azadirachta Indica	Neem	نیم
28	11,465,966.40	1,424,925.29	71"	Melia Azedarach	Boken	بوکین
29	11,466,139.62	1,424,902.79	59"	Sacred Fig	Peepal	پپیل
30	11,466,137.24	1,424,893.63	71"	Eucalyptus	Safida	صفیدہ

31	11,466,125.16	1,424,897.82	51"	Azadirachta Indica	Neem	نیم
32	11,466,120.82	1,424,894.32	57"	Azadirachta Indica	Neem	نیم
33	11,466,130.42	1,424,858.10	51"	Azadirachta Indica	Neem	نیم
34	11,466,106.76	1,424,865.84	63"	Azadirachta Indica	Neem	نیم
35	11,466,127.63	1,424,839.60	39"	Azadirachta Indica	Neem	نیم
36	11,466,125.23	1,424,832.45	51"	Azadirachta Indica	Neem	نیم
37	11,466,123.55	1,424,826.57	55"	Eucalyptus	Safida	صفیدہ
38	11,466,097.09	1,424,828.13	110"	Eucalyptus	Sambal	سنبل
39	11,466,122.40	1,424,816.11	43"	Azadirachta Indica	Neem	نیم
40	11,466,118.45	1,424,796.50	35"	Azadirachta Indica	Neem	نیم
41	11,466,101.21	1,424,807.91	45"	Azadirachta Indica	Neem	نیم
42	11,466,114.13	1,424,788.39	47"	Azadirachta Indica	Neem	نیم
43	11,466,086.25	1,424,769.24	31"	Jaman	Jaman	جمن
44	11,466,174.70	1,425,030.36	43"	Eucalyptus	Safida	صفیدہ
45	11,466,100.74	1,424,759.55	39"	Tally	Tally	ٹیلی
46	11,466,175.80	1,425,052.33	24"	Azadirachta Indica	Neem	نیم
47	11,466,114.68	1,424,743.44	31"	Azadirachta Indica	Neem	نیم
48	11,466,106.97	1,424,739.83	79"	Eucalyptus	Safida	صفیدہ
49	11,466,110.71	1,424,730.97	83"	Sacred Fig	Peepal	پپل
50	11,466,065.66	1,424,738.75	31"	Azadirachta Indica	Neem	نیم
51	11,466,058.25	1,424,716.62	35"	Sacred Fig	Peepal	پپل
52	11,465,928.83	1,424,986.93	138"	Tally	Tally	ٹیلی
53	11,465,922.77	1,424,968.58	20"	Azadirachta Indica	Neem	نیم
54	11,465,958.69	1,424,936.32	55"	Aegle Marmelos	Sambal	سنبل
55	11,465,957.06	1,424,939.59	35"	Azadirachta Indica	Neem	نیم
56	11,465,952.97	1,425,047.32	59"	Azadirachta Indica	Neem	نیم
57	11,465,956.21	1,425,043.08	14"	Crateva Religiosa	Burma	برما
58	11,465,975.19	1,425,038.67	87"	Sukhchin	Sukhchin	سخچن
59	11,465,969.64	1,425,011.70	31"	Sukhchin	Sukhchin	سخچن

60	11,465,972.35	1,425,064.50	87"	Aegle Marmelos	Sambal	سنبل
61	11,466,004.54	1,425,119.91	39"	Mangifera Indica	Mango	آم
62	11,465,983.79	1,425,056.86	87"	Melia Azedarach	Boken	بوکین
63	11,465,914.26	1,425,138.56	71"	Azadirachta Indica	Neem	نیم
64	11,465,915.42	1,425,149.08	63"	Azadirachta Indica	Neem	نیم
65	11,465,933.98	1,425,155.39	31"	Mulberry	Shahtoot	شابتوت
66	11,466,034.51	1,425,130.54	39"	Azadirachta Indica	Neem	نیم
67	11,466,070.65	1,425,132.83	87"	Cordia Myxa	Lasoda	لسوڈا
68	11,466,083.28	1,425,100.62	47"	Azadirachta Indica	Neem	نیم
69	11,466,127.21	1,425,088.86	31"	Jaman	Jaman	جمن
70	11,465,988.37	1,424,892.85	102"	Platanus Orientalis	Boade	بوڈ
71	11,465,961.82	1,424,911.30	28"	Melia Azedarach	Boken	بوکین
72	11,465,937.40	1,424,882.65	16"	Jaman	Jaman	جمن
73	11,465,937.24	1,424,854.90	79"	Platanus Orientalis	Boade	بوڈ
74	11,465,964.13	1,424,848.47	31"	Jaman	Jaman	جمن
75	11,466,004.86	1,424,883.25	26"	Jaman	Jaman	جمن
76	11,466,005.31	1,424,868.76	31"	Platanus Orientalis	Boade	بوڈ
77	11,466,004.28	1,424,849.65	43"	Azadirachta Indica	Neem	نیم
78	11,465,993.69	1,424,831.00	35"	Mangifera Indica	Mango	آم
79	11,465,993.78	1,424,819.88	51"	Eucalyptus	Safida	صفیدہ
80	11,465,930.42	1,424,820.94	59"	Azadirachta Indica	Neem	نیم
81	11,465,930.61	1,424,813.03	47"	Melia Azedarach	Boken	بوکین
82	11,465,929.78	1,424,802.89	48"	Sukhchin	Sukhchin	سکچن
83	11,465,935.02	1,424,799.63	47"	Sukhchin	Sukhchin	سکچن
84	11,465,964.99	1,424,794.82	47"	Melia Azedarach	Boken	بوکین
85	11,465,993.40	1,424,787.65	57"	Sukhchin	Sukhchin	سکچن
86	11,465,989.73	1,424,783.86	28"	Mangifera Indica	Mango	آم
87	11,465,985.48	1,424,784.67	31"	Mangifera Indica	Mango	آم
88	11,465,951.76	1,424,735.16	47"	Melia Azedarach	Boken	بوکین

89	11,465,912.78	1,424,745.77	51"	Melia Azedarach	Boken	بوکین
90	11,465,912.99	1,424,862.29	118"	Platanus Orientalis	Boade	بوڈ
91	11,465,935.81	1,424,919.56	12"	Azadirachta Indica	Neem	نیم
92	11,465,868.69	1,424,951.95	31"	Azadirachta Indica	Neem	نیم
93	11,465,897.26	1,424,952.51	24"	Azadirachta Indica	Neem	نیم
94	11,465,897.16	1,424,908.53	51"	Azadirachta Indica	Neem	نیم
95	11,465,904.09	1,424,926.05	55"	Eucalyptus	Safida	صفیدہ
96	11,465,888.75	1,424,926.52	43"	Eucalyptus	Safida	صفیدہ
97	11,465,860.06	1,424,892.65	43"	Azadirachta Indica	Neem	نیم
98	11,465,859.90	1,424,878.29	12"	Jaman	Jaman	جمن
99	11,465,866.24	1,424,876.59	94"	Platanus Orientalis	Boade	بوڈ
100	11,465,889.14	1,424,870.57	31"	Azadirachta Indica	Neem	نیم
101	11,466,004.15	1,424,844.30	12"	Azadirachta Indica	Neem	نیم
102	11,465,986.38	1,424,742.96	31"	Tally	Tally	ٹلی
103	11,465,824.55	1,424,865.44	31"	Azadirachta Indica	Neem	نیم
104	11,465,821.94	1,424,853.60	12"	Azadirachta Indica	Neem	نیم
105	11,465,819.88	1,424,847.39	16"	Jaman	Jaman	جمن
106	11,465,799.33	1,424,872.07	10"	Azadirachta Indica	Neem	نیم
107	11,465,778.37	1,424,815.22	35"	Azadirachta Indica	Neem	نیم
108	11,465,801.04	1,424,814.89	63"	Eucalyptus	Safida	صفیدہ
109	11,465,805.75	1,424,792.14	24"	Azadirachta Indica	Neem	نیم
110	11,465,805.10	1,424,762.01	31"	Azadirachta Indica	Neem	نیم
111	11,465,788.93	1,424,763.75	47"	Mangifera Indica	Mango	آم
112	11,465,776.09	1,424,746.79	28"	Platanus Orientalis	Boade	بوڈ
113	11,465,774.18	1,424,728.56	39"	Azadirachta Indica	Neem	نیم
114	11,465,789.70	1,424,908.10	8"	Azadirachta Indica	Neem	نیم
115	1,465,781.06	1,424,897.34	12"	Sukhchin	Sukhchin	سخچن
116	11,465,809.33	1,424,766.85	24"	Tally	Tally	ٹلی

5.5.2 Fauna

Common birds found in the area are crows and sparrows. Chirping birds are having their nests at the well grown trees that are providing a natural habitat for the birds. Some squirrels, parrot, rats, weaver, sparrows are also found in the area. Figure 5.5 is showing the current baseline data of the project area.

Figure-5.5 Baseline Condition of Project Site



5.6 Baseline socio-economic Environment

This section describes the socio-economic and cultural environment of the project area. There are urban settlements, Badshahi Mosque, Lahore Fort, Minar-E-Pakistan and National Highway N-5 in the one km radius shown in Figure-5.6.

Figure-5.6 Baseline Condition of Project Area



To assess the present socio-economic and socio-cultural conditions of the project area, a survey was conducted of nearby settlements. For this purpose, socio-economic data was collected from the neighbouring developments and residents of the area. Following are the details of the present socio-cultural and socio-economic conditions of the areas located in the project area.

Lahore-Fort Road

Location: Lahore Fort road lies to the front of Project Site of TMLW Hospital.

Demographics: There are a number of shops on this road and The Punjab Dental hospital is lying adjacent to the project site. Ravi road is passing on the western side while Fort road is on front of the building. Lahore Fort is situated approximately at 700 meter while Badshahi Mosque is lying at 550 meter as well. The aesthetic and marvelous view of Badshahi mosque from the LW hospital has been considered at design stage to be retained.

Ethnic Structure: The population of the area is predominantly Muslim and Punjabi and Urdu are the predominant languages being spoken in the area.

Groundwater: The main source of drinking water in the area is water lines by the government. Groundwater source is tube wells and tap water is the source to fulfill domestic need.

Transport/Communications: The mode of transport in the local areas are through cars, vans, motorbikes, Qing qi rickshaws, buses etc.

Education: There are excellent educational institutions nearby the Walled City and the facility of learning is being fulfilled in the best way through Punjab Dental College, Govt. College University, University of Veterinary and Animal Sciences, Govt. College

for Women, Govt. Education University, Jamia Nizamia Rizwia and a number of Schools.

Health Care: Lahore district is the most populated area of Punjab having a population of approximately 11 million with a growth rate of 4%. It is the second-most populous city of Pakistan. Migration to Lahore is one of the reasons for Lahore's higher population growth rate than other cities in Pakistan. Lahore is found to be the highest recipient of migrants in Punjab. This rapid increase of population has led to increased demand for the healthcare facilities. Existing government hospitals are insufficient to cater for this population.

Heath Profile

Hospitals in Lahore District

DHQ Hospital	01
THQ Hospitals	02
RHCs	05
BHUs	47
Rural Dispensaries	23
MCH Centre	06
Civil Hospital Khewra	01
Total	85

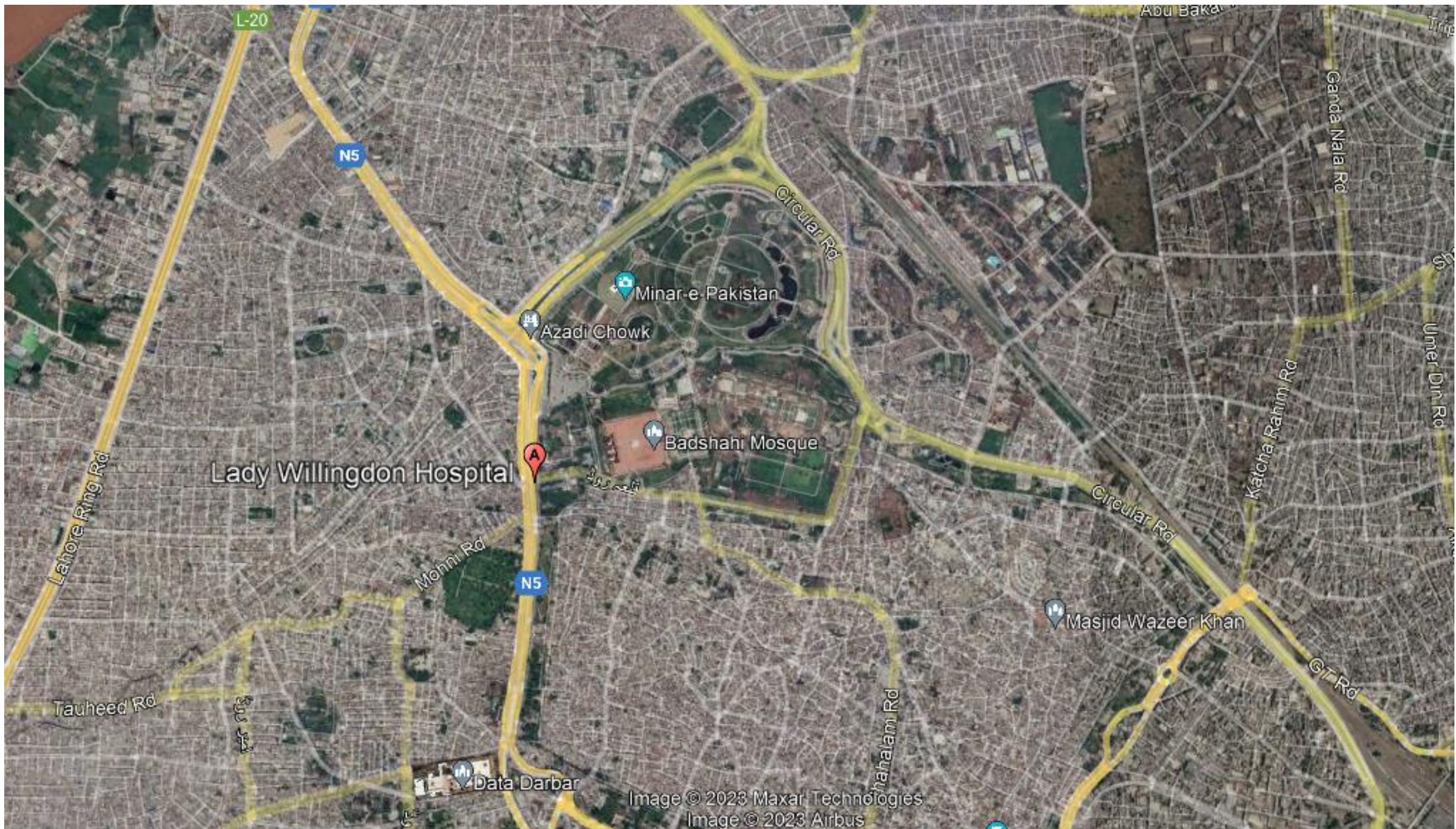
Lahore's rapid population growth has led to a significant gap in healthcare facilities.

Employment: The population of the area is mostly associated with business, Govt. Jobs, private jobs and private businesses.

Cultural Heritage and Archeology: Badshahi Mosque and Lahore Fort are the Cultural Heritage nearby the project site. Project area map is provided in Figure-5.4.

Other Facilities: Inhabitants of project area have the facility of electricity, and mobile services in their area. There are markets along Fort road.

Figure 5.7: Project Area Map



6 Stakeholder Consultation

6.1 Introduction

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

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

6.2 Approach to Public Consultation

The public consultation process has been approached to involve the community and stakeholders from the earliest stages. Public consultation has taken place during the planning and design phase of the project. The focus of attention has been the community living adjacent to the Reconstruction of Lady Willingdon Hospital Lahore 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 in the EIA where appropriate.

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

Meetings were held with the Proponent Reconstruction of Lady Willingdon Hospital Lahore Project, Doctors working in public and private sector hospitals, Health authority, and community living around the project site. Their point of concern and suggestions regarding the project was solicited.

6.3 Objectives of Consultation

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

The objectives of the public consultation process are:

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

6.4 Categories of Stakeholders Contacted

Potential stakeholders for consultation and participation were identified, and discussions were held with the community living in the project area of impact,

pedestrians, vendors, and business/shop owners. Moreover, government and private employees, private hospitals and local public representatives were also contacted.

6.5 Major Stakeholders Involved

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

Table 6.1: Categories of Stakeholders Interviewed in the Project Area

No.	Stakeholder Category
1	Project Proponent (the Proponents Environmental Management Team)
2	Hospital Staffe Working in TMLW Hospital
3	Government Organizations (District Health Authority, Lahore.)
4	Community living adjacent to the Reconstruction of Lady Willingdon Hospital Lahore.

6.6 Scoping Session

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

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

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

Generally, the community was not aware of the project, but they were informed about the project during the public consultation. The negative and positive impacts were communicated to them.

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

On the other hand, there were also persons who gave positive gestures towards the project because the proposed project will provide employment opportunities, enhance the overall healthcare of the community and will reduce hazard of unsafe old structured building and surrounding areas. Those who were aware of the project indicated their support as it will provide employment opportunities and enhance the overall healthcare of the community, as there is no such maternity hospital in the adjacent area and will benefit the people from surrounding areas of Lahore as well.

6.7 Issues Discussed

Following issues were discussed during the stakeholder consultation:

- Overall activities of the project and their possible impacts;
- Possible impacts on natural vegetation, flora and fauna;

- Possible mitigation measures and
- Beneficial factors and involvement opportunities of the local people in the set of activities of the Project.

6.8 Major Stakeholders and their Apprehensions

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

Stakeholders consulted, and their valuable suggestions and comments are described here under:

Date & Time	Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
Responsible Authority			
10/07/2023	Ms. Zill-e-Huma Faizi, Manager Environment and Public Health	Infrastructure Development Authority, Punjab	- Infrastructure Development Authority Punjab is the executing agency for the project. IDAP has expertise and experience in handling healthcare infrastructure projects. - We have in-house complete project management services, including feasibility, design, contract management, execution, supervision, third party evaluation, and delivery to the client department. - The establishment of Reconstruction of TMLW Hospital, Lahore has been proposed to improve access of communities to quality Health Care. - IDAP gives special attention to environmental compliance to its project during the design and construction phases of the project. During the design phase, we do ensure the use of energy-efficient and environmentally friendly products and technologies that are available in Pakistan.
12/07/2023	Structure Design Team	Infrastructure Development Authority, Punjab	The Design of Hospital is a State of the Art Design and it will be the aesthetic addition to the area as well.
14/07/2023	Geo Technical Experts	Infrastructure Development Authority, Punjab	- The Geo Technical Survey has been executed for the project. - A credible survey and mapping Team was hired for Detailed Topographic survey in the digital format for the planning and design of Hospital Project.
17/07/2023	Water Supply Public Health Design Team	IDAP	- This project will act as a catalyst to improve the socio-economic situation of the area in the long term. By providing easy accessibility to a state-of-the-Art hospital facility, the local communities will gain access to prompt health care. - For this project, Waste water treatment plant and further disposal into the municipal sewerage line is proposed.
Project Proponent			
18/07/2023	Dr. Saeed Ahmad Khan Medical Superintendent TMLW Hospital, Lahore	Teaching and Maternity Lady Willingdon Hospital Lahore	The Reconstruction of Lady Willingdon Hospital Lahore is a very necessary step to ensure service delivery by trained, skilled and well-equipped staff to provide the neighboring communities of the project accessibility to quality health care.

Date & Time	Name and Designation	Location	Opinions/Concerns/Issues/Suggestions
			▪ This project is targeted to the public to boost their confidence in the primary health care system. This will also enable them to obtain the requisite medical treatment to enable them to live a healthy life and can play a positive role in the progress of the country. ▪ Appropriate mitigation measures should be implemented during the construction. ▪ Infectious waste is being carried out by the Hospital Waste Management Team.

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

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

Main Concerns of the Stakeholders	Address of the Stakeholders	Addressed in the EIA
- During the construction phase, dust should not be emitted into the surrounding areas. - Noise generation activities should be minimized. - Trees should be planted as many as possible to compensate for the trees that will be re-located during the construction phase. - No one should get hurt or injured during the construction phase. - The infectious hospital waste should be managed properly - The contractor should take measures to reduce traffic congestion on Fort Road and Ravi Road. - The project should provide job opportunities to the local community on a regular basis.	- The contractor will spray water on the soil to minimize fugitive dust emission. - The contractor will keep the vehicles and construction machinery properly tuned, and silencers should be used. - The ornamental plants and a few species of local trees will be planted. - The contractor will make sure that every worker is using Personal Protective Equipment (PPEs) during the construction phase of the project. - The proponent will implement a hospital waste management plan to dispose of the infectious hospital waste. - The Implementing Agency IDAP has prepared a Traffic Management Plan to mitigate the matter. - The contractor will ensure that construction material arrives at the project during night-time. - The local population of Lahore. will be provided job opportunities.	- Construction Phase Mitigation measures have been proposed (EIA chapter 7) - Mitigation measures have been proposed (EIA chapter 7) - The plantation/re location plan for the proposed project has been prepared (EIA chapter 8) - Mitigation measures have been proposed (EIA chapter 7) - The suggestion has been noted and will be considered by the proponent. - Mitigation measures have been proposed (EIA chapter 7) - The proposed project will provide employment opportunities to the local people of Lahore during the construction as well as operational phase. (EIA chapter 7) - The suggestion has been noted and will be considered by the proponent.

6.9 Consultation with the Communities (Affected and Wider Communities)

The general consultation included nurses, patients, and community members at and around Reconstruction of TMLW Hospital Lahore to find out their opinion about the project.

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

The list of people consulted during public consultation is attached in **Annexure 5**.

The viewpoints of respondents are as follows:

- Overall, the residents of adjoining communities had no issue with the development of this project and supported the project.
- The hospital waste is very infectious. Hospital waste should be burned properly in the incinerator, and the ashes should be disposed of in a proper way.
- There must be a proper landfill site for the disposal of construction and municipal waste.
- There should be a monitoring system for the hospitals, as well. The community should not be disturbed in any way by the operation and construction activities.
- Proper Plantation should be done to compensate for the cut of trees if any during the project construction.
- The workers at the construction site should be equipped with PPEs, and they should be properly trained.
- There is a need to regulate the healthcare practices of un-qualified doctors and Hakeem's.

Table 6.3: Community Response towards the project

#	Question	Response of the community
1	What is the present practice of Health care in Lahore and surrounding small cities?	Health care facility is available but they are facing the insufficient resources in existing building.
2	Is there any such Hospital available in Lahore?	There are many maternity hospitals but LW Hospital is the largest, however, the patient influx is greater than the available facilities.
3	Is TMLW Hospital Important?	100% (very Important)
4	Do you belong to a community support group that meets to discuss women's and children's health issues?	90% (yes, they belong to the community support groups)
5	How successful is the group's effort to improve the situation for patients in this community?	80% (No group effort)
6	What do you think there should be Re-Construction of Reconstruction of Lady Willingdon Hospital Lahore?	100% (there is dire need) because the building are a threat due to the age factor and to accommodate the patients properly.
7	Are you aware of Reconstruction of Lady Willingdon Hospital Lahore by Govt. of Punjab?	60% (Yes)
8	What do you think is the real need/requirement?	100% (Real need of the day)
9	What facilities do you expect from TMLW Hospital?	100% (All facilities)

10	What will be the benefit to the community?	100% (Many benefits)
11	What Environmental impacts do you foresee during the construction of TMLW?	70% (Some Environmental impacts like dust)
12	How soon do you want to have this Reconstruction of Lady Willingdon Hospital Lahore project completed?	100% (As soon as possible)

Figure 6.1: Pictorial Presentation of Public and Stakeholders Consultation

Consultation with Dr. Saeed Ahmad Khan. MS TMLW Hospital



Consultation with Structure Design Team



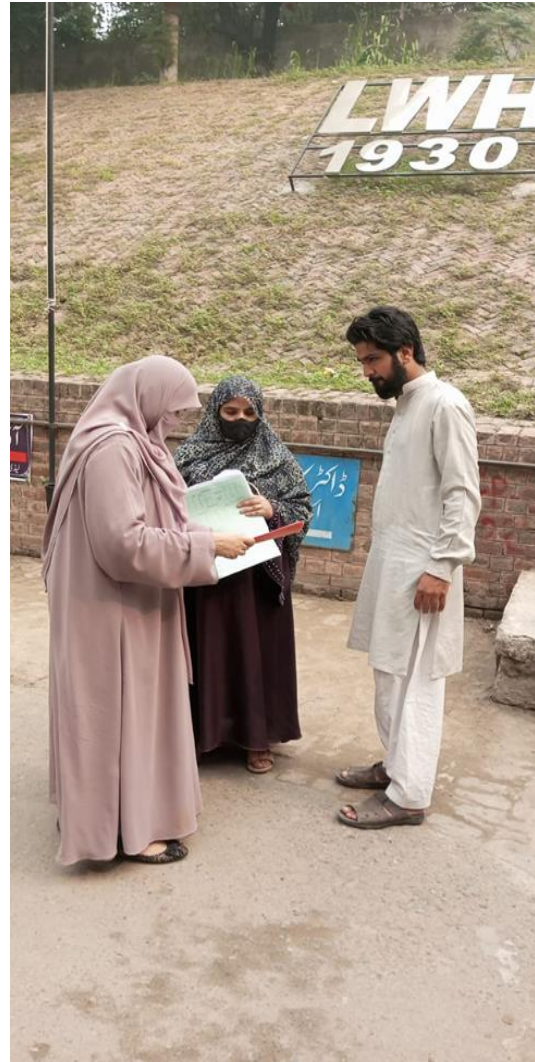
Consultation with Geo-Technical Experts



Meeting with wastewater Treatment Plant and Water Supply (Public health) Design Team



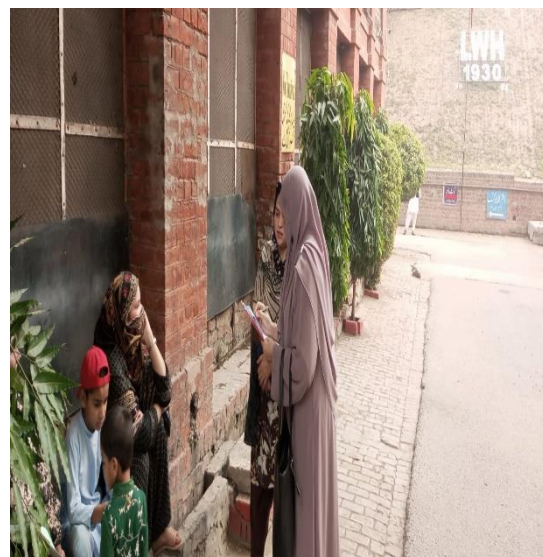
Roadside consultation at project area



Discussion with Community members



Consultation with staff members TMLWH



Consultation with visitors at TMLWH

7 Impact Assessment and Mitigation Measures

7.1 Introduction

This chapter provides screening of potential environmental impacts of the proposed project, discusses the stakeholders' views, assesses the significance of the potential impacts, and recommends mitigation measures to minimize if not eliminate the potentially adverse impacts of the proposed activities.

7.2 Environmental Screening of the Project

To examine the environmental impact of the project, an Environmental Screening Matrix has been developed as part of the present EIA study that focuses on the potential environmental impacts of the project during pre-construction/design, construction and operational phases.

7.2.1 Impact Identification with Matrices

Environmental metrics are designed to assess the environmental impact of technology or activity. Such impacts are primarily related to using natural resources (lifecycle INPUTS) and generating waste and emissions (lifecycle OUTPUTS). The ultimate sustainability goal is to minimize the environmental impacts due to using non-renewable resources and minimizing waste and pollution. Since the complete elimination of these impacts is hardly possible (any technology has its environmental costs), it is also important to evaluate the rate at which environment can absorb the impacts and become remediated.

Impact Identification with Matrices:

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

Risk Assessment

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

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

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

$$\text{Risk} = \text{Likelihood} \times \text{Consequence}$$

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

- Certain: Will undoubtedly happen/recur on a frequent basis.
- Likely: Will probably happen/recur, but it is not a persisting issue/circumstances.

- Possible: Might happen or recur occasionally
- Unlikely: Do not expect it to happen/recur but it may do so
- Rare: This will probably never happen/recur

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

- *Remarkable*: Impact on a larger area and highly sensitive receptors.
- *Major*: Impact on a large area and slightly sensitive receptors.
- *Moderate*: Impact on a small area with few receptors.
- *Minor*: Impact on a very small area with almost no receptors.
- *Insignificant*: Almost no impact.

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

Table 7.1: Environmental Screening Matrix (un-mitigated) of TMLW Hospital, LAHORE.

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

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

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

Positive impacts

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

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

Table 7.2: Positive Impact Analysis Matrix

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

Based on the related values in Table 7-3 following positive impact categories are identified.

- Extremely Beneficial (score 20-25): Will add a lot of value to the local environment
- Highly Beneficial (score 10-19): Will have a large positive impact on the environment
- Medium (score 5-9): Will have a small positive impact
- Low (score 1-4): Will not have any significant impact

Table 7.3: Impact Identification with Matrix

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
Pre-construction Phase Impacts								
Site Selection	Encroachment on historic/cultural values	2	2	2	This is not a new site selection it is re-construction of existing old building. A historical building Badshahi Mosque is lying in a 500 m radius however, there is no chance of encroachment due to Reconstruction of TMLW Hospital Project	1	1	1
	Disruption of Flora and Fauna	3	6	9	88 trees will be relocated.	1	3	3
	Resettlement	2	5	10	No resettlement will be caused by the project.	1	3	3
Site Preparation	Noise	5	3	15	Noise barriers around the construction site along with mufflers	4	2	8

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
					(silencers) for vehicles and construction equipment to minimize noise.			
	Dust generation	5	3	15	Additional water to be applied for dust suppression during dry weather.	3	2	6
	Damage to vegetation	3	6	9	88 trees will be re-located, there will be significant impact on the local bird population.	2	4	8
Construction Phase Impacts								
Construction Works	Soil Erosion and degradation	5	3	15	Minimal land clearing, levelling and grading to reduce soil erosion. Construction of temporary reinforced walls to contain debris. Waste to be categorized and recycled. Slope stabilization measures to be taken during the project.	3	2	6
	Air Quality Deterioration	5	3	15	Construction equipment to be well maintained to reduce exhaust emissions. Workers to be provided with Personal Protective Gears (e.g., masks). Water to be used for dust suppression.	3	2	8
	Loss of vegetation	5	3	15	Spilling of chemicals and other effluents on the soil will be avoided. Tree plantation will also be carried out.	3	2	6
	Damage to Wildlife	3	6	9	Minimal impacts on the local bird population	3	2	6
	Noise and Vibration	4	3	12	Barriers to be constructed in sensitive areas. Night-time activities will not be held unless unavoidable.	3	2	6
	Quarrying Hazards	3	4	12	Exposed soils to be stabilized with mulch and grass to prevent hazards.	3	2	6
Waste Disposal	Surface (and Groundwater) quality	4	3	12	Wastewater will be properly drained into the nearest sewerage line or nullah on the site.	3	2	6
	Solid Waste Disposal	4	4	16	Any solid waste generated during construction will be recycled or disposed of in the nearest waste disposal site after consultation with MC Lahore..	2	3	6

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
	Waste Effluent Disposal	4	4	16	Waste effluent generated from the Contractor Camp will be properly drained into the nearest sewerage line on the site.	3	3	9
Positive impact	Job opportunities	4	4	16	Training will be arranged to hire a local crew for the project.	5	4	20
Operational Phase Impacts								
Operation of Office facility	Air Quality	3	5	15	The building will install proper HVAC system to facilitate ventilation in the building.	2	4	8
	Safety Hazard, Public Health & Nuisance	4	4	16	The building will be properly monitored by the HSE Officer to ensure that all the health and safety measures are applied.	3	3	9
	Noise	4	3	12	Noise barrier and mufflers will be used to minimize noise generation.	3	3	9
	Wastewater	4	3	12	Wastewater will be properly drained into the nearest sewerage line or nullah after proper treatment by Waste Water Treatment Plant	3	2	6
	Traffic congestion	3	3	9	Defensive and best driving practices will be inculcated in the project drivers.	2	2	4
	Solid waste	4	4	16	Hospital Waste will be disposed of as per "Regulations 2014". Solid waste will be disposed properly at a designated disposal site.	3	3	9
Positive impact	Employment	4	4	16	Availability of more offices will increase the employment opportunity.	5	4	20
	Efficient land use	4	4	16	Vertical expansion will help in efficient land use as people will get residential space and horizontal construction will be reduced, thus leaving more green areas.	5	4	20
	Reduction of energy consumption	4	4	16	The building will use innovative and advanced energy saving technologies such as double-glazing glass, emergency lights, LED energy savers etc.	4	5	20

Project activity	Environmental and Social issues	Risk Assessment			Mitigation Measures for risks/Enhancement measures for positive impacts	Risk Assessment after taking mitigation Measures		
		Likelihood	Consequence	Significance		likelihood	Consequence	Significance
	Business opportunities	4	3	12	The project will give rise to small scale businesses in the vicinity.	4	4	16

7.3 Environmental Impact Characterization

During the environmental impact assessment process of TMLW Hospital, Lahore, the predicted impacts were characterized. Various aspects of the impact characterization include:

- Nature (direct/indirect)
- Duration of impact (short term, medium-term, long-term)
- Geographical extent (local, regional)
- Timing (Project phase)
- Reversibility of impact (reversible/irreversible)
- Likelihood of the impact (certain, likely, unlikely)
- Impact consequence severity (severe, moderate, mild)
- Significance of impact (High, medium, low)

The above aspects of environmental characterization are defined in **Table 7.3**.

Table 7.3: Impact Characterization of TMLW Hospital, Lahore.,

Categories	Characteristics
Nature	Direct: The environmental parameter is directly changed by the project. Indirect: The environmental parameter changes because of a change in another parameter.
Duration of impact	Short-term: Lasting only for the duration of the project, such as noise from the construction activities. Medium-term: Lasting for a period of a few months to a year before naturally reverting to the original condition such as loss of vegetation due to the clearing of the campsite, contamination of soil or water by fuels or oil. Long-term: Lasting for a period much greater than medium-term impact before naturally reverting to the original condition such as loss of soil due to soil erosion.
Geographical extent	Local, regional (spatial dimension)
Timing	Construction and operation
Reversibility of impact	Reversible: When a receptor resumes its pre-project condition.

Categories	Characteristics
	Irreversible: When a receptor does not or cannot resume its pre-project condition.
Likelihood of the impact	Almost Certain: Impact expected to occur under most circumstances. Likely: Impact will probably occur under most circumstances Possibly: Impact may possibly occur at some time Unlikely: Impact could occur at some time Rare: Impact may occur but only under exceptional circumstances
Impact consequence severity	Major: When an activity causes irreversible damage to a unique environmental feature; causes a decline in abundance or change in distribution over more than one generation of an entire population of species of flora or fauna; has long-term effects (period of years) on socio-economic activities of significance or regional level. Moderate: When an activity causes long-term (period of years), reversible damage to a unique environmental feature; causes reversible damage or change in abundance or distribution over one generation of a population of flora or fauna; has short-term effects (period of months) on socioeconomic activities of significance on a regional level. Minor: When an activity causes short-term (period of few months) reversible damage to an environmental feature; slight reversible damage to a few species of flora or fauna within a population over a short period; has short-term (period of months) effects on socio-economic activities of local significance. Negligible: When no measurable damage to the physical, socio-economic, or biological environment above the existing level of public concern; and conformance with legislative of statutory requirements.
Significance of impact	Categorized as High, Medium, or Low Based on the consequence, likelihood, reversibility, geographical extent, and duration; the level of public concern; and conformance with legislative of statutory requirements.

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

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

7.4 Pre-Construction/Design Phase Impacts

7.4.1 Project Sitting Impacts

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

For the proposed project, the

- The project site, land use and design
- Visual Impacts

These are characterized in Table 7.2, and discussed below:

Project Site, Land Use, and Design

The project site of TMLW Hospital, Lahore, should be in line with the guidelines for commercial buildings. The land use and design should be in accordance with the building codes and by-laws of for the construction of high-rise buildings.

The design of the project should be able to withstand seismic activity, and necessary arrangements are in place for the health and safety of the workers and patients.

The project might increase energy consumption and will put the burden on the already existing energy crisis in the country. Furthermore, the extraction of water to meet the construction as well as operational needs of the project might put pressure on ground water resources.

In addition, more solid waste will have to be collected, transported, and disposed of at the designated dumping site of Lahore. The proposed project can contribute towards the landfill crises indirectly.

The unmitigated impact associated with not following the building guidelines are characterized as follows:

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

Mitigation Measures

Project Site: The land of project site is located in TMLWH building on a plot already owned by the proponent.

Land Use: The land use of TMLW Hospital, Lahore, will be in accordance with the building by-laws. The land-use plan of the project will be approved by the development authority.

Design: The proposed structure of TMLW Hospital, Lahore. will be in accordance with existing building by-laws, and its design will be approved by the development authority. The following mitigation measures are proposed for earthquake and firefighting:

- The Building By-Laws and Codes will be strictly adopted.
- Complete equipment control system, fire escape stairs and secured access system supplemented with close circuit surveillance equipment/alarms will be included in the design of the building.
- The adequate internal and external water distribution system will be designed, with a standby system for sufficient water, which could also supply adequate quantity for firefighting.

- Adequate space will be provided for parking firefighting vehicle at the front and backside of the project. The designated space will be able to withstand the load of the firefighting vehicle, which is 30-40 tons.
- Sufficient access points should be provided for access of firefighting staff to enter into the project building.
- Provision for pumping out water from the basement will be kept, to meet any emergency in case of water flooding the basement.
- Groundwater extraction will be used as the primary source of water.
- The solid waste reduction, reuse and recycling will be encouraged during operational phase of the project.
- Infectious or biohazard waste will be properly incinerated.
- Adequate water storage for firefighting will be provided in the building. The pumps for firefighting will maintain constant pressure in the system.
- Standpipes, connected with fire pumps, will be provided in the building with fire hose cabinets on each floor. Each cabinet will house one 1.5 diameter hose of 100 ft. the length and attached to a gate valve of the same diameter.
- Orifice plates will be provided at the hose cabinets to control pressure at required level as per manufacturer's requirements.

Visual Impacts

The TMLW Hospital Lahore can potentially damage the natural landscape, and visual impact will be impacted. The unmitigated impact associated with the aesthetic value of the area is characterized as follows:

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

Mitigation Measures

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

- First of all, the design of the sector should be adopted in a manner that minimizes the changes in the Topography, landscape and damage to the natural vegetation.
- A plantation plan has been proposed for the TMLW Hospital, which should be followed.
- Certain areas must be marked and left untouched to preserve natural vegetation.

Residual Impacts

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

7.5 Construction Phase Impacts

The construction phase will be by far the most significant part of the project with respect to environmental considerations since most of the impacts are likely to take place during this period. Various construction activities will invariably create environmental disturbances, which may have impacts on the physical, biological and social environment of the area and nearby community. Such impacts include the following:

Physical Environment

- Soil degradation and contamination
- Air quality deterioration
- Surface and groundwater contamination
- Solid Waste Management

Biological Environment

- Loss of/damage to the floral resources (natural vegetation) of the area
- Loss of/damage to faunal resources (wildlife) of the area

□ Social Environment

- Compensation for land acquisition
- Noise and vibration
- Safety hazards
- Public health and nuisance issue
- Sites of Archaeological or Historical Significance

These impacts are characterized in Table 7.2 and can be readily pre-empted and mitigated.

The mitigation measures recommended in this section will need to be incorporated into the construction of the project.

These impacts and their respective mitigation measures are discussed below:

7.5.1 Soil Degradation and Contamination

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

Soil may be contaminated as a result of fuel/oils/chemical spillage and leakage, and inappropriate waste (solid as well as liquid) disposal.

Extraction of stone and gravel from the area may potentially lead to soil erosion.

The unmitigated impacts related to soil erosion and contaminations are characterized below.

- Nature : Direct
- Duration : Long-term

- Geo extent : Local
- Reversibility : Irreversible
- Likelihood : Certain
- Consequence : Moderate
- Impact significance : High

Mitigation Measures

The followings mitigation measures will minimize soil erosion and contamination:

- Land clearing, levelling and grading be minimized and carried out in a manner to minimize soil erosion.
- Good management of topsoil should be done to prevent the loss of soil fertility.
- Excavated slopes will not be left untreated/unattended for long durations. Appropriate slope stabilization measures will be taken per the design (i.e. Stone pitching). Temporary measures, such as the construction of temporary walls reinforced with brick lining bordering the construction areas to contain debris and spoil, will also be undertaken to avoid soil erosion and water contamination.
- The stone and gravel will not be extracted from LAHORE..
- Vehicles and equipment will not be repaired at the project site. If unavoidable, impervious sheathing will be used to avoid any soil contamination.
- For the domestic sewage from the contractor's camp, septic tanks with soaking pits will be constructed having adequate capacity. Waste oils (if any) will be collected in drums and sold to the recycling contractors.
- The recyclable waste from the project site (such as cardboard, drums, broken/used parts, etc.) will be sold to recycling contractors, or where appropriate reuse/recycle it.
- The hazardous waste should be kept separate and handled according to the nature of the waste. While storing, hazardous waste will be marked.
- Domestic solid waste will be disposed of in a manner that does not cause soil contamination/water contamination.

Residual Impacts

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

7.5.2 Air Quality Deterioration

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

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

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

- Nature : Direct
- Duration : Short-term
- Geo extent : Local
- Reversibility : Reversible
- Likelihood : Likely
- Consequence : Minor
- Impact significance : Medium.

Mitigation Measures

The following mitigation measures will minimize the emission and their impacts:

- Construction machinery and vehicles will be kept in good working condition and properly tuned, in order to minimize the exhaust emissions.
- Fugitive dust emissions will be minimized by spraying water on the soil, where required and appropriate.

Residual Impacts

The above measures will reduce the magnitude of the adverse impacts on ambient air quality. The significance of the residual impacts on air quality is expected to be low.

7.5.3 Noise and Vibration

Noise and vibration will be generated by the construction machinery and vehicles during construction activities.

The unmitigated impacts related to the noise and vibrations caused by the project are characterized as follows:

- Nature : Direct
- Duration : Short-term
- Geo extent : Local
- Reversibility : Reversible
- Likelihood : Certain
- Consequence : Moderate
- Impact significance : High

Mitigation Measures

- Construction equipment and vehicles will have exhaust mufflers (silencers) to minimize noise generation.
- Noise monitoring will be done at the project site, and if found more than 55 dBA, appropriate sound reduction mechanism (such as a noise barrier) will be put in place.
- Blasting will not be allowed as part of the proposed construction activities.

Residual Impact

With the implementation of the above mitigation measures, the residual noise impact will be low to medium.

7.5.4 Surface Water and Groundwater Contamination

The project activities that can contaminate soil may also contaminate the surface water and groundwater. These include:

- Solid waste disposal
- Sewerage disposal
- Equipment/ vehicles maintenance
- Spillage/ leakage of fuels, oils and chemicals
- Campsite sanitation facilities

The unmitigated impacts of the proposed construction activities on the water resources of the area characterized below:

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

Mitigation Measures

The mitigation measures recommended to forestall soil contamination will also prevent surface and groundwater contamination.

Residual Impacts

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

7.5.5 Loss of Vegetation

There are a total 116 trees on the site 88 out of them will be relocated while 28 trees on the proposed site of Hospital will be retained. Damage and/or loss of vegetation and clearing of other indigenous and introduced species, as well as undergrowth species which comprising bushes, grass, etc., will also lose.

The construction crew might also indulge in tree/shrub cutting to obtain fuelwood for the camp.

The unmitigated impacts of the proposed activities on the floral resources of the area are characterized below.

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

- Impact significance : High

Mitigation Measures

The follows mitigation measures will further minimize any negative impacts on the floral resources of the area:

- Endeavours will be made to compensate for the loss by enhancing the environment, through a plantation of trees and ornamental plants.
- A plantation/relocation plan for the project has been prepared. The plan has a mix of appropriate trees/bushes which will be planted within the premises as well as any designated plantation site.
- All preventive measures will be adopted to control the spill-over of chemicals and other effluents on the ground to protect soil fauna and ensure microbial activity.
- Cutting of trees and other natural vegetation will be minimized as far as possible through astute planning.
- A record will be maintained for any tree relocated.
- The construction crew will be provided with LPG as cooking (and heating, if required) fuel. Use of fuelwood will not be allowed at the contractor camp.

Residual Impact

The trees planted under the plantation plan will take some time to grow and mature. Therefore, there will be some reduction of vegetation cover in the area. However, no vegetation will be possible in the built-up area. This impact cannot be fully mitigated, and the residual impact would be medium, at least in the medium term. In the longer run, however, the planted trees and vegetation will be more than compensate for any vegetation loss.

7.5.6 Damage to Wildlife

The project site is located in TMLW Hospital Lahore., which provides little to no habitat for wildlife. The construction activities will not have adverse impact considering the mitigation measures are implemented during project execution. The loss of natural vegetation discussed above and other project activities will potentially have adverse impacts on the faunal resources and habitats of the area as well. Smoke, chemicals, dust particles, and noise generated by heavy machinery are a scaring factor for wildlife. Rodents, hedgehogs, porcupines would lose their abode.

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

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

Mitigation Measures

- The measures to prevent soil and water contamination will forestall any adverse impact on the faunal resources of the area.
- Special measures will be adopted to minimize impacts on birds, such as avoiding noise-generating activities.
- Solid waste from the contractor's site office and construction waste will not be left in the open and be disposed of properly.
- The measures to restore natural vegetation loss in the area will benefit the area's fauna as well.
- The project staff will not be allowed to indulge in any hunting or trapping activities.
- Illumination levels at the site will be minimized, as far as possible.
- Appropriate diffusers should be used to restrict the illumination within the project site.
- Blasting should not be undertaken at the site for excavation purposes.
- Destruction of habitat and consequent check on the population of pest rodents may prove to be boon to maintain ecological balance.
- Developmental activities and establishment of the project site would be a positive step to keep down the number of this undesirable species at the desirable level from the human point of view.

Residual Impact

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

7.5.7 Disposal of Construction Waste/Excavated Material

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

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

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

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

- Impact significance: Moderate

Mitigation Measures

- Management of construction activities will be done in a way to ensure minimal degradation to the soil around the project site.
- Dumping of excavated waste and waste generated from the construction camp will be done at a designated site approved by local authorities.

The contractors will be bound by contractual obligations to take care of the waste generated from the construction activities.

7.5.8 Traffic Management

During the construction phase, the movement of heavy machinery and transportation of construction material and equipment may cause traffic problems on Ravi Road and Fort Road. As a result, the daily activities of the people living in vicinity as well as the normal traffic may be disturbed, which will require proper mitigation measures. This impact is temporary and minor negative in nature.

Mitigation Measures

- A traffic management plan will be prepared to avoid traffic jams/public inconvenience.
- Movement of vehicles carrying construction materials will be restricted during the night time to reduce traffic load and inconvenience to the local residents.

The management is required to maintain liaison between the Traffic Police, local residents/ travellers and the contractor to facilitate traffic movement during the construction stage.

7.5.9 Safety Hazards, Public Health and Nuisance

The project may pose some safety hazards to the public during construction as well as operational phase. The public health issues related to the project location are the possibility of contamination of local drinking water resources and dust emissions during the construction phase. The anticipated health impacts are classified into the following categories:

Dust and Pollen Allergy: One of the main problem people are facing here is of dust, smog and pollen allergy.

Eye and Respiratory Diseases: Construction workers may be susceptible to the eye and respiratory diseases due to their routine exposure to dust and exhaust emissions on site. These effects could possibly be mitigated by routine health screening and training of contractor's employees.

Physical Injuries: Injuries could happen primarily by occupational-related accidents, animal bites, etc. Activities such as land clearing, tree felling, earthworks, and construction of facilities present various occupational hazards to the workers on site. These risks can be mitigated through the provision of appropriate training and emergency response procedures.

Psychological Disorders: Some workers may suffer from depression and anxiety disorders due to working and accommodation conditions, and their relationship with fellow workers. The psychological wellbeing of some members of the community may be affected due to disturbances created by the project activities. Mitigation measures for workers include the devotion to standards regarding working conditions.

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

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

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

Mitigation Measures

- Protected fencing will be fixed around the construction site. Unauthorized access within the construction area will not be allowed.
- The local community will be educated regarding the safety hazards at the site.
- The mitigation measures discussed under air quality deterioration, soil and water contamination will address the public health concerns as well.
- Defensive driving practices will be inculcated in the project drivers through training, posters and other similar measures.
- Vehicle speeds of 15 km/hr at the project site will be implemented.
- Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance caused by light pollution.
- A traffic management plan will be prepared and implemented during the construction phase to control the accidents.
- The contractor will ensure better working conditions for its employees.
- Regular routine health screening of the staff should be carried out.
- Firefighting equipment will be made available at the camp.
- The camp staff will be provided with firefighting training.
- The construction camps and site offices will have first-aid kits.
- The construction crew will be provided with an awareness of the transmissible diseases (such as HIV/AIDS, hepatitis B, and C).
- All safety precautions will be taken to transport, handle and store hazardous substances such as fuel.
- Road signage will be fixed at appropriate locations to reduce safety hazard associated with project-related vehicular traffic.

Residual Impacts

There will be a moderate level of the residual impact of safety hazard associated with the vehicular traffic and construction activities.

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

7.5.10 Sites of Archaeological or Historical Significance

There are no reported sites of archaeological or historical significance at the land acquired for the project. However, in case an artifact of such significance is found during the construction activities, the Archaeology Department, Government of Pakistan will be informed.

7.6 Operational Phase Impacts

The operation of TMLW Hospital, Lahore Project will interact with different components of the environment. This interaction may result in the following adverse impacts:

- Soil contamination
- Contamination of Surface and Groundwater
- Safety hazards, public health and nuisance

However, the magnitude of some of the above impacts is likely to be lesser as compared to the construction phase impacts.

To ensure the harmony of the project with the environment, the management will implement sound environmental management practices to handle the basic environmental issues effectively

- Landscaping and plantation
- Noise and another public nuisance abatement.

The potential environmental impacts of the project during operational phase are discussed below:

7.6.1 Solid Waste Management

The solid waste generated during construction activities will be safely disposed of at an approved waste disposal site. The management will prepare a solid waste management plan which details municipal waste collection and disposal as well as promotes recycling.

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

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

Mitigation Measures

Solid Waste Management will also be an important issue during the operational phase of TMLW Hospital, Lahore.

- A small secondary point should be available at the project site where segregation of recyclable and non-recyclable waste can take place.
- All the solid waste from the building will be collected at one location and will be transported for disposal and the designated dumping site.
- Any infectious or biohazard waste will be incinerated.

Residual Impact

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

7.6.2 Contamination of Surface and Groundwater

The nature of the impact of the project's operation activities on the surface and groundwater quality is expected to be quite similar to those predicted for the construction phase, except that the magnitude is likely to be lesser.

The unmitigated impacts on the surface and groundwater resources of the area are characterized below:

- Nature: Direct
- Duration: Short-term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Likely
- Consequence: Major
- Impact significance: High

Mitigation Measures

The mitigation measures against soil contamination discussed above for the operation activities will forestall any possible water contamination as well.

Residual Impact

After the effective implementation of the above measures, the residual impacts of the operation of TMLW Hospital, Lahore. on the water resources of the area will be negligible.

7.6.3 Safety Hazard, Public Health and Nuisance

The nature impacts of the project's operation activities relating to safety hazards, public health and nuisance are expected to be quite similar to those predicted for the construction phase.

These unmitigated impacts are characterized below:

- Nature: Direct and indirect
- Duration: Short-term
- Geo extent: Local
- Reversibility: Reversible
- Likelihood: Likely/possible

- Consequence: Moderate
- Impact significance: High to medium.

Mitigation Measures

The following mitigation measures will forestall any possible impact during the operation phase:

- The mitigation measures discussed under air quality deterioration, soil and water contamination will address the public health concerns as well.
- Appropriate solid waste disposal mechanisms will be implemented, as described earlier.
- Appropriate light diffusers and reflectors will be used where required to minimize the public nuisance caused by light pollution.
- Provision of firefighting arrangements in each floor of the project.

Residual Impact

After the effective implementation of the above-mentioned measures, the residual impacts of the estate operation activities relating to safety hazards, public health and nuisance will be negligible.

7.7 Positive Impacts of the Project

The positive impacts of TMLW Hospital, Lahore project are as follows:

TMLW Hospital, Lahore. will provide state of the art healthcare facilities to the area.

The multi-dimensional impact of the proposed project will be to

- Provide sustainable development.
- Provide better healthcare facilities.
- Enhance economic activities.
- Contribute to the promotion of skill applications.

7.7.1 Business Opportunity

With the start-up of operation of TMLW Hospital, Lahore, business opportunities in the area will be enhanced, thus, boosting up the local economy.

7.7.2 Employment

The operation of the project will improve the employment opportunities in the project area. It is anticipated that the local community will get direct or indirect employment due to the project. Employment will have a positive impact on the local economy.

7.7.3 Healthcare Facilities

The project will help to reduce the maternal and infant mortality rate by providing state of the art facilities to the local population.

7.8 Summary of Impacts and their Mitigation Measures

The impacts, mitigation measures have been developed to minimize the likelihood, extent or duration of their occurrence and any associated adverse effects. **Table 7.5** summarizes potential impacts and proposed avoidance and mitigation measures associated with construction camps.

Table 7.4: Summary of Impacts and Mitigation Measures

Impact	Mitigation Measures
Pre-construction Phase Impacts	
Project Site, Land Use, and Design	TMLW Hospital, Lahore. is being constructed on an old constructed hospital building (after demolition) on Govt. owned Land and is accessible by Ravi Road and Fort Road. The land use and design of the project will be in line with the existing by-laws.
Air Quality Deterioration	The project site should be monitored throughout to keep a record of air quality and any change in it. The project site will be sprinkled with water to control dust.
Surface Water and Groundwater Contamination	Protection of the groundwater reserves from any contamination. Excavation should be done in the supervision of the site engineer so he can decide up to which limit excavation should be done. Prohibit the washing of vehicles and machinery in the project area.
Noise and Vibration	To mitigate these impacts noise barriers should be constructed in sensitive areas. Construction equipment and vehicles will have exhaust mufflers (silencers) to minimize noise generation. Premix Concrete will be hauled to reduce the noise that is generated due to preparation of concrete at the site.
Safety Hazards, Public Health and Nuisance	There should be proper check and balance on construction activities. There should be proper control on oil spillage and leakage of vehicles. Firefighting equipment will be made available at the camp. The camp staff will be provided for firefighting training.
Sites of Archaeological or Historical Significance	There are no reported sites of archaeological or historical significance at the land acquired for the project. However, in case an artefact of such significance is found during the construction activities, the Archaeology Department, Government of Pakistan will be informed.
Operational Phase	
Contamination of Surface and Ground Water	The mitigation measures against soil contamination discussed above for the operation activities will forestall any possible water contamination as well.
Solid Waste Management	The TMLW Hospital, Lahore. will have a proper solid waste management system. All collected waste will be segregated, the infectious or biohazard waste will be incinerated and the rest will be disposed on an approved and designated landfill site.

8 Environmental Management and Monitoring Program

8.1 Introduction

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

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

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

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

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

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

8.2 Purpose and Objectives of EMP

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

The primary objectives of the EMP are to:

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

8.3 Management Approach/ Institutional Capacity

8.3.1 Pre-Construction and Construction Phase

The organizational roles and responsibilities are summarized below:

- a) Reconstruction of TMLW Hospital, District Lahore.

The overall responsibility of supervision of all the project activities rests with the project proponent, Reconstruction of TMLW Hospital Lahore.

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

b) Project Manager

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

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

c) EPD Punjab

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

8.3.2 Organizational Structure and Responsibilities

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

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

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

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

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

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

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

8.3.3 Operational Phase

Management of TMLW Hospital will assume the main responsibility for the environmental performance of the Reconstruction of during its operational phase.

An environmental monitoring plan has been developed as part of the Reconstruction of Teaching Maternity Hospital Project. The key environmental parameters, such as

solid waste management, infectious hospital waste management, sewerage treatment plant, traffic count, noise, and status of implementation of plantation plan, will be monitored on a regular basis. The environmental monitoring reports will be produced and shared with the concerned authorities if required.

8.4 Legislation and Guidelines

The EIA of the Reconstruction of Lady Willingdon Hospital Lahore Project has discussed national and international legislation and guidelines that are relevant. The proponent will ensure that his staff and all its assigned design & supervision consultant and contractor are aware of this legislation and guidelines prior to the start of the project activities.

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

8.5 Environmental Improvement Cell and Responsibilities

During the construction phase of the Reconstruction of Lady Willingdon Hospital Lahore Project, will form an Environmental Improvement Cell, which will be responsible for the environmental management and supervisory affairs during the construction and operational phases of the project. The responsibilities of the Environmental Improvement Cell are as follows:

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

8.6 Approvals

Reconstruction of Lady Willingdon Hospital Lahore Project will obtain environmental approval from the Environmental Protection Department, Government of Punjab.

8.7 Contractual Provisions

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

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

8.8 Description of proposed mitigation actions

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

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

Table 8.1: Environmental Mitigation Matrix of Reconstruction of Lady Willingdon Hospital Lahore Project

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
Pre-construction Phase Impacts						
Seismic activities may damage structures, environment, health, and lives	At the Reconstruction of Lady Willingdon Hospital Project site.	After an earthquake with an intensity higher than design.	The project will be designed in accordance with the revised seismic codes	Engineering Consultant	M/s Infrastructure Development Authority	Land
Construction Phase						
Contamination of soil and groundwater	At the project site.	Construction of campsite and buildings.	▪ The outflow from the construction activities during construction will relate to the sanitary sewerage system of the hospital to prevent contamination of soil and groundwater. ▪ Vehicles and equipment will not be repaired at the project site. If unavoidable, an impervious shield will be used to avoid any soil contamination. ▪ Waste oils (if any) will be collected in drums and sold to the recycling contractor. ▪ Solid waste will not be disposed of in the open, and on-site burning of solid waste will be not allowed. ▪ Waste bins/containers will be placed at appropriate locations.	Contractor	Engineering Consultant,	Water and Soil

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
			- The recyclable waste from the project site (such as cardboard, drums, broken/used parts, etc.) will be used as appropriate or to be sold to a recycling contractor. - All preventive measures will be adopted to control the spill-over of chemicals and other effluents on the ground to protect the soil.			
Soil Erosion	At the project site.	Construction of campsite and land levelling for construction activities.	- Campsite area to be kept the minimum. - The construction of a campsite in the levelled area will minimize disturbance to the soil. - Construction activities are carried out in a manner to minimize soil erosion. - Land clearing, levelling and grading be minimized. - The exposed surface will be re-surfaced and stabilized as soon as possible. - Existing pathways and access roads will be used as much as possible. - Appropriate slope stabilization measures will be taken as per the design (i.e., Stone pitching). - Temporary measures, such as the construction of temporary walls reinforced with brick lining bordering the construction areas to contain debris and spoil, will also be undertaken to avoid soil erosion and water contamination. - The hazardous waste will be kept separate and handled according to the	Contractor	Engineering Consultant,	Land

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
			nature of the waste. While storing, hazardous waste will be marked.			
Air Quality Deterioration	At the project site	Construction of campsite and buildings	- Construction machinery and vehicles will be kept in good working condition and properly tuned in order to minimize exhaust emissions. - Fugitive dust emissions will be minimized by spraying water on the soil, where required and appropriate. - Vehicular traffic on unpaved tracks will be avoided as far as possible.	Contractor	Engineering Consultant,	Air Quality Report
Ground Water Quality	At the project site	Construction of campsite and buildings	The solid waste generated will be reused where possible. If not reused, that will be disposed of at the hospital designated solid waste disposal site from where the municipal committee will take it.	Contractor	Engineering Consultant,	Water Quality Report
Loss of Vegetation	At the project site	Construction of campsite and buildings	- Removal of vegetation cover will be kept at a minimum. - Un-necessary clearing will be avoided. - Tree plantation will be carried out after the completion of construction activities. - The construction workforce will be provided with LPG as cooking and heating (if required) fuel. The burning of fuelwood will be strictly prohibited. - Re-location of trees will be executed with collaboration of Forest department and a Re-location plan will be prepared by the Contractor and implemented after the approval of Forest department and IDAP	Contractor	Engineering Consultant, Forest Department	Plantation plan implementation

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
Damage to Wildlife	At the project site	Construction of campsite and buildings	- The measures to prevent soil and water contamination will forestall any adverse impact on the faunal resources of the area. - The measures to enhance natural vegetation in the area will benefit the area's fauna as well. - The movement of construction machinery and equipment will be restricted to work areas only to avoid necessary disturbance of the wildlife.	Contractor	Engineering Consultant,	Ambient Air and Noise Monitoring
Noise and Vibration	At the project site	Construction of campsite and buildings	- Construction equipment and machinery will have exhaust mufflers (silencers) to minimize noise generation. - Noise construction activities will be carried out only during normal working hours. - It will be ensured that the generator, vehicles and other potentially noisy equipment used are in good condition. - The use of pressure horns will not be allowed inside the hospital premises. - Night time traffic and construction activities will be avoided. The Medical Superintendent of the hospital will be taken in confidence if such work is unavoidable.	Contractor	Engineering Consultant,	Noise Monitoring
Health and Safety of the workforce	At the project site	Construction of campsite and buildings	- All occupational and health, and safety requirements for the workforce will be adhered to. - Special safety measures will be adopted during the lifting and unloading of the infectious waste.	Contractor	Engineering Consultant,	Health and Safety Environment Report

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
			- Protected sheet/fencing will be fixed around the construction site. Unauthorized access to the construction area will not be allowed. - To minimize the occupational health hazard, proper personal protective gear, i.e. masks, shall be provided to the workers who are engaged in dust generation activity.			
Public Health, Safety and Nuisance	At the project site	Construction of campsite and buildings	- The hospital staff will be educated regarding the safety hazards at the project site. - Defensive driving practices will be inculcated in the project drivers through training. - Vehicle speeds of 20 km/hr at the project site will be implemented. - Protected Sheet will be fixed around the construction site throughout the Construction phase, to prevent the people in surroundings and Historical Buildings (Badshahi Mosque and Badshahi Qila) from dust. - Appropriate light diffusers and reflectors will be used, if required, to minimize the public nuisance caused by light pollution.	Contractor	Engineering Consultant,	Public Health and Safety
Site Restoration	At the project site	Upon completion of construction activities	- All equipment and machinery at the project site will be demolished. - All temporary structures will be demolished, the land levelled and re-contoured to the original condition or better. All debris and any other material will be removed from the site.	Contractor	Engineering Consultant,	Demobilization of contractor

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
Operational Phase						
Hospital Waste Generation	At the hospital	During Operation and maintenance period	▪ The infection control protocol will be strictly implemented to minimize health risks for the staff and patients. ▪ The hospital waste will be properly managed compliance with the procedures specified in the Punjab Hospital Waste Management Rules of 2014 (and other similar standards). ▪ The infectious waste storage facility will be marked properly, and unauthorized personals will not be allowed there. ▪ While dealing with the waste, workers will wear personal protective equipment like a gas mask, gloves, safety shoes etc. ▪ Thick/puncture resistant plastic bags will be used to collect Hospital Waste and rigid/puncture-proof boxes to dispose of needles/other sharps.	Engineering Department, Reconstruction of Lady Willingdon Hospital Lahore Project	Management of Reconstruction of Lady Willingdon Hospital Lahore	Infectious solid waste
Traffic Congestion	Ravi Road and Fort Road	During Operation and maintenance period	▪ Traffic management plan to be developed. ▪ Traffic control measures, including speed limit, are to be enforced. ▪ Mass awareness regarding traffic rules	Engineering Department, Reconstruction of Lady Willingdon Hospital Lahore	Management of Reconstruction of Lady Willingdon Hospital Lahore	Traffic

Potential Environmental Impact	Where the impact is likely to happen	When the impact likely to occur	Mitigation Measures	Responsibility		Parameters for Monitoring
				Implementation	Supervision	
Public Health and Safety hazards	At the hospital	During Operation and maintenance period	- The infection control protocol will be strictly implemented to minimize health risks for the staff and patients. - Proper management of hospital waste can minimize the risks both within and outside healthcare facilities. - Strict compliance with the procedures specified in the Punjab Hospital Waste Management Rules of 2014 (and other similar standards), in close coordination with the infection control protocols mentioned above. - Infectious Hospital waste will be incinerated on a daily basis. If not, the infectious hospital waste (yellow bag) will not be stored for more than 24 hours. - The infectious waste storage facility will be marked properly, and unauthorized personals will not be allowed there. - While dealing with the storage facility, workers will wear personal protective equipment like a gas mask, gloves, safety shoes etc. - Housekeeping around and inside the incinerator facility area will be ensured. - Vaccination of the staff, particularly for Hepatitis A and B and tetanus. - Thick/puncture resistant plastic bags to collect Hospital Waste and rigid/puncture-proof boxes to dispose of needles/other sharps will be used.	Engineering Department, Reconstruction of Lady Willingdon Hospital Lahore	Management of Reconstruction of Lady Willingdon Hospital Lahore	Public Health and Safety Hazard

8.9 Solid Waste Management Plan

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

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

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

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

Operational Phase: The infectious waste produced will be collected and stored in yellow bags in Yellow Room for not more than 24 hours. The infectious waste will be disposed of using an incinerator.

8.10 Hospital Waste Management

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

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

- **Chemical waste:** Waste containing chemical substances, e.g., laboratory reagents; film developer, disinfectants (disinfectants) that are expired or no longer needed solvents
- **Waste with high content of heavy metals:** Batteries, broken thermometers, blood-pressures gauges, etc.
- **Pressurized containers:** Gas cylinders, gas cartridges, aerosol cans.
- **General solid waste:** Waste generated from offices, kitchens, packaging material from stores.
- **Microorganisms:** Any biological entity, cellular or non-cellular capable of replication or of transferring genetic material.

Responsibility for waste management:

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

Waste Management Plan (WMP):

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

The WMP shall include:

- a plan of the hospital showing the waste disposal points for every ward and department, indicating whether each point is for risk waste or non-risks waste, and showing the sites of the central storage facility for risk waste and the central storage facility for non-risk waste.
- Details of the types, numbers and estimated costs of containers, waste bags and trolleys required annually.
- Timetables include the frequency of waste collection from each ward and department.
- Duties and responsibilities for each of the different categories of the hospital. Staff members who shall generate hospital waste and be involved in the management of the waste.
- An estimate of the number of staff members required for waste collection.
- Procedures for the management of waste require special treatment, such as autoclaving before final disposal.
- Contingency plans for storage or disposal of risk waste in the event of breakdowns of incinerators or of maintenance or collection arrangements.
- training courses and programs on waste management; and
- Emergency procedures.
- Representatives of a local MC responsible for the collection and disposal of waste from the hospital shall be consulted in preparing and finalization of the WMP.
- The WMP shall be regularly monitored, reviewed, and revised and updated by the Waste Management Team as and when necessary.

Table 8.2 shows Hospital Solid Waste Management and Disposal plan

Table 8.2: Hospital Solid Waste Management and Disposal plan

Component	Actions/recommendations
Waste Minimization, Reuse, and Recycling	Consider practices and procedures to minimize waste generation without sacrificing patient hygiene and safety considerations Use of efficient stock management practices and monitoring e.g. • For chemical and pharmaceutical stocks, Small/frequent orders for products that spoil quickly and strict monitoring of expiry dates • Complete use of the old product before new stock is used • Maximization of safe equipment reuse practices, including Reuse of equipment following sterilization and disinfection (e.g., sharps containers)
Waste Segregation	Waste should be identified and segregated at the point of generation. • Non-hazardous waste, such as paper and cardboard, glass, aluminum and plastic, should be collected separately and recycled. Food waste should be segregated for composting. • Infectious and/or hazardous wastes should be identified and segregated according to their category using a color-coded system • Other segregation considerations include the following: Avoid mixing general health care waste with hazardous health care waste to reduce disposal costs; Segregate waste containing mercury for special disposal. Aerosol cans and other gas containers should be segregated to avoid disposal via incineration and related explosion hazard; Segregate health care products containing PVC to avoid disposal via incineration or MW Shredders and subsequent harmful air emissions
On-site Handling, Collection, Transport and Storage	• Seal and replace waste bags and containers when they are approximately three-quarters full. Full bags and containers should be replaced immediately. • Identify/label waste bags/containers properly prior to removal. • Transport waste to storage areas on designated trolleys/carts, which should be cleaned/disinfected regularly; Waste storage areas should be located within the facility & sized to the quantities of waste generated, with the following design considerations: • Hard, impermeable floor with drainage, and designed for cleaning/disinfection with available water supply. • Secured by locks with restricted access. • Designed for access and regular cleaning by authorized cleaning staff and vehicles. • Protected from the sun and inaccessible to animals/rodents. • Equipped with appropriate lighting and ventilation. • Segregated from food supplies and preparation areas. • Equipped with supplies of protective clothing, and spare bags/containers • Store mercury separately in sealed and impermeable containers in a secure location. • Store cytotoxic waste separately from other waste in a secure location. • Store radioactive waste in containers to limit dispersion, and secure behind lead shields.
Transport to Outside facilities for treatment	If the proponent does not have an onsite waste treatment facility now, therefore, during operation, solid waste segregation, collection, and storage shall be the responsibility of the hospital, whereas waste transportation to treatment facility and treatment shall be the work of a contracted biomedical waste handler. Therefore, the proponent shall: • Appoint a waste handler who is licensed by NEMA and permitted by the local government to handle, transport, and treat biomedical wastes at approved treatment sites using recommended treatment procedures given by the legal framework and respective government agencies. • The contractor shall transport waste destined for off-site treatment facilities according to the guidelines for transport of hazardous wastes / biomedical wastes in EPA HWM Rules 2014.

	• Packaging for infectious waste should include an inner, watertight layer of metal or plastic with a leak-proof seal. Outer packaging should be of adequate strength and capacity for the specific type and volume of waste; • Packaging containers for sharps should be puncture-proof; • Waste should be labelled appropriately, noting the substance class, packaging symbol (e.g. infectious waste, radioactive waste), waste category, mass/volume, place of origin within the hospital, and final destination; • Transport vehicles should be dedicated to waste and the vehicle compartments carrying waste sealed.
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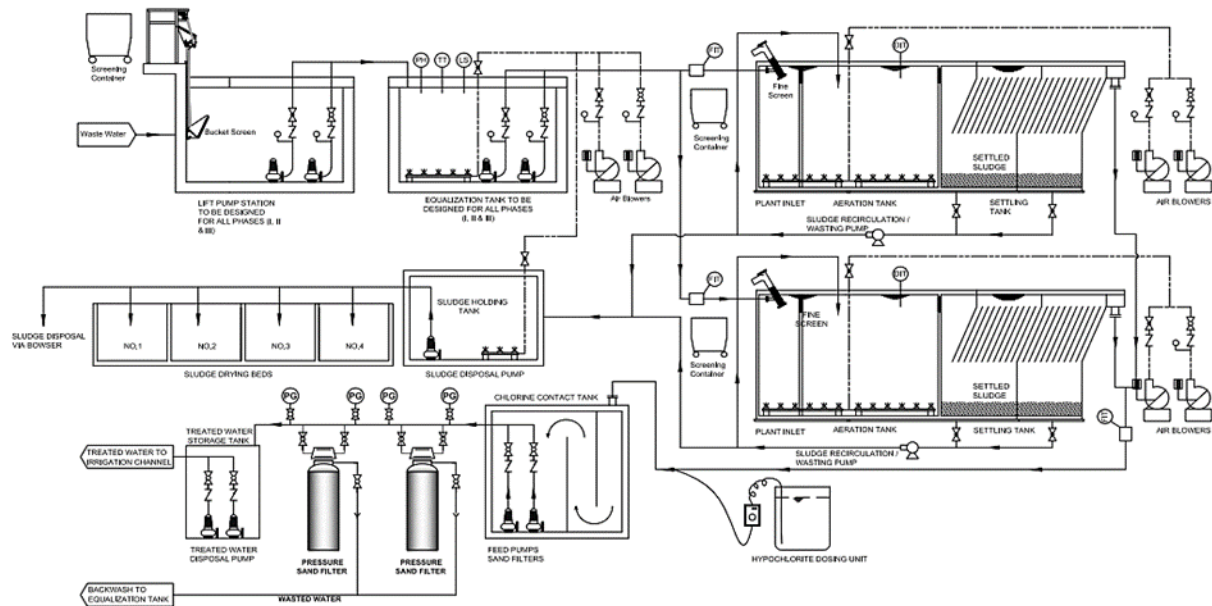
8.11 Wastewater Management Plan

During the operational phase of the Reconstruction of TMLW Hospital, various wastewater will be generated:

- Waste Water Treatment Plant is proposed as a first priority in waste water management.
- Blackwater (sewage) will be generated from the washrooms and kitchen of the hospital, which will contain a high concentration of faecal matter and urine, food residues, and toxic chemicals.
- Greywater (sullage) will be generated from washing, bathing, laboratory processes, laundry or technical processes such as cooling water or the rinsing of X-ray films.
- Stormwater will be generated from the hospital roofs, grounds, and paved surfaces.
- The wastewater generated should be treated by taking into consideration the following wastewater management plan:
- Two separate collection systems for sewage and stormwater should be constructed where the wastewater will be collected.
- The medical laboratory waste should be pretreated by using acid-base neutralization, filtration or autoclaving options.
- The blackwater should be pretreated with lime milk (hydrated calcium oxide or calcium hydroxide).
- Blood should be pretreated by using a thermal method or disposed of directly to the septic tank if safety measures are used.
- After pretreatment, the heavy solids should be removed from the wastewater through primary treatment processes, i.e., sedimentation.
- After the primary treatment, the wastewater should be treated by using indigenous bacteria to remove the dissolved and suspended biological matter.
- Finally, the wastewater should be treated with chlorine to further reduce the remaining pathogens, suspended solids and other chemical contaminants.
- After the treatment, sludge will be produced, which should be treated in the anaerobic digester or used for composting.
- The treated water should be released in any water body or should be used for horticulture purposes.

A Waste Water Treatment Plant (WWTP) has been proposed in Reconstruction of TMLWH project at design stage and shown in Figure-8.1.

Figure-8.1 Waste Water Treatment Plant (WWTP): Reconstruction of TMLWH project Lahore



8.12 HSE Management Plan

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

- HSE Signboard will be installed at the project site for emergency response.
- Regular First Aid Center, along with all required medicines 24/7, will be available at the project site.

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

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

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

Table 8.3: Estimated Cost for the Implementation of Environmental Management Plan for Establishment of Reconstruction of TMLW Hospital Lahore Project

No	Item	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
Personal Protective Equipment (A)				
1	Dust Masks	11,500	20	230,000
2	Safety Shoes	300	1500	450,000
3	Gloves	5,600	100	560,000
4	First Aid Box	4	5,000	20,000
5	Ear Plugs	500	100	50,000
6	Safety Helmets	300	1500	450,000
7	Safety Jackets (Hi Vis)	350	1000	350,000
Others (B)				

No	Item	Quantity	Unit Cost (Rs.)	Total Cost (Rs.)
8	Provision of Dust Bins	30	500	15,000
9	Warning Tape	70	500	35,000
10	Safety Cones	20	1000	20,000
11	Safety Sign Boards	40	2000	80,000
12	Raincoat	100	1000	100,000
13	Protecting Sheet to Fix around the Project Site	1500	3000	4500000
14	HSE Trainings	100	2000	200000
Total (A + B)				7060,000

- Time Required for Construction Period = 25 months (2.1 years)
- Number of Labor Required during peak Construction = 200
- Personal Protective Equipment PPEs
- Dust Mask: 1 Dust Mask to be used in a week by each labourer
- Safety Shoes: 1 Safety shoe for 1 year for each labourer
- Gloves 2 pairs of gloves for each labourer for each month
- First Aid Box 1 first aid box for every 50 labourer
- Ear Plug 1 set of the earplug to be used for 6 months for each labourer
- Safety Helmet 1 safety helmet for each labourer for 12 months
- Safety Jackets 2 safety Jackets (Hi-Vis) for each labourer for 12 months
- Dust Bin: Rough estimate
- Water Sprinkling the whole construction period
- Rain Cost: 1 Raincoat for each labourer

8.13 Traffic Management and Construction Material Transportation Plan

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

8.14 Emergency Preparedness, Response and Site Evacuation Plan

- The contractor will always be ready for response in any kind of emergency at the project site.
- Special assembly points will be established at the project site (offices and site).

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

8.15 Fire Fighting Plan

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

8.16 Plantation Plan

The Reconstruction of Lady Willingdon Hospital Lahore Project will ensure the provision of staff and budget for the implementation of the plantation plan and aesthetic value at Reconstruction of Lady Willingdon Hospital.

Table 8.4: Recommended Flowering Plants for Reconstruction of Lady Willingdon Hospital Lahore Project

No.	Scientific Name	Description
1	Meri gold	An evergreen flowering vine
2	Petunia	An evergreen flowering vine
3	Pansy	An evergreen flowering vine
4	Calendula	An evergreen flowering vine
5	Nausturcium	An evergreen flowering vine
6	Rose	Perennial flowering plant

8.17 Restoration and Rehabilitation Plan

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

Following measures will be adopted for site restoration and rehabilitation:

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

8.18 Proposed monitoring program to access performance or output of EMP

The Reconstruction of Lady Willingdon Hospital Lahore Project will make necessary arrangements to monitor the key environmental data during the construction and operational phases for the first three years after the operational phase. These will include the quantity of water used, a record of waste produced, a record of waste disposal, and project-related vehicular traffic.

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

8.19 Proposed EMP reporting and reviewing procedures

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

In order to respond to unanticipated environmental concerns at an early stage and to determine the accuracy of impact, predictions are also required. Specific monitoring

programs are outlined below as well as responsibilities for the collection and analysis of data and the reporting requirements.

The various purposes of the environmental monitoring plan are:

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

An Environmental Monitoring Plan for the Reconstruction of Lady Willingdon Hospital Lahore Project has been provided in Table 8.5. The plan will be used as a management and monitoring tool for the implementation of the mitigation measures required by the EIA. The plan entails the required mitigation measures recommended in the EIA.

Table 8.5: Environmental Monitoring Plan for Establishment of Reconstruction of TMLW Hospital Project

Environmental Component	Project Phase	Parameters	Locations	Frequency	Standards	Implementation	Supervision
Construction Phase							
Air Quality	Construction	SO ₂ , NO, NO ₂ , O ₃ , SPM, PM ₁₀ , PM _{2.5} , Pb and CO	At one location in Reconstruction of TMLWH at Project site	PM ₁₀ , for continuous 8 hours, on a quarterly basis	WHO/USEPA guidelines, PEQS	Civil Work Contractor	Infrastructure Development Authority (IDAP)
Noise Levels	Construction	dB (A)	At a central location in Reconstruction of TMLWH Project	Twice in 8 hours at a selected site on a weekly basis.	EPA Ambient Noise standards	Civil Work Contractor	Infrastructure Development Authority (IDAP)
Water Quality	Construction	Drinking Water Quality (28 parameters) including pH, BOD, COD, TDS, TSS, DO, coliforms, hardness, nitrate, chloride, sulphate, hydrocarbon etc.	From Drinking water consumption point at the Project site	Quarterly	WHO and PEQS	Civil Work Contractor	Infrastructure Development Authority (IDAP)
Operational Phase							
Solid Waste Management	Operational phase	Infectious hospital waste	Solid Waste Management facility	Daily	PEQS/Hospital Waste Management Rules -2014	Waste Management Team of TMLW Hospital Lahore	Management of TMLW Hospital Lahore

Key:

- dBA** = decibels (measured in the audible range)
- EPA** = Environmental Protection Authority
- PM₁₀** = Particulate Matter smaller than about 10 micrometres
- ROW** = Right-of-Way
- PEQS** = Punjab Environmental Quality Standards

SPM = Suspended Particulate Matter

TSS = Total Suspended Solids

USEPA = United States Environmental Protection Agency

WHO = World Health Organization

Table 8.6 shows the estimated cost for the EMP.

Table 8.6: Estimated Cost for the Implementation of Environmental Monitoring Plan for the establishment of Reconstruction of TMLW Hospital Lahore.

Environmental Monitoring Activities	Units/ No. of Samples	Unit Cost specification	Cost (Rs)
Construction phase			
Ambient air quality monitoring Quarterly basis for 24 months	7	@ 35,000 per sample for 24 hr monitoring	245,000
Ground water quality monitoring Quarterly basis on one location for 24 months	7	@ 18,000 per sample	126,000
Noise levels, quarterly basis for 24 months	7	@ 5,000 per sample	35,000
Environment , Health Safety Manager	24 months	@ 50,000	1,400,000
Total			1,806,000

8.20 Training needs required to ensure implementation of EMP and Monitoring plans

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

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

M/s Infrastructure Development Authority, Punjab will be primarily responsible for providing training to all project personnel. Lump-sum fees of Rs. 500,000/- should be kept for the training management plan. Framework for the environmental and social training program is being provided in Table 8.15.

Table 8.7: Framework for Environmental & Social Training Program of Establishment of Reconstruction of TMLWH Project

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

8.21 Schedule for Implementation and Environmental Budget

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

The summary of the cost of monitoring the environment and mitigation cost is shown in **Table 8.8**.

Table 8.8: Summary of Environmental Budget

Activity	Basis	Cost (Rs)
Environmental Monitoring Cost	Ambient Air, Noise and Water Quality Monitoring	1,80,6000
Plantation Plan	Implementation of plantation/Re-location plan (tentative) it will be finalized after the coloboration of Forest Department before the commencement of project.	50,00,000
Health and Safety of Workers	For 200 employees for the provision of dust masks, safety shoes, gloves, first aid box, ear plugs, safety helmets and safety jackets (Hi-Vis) and Provision of dustbins, warning tap, safety cones, safety signboards, water sprinkling and Dust proof Sheets.	70,60,000
Cost of Environmental Training	For the whole construction period	500,000
Grand Total		1,43,66,000

8.22 Reporting/Communication and Documentation

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

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

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

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

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

the meetings will be mitigated after discussions with the proponent site representatives.

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

8.23 Change Management Plan

The EIA for Reconstruction of Lady Willingdon Hospital Lahore Project recognizes that changes in the EMP may be required and therefore provides a Change Management Plan to manage such changes.

The overall responsibility for the preparation of change management statements will lay with the project Manager, Reconstruction of Lady Willingdon Hospital Lahore Project. However, if major changes are envisaged, then the environmental consultant will review the entire process and formulate the Change Management Plan to be implemented by the Project Manager, Reconstruction of Lady Willingdon Hospital Lahore Project.

8.24 Post Project Monitoring

The Reconstruction of TMLW Hospital Lahore or the representative shall prepare a brief post-project report describing the conduct of the actual operation, any changes from the operation for which approval was obtained, the degree to which the recommendations of the EIA were adhered to, any damages to the environment and the mitigation or compensation provided, and monitoring information of scientific or environmental interest that is not propriety in nature. This report should be submitted to the Environmental Protection Department, Government of Punjab.

9 Conclusion and Recommendations

9.1 Introduction

This chapter presents the assessment of the possible environmental impacts of the establishment of the Reconstruction of TMLWH Project. The study presents the purpose of the EIA as to the description of the site, the impact of the project during and after implementation, the mitigation measures, and residual impacts.

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

9.2 Conclusions

The major conclusions of the EIA are:

The Government of the Punjab, Primary and Secondary Healthcare Department, intends to construct Reconstruction of Lady Willingdon Hospital Lahore Project in Lahore. The project has been initiated by the commitment of the government of Punjab to provide infrastructure for the speedy provision of general healthcare facilities. The project will help reduce and manage an enormous load of patient influx on the existing facilities. The project will accommodate the existing facility's patient load by adding state-of-the-art facilities for the public. The Hospital may better cater for patient load through efficient use of space & equipment while meeting medical standards of hygiene & technology. The project will encourage medical and healthcare human resources advancements by promoting medical research, training, and education. The project is located in Lahore along Ravi Road and Lahore Fort Road.

- The Reconstruction of TMLWH will comprise a bed strength of 230 beds with a total plot area of approximately 280000 sq. ft. The total approximate covered area is 250,000 sq. ft. consisting on ground floor covered area 50,695 sft, basement 54,948 sft first floor covered area 49,745 sq. ft., second floor covered area 45,499 sft, third floor covered area 46,813 sft and roof plan covered area 2,300 sft is.
- Other necessary services include clinical pathology, laboratory, radiology, pharmacy, CSSD, kitchen, Café, laundry, and blood bank are also included in the plan to ensure prompt delivery of respective services round the clock without interruption.
- The estimated cost of the project is Rs. **8,927.72** million and will be completed in 24 months.
- The potential impacts during the construction phase include loss of flora (shrubs and grass only because the 88 trees will be Re-Located as per the TPP), soil erosion and contamination, water contamination, deterioration of ambient air quality caused by the construction activities.
- The significant environmental management issues during the operational phase include sewage (Waste Water) disposal, Hospital Waste disposal and solid waste disposal.
- The project construction and operational activities can potentially affect the people living in the vicinity of the project site. These adverse impacts can be largely reduced by implementing the appropriate mitigation measures, which has been discussed in this report.

- The mitigation measures have been identified for impacts expected during the different phases of the project.

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

9.3 Recommendations

- Specialized Healthcare & Medical Education Department, Govt. of The Punjab should properly implement the sewerage treatment plant for the Reconstruction of Lady Willingdon Hospital Lahore Project.
- Specialized Healthcare & Medical Education Department, Govt. of The Punjab should properly design and implement a solid waste management plan for the Reconstruction of Lady Willingdon Hospital Lahore Project.

On the basis of the overall impact assessment, more specifically, the nature and magnitude of the residual environmental impacts identified during the present EIA, it is concluded that the Reconstruction of Lady Willingdon Hospital Lahore Project is likely to cause environmental impacts during its construction and operational phase. However, these impacts can be mitigated by the implementation of proposed mitigation measures. M/s Infrastructure Development Authority, Punjab will ensure the effective implementation of mitigation measures during the construction phase, and the management of the Lady Willingdon Hospital Lahore (under Specialized Healthcare & Medical Education Department, Govt. of The Punjab) will ensure the implementation of mitigation measures during the operational phase.

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

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

Name	Project Position	Qualification and Experience	Tasks Assigned
Engr. Umer Umair	Environmental	Engr. Muhammad Umer Umair MSc. Chemical Engineering Environmental and HSE Manager in ADB and World Bank Funded Projects	▪ Suggest mitigation measures for impacts that affect the environment. ▪ Identification of site for baseline data collection for water, wastewater, noise, soil, traffic and ambient air quality. ▪ To prepare a draft and final EIA reports. ▪ To give public hearing and respond to comments

Annexure-2: Terms of Reference

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

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

Annexure-3: References

- Astha Kumari et al., Current Developments in Biotechnology and Bioengineering, Hospital wastewater treatment scenario around the globe 2020;68: 549–570
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Annexure-4: Glossary

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

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

Annexure-5: List of People Met During EIA

No.		Name of Person/Team	Designation
1	Stakeholders	Ms. Zill-e-Huma Faizi	Manager Environment and Public Health– Infrastructure Development Authority Punjab (IDAP)
2		Structure Design and Public Health Team	Infrastructure Development Authority Punjab (IDAP)
		Mr. Ali Raza	Assistant Manager Structure
		Mr. Kamran Munir	Manager Structure
		Mr. Rohail	Assistant Manager Public Health
		Mr. Azam Minhas	Manager Public Health
		Mr. Zaheer Ahmad	Assistant Manager
3		Dr. Saeed Ahmad Khan	Medical Superintendent TMLW Hospital, Lahore

Community Respondents

No.	Name	Age	Gender	Education	Designation
1	Mr. Zohaib Ali	25	Male	Graduate	Private Job Shop keeper
8	Mr. Khadim	28	Male	Graduate	Private Job Shop keeper
9	Mr. Adnan Huzoor Bakhsh	40	Male	Matric	Patient
10	Mr. Akram	21	Male	Matic	Patient (visiter at hospital TMLW)
11	Mr. Masood	20	Male	Middle	Patient (visiter at hospital TMLW)
12	Mr. Shakeel	22	Male	Illiterate	Laborer
13	Mr. Arshad	21	Male	Middle	Laborer
14	Mr. Aqib Hussain	23	Male	Primary	Laborer
15	Mr. Bilal Hussain	24	Male	Intermediate	Private Job
16	Mr. Ismail	18	Male	Intermediate	Student
17	Mrs. Asif	25	Female	Middle	House wife (visiter at hospital TMLW)
18	Mr. Muhammad Bakhsh	52	Male	Intermediate	Private Business (Shop keeper)
19	Mrs. Afzal	24	Female	Matric	House wife (visiter at hospital TMLW)
20	Mrs. Aslam	34	Female	Inter	Patient House wife (visiter at hospital TMLW)

No.	Name	Age	Gender	Education	Designation
21	Mr. Sarfaraz Ahmed	57	Male	Middle	Private Job
22	Mr. Yasin	44	Male	Matric	Private Job
23	Miss. Ayesha	23	Female	Graduate	Medical Student
24	Miss. Tabassum	24	Female	Graduate	Medical Student
25	Miss. Zubaria	24	Female	Graduate	Medical Student
26	Miss. Saima Ali	23	Female	Graduate	Medical Student
27	Mr. Sarwar	35	Male	Primary	Laborer
28	Mr. Khadim Hussain	75	Male	Illiterate	Laborer
29	Mr. Wahid Bakhsh	27	Male	Graduate	Private Job

Annexure-6: Validation Certificate & Groundwater Quality Reports for Drinking (Filtration Plant) and Tap Water samples



ENVIRONMENTAL PROTECTION AGENCY
GOVERNMENT OF THE PUNJAB
National Hockey Stadium, Gate No. 08
Gaddafi Stadium Complex, Lahore

Validation # 518-D

Validation for Wastewater & Drinking Water



Facility /Project Name & Address	<i>Lady Willingdon Hospital</i> <i>Ravi Road, Walled City of Lahore, Lahore.</i>		Sampling Point	<i>Tap</i>		
Phone						
Waste Water (WW) Treatment Facility			Drinking Water (W) Treatment Facility			
Primary Secondary Tertiary NA			Primary Secondary Tertiary NA			
Total WW collected Sample			Total Collected Drinking water samples.....			
Sample Tag for testing parameter is assigned on sample container			Yes NO NA			
Sample is preserved properly for each testing parameter			Yes NO NA			
Sample size is adequate for testing the target parameters			Yes NO NA			
Wastewater Flow Measurement performed to ensure sample representativeness			Yes NO NA			
No. of Waste Water outlets	Waste Water Flow m ³ /hr from each outlet (Optional)	Water Intake m ³ /hr (Optional)	Water Mass balance complied during sampling (Optional)	Sample Type		
				<i>Drinking Water</i>		
Parameter		Matrix	Container	Sample Size	Preservation	
		W WW			Grab Composite	
					Yes NO NA	
Coliform, Total or Fecal		✓	Sterile Container	100 mL	Refrigerate 6 C	✓
Coliform, Total or Fecal, Chlorinated Water			Sterile Container	100 mL	0.008% Thiosulphate & cooled 6 C	
Color, Turbidity		✓	P.G	500 mL	Cool 6 C	
Oil & Grease, COD, NH ₃						
Metals, General		✓	P.G Rinsed I.I HNO ₃	500 mL	HNO ₃ to pH < 2	
Cyanide, Total			P.G	500 mL	NaOH to pH > 12, Cool 6C	
Pesticides, General			Glass	1 Liter	Cool 6 C	
Field Parameters*						
Field parameter		pH meter, Model Make		Measurement Method	Calibrated in Field	Measured value
pH				ADHA	Yes NO	7.25
Temp				ADHA	Yes	21.1°C
Cl				ADHA	Yes	0.3

* Field testing parameters only be validated by RAs, ROs, DD (Labs)

Remarks for Sample Quality (if Any):-

Signature

Name of EPA Officer with office Address

Inspectors /RAs / ROs or ADs /DDs

Research Officer
Environment Protection Agency
Punjab Lahore

Dated

07-10-2023

Signature

Saad Malik

Name of Assistant /Deputy Analyst, Analy:

with Name of Private Lab along with Address:





SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



DRINKING WATER ANALYSIS REPORT

Client Name: Lady Willingdon Hospital Site Location: Ravi Road, Walled City, Lahore
 Sampling Point: Filtration Plant Nature of Sample: Drinking Water
 Sampling Date: 07-10-2023 Date of Completion: 11-10-2023
 Sampling By: SEAL Temp. & Humidity: 23-27 C° & 50-70 %
 Results: - Reference No.: SEAL/Lab/2023/DW/254

Sr. No.	Parameter	Method	Unit	Result	PEQS
1	pH	APHA 4500-H ⁺ B	--	7.46	6.5-8.5
2	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	180	1000
3	Chloride	4500-APHA Cl ⁻ B	mg/l	133.01	250
4	Fluoride	APHA 4500-F D	mg/l	0.19	1.5
5	Taste	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
6	Odour	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
7	Colour	APHA 2120 B	TCU	0.79	15
8	Nitrate (as NO ₃ ⁻)	APHA 4500-NO ₃ ⁻ E	mg/l	2.0	50
9	Nitrite (as NO ₂ ⁻)	APHA 4500-NO ₂ ⁻ B	mg/l	0.32	3
10	Lead	APHA-Pb B	mg/l	BDL	0.05
11	Total Hardness as CaCO ₃	APHA 2340 C	mg/l	59.73	500
12	Turbidity	APHA 2130 B	NTU	BDL	5
13	Zinc	APHA 3500-Zn B	mg/l	0.05	5
14	Aluminum	APHA 3111 D	mg/l	BDL	0.2
15	Chromium	APHA 3500-Cr B	mg/l	0.011	0.050
16	Cadmium	APHA 3500-Cd D	mg/l	BDL	0.01
17	Copper	APHA 3500-Cu C	mg/l	BDL	2
18	Boron	APHA 4500-B C	mg/l	0.014	0.300
19	Barium	APHA 3111 B	mg/l	0.021	0.700

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 Shahr-e-Faisal, Karachi, Pakistan. Phone : 92-300-9768799
 Email : karachi@seal.com.pk



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



Client Name: Lady Willingdon Hospital
 Site Location: Ravi Road, Walled City, Lahore
 Sampling Point: Filtration Plant
 Nature of Sample: Drinking Water
 Sampling Date: 07-10-2023
 Date of Completion: 11-10-2023
 Temp. & Humidity: 23-27 C° & 50-70 %
 Reference No.: SEAL/Lab/2023/DW/254

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C	mg/l	0.002	0.020
21	Arsenic	APHA 3114 C	mg/l	0.012	0.050
22	Cyanide	APHA 4500-CN D	mg/l	0.01	0.05
23	Mercury	APHA 3112	mg/l	BDL	0.001
24	Nickel	APHA 3111 B	mg/l	BDL	0.020
25	Residual Chlorine	APHA 4500-Cl ₂	mg/l	0.33	0.2 - 0.5
26	Total Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
27	Thermo Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
28	E. coli	APHA 9222 C	Number/100ml	0	0/100 ml

PEQS = Punjab Environmental Quality Standards
 BDL (Below Detection Limit)

APHA = American Public Health Association

Note:

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- The left-over samples (if so available) shall be retained for 10 days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



GROUND WATER ANALYSIS REPORT

Client Name: Lady Willingdon Hospital
 Site Location: Ravi Road, Walled City, Lahore
 Sampling Point: Tap Water
 Nature of Sample: Ground Water
 Sampling Date: 03-11-2023
 Date of Completion: 06-11-2023
 Temp. & Humidity: 23-27 C^o & 50-70 %
 Sampling By: SEAL
 Reference No.: SEAL/Lab/2023/GW/518
 Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
1	pH	APHA 4500-H ⁺ B	--	7.28	6.5-8.5
2	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	189	1000
3	Chloride	4500. APHA Cl ⁻ B	mg/l	11.007	250
4	Fluoride	APHA 4500-F ⁻ D	mg/l	0.2	1.5
5	Taste	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
6	Odour	APHA 2120 B	Object. /unobj.	Unobject.	Unobject.
7	Colour	APHA 2120 B	TCU	0.79	15
8	Nitrate (as NO ₃ ⁻)	APHA 4500-NO ₃ ⁻ E	mg/l	0.5	50
9	Nitrite (as NO ₂ ⁻)	APHA 4500-NO ₂ ⁻ B	mg/l	0.02	3
10	Lead	APHA-Pb B	mg/l	BDL	0.05
11	Total Hardness as CaCO ₃	APHA 2340 C	mg/l	59.73	500
12	Turbidity	APHA 2130 B	NTU	1.0	5
13	Zinc	APHA 3500-Zn B	mg/l	0.03	5
14	Aluminum	APHA 3111 D	mg/l	BDL	0.2
15	Chromium	APHA 3500-Cr B	mg/l	0.011	0.050
16	Cadmium	APHA 3500-Cd D	mg/l	BDL	0.01
17	Copper	APHA 3500-Cu C	mg/l	0.5974	2
18	Boron	APHA 4500-B C	mg/l	0.08	0.300
19	Barium	APHA 3111 B	mg/l	0.021	0.700

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 Email : karachi@seal.com.pk



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



Client Name: Lady Willingdon Hospital
 Sampling Point: Tap Water
 Sampling Date: 03-11-2023
 Sampling By: SEAL

Site Location: Ravi Road, Walled City, Lahore
 Nature of Sample: Ground Water
 Date of Completion: 06-11-2023
 Temp. & Humidity: 23-27 C° & 50-70 %
 Reference No.: SEAL/Lab/2023/GW/518

Results: -

Sr. No.	Parameter	Method	Unit	Result	PEQS
20	Antimony	APHA 3114 C	mg/l	0.002	0.020
21	Arsenic	APHA 3114 C	mg/l	0.012	0.050
22	Cyanide	APHA 4500-CN D	mg/l	0.01	0.05
23	Mercury	APHA 3112	mg/l	BDL	0.001
24	Nickel	APHA 3111 B	mg/l	BDL	0.020
25	Residual Chlorine	APHA 4500-Cl ₂	mg/l	0.33	0.2 - 0.5
26	Total Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
27	Thermo Coliform	APHA 9222 B	Number/100ml	0	0/100 ml
28	E. coli	APHA 9222 C	Number/100ml	0	0/100 ml

PEQS = Punjab Environmental Quality Standards

BDL (Below Detection Limit)

APHA = American Public Health Association

Note:

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- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager

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Annexure-7: Waste Water Analyses Report



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



WASTEWATER ANALYSIS REPORT

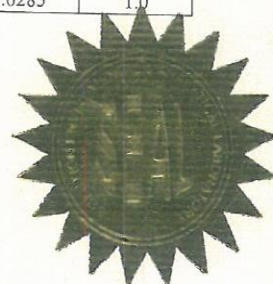
Client Name: Lady Willingdon Hospital
 Sampling Point: Outlet
 Receiving Date: 03-11-2023
 Sampling By: SEAL

Site Location: Ravi Road, Walled City, Lahore
 Nature of Sample: Wastewater
 Completion Date: 14-11-2023
 Temp. & Humidity: 23-27 C° & 50-70 %
 Reference No.: SEAL/LAB/2023/WW/517

Results:-

Sr. No.	Parameters	Method	Parameter	Result	PEQS
1	Temperature	APHA 2550 B	°C	25.5	≤3°
2	pH	APHA 4500-H+ B	---	7.61	6-9
3	Chemical Oxygen Demand (COD)	APHA 5220 D	mg/l	139	150
4	Biochemical Oxygen Demand (BOD ₅)	APHA 5210 D	mg/l	70	80
5	Total Dissolved Solids (TDS)	APHA 2540 C	mg/l	805	3500
6	Total Suspended Solids (TSS)	APHA 2540 D	mg/l	41.33	200
7	Oil & Grease	APHA 5520 B	mg/l	4.5	10
8	Chromium (Hexa & Trivalent)	APHA 3500-Cr B	mg/l	BDL	1.0
9	Sulphate (SO ₄ ²⁻)	APHA 4500-SO ₄ ²⁻ C	mg/l	273.5082	600
10	Iron (Fe ²⁺)	APHA 3111 B	mg/l	1.154	8
11	Chlorine (Cl ₂) Free	APHA 4500-Cl ₂ G	mg/l	0.38	1.0
12	Fluoride (F ⁻)	APHA 4500-F D	mg/l	BDL	10
13	Chloride	APHA 4500-Cl ⁻ B	mg/l	88.05	1000
14	Ammonia (NH ₃)	APHA 4500-NH ₃ C	mg/l	23.2	40
15	Cadmium	APHA 3500-Cd D	mg/l	BDL	0.1
16	Lead	APHA-Pb B	mg/l	0.02	0.5
17	Arsenic	APHA 3114 C	mg/l	0.05	1.0
18	Phenolic Compounds	APHA 5530 D	mg/l	0.01	0.1
19	Copper	APHA 3500-Cu C	mg/l	0.6285	1.0

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 Email : karachi@seal.com.pk



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



Client Name: Lady Willingdon
Hospital
Outlet

Site Location: Ravi Road, Walled City, Lahore

Sampling
Point:

Nature of Sample: Wastewater

Receiving Date: 03-11-2023

Completion Date: 14-11-2023

Temp. & Humidity: 23-27 C° & 50-70 %

Sampling By: SEAL

Reference No.: SEAL/LAB/2023/WW/517

Results:-

Sr. No.	Parameters	Method	Parameter	Result	PEQS
20	Barium	APHA 3111 B	mg/l	0.33	1.5
21	Silver	APHA 3111 B	mg/l	BDL	1.0
22	Zinc	APHA 3500-Zn B	mg/l	0.22	5.0
23	Nickel	APHA 3111 B	mg/l	BDL	1.0
24	Boron	APHA 4500-B C	mg/l	0.15	6.0
25	Mercury	APHA 3112 B	mg/l	BDL	0.01
26	Sulphide (S ²⁻)	APHA 4500-S ²⁻ F	mg/l	0.37	1.0
27	Total Toxic Metals	---	mg/l	0.54	2.0
28	Cyanide	APHA 4500-CN D	mg/l	0.007	1.0

PEQS = Punjab Environmental Quality Standards

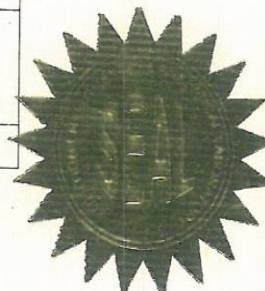
BDL (Below Detection Limit)

APHA = American Public Health Association

Note:

- Standard Method for the Examination of Water & Wastewater, 23rd Edition, 2017
- This report should be reproduced as a whole and not in parts.
- The responsibility of the ethical use of the results reported in this report lies with the client.
- Consequently, the laboratory is absolved of its responsibility for any claim that may result through the use by the client or others of the results appearing in this report.
- The left-over samples (if so available) shall be retained for 15 days after the issuance of the report unless otherwise negotiated between the client and the laboratory.
- The report is not valid for any negotiations.
- Total Toxic Metals (Cadmium, Lead, Mercury, Arsenic, Chromium, Copper, Nickel, Cobalt, Zinc and Barium).

ANALYZED BY	REVIEWED BY	APPROVED BY
<i>for</i> <i>Ar.</i>	<i>Quarrell</i>	<i>Arhad</i>
Lab Analyst	Assistant Lab Manager	Lab Manager



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Annexure-8: Ambient Air and Noise Monitoring Reports



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY

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AMBIENT AIR MONITORING REPORT

Client Name: Lady Willingdon Hospital

Monitoring Point: Mid of Project

Starting Date: 07-10-2023

Monitoring By: SEAL

Site Location: Ravi Road, Walled City, Lahore

Monitoring Time: 24 Hour

Reporting Date: 11-10-2023

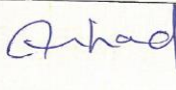
Reference No.: SEAL/Lab/2023/AA/001

Results: -

Sr. No.	Parameter	Method	Unit	Results	PEQS
1	Particulate Matter (PM ₁₀)	40 CFR Part 50, App J (US-EPA)	µg/m ³	92.1	150
2	Particulate Matter (PM _{2.5})	40 CFR Part 50, App J (US-EPA)	µg/m ³	28.0	35
3	Carbon monoxide (CO)	40 CFR Part 50, App. C (US-EPA)	mg/m ³	3.0	5
4	Oxides of Nitrogen NO _x (NO & NO ₂)	40 CFR Part 50, App F (US-EPA)	µg/m ³	42.05	120
5	Sulphur dioxide SO _x (SO ₂)	EQSA-0197-114 (US-EPA)	µg/m ³	50.72	120

Note: PEQS: Punjab Environmental Quality Standards

- Quality was assured through self-calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.

ANALYZED BY	REVIEWED BY	APPROVED BY
		
Lab Analyst	Assistant Lab Manager	Lab Manager



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Email : karachi@seal.com.pk



SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



NOISE LEVEL MONITORING REPORT

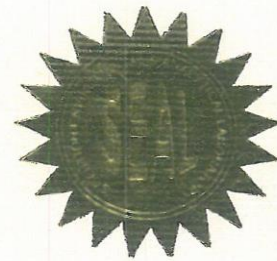
Client Name: Lady Willingdon Hospital
 Monitoring Point: Mid of Site
 Monitoring Date: 07-10-2023
 Monitoring By: Solution Environmental & Analytical Laboratory

Site Location: Ravi Road, Walled City, Lahore
 Reporting Date: 11-10-2023
 Reference No.: SEAL/LAB/2023/AA/001

Results: -

Sr. No.	Time	Noise dB(A)		PEQS
1	09:00 PM	64.2	Day Time	65
2	10:00 PM	62.4		
3	11:00 PM	56.5		
4	12:00 AM	54.6	Night Time	55
5	01:00 AM	52.5		
6	02:00 AM	55.4		
7	03:00 AM	52.1		
8	04:00 AM	52.4		
9	05:00 AM	54.6		
10	06:00 AM	55.2	Day Time	65
11	07:00 AM	58.4		
12	08:00 AM	57.2		
13	09:00 AM	60.2		

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SOLUTION ENVIRONMENTAL & ANALYTICAL LABORATORY



14	02:00 AM	54.8	Night Time	65
15	03:00 AM	52.6		
16	04:00 AM	49.4		
17	05:00 AM	48.8		
18	06:00 AM	46.5		
19	07:00 AM	49.4	Day Time	75
20	08:00 AM	52.2		
21	09:00 AM	48.7		
22	10:00 AM	56.5		
23	11:00 AM	62.6		
24	12:00 PM	63.8		
Average Noise Level		54.5 dB(A)		

NEQS: National Environmental Quality Standards

Note:

- The average noise levels describe the overall ambient noise levels of the points.
- Selected measurement units were dB (A) otherwise stated.
- Quality was assured through self calibration of the instrument.
- The measurements were carried out on client request.
- The client is responsible lawful usage of reported data in future.
- The report is not valid for any negotiation.

ANALYZED BY	REVIEWED BY	APPROVED BY
Lab Analyst	Assistant Lab Manager	Lab Manager



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